OMRON

# Industrial Automation Guide 2015

Industrial Products & Systems

industrial.omron.eu

# Targeted Technologies

## Creating maximum output with minimum input

By identifying the many ways of innovation in specific industries we developed the 'targeted technologies' concept. It's a way of thinking about technology in a prioritized format. Prioritized according to our customers' most pressing needs. The result? A set of solutions that make immediate impact on the core of our customers' businesses. A set of solutions that hit the target every time. Take a look at the examples on our website.
industrial.omron.eu/technologies


PROplus Line
The 361° Approach
OMRON
Technologies
Creating maximum output with minimum input
Sysmac: the all-in-one platform
361°: the perfect match
The 361° portfolio
Related product news
Related product news
Related product news
Product groups

# Welcome to our world

## Our best-in-class devices for your automation system

Welcome to Omron's world of advanced industrial automation. The INDUSTRIAL AUTOMATION GUIDE is your essential tool to select best-in-class devices for your automation system. It highlights our core competences in sensing, control, visualisation, motion and panel components.

Of course, Omron offers a much larger range of products than you can find on the attached DVD's. For more information on services and company competence visit our website.

Here you will find:

- Latest product news
- Technical product specifications
- 2D / 3D CAD Library
- Customer references
- Technology concepts
- Supporting product documentation
- Knowledge Base - "myOmron"
- Events Calendar
- Contact information

## Find information fast!

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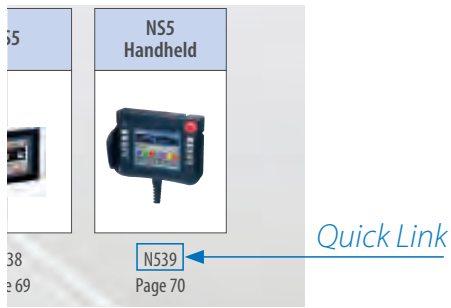


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# Industrial Automation Guide 2015

"To the machine the work of the machine,
to man the thrill of further creation."

Kazuma Tateisi, founder of Omron

# Omron at a glance

Listed in Top 2000 largest companies of the globe
Omron Corporation NASDAQ: OMRNY
Top ranking in Dow Jones Sustainability Index
Thomson Reuters Top 100 Global Innovators

## 200.000 products ranging input, logic and output

Sensing, Control Systems, Visualization, Drives, Robots, Safety, Quality Control & Inspection, Control and Switching Components

## 7%

Investment in Research & Development

## Innovation track record of 80 years

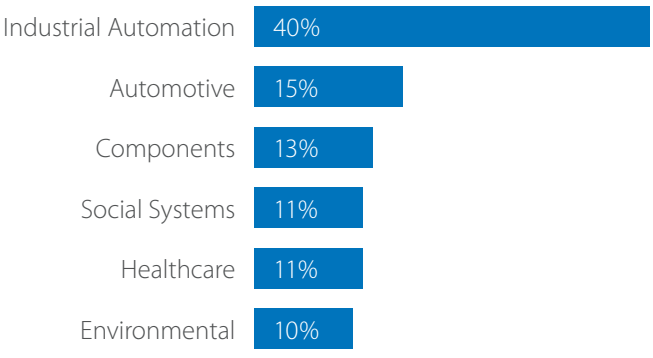
Top 150 global patent assignee
1.200 employees dedicated to R&D
11.000 + issued and pending patents

## 36.500
Employees worldwide

## 210
Locations worldwide

## 22
Countries in EMEA

## Working for the benefit of society




## Sysmac Automation Platform

- One control for the entire machine or production cell
- Harmony between machine and people
- Open communication and open programming standards

SYSMAC
always in control

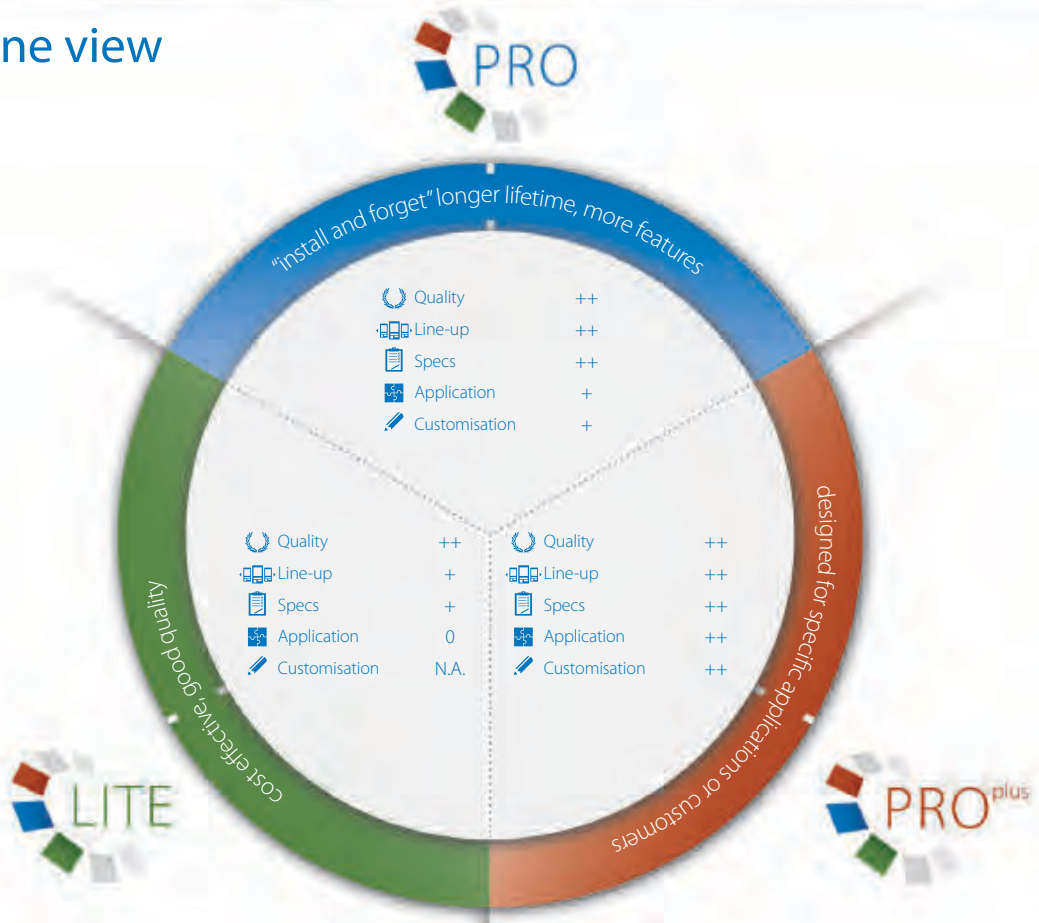
# Your needs, our focus

## Solutions perfectly matching your needs

We asked ourselves: 'What do you need in sensors and components?' Well, first you need reliability. Then a variety and choice of performance levels. You may also want advanced functionality, with special features defined by you – or you may want standardized solutions, with highly competitive prices.

Whatever it is, it can all add up to a wish list that is difficult to fulfil. Until now. That's because our new 361° Approach not only provides a complete all-round offer without gaps, it also puts you at the very centre of the product selection process. It's an approach that leads to a Perfect Match – one with the extra degree of confidence that comes from choosing Omron.

## 361° in one view




### Three distinct lines

361° Approach offers three distinct lines within each sensor or component product category. LITE products are cost-effective without any compromise in quality. PRO products represent the "install & forget" option, offering longer lifetime, higher protection, and more features. While PRO$^{plus}$ products are designed for specific applications or customer demands.

# The extra degree of advantage

## Three distinct lines of sensors and components

### Optimized reliability

All three lines are backed by the Omron commitment to quality, so even when you need a price-competitive advantage, you can be confident that they will never let you down.

### Solutions that perfectly match your needs

The 361° Approach ensures that you can quickly and easily identify the perfect match solution to your needs – nothing more, nothing less.

### Optimized costs

Your sensor and component costs are also minimized – because it eliminates over-specification.

### Why an extra 1°?

The extra degree is what you get when you do business with Omron, and that means different things to different customers – all depending on their needs. For example, if you need specification advice, the extra degree is 'service'. But ultimately, to everyone it means "an extra degree of confidence in the perfect match".


'Quality' refers to the standard of manufacturing and the materials used – this translates into reliability.

'Line-up' refers to the number of model types.

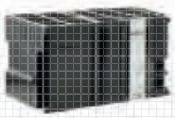
'Specs' refers to the choice of performance levels.

'Application' indicates the complexity of the automation.

'Customization' is the possibility to modify the product.

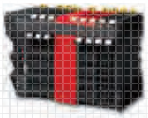
# Product selection table

## Automation systems



10 Machine automation controller

16 Programmable logic controllers (PLC)



44 Remote I/O

58 Human machine interfaces (HMI)

## Motion & Drives

86 Motion controllers

102 Servo systems

150 Frequency inverters

## Sensing

172 Photoelectric sensors

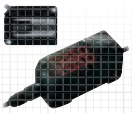
214 Mark and color sensors

222 Lightcurtains and area sensors

230 Fiber optic sensors and amplifiers

## Quality control & Inspection

310 Inspection & Ident systems



366 Measurement sensors

## Safety

402 Control- and Signalling devices

426 Safety limit switches

434 Safety door switches

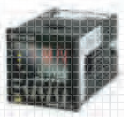
462 Safety sensors

## Control components

512 Temperature controllers

538 Power supplies

554 Timers



564 Counters

## Switching components

594 Electromechanical relays

608 Solid state relays

618 Low voltage switchgear

634 Monitoring products

## Software

674 Software

# Automation systems

## Find information fast!

Quick Links shortens your search. Quick Links are unique codes assigned to Omron products listed in this guide. Enter Quick Link codes in the search box on industrial.omron.eu to access detailed information on products in this guide.

Content

# Automation systems

## Machine automation controller



## Programmable logic controllers (PLC)



## Remote I/O



## Human machine interfaces (HMI)



## Cables and accessories

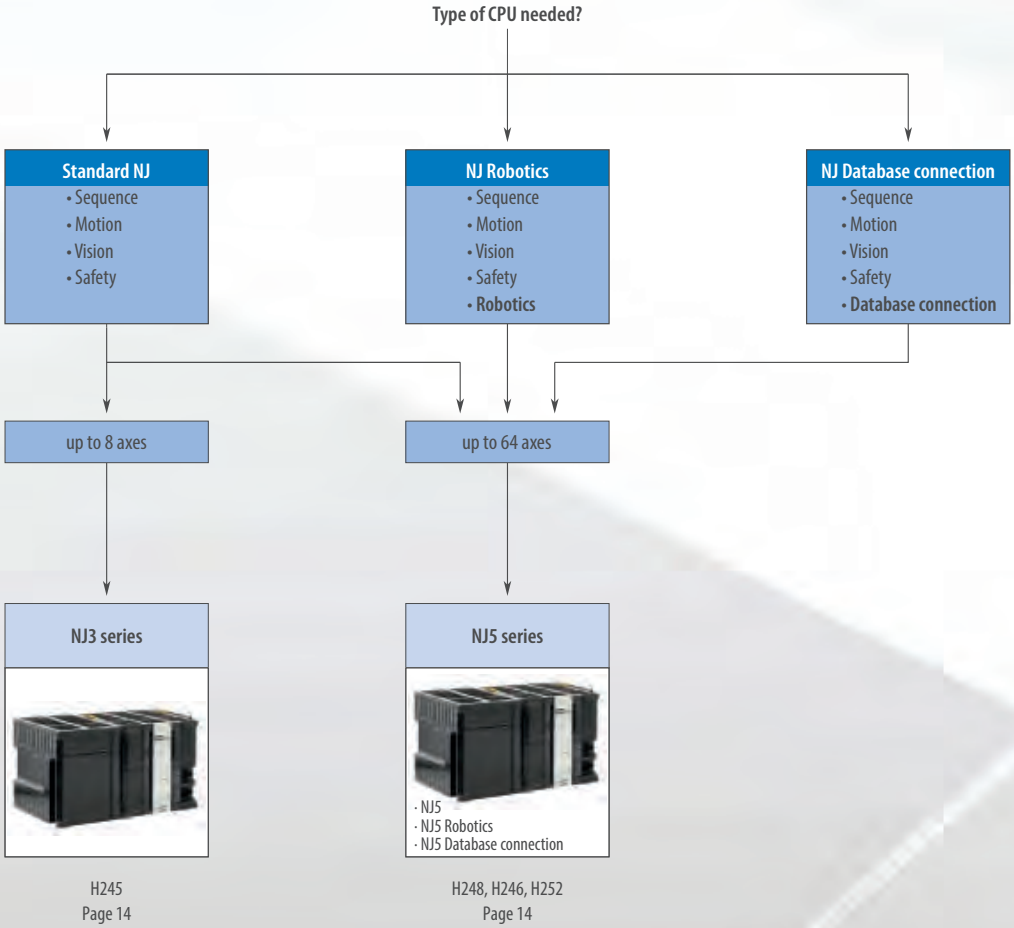
# NJ-SERIES MACHINE AUTOMATION CONTROLLER

## Complete and robust machine automation

The NJ-Series Machine A utomation Controller is at the heart of the new Sysmac platform. One in tegrated machine controller that o ffers speed, f lexibility and s calability of software centric architecture without compromising on the traditional reliability and robustness that you have come to expect from Omron PLCs. The NJ-Series is de signed to meet extreme machine control requirements in terms of motion control speed and ac curacy, communication, security and robust system. You just create…

- Integration of logic and motion in one Intel CPU
- Scalable control: CPUs for 4, 8, 16, 32 and 64 axes
- EtherCAT and EtherNet/IP ports embedded
- Fully conforms to IEC 61131-3 standards
- Certified PLCopen function blocks for motion control
- Linear, circular and spiral (helical) interpolation
- CPU units with SQL client and robotic functionality


sysmac
always in control




H245
Page 14

H248, H246, H252
Page 14

| | Machine automation controller | | | |
|---|---|---|---|---|
| |  | | | |
| **Model** | **NJ5** | **NJ5 Robotics** | **NJ5 with Database connection** | **NJ3** |
| **Description** | NJ5 series Machine Controller with Sequence and Motion functionality | NJ5 series Machine Controller with Sequence, Motion and Robotics functionality | NJ5 series Machine Controller with Sequence, Motion and Database connection functionality | NJ3 series Machine Controller with Sequence and Motion functionality |
| **Task** | Multi-tasking program | | | |
| **Software** | Sysmac Studio | | | |
| **Programming** | • Ladder<br>• Structured Text<br>• In-Line ST | | | |
| **Standard programming** | • IEC 61131-3<br>• PLCopen Function Blocks for Motion Control | | | |
| **Program capacity** | 20 MB | | | 5 MB |
| **SD Memory Card** | SD and SDHC Memory card | | | |
| **Built-in port** | • EtherNet/IP<br>• EtherCAT<br>• USB 2.0 | | | |
| **EtherCAT slaves** | 192 | | | |
| **Number of axes** | 64, 32, 16 | | | 8, 4 |
| **Servo Drive** | Accurax G5/EtherCAT | | | |
| **Motion Control** | • Axes groups interpolation and single axis moves<br>• Electronic cams and gearboxes<br>• Direct position control for axis and group | • Axes groups interpolation and single axis moves<br>• Electronic cams and gearboxes<br>• Direct position control for axis and group<br>• Up to 8 Delta Robot control | • Axes groups interpolation and single axis moves<br>• Electronic cams and gearboxes<br>• Direct position control for axis and group | |

| **Local I/O** (Compatible CJ series units) | **Digital I/O units** | | **Analog I/O units** | **Special I/O units** | **Communication units** | **ID sensor units** |
|---|---|---|---|---|---|---|
| | CJ1W-IA201 | CJ1W-OD213 | CJ1W-AD04U | CJ1W-CT021 | CJ1W-SCU22 | CJ1W-V680C11 |
| | CJ1W-IA111 | CJ1W-OD231 | CJ1W-AD04U(SL) | CJ1W-CTL41-E | CJ1W-SCU32 | CJ1W-V680C12 |
| | CJ1W-ID201 | CJ1W-OD233 | CJ1W-AD041-V1 | | CJ1W-SCU42 | |
| | CJ1W-ID211 | CJ1W-OD234 | CJ1W-AD041-V1(SL) | | CJ1W-EIP21 | |
| | CJ1W-ID211(SL) | CJ1W-OD261 | CJ1W-AD042 | | CJ1W-DRM21 | |
| | CJ1W-ID212 | CJ1W-OD263 | CJ1W-AD081-V1 | | CJ1W-CRM21 | |
| | CJ1W-INT01 | CJ1W-OD202 | CJ1W-AD081-V1(SL) | | CJ1W-PRM21 | |
| | CJ1W-IDP01 | CJ1W-OD204 | CJ1W-DA021 | | CJ1W-PRT21 | |
| | CJ1W-ID231 | CJ1W-OD212 | CJ1W-DA021(SL) | | CJ1W-PNT21 | |
| | CJ1W-ID232 | CJ1W-OD212(SL) | CJ1W-DA041 | | CJ1W-CIF11 | |
| | CJ1W-ID233 | CJ1W-OD232 | CJ1W-DA041(SL) | | | |
| | CJ1W-ID261 | CJ1W-OD262 | CJ1W-DA042V | | | |
| | CJ1W-ID262 | CJ1W-MD232 | CJ1W-DA08V | | | |
| | CJ1W-OA201 | CJ1W-MD231 | CJ1W-DA08V(SL) | | | |
| | CJ1W-OC201 | CJ1W-MD233 | CJ1W-DA08C | | | |
| | CJ1W-OC201(SL) | CJ1W-MD261 | CJ1W-DA08C(SL) | | | |
| | CJ1W-OC211 | CJ1W-MD263 | CJ1W-MAD42 | | | |
| | CJ1W-OC211(SL) | CJ1W-MD563 | CJ1W-MAD42(SL) | | | |
| | CJ1W-OD201 | | CJ1W-PH41U | | | |
| | CJ1W-OD203 | | CJ1W-PDC15 | | | |
| | CJ1W-OD211 | | CJ1W-TS561 | | | |
| | CJ1W-OD211(SL) | | CJ1W-TS561(SL) | | | |
| | | | CJ1W-TS562 | | | |
| | | | CJ1W-TS562(SL) | | | |
| | | | CJ1W-TC003 | | | |
| | | | CJ1W-TC004 | | | |
| | | | CJ1W-TC103 | | | |
| | | | CJ1W-TC104 | | | |

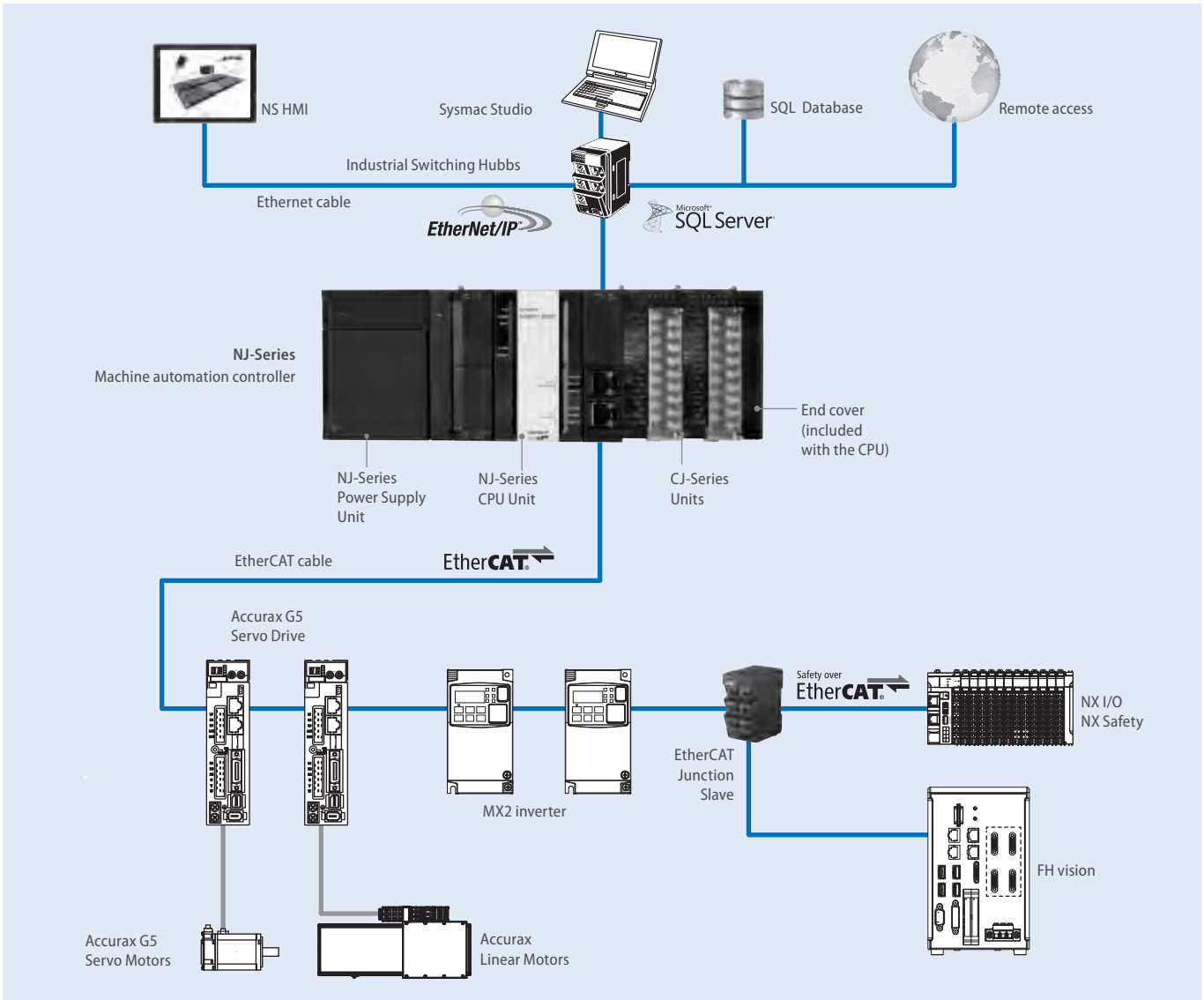
| | |
|---|---|
| **Remote I/O** | NX I/O units/EtherCAT |
| **Mounting** | DIN rail |
| **Global standards** | CE, cULus, NK, LR |
| **Page/Quick Link** | 14 |

## Complete and robust machine automation

The NJ-Series is designed to meet extreme machine control requirements in terms of motion control speed and accuracy, communication, security and robustness.

- Integration of logic and motion in one Intel CPU
- Scalable control: CPUs for 4, 8, 16, 32 and 64 axes
- EtherCAT and EtherNet/IP ports embedded
- Fully conforms to IEC 61131-3 standards
- Certified PLCopen function blocks for motion control
- Linear, circular and spiral (helical) interpolation
- CPU units with database connection and robotic functionality

## Ordering information



## Power supply

| Type | Output capacity at 5 VDC | Output capacity at 24 VDC | Max. output power | Features | Size in mm (H × W × D) | Order code |
|---|---|---|---|---|---|---|
| 100 to 240 VAC | 6.0 A | 1.0 A | 30 W | Run output | 90 × 70 × 90 | NJ-PA3001 |
| 24 VDC | | | | | | NJ-PD3001 |

## CPU

| Series | Description | Max. Digital I/O points | Program capacity | Variables capacity | Max. I/O units | 5 VDC current consumption | Size in mm (H × W × D) | Number of axes | Order code |
|---|---|---|---|---|---|---|---|---|---|
| NJ5 series | Sequence and motion functionality | 2,560 | 20 MB | 2 MB: Retained<br>4 MB: Not retained | CPU rack: 10 units max.<br>Expansion rack:<br>40 units max.<br>(up to 3 expansion racks) | 1.90 A | 90 × 90 × 90 | 64 | NJ501-1500 |
| | | | | | | | | 32 | NJ501-1400 |
| | | | | | | | | 16 | NJ501-1300 |
| | Sequence, motion and robotics functionality | | | | | | | 64 | NJ501-4500 |
| | | | | | | | | 32 | NJ501-4400 |
| | | | | | | | | 16 | NJ501-4300 |
| | | | | | | | | | NJ501-4310*1 |
| | Sequence, motion and database connection functionality | | | | | | | 64 | NJ501-1520 |
| | | | | | | | | 32 | NJ501-1420 |
| | | | | | | | | 16 | NJ501-1320 |
| NJ3 series | Sequence and motion functionality | | 5 MB | 0,5 MB: Retained<br>2 MB: Not retained | | | | 8 | NJ301-1200 |
| | | | | | | | | 4 | NJ301-1100 |

*1 The NJ501-4310 CPU unit only supports one delta robot.

**Note:** The end cover unit CJ1W-TER01 is included with the CPU unit.

## Accessories

| Type | Remarks | Size in mm (H × W × D) | Order code |
|---|---|---|---|
| EtherCAT branching unit | 3 ports, 24 VDC, DIN rail mounting | 90 × 25 × 78 | GX-JC03 |
| | 6 ports, 24 VDC, DIN rail mounting | 90 × 48 × 78 | GX-JC06 |
| Industrial switching hub | 3 ports, 24 VDC, DIN rail mounting | 90 × 25 × 78 | W4S1-03B |
| | 5 ports, 24 VDC, DIN rail mounting | 90 × 48 × 78 | W4S1-05B |
| | 5 ports, 24 VDC, failure detection, DIN rail mounting | 90 × 48 × 78 | W4S1-05C |
| SD memory card | 2 GB | | HMC-SD291 |
| | 4 GB | | HMC-SD491 |
| DIN track | Length: 0.5 m, height: 7.3 mm | | PFP-50N |
| | Length: 1 m, height: 7.3 mm | | PFP-100N |
| | Length: 1 m, height: 16 mm | | PFP-100N2 |
| End plate to secure the units on the DIN track | 2 pieces are included with the CPU unit and I/O interface unit | | PFP-M (2 pcs.) |
| Battery for NJ-series CPU unit | The battery is included with the CPU unit | | CJ1W-BAT01 |
| End cover | The end cover is included with each CPU unit and I/O interface unit | | CJ1W-TER01 |

## Computer software

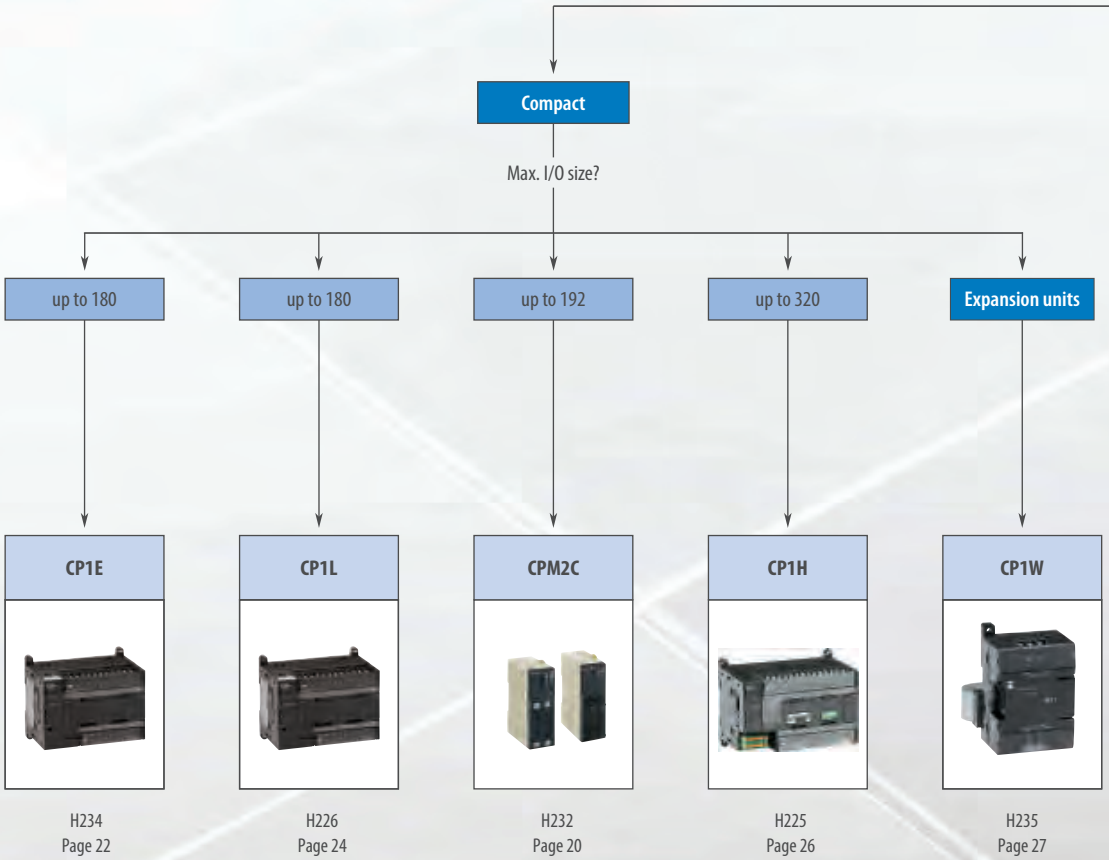
| Specifications | Order code |
|---|---|
| Sysmac Studio | SYSMAC-SE2___ |

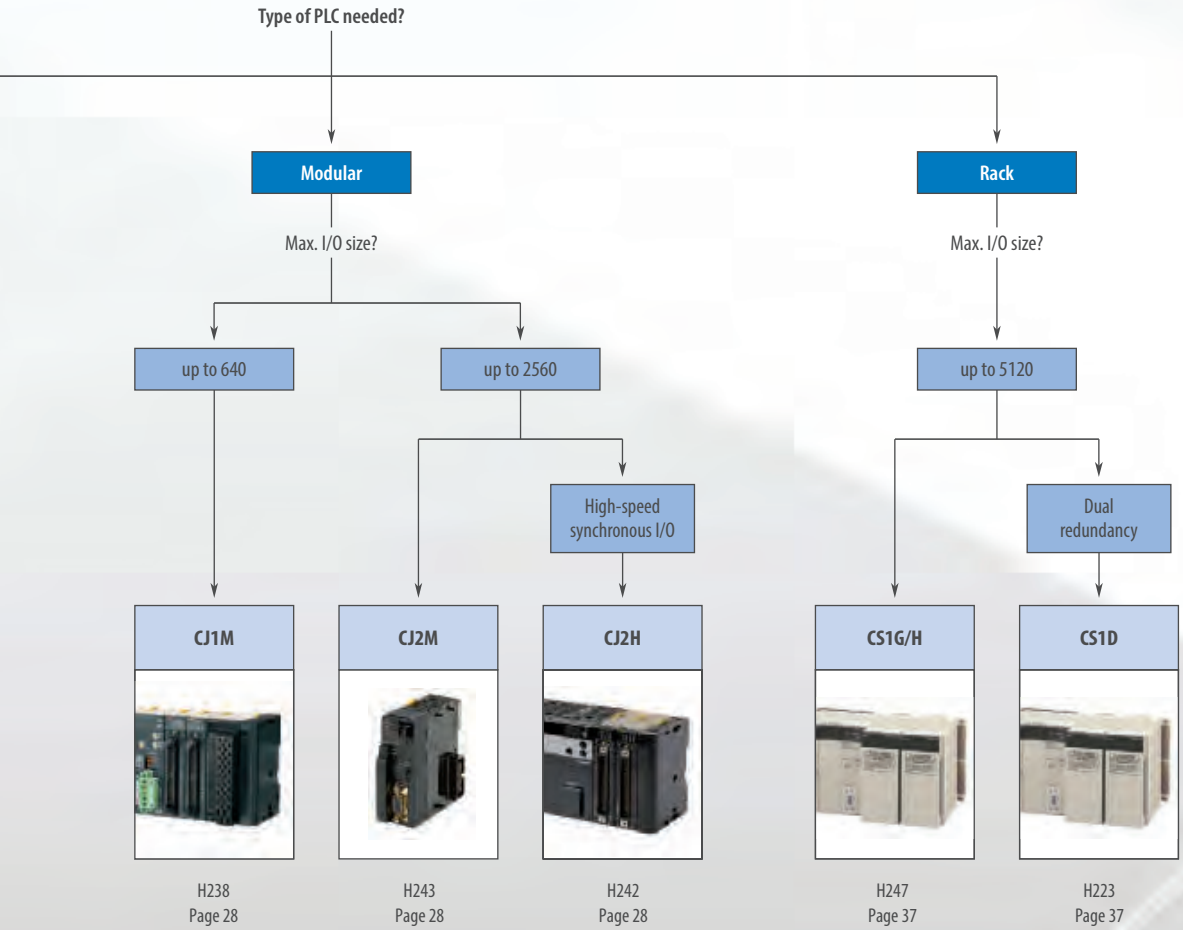
# KNOW ONE ... KNOW THEM ALL!

Whether your automation requires a simple and economical solution, or your target is advanced, high-speed control, you can find what you need in Omron's line-up of Programmable Controllers.

And if your systems grow, or change due to market demand, you will find that only Omron offers a full range of Compact PLCs and Modular PLCs that share the same architecture. Therefore your programs are fully upward compatible, both in memory allocation and instruction set.

- One scalable PLC family to always match exactly with your application
- Transparent communication routing through different networks
- The best size/performance ratio in the industry




Type of PLC needed?
Modular
Rack
Max. I/O size?
Max. I/O size?
up to 640
up to 2560
up to 5120
High-speed synchronous I/O
Dual redundancy
CJ1M
CJ2M
CJ2H
CS1G/H
CS1D
H238
Page 28
H243
Page 28
H242
Page 28
H247
Page 37
H223
Page 37

# Selection table

| | | Compact PLC series | | | |
|---|---|---|---|---|---|
| | |  |  |  | |
| **Model** | | **CPM2C** | **CP1E** | **CP1L** | **CP1H** |
| **Max digital I/O points**[*1] | | 192 | 180 | 180 | 320[*2] |
| **Built-in** | **Digital I/O** | 10 to 32 | 10 to 60 | 10 to 60 | 20 or 40 |
| | **Interrupt inputs** | 2 or 4 | 4 or 6 | 2, 4, or 6 | 6 or 8 |
| | **Counter inputs** | 2 or 4 | 5 or 6 | 4 | 2 or 4 |
| | **Pulse outputs**[*1] | 2 | 2 | 2 | 2 or 4 |
| **CPU features**[*1] | | Compact size<br>Expansion units<br>Quick-response inputs<br>High-speed counter<br>Pulse output with PWM<br>RS-232C port<br>Real time clock | USB port<br>Expansion I/O units<br>Quick-response inputs<br>High-speed counter<br>Pulse output with PWM<br>RS-232C port<br>RS-485 port<br>Real time clock<br>2 Analog adjusters<br>See Analog I/O section | USB or Ethernet port<br>Expansion I/O units<br>Quick-response inputs<br>High-speed counter<br>Pulse output with PWM<br>Up to 2 serial option boards<br>Real time clock<br>1 Analog adjuster<br>See Analog I/O section | USB port<br>Expansion I/O units<br>CJ-series Special I/O Units<br>CJ-series CPU Bus Units<br>Quick-response inputs<br>High-speed counter<br>Pulse output with PWM<br>RS-232C port<br>Option board slots<br>Real time clock<br>1 Analog adjuster<br>LED display, 2 digit<br>See Analog I/O section |
| **Instruction Execution time (bit instruction)** | | 0.64 µs | 1.19 µs | 0.55 µs | 0.10 µs |
| **Program memory** | | 4K words | 2 or 8K steps | 5 or 10K (+10K Function block) steps | 20K steps |
| **Data memory** | | 2K words | 2 or 8K words | 10 or 32K words | 32K words |
| **External memory** | | Expansion memory unit | – | Memory cassette | Memory cassette |
| **Analog I/O** | | Analog I/O unit<br>Temperature sensor unit | Built-in for E-NA model (2 in + 1 out)<br>Analog I/O Expansion Units<br>Temperature Input Expansion Units | Built-in for EL/EM model (2 inputs)<br>Analog I/O Expansion Units<br>Temperature Input Expansion Units | Built-in for XA model (4 in + 2 out)<br>Analog I/O Expansion Units<br>Temperature Input Expansion Units<br>CJ Analog I/O Units<br>CJ Temperature Units |
| **Special function units** | | – | | | CJ-series Special I/O Units<br>CJ-series CPU Bus Units |
| **Fieldbus master** | | – | ModBus | Ethernet<br>ModBus | Ethernet<br>EtherNet/IP<br>Controller Link<br>DeviceNet<br>PROFIBUS-DP<br>PROFINET<br>ModBus<br>CompoNet<br>CompoBus/S<br>CAN (freely configurable) |
| **Fieldbus I/O** | | CompoBus/S<br>DeviceNet | PROFIBUS-DP<br>CompoBus/S<br>DeviceNet | PROFIBUS-DP<br>CompoBus/S<br>DeviceNet | PROFIBUS-DP<br>CompoBus/S<br>DeviceNet |
| **Page/Quick Link** | | 20 | 22 | 24 | 26 |

*1 Some features listed are not available for all CPU types within each series. Please review specifications for more information on CPU features and performance.
*2 Represents local I/O capacity. If a fieldbus master is used more I/O is possible.

| | | Modular PLC series | | | Rack PLC series | |
|---|---|---|---|---|---|---|
| | |  | | |  | |
| **Model** | | **CJ1M/G** | **CJ2M** | **CJ2H** | **CS1G/H** | **CS1D** |
| **Max. digital I/O points**[*1] | | 1280 | 2560 | 2560 | 5120 | 5120 |
| **Built-in**[*1] | **Digital I/O** | 16 | – | | | |
| | **Interrupt inputs** | 4 | – | | | |
| | **Counter inputs** | 2 | – | | | |
| | **Pulse outputs** | 2 | – | | | |
| **CPU features**[*1] | | Compact size<br>No backplane required<br>Large program capacity<br>Easy backups<br>Built-in pulse I/O<br>Loop control CPU type<br>Real time clock | USB port<br>Ethernet/IP port<br>High-speed I/O units<br>Option board plug-in<br>Structures and arrays<br>Tag data links<br>Compact size<br>No backplane required<br>Large program capacity<br>Function Block memory<br>Easy backups<br>Real time clock | USB port<br>Ethernet/IP port<br>High-speed I/O units<br>Structures and arrays<br>Tag data links<br>Synchronous I/O<br>Compact size<br>No backplane required<br>Extra Large program capacity<br>Easy backups<br>Real time clock | High I/O capacity<br>Inner board support<br>Large program capacity<br>Backwards compatible<br>Easy backups<br>Real time clock | Redundant CPU<br>Redundant power supply<br>Hot swapping<br>High I/O capacity<br>Inner board support<br>Large program capacity<br>Backwards compatible<br>Easy backups<br>Real time clock |
| **Instruction Execution time (bit instruction)** | | 0.10/0.04 µs | 0.04 µs | 0.016 µs | 0.04/0.02 µs | 0.04/0.02 µs |
| **Program memory** | | 5 to 60K steps | 5 to 60K steps | 50 to 400K steps | 10 to 250K steps | 10 to 250K steps |
| **Data memory** | | 32 to 128K words | 64 to 160K words | 160 to 832K words | 64 to 448K words | 64 to 448K words |
| **CompactFlash memory** | | Up to 512 MB | | | | |
| **Analog I/O** | | Analog I/O unit<br>Temperature sensor unit<br>Temperature control unit | | | | |
| **Special function units** | | Temperature control<br>High-speed counters (500 kHz)<br>SSI encoder input<br>Position control<br>Protocol macro<br>RFID sensor unit<br>Weighing unit<br>Data collection & storage unit | | Temperature control<br>High-speed counters (500 kHz)<br>SSI encoder input<br>Position control<br>Protocol macro<br>RFID sensor unit<br>High-speed I/O<br>Synchronised Position<br>Data collection & storage unit | Temperature control<br>SSI encoder input<br>High-speed counters (500 kHz)<br>Position control<br>Motion control<br>Process control<br>Protocol macro<br>RFID sensor unit<br>Data collection & storage unit | |
| **Fieldbus master** | | Ethernet<br>EtherNet/IP<br>Controller Link<br>DeviceNet<br>PROFIBUS-DP<br>PROFINET<br>ModBus<br>CompoNet<br>CompoBus/S<br>CAN (freely configurable) | | | | |
| **Fieldbus I/O** | | DeviceNet<br>PROFIBUS-DP<br>CAN (freely configurable) | | | | |
| **Page/Quick Link** | | 28 | | | 37 | |

[*1] Some features listed are not available for all CPU types within each series. Please review specifications for more information on CPU features and performance.

## The versatile slim-line controller

An extensive range of models ensures efficient machine control in an ultra-compact package. CPU units are available with relay or transistor output, terminal block or various connector options, and an optional real-time clock function. Select the output type, number of I/O points and other specifications to meet your needs. Expansion I/O units with 8 to 32 I/O points make it possible to configure a control system with a maximum of 192 I/O points.

- Space-saving slim outline, high-density I/O
- 10-32 I/O points per CPU, transistor or relay outputs
- 20 kHz counter input, two 10 kHz pulse outputs integrated
- Two communication ports built-in, freely accessible
- Digital, analog, and fieldbus expansion units

## Ordering information

| Input points | Output points | Program capacity | Data memory capacity | Logic execution speed | Size in mm (H × W × D) | I/O Connectors | Output method | Built-in functions | Real time clock | Order code |
|---|---|---|---|---|---|---|---|---|---|---|
| 6 points | 4 points | 4K words | 2K words | 0.64 µs | 90 × 33 × 65 | 2 Terminal blocks | Relay | 1 Encoder input (20 kHz) | – | CPM2C-10CDR-D |
| | | | | | | | | | Yes | CPM2C-10C1DR-D |
| | | | | | | 2 Fujitsu (24 pt) | Transistor (source type) | 1 Encoder input (20 kHz) 2 Pulse output (10 kHz) | – | CPM2C-10CDT1C-D |
| | | | | | | | | | Yes | CPM2C-10C1DT1C-D |
| | | | | | | 2 MIL (20 pt) | Transistor (source type) | 1 Encoder input (20 kHz) 2 Pulse output (10 kHz) | – | CPM2C-10CDT1M-D |
| | | | | | | | | | Yes | CPM2C-10C1DT1M-D |
| 12 points | 8 points | 4K words | 2K words | 0.64 µs | 90 × 33 × 65 | 2 Terminal blocks | Relay | 1 Encoder input (20 kHz) | – | CPM2C-20CDR-D |
| | | | | | | | | | Yes | CPM2C-20C1DR-D |
| | | | | | | 2 Fujitsu (24 pt) | Transistor (source type) | 1 Encoder input (20 kHz) 2 Pulse output (10 kHz) | – | CPM2C-20CDT1C-D |
| | | | | | | | | | Yes | CPM2C-20C1DT1C-D |
| | | | | | | 2 MIL (20 pt) | Transistor (source type) | 1 Encoder input (20 kHz) 2 Pulse output (10 kHz) | – | CPM2C-20CDT1M-D |
| | | | | | | | | | Yes | CPM2C-20C1DT1M-D |
| 16 points | 16 points | 4K words | 2K words | 0.64 µs | 90 × 33 × 65 | 2 Fujitsu (24 pt) | Transistor (source type) | 1 Encoder input (20 kHz) 2 Pulse output (10 kHz) | – | CPM2C-32CDT1C-D |
| | | | | | | 2 MIL (20 pt) | Transistor (source type) | 1 Encoder input (20 kHz) 2 Pulse output (10 kHz) | – | CPM2C-32CDT1M-D |
| 6 points | 4 points | 4K words | 2K words | 0.64 µs | 90 × 40 × 65 | 1 Fujitsu (24 pt) | Transistor (source type) | 1 Encoder input (20 kHz) 2 Pulse output (10 kHz) Programmable Slave with DeviceNet slave and CompoBus/S Master | Yes | CPM2C-S110C-DRT |
| 6 points | 4 points | 4K words | 2K words | 0.64 µs | 90 × 40 × 65 | 1 Fujitsu (24 pt) | Transistor (source type) | 1 Encoder input (20 kHz) 2 Pulse output (10 kHz) CompoBus/S Master | Yes | CPM2C-S110C |

**Note:** All CPU's are available only with DC supply voltage (CPM2C-PA201 can be used as power supply).
CPU's with sourcing transistor outputs are also available with sinking transistor outputs.
MIL = connector according to MIL-C-83503 (compatible with DIN 41651/IEC 60603-1).
For I/O Cables and Terminal Blocks, see page 72

## Expand the capacity of your CPM2C PLC

Expansion I/O units with 8 to 32 I/O points make it possible to configure a control system with a maximum of 192 I/O points



## Ordering information

| Unit | Output type | I/O Connectors | Inputs | Outputs | Order code |
|---|---|---|---|---|---|
| Expansion I/O units | – | 1 Fujitsu (24 pt) | 8 | – | CPM2C-8EDC |
| | | 1 MIL (20 pt) | | | CPM2C-8EDM |
| | – | 1 Fujitsu (24 pt) | 16 | – | CPM2C-16EDC |
| | | 1 MIL (20 pt) | | | CPM2C-16EDM |
| | Relay | 1 Terminal block | – | 8 | CPM2C-8ER |
| | Transistor output (source type) | 1 Fujitsu (24 pt) | | | CPM2C-8ET1C |
| | | 1 MIL (20 pt) | | | CPM2C-8ET1M |
| | Transistor output (source type) | 1 Fujitsu (24 pt) | – | 16 | CPM2C-16ET1C |
| | | 1 MIL (20 pt) | | | CPM2C-16ET1M |
| | Relay | 2 Terminal blocks | 6 | 4 | CPM2C-10EDR |
| | Relay | 2 Terminal blocks | 12 | 8 | CPM2C-20EDR |
| | Transistor output (source type) | 2 Fujitsu (24 pt) | 16 | 8 | CPM2C-24EDT1C |
| | | 2 MIL (20 pt) | | | CPM2C-24EDT1M |
| | Transistor output (source type) | 2 Fujitsu (24 pt) | 16 | 16 | CPM2C-32EDT1C |
| | | 2 MIL (20 pt) | | | CPM2C-32EDT1M |
| Analog I/O units | Analog (resolution 1/6,000) | 2 Terminal blocks | 2 | 1 | CPM2C-MAD11 |
| Temperature sensor units | Thermocouple input | 1 Terminal block | 2 | – | CPM2C-TS001 |
| | Platinum resistance input | 1 Terminal block | 2 | – | CPM2C-TS101 |
| CompoBus/S I/O link unit | – | 1 Terminal block | I/O link of 8 input bits and 8 output bits | | CPM2C-SRT21 |
| RS-232C and RS422 adapter units | – | 1 D-sub 9-pin | RS-232C | | CPM2C-CIF01-V1 |
| | | 1 Terminal block and 1 D-sub 9-pin | RS-232C and RS422 | | CPM2C-CIF11 |

**Note:** Expansion I/O units with sourcing transistor outputs are also available with sinking transistor outputs.
MIL = connector according to MIL-C-83503 (compatible with DIN 41651/IEC 60603-1).
For I/O Cables and Terminal Blocks, see page 72

## Maximum functionality at minimum cost

Omron's CP1E series targets a "lean" automation solution, but still offers all functionality you need to control relatively simple applications, including outstanding positioning capability. The CP1E comes with 10, 14, 20, 30, 40 or 60 I/O built-in and can be expanded with a wide range of CP1W expansion units up to 180 I/O points. It uses a standard USB port for programming and monitoring. The CP1E-N CPU types have a RS232 serial communication port embedded and offer an extra serial communication port that can be used to connect frequency inverters or temperature controllers. As the CP1E series shares the same architecture as the CP1L, CP1H, CJ, and CS1 series, programs are compatible for memory allocations and instructions.

## Ordering information

| CP1E CPU | Digital input | Digital output | Max. I/O points (incl. expansions) | Communication ports | Input/output functions | Output type | Power supply | Expandability | Program capacity | Data memory capacity | Logic execution speed | Order code |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| E-type with 10 I/O points | 6 | 4 | 10 | – | 5 Encoder inputs (10 kHz)<br>4 Interrupts/counters | Relay | 84 to 264 VAC | – | 2K steps | 2K words | 1.19 µs | CP1E-E10DR-A |
| | | | | | | | 20.4 to 26.4 VDC | | | | | CP1E-E10DR-D |
| | | | | | | Transistor (sinking) | | | | | | CP1E-E10DT-D |
| | | | | | | Transistor (sourcing) | | | | | | CP1E-E10DT1-D |
| E-type with 14 I/O points | 8 | 6 | 14 | | 6 Encoder inputs (10 kHz)<br>6 Interrupts/counters | Relay | 84 to 264 VAC | | | | | CP1E-E14SDR-A |
| E-type with 20 I/O points | 12 | 8 | 20 | | | | | | | | | CP1E-E20SDR-A |
| E-type with 30 I/O points | 18 | 12 | 150 | | | | | Up to 3 expansion units*1 | | | | CP1E-E30SDR-A |
| E-type with 40 I/O points | 24 | 16 | 160 | | | | | | | | | CP1E-E40SDR-A |
| N-type with 14 I/O points | 8 | 6 | 14 | RS-232C port | 6 Encoder inputs (2 × 100 kHz, 4 × 10kHz) | Relay | 84 to 264 VAC | – | 8K steps | 8K words | | CP1E-N14DR-A |
| | | | | | | | 20.4 to 26.4 VDC | | | | | CP1E-N14DR-D |
| | | | | | 6 Encoder inputs (2 × 100 kHz, 4 × 10kHz)<br>2 Pulse outputs (100 kHz) | Transistor (sinking) | | | | | | CP1E-N14DT-D |
| | | | | | | Transistor (sourcing) | | | | | | CP1E-N14DT1-D |
| N-type with 20 I/O points | 12 | 8 | 20 | | 6 Encoder inputs (2 × 100 kHz, 4 × 10kHz) | Relay | 84 to 264 VAC | | | | | CP1E-N20DR-A |
| | | | | | | | 20.4 to 26.4 VDC | | | | | CP1E-N20DR-D |
| | | | | | 6 Encoder inputs (2 × 100 kHz, 4 × 10kHz)<br>2 Pulse outputs (100 kHz) | Transistor (sinking) | | | | | | CP1E-N20DT-D |
| | | | | | | Transistor (sourcing) | | | | | | CP1E-N20DT1-D |
| NA-type with 20 I/O points and analog I/O | 12 | 8 | 140 | | 6 Encoder inputs (2 × 100 kHz, 4 × 10kHz)<br>2 analog inputs (1/6,000)<br>1 analog output (1/6,000) | Relay | 84 to 264 VAC | Up to 3 expansion units*1 | | | | CP1E-NA20DR-A |
| | | | | | 6 Encoder inputs (2 × 100 kHz, 4 × 10kHz)<br>2 Pulse outputs (100 kHz)<br>2 analog inputs (1/6,000)<br>1 analog output (1/6,000) | Transistor (sinking) | 20.4 to 26.4 VDC | | | | | CP1E-NA20DT-D |
| | | | | | | Transistor (sourcing) | | | | | | CP1E-NA20DT1-D |

| CP1E CPU | Digital input | Digital output | Max. I/O points (incl. expansions) | Communication ports | Input/output functions | Output type | Power supply | Expandability | Program capacity | Data memory capacity | Logic execution speed | Order code |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| N-type with 30 I/O points | 18 | 12 | 150 | RS-232C port | 6 Encoder inputs (2 × 100 kHz, 4 × 10kHz) | Relay | 84 to 264 VAC | Up to 3 expansion units*1 | 8K steps | 8K words | 1.19 µs | CP1E-N30DR-A |
| | | | | | | | 20.4 to 26.4 VDC | | | | | CP1E-N30DR-D |
| | | | | | 6 Encoder inputs (2 × 100 kHz, 4 × 10kHz) 2 Pulse outputs (100 kHz) | Transistor (sinking) | | | | | | CP1E-N30DT-D |
| | | | | | | Transistor (sourcing) | | | | | | CP1E-N30DT1-D |
| | | | | RS-232C port RS-485 port (half-duplex) | 6 Encoder inputs (2 × 100 kHz, 4 × 10kHz) | Relay | 84 to 264 VAC | | | | | CP1E-N30S1DR-A |
| | | | | | 6 Encoder inputs (2 × 100 kHz, 4 × 10kHz) 2 Pulse outputs (100 kHz) | Transistor (sinking) | 20.4 to 26.4 VDC | | | | | CP1E-N30S1DT-D |
| | | | | | | Transistor (sourcing) | | | | | | CP1E-N30S1DT1-D |
| N-type with 40 I/O points | 24 | 16 | 160 | RS-232C port | 6 Encoder inputs (2 × 100 kHz, 4 × 10kHz) | Relay | 84 to 264 VAC | | | | | CP1E-N40DR-A |
| | | | | | | | 20.4 to 26.4 VDC | | | | | CP1E-N40DR-D |
| | | | | | 6 Encoder inputs (2 × 100 kHz, 4 × 10kHz) 2 Pulse outputs (100 kHz) | Transistor (sinking) | | | | | | CP1E-N40DT-D |
| | | | | | | Transistor (sourcing) | | | | | | CP1E-N40DT1-D |
| | | | | RS-232C port RS-485 port (half-duplex) | 6 Encoder inputs (2 × 100 kHz, 4 × 10kHz) | Relay | 84 to 264 VAC | | | | | CP1E-N40S1DR-A |
| | | | | | 6 Encoder inputs (2 × 100 kHz, 4 × 10kHz) 2 Pulse outputs (100 kHz) | Transistor (sinking) | 20.4 to 26.4 VDC | | | | | CP1E-N40S1DT-D |
| | | | | | | Transistor (sourcing) | | | | | | CP1E-N40S1DT1-D |
| N-type with 60 I/O points | 36 | 24 | 180 | RS-232C port | 6 Encoder inputs (2 × 100 kHz, 4 × 10kHz) | Relay | 84 to 264 VAC | | | | | CP1E-N60DR-A |
| | | | | | | | 20.4 to 26.4 VDC | | | | | CP1E-N60DR-D |
| | | | | | 6 Encoder inputs (2 × 100 kHz, 4 × 10kHz) 2 Pulse outputs (100 kHz) | Transistor (sinking) | | | | | | CP1E-N60DT-D |
| | | | | | | Transistor (sourcing) | | | | | | CP1E-N60DT1-D |
| | | | | RS-232C port RS-485 port (half-duplex) | 6 Encoder inputs (2 × 100 kHz, 4 × 10kHz) | Relay | 84 to 264 VAC | | | | | CP1E-N60S1DR-A |
| | | | | | 6 Encoder inputs (2 × 100 kHz, 4 × 10kHz) 2 Pulse outputs (100 kHz) | Transistor (sinking) | 20.4 to 26.4 VDC | | | | | CP1E-N60S1DT-D |
| | | | | | | Transistor (sourcing) | | | | | | CP1E-N60S1DT1-D |

*1 There is no restriction on the possible combination of CP1W expansion units. All expansion units can be combined with each other up to the maximum number of expansions.

**Note:** The CP1E E-type has no real-time clock and therefore no battery. The N/NA-type has one optional battery for the real-time clock.
The CP1E-N/NA-type has 6 Interrupts/counters.
The CP1E-NxxS1 CPU types do not support serial option boards.

## Accessories

| Type | Remarks | Order code |
|---|---|---|
| USB programming cable | A-type male to B-type male (length: 1.8 m) | CP1W-CN221 |
| RS-232C option board | D-Sub, 9 pins, female (15 m max.) | CP1W-CIF01 |
| RS-422A/485 option board | Terminal block (50 m max.) | CP1W-CIF11 |
| RS-422A/485 (isolated) option board | Terminal block (500 m max.) | CP1W-CIF12 |
| Ethernet option board | 100/10Base-TX (Auto-MDIX) | CP1W-CIF41*1 |
| Battery for CP1E-N/NA type | To retain time of clock | CP1W-BAT01 |

*1 Only firmware v2.0

## The compact machine controller

When it comes to controllers for compact machines, Omron's CP1L series offers the compactness of a micro-PLC with the capability of a modular PLC. It provides all the functionality you need to control your machine, including outstanding positioning capability. The CP1L comes with 14, 20, 30, 40, or 60 I/O built-in and can be expanded with a wide range of CP1W expansion units up to 180 I/O points. It uses a standard USB port for programming and monitoring and offers two optional plug-in serial communication ports, of which one can be used for a display or Ethernet option as well. As the CP1L series shares the same architecture as the CP1E, CP1H, CJ1, and CS1 series, programs are compatible for memory allocations and instructions.

## Ordering information

| CP1L CPU | Digital input | Digital output | Max. I/O points (incl. expansions) | Input/output functions | Output type | Power supply | PLC port | Expandability | Program capacity | Data memory capacity | Logic execution speed | Order code |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L-type with 10 I/O points | 6 | 4 | 10 | 4 Encoder inputs (100 kHz)<br>2 Interrupts/counters | Relay | 84 to 264 VAC | USB | – | 5K steps | 10K words | 0.55 µs | CP1L-L10DR-A |
| | | | | | | 20.4 to 26.4 VDC | | | | | | CP1L-L10DR-D |
| | | | | 4 Encoder inputs (100 kHz)<br>2 Pulse outputs (100 kHz)<br>2 Interrupts/counters | Transistor (sinking) | | | | | | | CP1L-L10DT-D |
| | | | | | Transistor (sourcing) | | | | | | | CP1L-L10DT1-D |
| L-type with 14 I/O points | 8 | 6 | 54 | 4 Encoder inputs (100 kHz)<br>4 Interrupts/counters | Relay | 84 to 264 VAC | | Up to 1 expansion units[*1] | | | | CP1L-L14DR-A |
| | | | | | | 20.4 to 26.4 VDC | | | | | | CP1L-L14DR-D |
| | | | | 4 Encoder inputs (100 kHz)<br>2 Pulse outputs (100 kHz)<br>4 Interrupts/counters | Transistor (sinking) | | | | | | | CP1L-L14DT-D |
| | | | | | Transistor (sourcing) | | | | | | | CP1L-L14DT1-D |
| L-type with 20 I/O points | 12 | 8 | 60 | 4 Encoder inputs (100 kHz)<br>6 Interrupts/counters | Relay | 84 to 264 VAC | | | | | | CP1L-L20DR-A |
| | | | | | | 20.4 to 26.4 VDC | | | | | | CP1L-L20DR-D |
| | | | | 4 Encoder inputs (100 kHz)<br>2 Pulse outputs (100 kHz)<br>6 Interrupts/counters | Transistor (sinking) | | | | | | | CP1L-L20DT-D |
| | | | | | Transistor (sourcing) | | | | | | | CP1L-L20DT1-D |
| | | | | 4 Encoder inputs (100 kHz)<br>6 Interrupts/counters<br>2 Analog inputs (1/1,000) | Relay | | Ethernet | | 5K (+10K FB) steps | | | CP1L-EL20DR-D |
| | | | | 4 Encoder inputs (100 kHz)<br>2 Pulse outputs (100 kHz)<br>6 Interrupts/counters<br>2 Analog inputs (1/1,000) | Transistor (sinking) | | | | | | | CP1L-EL20DT-D |
| | | | | | Transistor (sourcing) | | | | | | | CP1L-EL20DT1-D |
| M-type with 30 I/O points | 18 | 12 | 150 | 4 Encoder inputs (100 kHz)<br>6 Interrupts/counters | Relay | 84 to 264 VAC | USB | Up to 3 expansion units[*1] | 10K steps | 32K words | | CP1L-M30DR-A |
| | | | | | | 20.4 to 26.4 VDC | | | | | | CP1L-M30DR-D |
| | | | | 4 Encoder inputs (100 kHz)<br>2 Pulse outputs (100 kHz)<br>6 Interrupts/counters | Transistor (sinking) | | | | | | | CP1L-M30DT-D |
| | | | | | Transistor (sourcing) | | | | | | | CP1L-M30DT1-D |
| | | | | 4 Encoder inputs (100 kHz)<br>6 Interrupts/counters<br>2 Analog inputs (1/1,000) | Relay | | Ethernet | | 10K (+10K FB) steps | | | CP1L-EM30DR-D |
| | | | | 4 Encoder inputs (100 kHz)<br>2 Pulse outputs (100 kHz)<br>6 Interrupts/counters<br>2 Analog inputs (1/1,000) | Transistor (sinking) | | | | | | | CP1L-EM30DT-D |
| | | | | | Transistor (sourcing) | | | | | | | CP1L-EM30DT1-D |

| CP1L CPU | Digital input | Digital output | Max. I/O points (incl. expansions) | Input/output functions | Output type | Power supply | PLC port | Expandability | Program capacity | Data memory capacity | Logic execution speed | Order code |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| M-type with 40 I/O points | 24 | 16 | 160 | 4 Encoder inputs (100 kHz)<br>6 Interrupts/counters | Relay | 84 to 264 VAC<br>20.4 to 26.4 VDC | USB | Up to 3 expansion units*1 | 10K steps | 32K words | 0.55 µs | CP1L-M40DR-A |
| | | | | | | | | | | | | CP1L-M40DR-D |
| | | | | 4 Encoder inputs (100 kHz)<br>2 Pulse outputs (100 kHz)<br>6 Interrupts/counters | Transistor (sinking) | | | | | | | CP1L-M40DT-D |
| | | | | | Transistor (sourcing) | | | | | | | CP1L-M40DT1-D |
| | | | | 4 Encoder inputs (100 kHz)<br>6 Interrupts/counters<br>2 Analog inputs (1/1,000) | Relay | | Ethernet | | 10K (+10K FB) steps | | | CP1L-EM40DR-D |
| | | | | 4 Encoder inputs (100 kHz)<br>2 Pulse outputs (100 kHz)<br>6 Interrupts/counters<br>2 Analog inputs (1/1,000) | Transistor (sinking) | | | | | | | CP1L-EM40DT-D |
| | | | | | Transistor (sourcing) | | | | | | | CP1L-EM40DT1-D |
| M-type with 60 I/O points | 36 | 24 | 180 | 4 Encoder inputs (100 kHz)<br>6 Interrupts/counters | Relay | 84 to 264 VAC<br>20.4 to 26.4 VDC | USB | | 10K steps | | | CP1L-M60DR-A |
| | | | | | | | | | | | | CP1L-M60DR-D |
| | | | | 4 Encoder inputs (100 kHz)<br>2 Pulse outputs (100 kHz)<br>6 Interrupts/counters | Transistor (sinking) | | | | | | | CP1L-M60DT-D |
| | | | | | Transistor (sourcing) | | | | | | | CP1L-M60DT1-D |

*1 There is no restriction on the possible combination of CP1W expansion units. All expansion units can be combined with each other up to the maximum number of expansions.

## Accessories

| Type | Remarks | Order code |
|---|---|---|
| Memory cassette | 512K words (upload/download program) | CP1W-ME05M |
| USB programming cable | A-type male to B-type male (length: 1.8 m) | CP1W-CN221 |
| RS-232C option board | D-Sub, 9 pins, female (15 m max.) | CP1W-CIF01 |
| RS-422A/485 option board | Terminal block (50 m max.) | CP1W-CIF11 |
| RS-422A/485 (isolated) option board | Terminal block (500 m max.) | CP1W-CIF12 |
| Ethernet option board | 100/10Base-TX (Auto-MDIX) | CP1W-CIF41 |
| LCD display | 4 rows × 12 characters | CP1W-DAM01 |
| Analog I/O option board (only for CP1L-EL/EM) | 2 inputs, 0 to 10 V/0 to 20 mA | CP1W-ADB21 |
| Analog I/O option board (only for CP1L-EL/EM) | 2 outputs, 0 to 10 V | CP1W-DAB21V |
| Analog I/O option board (only for CP1L-EL/EM) | 2 inputs, 0 to 10 V/0 to 20 mA + 2 outputs 0 to 10 V | CP1W-MAB221 |
| Battery | For replacement purpose | CJ1W-BAT01 |

**Note:** CP1L-10 I/O points CPU does not support option boards.
CP1L-30/40/60 I/O points CPUs support two option boards.
For Ethernet Cables and Accessories, see page 81.

## The all-in-one PLC

Designed for compact machines, it combines the size of a micro PLC and the power of a modular PLC. Four built-in high-speed counters and four pulse outputs are ideal for multi-axis positioning control. The CP1H-XA comes with 4 analog inputs and 2 analog outputs built-in. This makes it suitable for simple loop control, using the PLC's advanced PID control function with auto-tuning. The CP1H can be expanded with CP1W I/Os and supports up to 2 CJ1 special I/O units. This means that it is open to popular fieldbuses and supports all communication units of the CJ1 series.

- Up to 1 MHz for inputs/outputs
- CJ1M compatible instruction set and execution speed
- 4 analog inputs and 2 analog outputs for the XA model
- USB port for easy communication, programming and configuration
- Supports PROFIBUS, DeviceNet, CAN and Ethernet

## Ordering information

| CP1H CPU | Digital input | Digital output | Max. I/O points (incl. expansions) | Input/output functions | Output type | Power supply | PLC port | Expandability | Program capacity | Data memory capacity | Logic execution speed | Order code |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Y-type with 20 I/O points | 12 | 8 | 300 | 4 Encoder inputs (2 × 1 MHz + 2 × 100 kHz)<br>4 Pulse outputs (2 × 1 MHz + 2 × 100 kHz)<br>6 Interrupts/counters | Transistor (sinking) | 20.4 to 26.4 VDC | USB | Up to 7 expansion units[*1] | 20K steps | 32K words | 0.1 µs | CP1H-Y20DT-D |
| X-type with 40 I/O points | 24 | 16 | 320 | 4 Encoder inputs (100 kHz)<br>8 Interrupts/counters | Relay | 84 to 264 VAC | | | | | | CP1H-X40DR-A |
| | | | | 4 Encoder inputs (100 kHz)<br>4 Pulse outputs (100 kHz)<br>8 Interrupts/counters | Transistor (sinking) | 20.4 to 26.4 VDC | | | | | | CP1H-X40DT-D |
| | | | | | Transistor (sourcing) | | | | | | | CP1H-X40DT1-D |
| XA-type with 40 I/O points and analog I/O | | | | 4 Encoder inputs (100 kHz)<br>8 Interrupts/counters<br>4 Analog inputs (1/12,000)<br>2 Analog outputs (1/12,000) | Relay | 84 to 264 VAC | | | | | | CP1H-XA40DR-A |
| | | | | 4 Encoder inputs (100 kHz)<br>4 Pulse outputs (100 kHz)<br>8 Interrupts/counters<br>4 Analog inputs (1/12,000)<br>2 Analog outputs (1/12,000) | Transistor (sinking) | 20.4 to 26.4 VDC | | | | | | CP1H-XA40DT-D |
| | | | | | Transistor (sourcing) | | | | | | | CP1H-XA40DT1-D |

[*1] CP1H CPU series can be expanded with CP1W expansion units (up to 7 units) and CJ1 Special I/O units (up to 2 units).

**Note:** Some expansion units count for 2 unit numbers (eg. CP1W-AD041, CP1W-DA041, CP1W-TS002 and CP1W-TS102) but only 7 expansion unit numbers can be allocated in a CP1H PLC's configuration.

### Accessories

| Type | Remarks | Order code |
|---|---|---|
| Memory cassette | 512K words (upload/download program) | CP1W-ME05M |
| USB programming cable | A-type male to B-type male (length: 1.8 m) | CP1W-CN221 |
| RS-232C option board | D-Sub, 9 pins, female (15 m max.) | CP1W-CIF01 |
| RS-422A/485 option board | Terminal block (50 m max.) | CP1W-CIF11 |
| RS-422A/485 (isolated) option board | Terminal block (500 m max.) | CP1W-CIF12 |
| Ethernet option board | 100/10Base-TX (Auto-MDIX) | CP1W-CIF41 |
| LCD display | 4 rows × 12 characters | CP1W-DAM01 |
| Expansion I/O connecting cable | 80 cm cable to connect CP1W expansion units | CP1W-CN811 |
| CJ1 expansion unit adapter | Unit to connect CJ1 Special I/O units | CP1W-EXT01 |
| Battery | For replacement purpose | CJ1W-BAT01 |

## Expand the capacity of your compact PLC

A wide variety of expansion units such as Digital I/O, Analog I/O and Remote I/O are available to create the application you need. These CP1W expansion units can be used for CP1E-, CP1L-, and CP1H series PLC.



## Ordering information

| Expansion unit | Inputs | Outputs | Max I/O points | Input/output functions | Input/output type | Size in mm (H × W × D) | No. of unit numbers allocated (CP1H only)*1 | Order code |
|---|---|---|---|---|---|---|---|---|
| Digital I/O units | 8 | – | 8 points | 8 Inputs | – | 90 × 66 × 50 | 1 | CP1W-8ED |
| | – | 8 | | 8 Outputs | Relay | 90 × 66 × 50 | 1 | CP1W-8ER |
| | | | | | Transistor (sinking) | 90 × 66 × 50 | 1 | CP1W-8ET |
| | | | | | Transistor (sourcing) | 90 × 66 × 50 | 1 | CP1W-8ET1 |
| | | 16 | 16 points | 16 Outputs | Relay | 90 × 86 × 50 | 1 | CP1W-16ER |
| | 12 | 8 | 20 points | 12 Inputs/8 outputs | Relay | 90 × 86 × 50 | 1 | CP1W-20EDR1 |
| | | | | | Transistor (sinking) | 90 × 86 × 50 | 1 | CP1W-20EDT |
| | | | | | Transistor (sourcing) | 90 × 86 × 50 | 1 | CP1W-20EDT1 |
| | 24 | 16 | 40 points | 24 Inputs/16 outputs | Relay | 90 × 150 × 50 | 1 | CP1W-40EDR |
| | | | | | Transistor (sinking) | 90 × 150 × 50 | 1 | CP1W-40EDT |
| | | | | | Transistor (sourcing) | 90 × 150 × 50 | 1 | CP1W-40EDT1 |
| Analog I/O units | 4 | – | 4 analog points | 4 Analog inputs (resolution 1/6,000) | Analog | 90 × 86 × 50 | 2 | CP1W-AD041 |
| | – | 4 | 4 analog points | 4 Analog outputs (resolution 1/6,000) | Analog | 90 × 86 × 50 | 2 | CP1W-DA041 |
| | – | 2 | 2 analog points | 2 Analog outputs (resolution 1/6,000) | Analog | 90 × 86 × 50 | 1 | CP1W-DA021 |
| | 2 | 1 | 3 analog points | 2 Analog inputs (resolution 1/6,000)<br>1 Analog output (resolution 1/6,000) | Analog | 90 × 86 × 50 | 1 | CP1W-MAD11 |
| Temperature sensor units (K, J) | 2 | – | 2 analog points | 2 Thermocouple inputs (K or J) | – | 90 × 86 × 50 | 1 | CP1W-TS001 |
| | 4 | – | 4 analog points | 4 Thermocouple inputs (K or J) | – | 90 × 86 × 50 | 2 | CP1W-TS002 |
| Temperature sensor units (Pt100, JPt100) | 2 | – | 2 analog points | 2 Platinum resistance thermometer inputs (Pt100 or JPt100) | – | 90 × 86 × 50 | 1 | CP1W-TS101 |
| | 4 | – | 4 analog points | 4 Platinum resistance thermometer inputs (Pt100 or JPt100) | – | 90 × 86 × 50 | 2 | CP1W-TS102 |
| CompoBus/S I/O link unit | 8 points | 8 points | 16 points | I/O link of 8 input bits and 8 output bits | CompoBus/S communication | 90 × 66 × 50 | 1 | CP1W-SRT21 |
| PROFIBUS-DP I/O link unit | 16 points | 16 points | 32 points | I/O link of 16 input bits and 16 output bits | PROFIBUS-DP communication | 90 × 66 × 50 | 1 | CPM1A-PRT21 |
| DeviceNet I/O link unit | 32 points | 32 points | 64 points | I/O link of 32 input bits and 32 output bits | DeviceNet communication | 90 × 66 × 50 | 1 | CPM1A-DRT21 |

*1 Some expansion units count for 2 unit numbers (eg. CP1W-AD041, CP1W-DA041, CP1W-TS002 and CP1W-TS102) but only 7 expansion unit numbers can be allocated in a CP1H PLC's configuration.

## Fast and powerful CPUs for any task

The family of CJ2 CPUs range from very small CPUs for simple sequence control to powerful and fast models that offer total machine control which can handle up to 2,560 I/O points. This enables you to modularize or 'slice' your machine into logical sections without changing PLC series.
All CPU units support IEC61131-3 Structured text, Sequential Function Charts and ladder language. Omron's extensive function block library helps to reduce your programming effort, while you can create your own function blocks to suit your specific needs.
All CJ2M CPU units can be equipped with pulse I/O option modules to perform position control for up to 4 axes, using dedicated instructions.

## Ordering information

| Max. digital I/O points | Program capacity | Data memory capacity | Logic execution speed | Max. I/O units | Width | 5 V current consumption | Built-in functions | Order code |
|---|---|---|---|---|---|---|---|---|
| 2,560 | 400 K | 832 K | 16 ns | 40 | 80 mm | 820 mA | USB + EtherNet/IP + RS-232C | CJ2H-CPU68-EIP |
| 2,560 | 250 K | 512 K | 16 ns | 40 | 80 mm | 820 mA | USB + EtherNet/IP + RS-232C | CJ2H-CPU67-EIP |
| 2,560 | 150 K | 352 K | 16 ns | 40 | 80 mm | 820 mA | USB + EtherNet/IP + RS-232C | CJ2H-CPU66-EIP |
| 2,560 | 100 K | 160 K | 16 ns | 40 | 80 mm | 820 mA | USB + EtherNet/IP + RS-232C | CJ2H-CPU65-EIP |
| 2,560 | 50 K | 160 K | 16 ns | 40 | 80 mm | 820 mA | USB + EtherNet/IP + RS-232C | CJ2H-CPU64-EIP |
| 2,560 | 60 K | 160 K | 40 ns | 40 | 62 mm | 700 mA | USB + EtherNet/IP, serial comm. option slot | CJ2M-CPU35 |
| 2,560 | 30 K | 160 K | 40 ns | 40 | 62 mm | 700 mA | USB + EtherNet/IP, serial comm. option slot | CJ2M-CPU34 |
| 2,560 | 20 K | 64 K | 40 ns | 40 | 62 mm | 700 mA | USB + EtherNet/IP, serial comm. option slot | CJ2M-CPU33 |
| 2,560 | 10 K | 64 K | 40 ns | 40 | 62 mm | 700 mA | USB + EtherNet/IP, serial comm. option slot | CJ2M-CPU32 |
| 2,560 | 5 K | 64 K | 40 ns | 40 | 62 mm | 700 mA | USB + EtherNet/IP, serial comm. option slot | CJ2M-CPU31 |
| 2,560 | 400 K | 832 K | 16 ns | 40 | 49 mm | 420 mA | USB + RS-232C | CJ2H-CPU68 |
| 2,560 | 250 K | 512 K | 16 ns | 40 | 49 mm | 420 mA | USB + RS-232C | CJ2H-CPU67 |
| 2,560 | 150 K | 352 K | 16 ns | 40 | 49 mm | 420 mA | USB + RS-232C | CJ2H-CPU66 |
| 2,560 | 100 K | 160 K | 16 ns | 40 | 49 mm | 420 mA | USB + RS-232C | CJ2H-CPU65 |
| 2,560 | 50 K | 160 K | 16 ns | 40 | 49 mm | 420 mA | USB + RS-232C | CJ2H-CPU64 |
| 2,560 | 60 K | 160 K | 40 ns | 40 | 31 mm | 500 mA | USB + RS-232C | CJ2M-CPU15 |
| 2,560 | 30 K | 160 K | 40 ns | 40 | 31 mm | 500 mA | USB + RS-232C | CJ2M-CPU14 |
| 2,560 | 20 K | 64 K | 40 ns | 40 | 31 mm | 500 mA | USB + RS-232C | CJ2M-CPU13 |
| 2,560 | 10 K | 64 K | 40 ns | 40 | 31 mm | 500 mA | USB + RS-232C | CJ2M-CPU12 |
| 2,560 | 5 K | 64 K | 40 ns | 40 | 31 mm | 500 mA | USB + RS-232C | CJ2M-CPU11 |
| 1,280 | 60 k | 128 k | 40 ns | 40 | 69 mm | 1,060 mA | Loop control engine (300 blocks) with Gradient Temperature Control | CJ1G-CPU45P-GTC |
| 1,280 | 60 k | 128 k | 40 ns | 40 | 69 mm | 1,060 mA | Loop control engine (300 blocks) | CJ1G-CPU45P |
| 1,280 | 30 k | 64 k | 40 ns | 40 | 69 mm | 1,060 mA | Loop control engine (300 blocks) | CJ1G-CPU44P |
| 960 | 20 k | 64 k | 40 ns | 30 | 69 mm | 1,060 mA | Loop control engine (300 blocks) | CJ1G-CPU43P |
| 960 | 10 k | 64 k | 40 ns | 30 | 69 mm | 1,060 mA | Loop control engine (50 blocks) | CJ1G-CPU42P |

## Accessories

| Description | Remarks | Order code |
|---|---|---|
| High-speed data collection and storage unit, with CF card slot and Ethernet port | CPU bus unit | CJ1W-SPU01-V2 |
| Pulse I/O option module for CJ2M CPU Units, 2 encoder inputs, 2 pulse outputs | NPN (sinking) outputs | CJ2M-MD211 |
| Pulse I/O option module for CJ2M CPU Units, 2 encoder inputs, 2 pulse outputs | PNP (sourcing) outputs | CJ2M-MD212 |
| CompactFlash memory card, 128 MB, for all models (not required for operation) | Industrial grade | HMC-EF183 |
| CompactFlash memory card, 256 MB, for all models (not required for operation) | Industrial grade | HMC-EF283 |
| CompactFlash memory card, 512 MB, for all models (not required for operation) | Industrial grade | HMC-EF583 |
| CompactFlash PC-Card adapter | – | HMC-AP001 |
| I/O terminal block (40-pt.) for CJ1M-CPU2_/CJ2M-MD21_ | Push-in | XW2R-P40G-T |
| I/O terminal block (40-pt.) for CJ1M-CPU2_/CJ2M-MD21_ | Clamp | XW2R-E40G-T |
| I/O terminal block (40-pt.) for CJ1M-CPU2_/CJ2M-MD21_ | M3 Screws | XW2R-J40G-T |
| Connection cable between I/O terminal block and CJ1M-CPU2_/CJ2M-MD21_ (_ _ _ _ = length in cm) | MIL (40 pt) | XW2Z-____FF-L |
| Servo unit terminal block for 1 axis | – | XW2B-20J6-8A |
| Servo unit terminal block for 2 axes | – | XW2B-40J6-9A |
| SMARTSTEP cable for CJ1M-CPU2_/CJ2M-MD21_, cable length: 1 m | – | XW2Z-100J-A26 |
| W-series servo cable for CJ1M-CPU2_/CJ2M-MD21_, cable length: 1 m | – | XW2Z-100J-A27 |
| CX-One, integrated software for programming and configuration of all Omron control system components | – | CX-ONE-AL__C-E |
| Connection cable, D-Sub 9-pin PC serial port to PLC peripheral port (length: 2.0 m) | – | CS1W-CN226 |
| Connection cable, D-Sub 9-pin PC serial port to PLC peripheral port (length: 6.0 m) | – | CS1W-CN626 |
| USB to serial conversion cable | – | CS1W-CIF31 |
| RS-232C Option Board*1 | – | CP1W-CIF01 |
| RS-422A/485 Option board*1 | – | CP1W-CIF11 |
| RS422A/485 (isolated) Option board*1 | – | CP1W-CIF12 |
| Battery Set*2 | – | CJ1W-BAT01 |
| USB Programming cable | – | CP1W-CN221 |

*1 Only used with CJ2M-CPU3_
*2 Included with the CPU unit

**Note:** -MIL = connector according to MIL-C-83503 (compatible with DIN 41651/IEC 60603-1).
-More accessories are available. Please refer to CJ-Series Data Sheets and Operation Manuals for details
For I/O Cables and Terminal Blocks, see page 72
For Ethernet Cables and Accessories, see page 81

## Power and flexibility

CJ systems can operate on 24 VDC power supply, or on 100 to 240 VAC mains. For small-scale systems with mainly digital I/O a low cost, small capacity power supply can be used. For systems with many analog I/Os and control/communication units, it may be necessary to use a larger power supply unit.
Depending on the CPU type, up to 3 expansions can be connected to the CPU 'rack', giving a total capacity of 40 I/O units. The total length of the expansion cables of one system may be up to 12 m.

## Ordering information

### Power supply

| Input range | Power consumption | Output capacity at 5 VDC | Output capacity at 24 VDC | Max. output power | Features | Width | Order code |
|---|---|---|---|---|---|---|---|
| 21.6 to 26.4 VDC | 35 W max. | 2.0 A | 0.4 A | 16.6 W | – | 27 mm | CJ1W-PD022 |
| 19.2 to 28.8 VDC | 50 W max. | 5.0 A | 0.8 A | 25 W | – | 60 mm | CJ1W-PD025 |
| 85 to 264 VAC 47 to 63 Hz | 50 VA max. | 2.8 A | 0.4 A | 14 W | – | 45 mm | CJ1W-PA202 |
| | 100 VA max. | 5.0 A | 0.8 A | 25 W | Run output (SPST relay) | 80 mm | CJ1W-PA205R |
| | | | | | Maintenance status display | 80 mm | CJ1W-PA205C |

**Note:** The CJ1W-PD022 has no galvanic isolation

### I/O expansion

| Type | Description | Width, Length | Order code |
|---|---|---|---|
| I/O control unit | Required unit on CPU 'rack' to connect I/O expansions | 20 mm | CJ1W-IC101 |
| I/O interface unit | Start unit for each I/O expansion 'rack'. Requires a power supply unit. | 31 mm | CJ1W-II101 |
| I/O expansion cable | Connects CJ1W-IC101 or -II101 to the next expansion rack's -II101 | 0.3 m | CS1W-CN313 |
| | | 0.7 m | CS1W-CN713 |
| | | 2.0 m | CS1W-CN223 |
| | | 3.0 m | CS1W-CN323 |
| | | 5.0 m | CS1W-CN523 |
| | | 10 m | CS1W-CN133 |
| | | 12 m | CS1W-CN133-B2 |

## 8 to 64 points per unit – input, output or mixed

Digital I/O units serve as the PLC's interface to achieve fast, reliable sequence control. A full range of units, from high-speed DC inputs to relay outputs, let you adapt CJ1 to your needs.
CJ1 units are available with various I/O densities and connection technologies. Up to 16 I/O points can be wired to units with detachable M3 screw terminals or screwless clamp terminals. High-density 32- and 64- point I/O units are equipped with standard 40-pin flat cable-connectors. Prefabricated cables and wiring terminals are available for easy interfacing to high-density I/O units.



## Ordering information

| Points | Type | Rated voltage | Rated current | Width | Remarks | Connection type*1 | Order code |
|---|---|---|---|---|---|---|---|
| 16 | AC input | 120 VAC | 7 mA | 31 mm | – | M3 | CJ1W-IA111 |
| 8 | AC input | 240 VAC | 10 mA | 31 mm | – | M3 | CJ1W-IA201 |
| 8 | DC input | 24 VDC | 10 mA | 31 mm | – | M3 | CJ1W-ID201 |
| 16 | DC input | 24 VDC | 7 mA | 31 mm | – | M3<br>Screwless | CJ1W-ID211<br>CJ1W-ID211(SL) |
| 16 | DC input | 24 VDC | 7 mA | 31 mm | Fast-response (15 µs ON, 90 µs OFF) | M3 | CJ1W-ID212 |
| 16 | DC input | 24 VDC | 7 mA | 31 mm | Inputs start interrupt tasks in PLC program | M3 | CJ1W-INT01 |
| 16 | DC input | 24 VDC | 7 mA | 31 mm | Latches pulses down to 50 µs pulse width | M3 | CJ1W-IDP01 |
| 32 | DC input | 24 VDC | 4.1 mA | 20 mm | – | 1 × Fujitsu | CJ1W-ID231 |
| 32 | DC input | 24 VDC | 4.1 mA | 20 mm | – | 1 × MIL*1 (40 pt) | CJ1W-ID232 |
| 32 | DC input | 24 VDC | 4.1 mA | 20 mm | Fast-response (15 µs ON, 90 µs OFF) | 1 × MIL*1 (40 pt) | CJ1W-ID233 |
| 64 | DC input | 24 VDC | 4.1 mA | 31 mm | – | 2 × Fujitsu | CJ1W-ID261 |
| 64 | DC input | 24 VDC | 4.1 mA | 31 mm | – | 2 × MIL*1 (40 pt) | CJ1W-ID262 |
| 8 | Triac output | 250 VAC | 0.6 mA | 31 mm | – | M3 | CJ1W-OA201 |
| 8 | Relay output | 250 VAC | 2 A | 31 mm | – | M3<br>Screwless | CJ1W-OC201<br>CJ1W-OC201(SL) |
| 16 | Relay output | 250 VAC | 2 A | 31 mm | – | M3<br>Screwless | CJ1W-OC211<br>CJ1W-OC211(SL) |
| 8 | DC output (sink) | 12 to 24 VDC | 2 A | 31 mm | – | M3 | CJ1W-OD201 |
| 8 | DC output (source) | 24 VDC | 2 A | 31 mm | With short-circuit protection, alarm | M3 | CJ1W-OD202 |
| 8 | DC output (source) | 24 VDC | 0.5 A | 31 mm | With short-circuit protection, alarm | M3 | CJ1W-OD204 |
| 16 | DC output (sink) | 12 to 24 VDC | 0.5 A | 31 mm | – | M3<br>Screwless | CJ1W-OD211<br>CJ1W-OD211 (SL) |
| 16 | DC output (source) | 24 VDC | 0.5 A | 31 mm | With short-circuit protection, alarm | M3<br>Screwless | CJ1W-OD212<br>CJ1W-OD212 (SL) |
| 16 | DC output (sink) | 24 VDC | 0.5 A | 31 mm | Fast-response (15 µs ON, 80 µs OFF) | M3 | CJ1W-OD213 |
| 32 | DC output (sink) | 12 to 24 VDC | 0.5 A | 20 mm | – | 1 × Fujitsu | CJ1W-OD231 |
| 32 | DC output (source) | 24 VDC | 0.3 A | 20 mm | With short-circuit protection, alarm | 1 × MIL*1 (40 pt) | CJ1W-OD232 |
| 32 | DC output (sink) | 24 VDC | 0.5 A | 20 mm | Fast-response (15 µs ON, 80 µs OFF) | 1 × MIL*1 (40 pt) | CJ1W-OD234 |
| 64 | DC output (sink) | 12 to 24 VDC | 0.3 A | 31 mm | – | 2 × Fujitsu | CJ1W-OD261 |
| 64 | DC output (source) | 24 VDC | 0.3 A | 31 mm | – | 2 × MIL*1 (40 pt) | CJ1W-OD262 |
| 16+16 | DC in+out (source) | 24 VDC | 0.5 A | 31 mm | – | 2 × MIL*1 (20 pt) | CJ1W-MD232 |
| 32+32 | DC in+out (sink) | 24 VDC | 0.3 A | 31 mm | – | 2 × MIL*1 (40 pt) | CJ1W-MD263 |
| 32+32 | DC in+out (TLL) | 5 VDC | 35 mA | 31 mm | – | 2 × MIL*1 (40 pt) | CJ1W-MD563 |

*1 MIL = connector according to MIL-C-83503 (compatible with DIN 41651/IEC 60603-1).

**Note:** All digital I/O units are designated as basic I/O units.
For I/O Cables and Terminal Blocks, see page 72

### Accessories

| Description | Connection type | Order code |
|---|---|---|
| Replacement 18-point screwless terminal blocks for I/O units, pack of 5 pcs. | Screwless | CJ-WM01-18P-5 |
| Replacement 18-point screw terminal blocks for I/O units, pack of 5 pcs. | M3 | CJ-OD507-18P-5 |

## From basic analog I/O to advanced temperature control

The CJ-series offers a wide choice of analog input units, fit for any application, from low-speed, multi-channel temperature measurement to high-speed, high-accuracy data acquisition. Analog outputs can be used for accurate control or external indication.
Advanced units with built-in scaling, filtering and alarm functions reduce the need for complex PLC programming. High-accuracy process I/O units support an extensive range of sensors, for fast and accurate data acquisition. Temperature control units relieve the PLC CPU of PID calculations and alarm monitoring. These functions are handled autonomously by the unit, offering control performance and auto-tuning functions similar to stand-alone temperature controllers.

## Ordering information

| Points | Type | Ranges | Resolution | Accuracy*1 | Conversion time | Width | Remarks | Connection type | Order code |
|---|---|---|---|---|---|---|---|---|---|
| 4 | Universal analog input | 0 to 5 V<br>1 to 5 V<br>0 to 10 V<br>0 to 20 mA<br>4 to 20 mA<br>K, J, T, L, R, S, B<br>Pt100, Pt1000,<br>JPt100 | V / I: 1/12,000<br>T/C: 0.1°C<br>RTD: 0.1°C | V: 0.3%<br>I: 0.3%<br>T/C: 0.3%<br>RTD: 0.3% | 250 ms/4 point | 31 mm | Universal inputs, with zero/span adjustment, configurable alarms, scaling, sensor error detection | M3 | CJ1W-AD04U |
| | | | | | | | | Screwless | CJ1W-AD04U(SL) |
| 4 | Analog input | 0 to 5 V,<br>0 to 10 V,<br>–10 to 10 V,<br>1 to 5 V,<br>4 to 20 mA | 1/8,000 | V: 0.2%<br>I: 0.4% | 250 µs/point | 31 mm | Offset/gain adjustment, peak hold, moving average, alarms | M3 | CJ1W-AD041-V1 |
| | | | | | | | | Screwless | CJ1W-AD041-V1 (SL) |
| 4 | High-speed analog input | 1 to 5 V,<br>0 to 10 V,<br>–5 to 5 V,<br>–10 to 10 V,<br>4 to 20 mA | 1/40,000 | V: 0.2%<br>I: 0.4% | 35 µs/4 points | 31 mm | Direct conversion (CJ2H special instruction) | M3 | CJ1W-AD042 |
| 8 | Analog input | 1 to 5 V,<br>0 to 5 V,<br>0 to 10 V,<br>–10 to 10 V,<br>4 to 20 mA | 1/8,000 | V: 0.2%<br>I: 0.4% | 250 µs/point | 31 mm | Offset/gain adjustment, peak hold, moving average, alarms | M3 | CJ1W-AD081-V1 |
| | | | | | | | | Screwless | CJ1W-AD081-V1 (SL) |
| 2 | Analog output | 0 to 5 V,<br>0 to 10 V,<br>–10 to 10 V,<br>1 to 5 V,<br>4 to 20 mA | 1/4,000 | V: 0.3%<br>I: 0.5% | 1 ms/point | 31 mm | Offset/gain adjustment, output hold | M3 | CJ1W-DA021 |
| | | | | | | | | Screwless | CJ1W-DA021 (SL) |
| 4 | Analog output | 1 to 5 V,<br>0 to 5 V,<br>0 to 10 V,<br>–10 to 10 V,<br>4 to 20 mA | 1/4,000 | V: 0.3%<br>I: 0.5% | 1 ms/point | 31 mm | Offset/gain adjustment, output hold | M3 | CJ1W-DA041 |
| | | | | | | | | Screwless | CJ1W-DA041 (SL) |
| 4 | High-speed analog output | 1 to 5 V,<br>0 to 10 V,<br>–10 to 10 V | 1/40,000 | 0.3% | 35 µs/4 points | 31 mm | Direct conversion (CJ2H special instruction) | M3 | CJ1W-DA042V |
| 8 | Voltage output | 0 to 5 V,<br>0 to 10 V,<br>–10 to 10 V,<br>1 to 5 V | 1/8,000 | 0.3% | 250 µs/point | 31 mm | Offset/gain adjustment, output hold | M3 | CJ1W-DA08V |
| | | | | | | | | Screwless | CJ1W-DA08V (SL) |
| 8 | Current output | 4 to 20 mA | 1/8,000 | 0.3% | 250 µs/point | 31 mm | Offset/gain adjustment, output hold | M3 | CJ1W-DA08C |
| | | | | | | | | Screwless | CJ1W-DA08C (SL) |
| 4 + 2 | Analog in + output | 1 to 5 V,<br>0 to 5 V,<br>0 to 10 V,<br>–10 to 10 V,<br>4 to 20 mA | 1/8,000 | in: 0.2%<br>out: 0.3% | 1 ms/point | 31 mm | Offset/gain adjustment, scaling, peak hold, moving average, alarms, output hold | M3 | CJ1W-MAD42 |
| | | | | | | | | Screwless | CJ1W-MAD42 (SL) |
| 4 | Universal analog input | DC voltage,<br>DC current,<br>Thermocouple,<br>Pt100/Pt1000,<br>potentiometer | 1/256,000 | 0.05% | 60 ms/4 points | 31 mm | All inputs individually isolated, configurable alarms, maintenance functions, user-defined scaling, zero/span adjustment | M3 | CJ1W-PH41U |
| 2 | Process input | 4 to 20 mA<br>0 to 20 mA<br>0 to 10 V,<br>–10 to 10 V,<br>0 to 5 V,<br>–5 to 5 V,<br>1 to 5 V,<br>0 to 1.25 V,<br>1.25 to 1.25 V | 1/64,000 | 0.05% | 5 ms/point | 31 mm | Configurable alarms, maintenance functions, user-defined scaling, zero/span adjustment, square root, totaliser | M3 | CJ1W-PDC15 |

| Points | Type | Ranges | Resolution | Accuracy*1 | Conversion time | Width | Remarks | Connection type | Order code |
|---|---|---|---|---|---|---|---|---|---|
| 2 | Thermocouple input | B, E, J, K, L, N, R, S, T, U, WRe5-26, PLII, –100 to 100 mV | 1/64,000 | 0.05% | 5 ms/point | 31 mm | Configurable alarms, maintenance functions | M3 | CJ1W-PTS15 |
| 4 | Thermocouple Input | B, J, K, L, R, S, T | 0.1°C | 0.3% | 62.5 ms/point | 31 mm | 4 configurable alarm outputs | M3 | CJ1W-PTS51 |
| 4 | Resistance thermometer input | Pt100, JPt100 | 0.1°C | 0.3% | 62.5 ms/point | 31 mm | 4 configurable alarm outputs | M3 | CJ1W-PTS52 |
| 6 | Thermocouple input | K-type (–200 to 1,300°C) J-Type (–100 to 850°C) | 0.1°C | 0.5% | 40 ms/point | 31 mm | Basic I/O unit, setup by DIP switches, adjustable filtering 10/50/60 Hz | M3 | CJ1W-TS561 |
| | | | | | | | | Screwless | CJ1W-TS561 (SL) |
| 6 | Resistance thermometer input | Pt100 (–200 to 650°C) Pt1000 (–200 to 650°C) | 0.1°C | 0.5% | 40 ms/point | 31 mm | Basic I/O unit, setup by DIP switches, adjustable filtering 10/50/60 Hz | M3 | CJ1W-TS562 |
| | | | | | | | | Screwless | CJ1W-TS562 (SL) |
| 4 | Temperature control loops, Thermocouple | B, J, K, L, R, S, T | 0.1°C | 0.3% | 500 ms total | 31 mm | 4 control outputs: PNP open collector, 100 mA max. | M3 | CJ1W-TC002 |
| 2 | Temperature control loops, Thermocouple | B, J, K, L, R, S, T | 0.1°C | 0.3% | 500 ms total | 31 mm | 2 control outputs: PNP open collector, 100 mA max., 2 current transformer inputs for heater burnout detection. | M3 | CJ1W-TC004 |
| 4 | Temperature control loops, RTD | Pt100, JPt100 | 0.1°C | 0.3% | 500 ms total | 31 mm | 4 control outputs: PNP open collector, 100 mA max. | M3 | CJ1W-TC102 |
| 2 | Temperature control loops, RTD | Pt100, JPt100 | 0.1°C | 0.3% | 500 ms total | 31 mm | 2 control outputs: PNP open collector, 100 mA max., 2 current transformer inputs for heater burnout detection. | M3 | CJ1W-TC104 |
| 1 | Load Cell Interface unit | 10 VDC or 2.5 VDC, max. four 350Ω load cells. | 24 bit, 0.1µV/count | Linearity error: <0.02% FS | 0.33 ms | 31 mm | Self-contained unit designed for fast weight and force measurement. Low-pass filter adjustable 3 Hz - 1 kHz. Made by Unipulse Co. | M3 | CJ1W-F130 |
| 1 | Weighing unit | 10 VDC, max. four 350Ω load cells | 24 bit, 0.3µV/count | Linearity error: <0.01% FS | 2 ms | 31 mm | Self-contained unit designed for feed weighing, discharge weighing, hopper scales, packing scales, bag filling, etc. Made by Unipulse Co. | M3 | CJ1W-F159 |

*1 Accuracy for Voltage and Current Inputs/Outputs as percentage of full scale and typical value at 25°C ambient temperature (Consult the operation manual for details)
Accuracy for Temperature Inputs/Outputs as percentage of process value and typical value at 25°C ambient temperature (Consult the operation manual for details)

**Note:** All Analog I/O units are designated as Special I/O units, except TS561/TS562, which are Basic I/O units (cannot be used with CP1H).

## Accessories

| Description | Connection type | Order code |
|---|---|---|
| Replacement 18-point screwless terminal blocks for I/O units, pack of 5 pcs. | Screwless | CJ-WM01-18P-5 |
| Replacement 18-point screw terminal blocks for I/O units, pack of 5 pcs. | M3 | CJ-OD507-18P-5 |

## Add motion control to any CJ-Series PLC

From simple position measurement to multi-axis synchronised motion control, the CJ-Series offers a full range of units:

- Counter units gather position information from SSI- or incremental encoders. Actual positions are compared with internally stored target values.
- CJ2M CPU Units have dedicated positioning functions that can be used by installing up to 2 Pulse I/O option modules.
- Position Control units are used for point-to-point positioning with servo drives or stepper motors. Target data and acceleration/deceleration curves can be adjusted on-the-fly.
- Position- and Motion Control units equipped with EtherCAT or MECHATROLINK-II interface can control multiple drives through a single high-speed link. Message routing through multiple communication layers allows the attached drives to be configured from any point in the control network.

## Ordering information

| Channels/ Axes | Type | Signal type | Unit class | Width | Remarks | Connection type | Order code |
|---|---|---|---|---|---|---|---|
| 2 | SSI inputs (absolute position data) | Synchronous serial protocol | Special I/O unit | 31 mm | Baud rate, encoding type, data length, etc. can be set per channel | M3 screw | CJ1W-CTS21-E |
| 2 | 500 kHz Counter | 24 V, line driver | Special I/O unit | 31 mm | 2 configurable digital inputs + outputs | 1 × Fujitsu (40 pt) | CJ1W-CT021 |
| 4 | 100 kHz Counter | Line driver, 24 V via terminal block | Special I/O unit | 31 mm | Target values trigger interrupt to CPU | 1 × MIL (40 pt) | CJ1W-CTL41-E |
| 1 | DC Motor Control unit | PWM (24 V/4 A) | Special I/O unit | 31 mm | 4 configurable digital inputs + 50 kHz counter input | 3 × Screwless | CJ1W-DCM11-E |
| 2 | Pulse I/O option module for CJ2M CPU | 24 V, line driver | CPU Option Module | 20 mm | 100 kpps encoder inputs and pulse outputs, NPN (sinking), interrupt / fast response inputs | 1 × MIL (40 pt) | CJ2M-MD211 |
| 2 | Pulse I/O option module for CJ2M CPU | 24 V, line driver | CPU Option Module | 20 mm | 100 kpps encoder inputs and pulse outputs, PNP (sourcing), interrupt / fast response inputs | 1 × MIL (40 pt) | CJ2M-MD212 |
| 1 | Position Control unit | 24 V open collector | Special I/O unit | 31 mm | 500 kpps pulse outputs, inputs for origin, limit switches, stop, interrupt | 1 × Fujitsu (40 pt) | CJ1W-NC113 |
| 2 | Position Control unit | 24 V open collector | Special I/O unit | 31 mm | 500 kpps pulse outputs, inputs for origin, limit switches, stop, interrupt | 1 × Fujitsu (40 pt) | CJ1W-NC213 |
| 4 | Position Control unit | 24 V open collector | Special I/O unit | 31 mm | 500 kpps pulse outputs, inputs for origin, limit switches, stop, interrupt | 2 × Fujitsu (40 pt) | CJ1W-NC413 |
| 2 | Position Control Unit High speed type | 24 V open collector | Special I/O Unit | 51 mm | 500 kpps pulse outputs, built-in feedback pulse counters, synchronous multi-axis control | MIL | CJ1W-NC214 |
| 4 | Position Control Unit High speed type | 24 V open collector | Special I/O Unit | 62 mm | 500 kpps pulse outputs, built-in feedback pulse counters, synchronous multi-axis control | MIL | CJ1W-NC414 |
| 2 | Position Control Unit | EtherCAT | CPU bus unit | 31 mm | Position, speed and torque control, access to all drive parameters | RJ45 | CJ1W-NC281 |
| 4 | Position Control Unit | EtherCAT | CPU bus unit | 31 mm | Position, speed and torque control, access to all drive parameters | RJ45 | CJ1W-NC481 |
| 4 | Position Control Unit | EtherCAT | CPU bus unit | 31 mm | Position, speed and torque control, access to all drive parameters, supports up to 64 general purpose EtherCAT slaves | RJ45 | CJ1W-NC482 |
| 8 | Position Control Unit | EtherCAT | CPU bus unit | 31 mm | Position, speed and torque control, access to all drive parameters | RJ45 | CJ1W-NC881 |
| 8 | Position Control Unit | EtherCAT | CPU bus unit | 31 mm | Position, speed and torque control, access to all drive parameters, supports up to 64 general purpose EtherCAT slaves | RJ45 | CJ1W-NC882 |
| 16 | Position Control Unit | EtherCAT | CPU bus unit | 31 mm | Position, speed and torque control, access to all drive parameters | RJ45 | CJ1W-NCF81 |
| 2 | Position Control Unit | MECHATROLINK-II | CPU bus unit | 31 mm | Position, speed and torque control, access to all drive parameters | ML-II | CJ1W-NC271 |
| 4 | Position Control Unit | MECHATROLINK-II | CPU bus unit | 31 mm | Position, speed and torque control, access to all drive parameters | ML-II | CJ1W-NC471 |
| 16 | Position Control unit | MECHATROLINK-II | CPU bus unit | 31 mm | Position, speed and torque control, access to all drive parameters | ML-II | CJ1W-NCF71 |
| 30 | Advanced Motion Control unit | MECHATROLINK-II, Encoder I/O, digital I/O | CPU bus unit | 49 mm | Trajexia Motion Controller on the CJ-series | ML-II, 9-pin D-Sub, screwless push-in | CJ1W-MCH72 |

**Note:** Line driver signal type units also available.

## Accessories

| Description | Connection type | Order code |
|---|---|---|
| Screwless terminal block for connecting 24 V or Line driver encoders to CJ1W-CTL41-E | Push-in | XW2G-40G7-E |
| General purpose I/O connection cable for I/O units with 40-pt. Fujitsu connector (_ _ _ _ = length in cm) | Fujitsu (40 pt.) to MIL (40 pt.) | XW2Z-_ _ _ _BF-L |
| General purpose I/O connection cable for I/O units with 40-pt. MIL connector (_ _ _ _ = length in cm) | 2 × MIL (40 pt) | XW2Z-_ _ _ _FF-L |
| Servo relay unit 1-Axis position control unit | – | XW2B-20J6-1B |
| Servo relay unit 2-Axes position control unit | – | XW2B-40J6-2B |
| Cable connecting servo relay unit to Position control unit CJ1W-NC113, cable length 1 m. For Accurax G5 servo drives. | – | XW2Z-100J-A14 |
| Cable connecting servo relay unit to Position control unit CJ1W-NC213/413, cable length 1 m. For Accurax G5 servo drives. | – | XW2Z-100J-A15 |
| Cable connecting servo relay unit to Position control unit CJ1W-NC113, cable length 1 m. For SmartStep 2 servo drives. | – | XW2Z-100J-A14 |
| Cable connecting servo relay unit to Position control unit CJ1W-NC213/413, cable length 1 m. For SmartStep 2 servo drives. | – | XW2Z-100J-A15 |
| Cable connecting servo relay unit to Position control unit CJ1W-NC133, cable length 1 m. For Accurax G5 servo drives. | – | XW2Z-100J-A18 |
| Cable connecting servo relay unit to Position control unit CJ1W-NC233/433, cable length 1 m. For Accurax G5 servo drives. | – | XW2Z-100J-A19 |
| Cable connecting servo relay unit to Position control unit CJ1W-NC133, cable length 1 m. For SmartStep 2 servo drives. | – | XW2Z-100J-A18 |
| Cable connecting servo relay unit to Position control unit CJ1W-NC233/433, cable length 1 m. For SmartStep 2 servo drives. | – | XW2Z-100J-A19 |
| Cable connecting servo relay unit to Accurax G5 servo drives, cable length 1 m. | – | XW2Z-100J-B25 |
| Cable connecting servo relay unit to SmartStep 2 servo drive, cable length 1 m. | – | XW2Z-100J-B29 |

**Note:** For General-purpose I/O Cables and Terminal Blocks, see page 72

## Open to any communication

The CJ-Series offers both standardised open networks interfaces, and cost-efficient high-speed proprietary network links. Datalinks between PLCs, or to higher-level information systems can be made using serial or Ethernet links, or the easy-to-use controller link network.
Omron supports the 2 major field networks, DeviceNet and PROFIBUS-DP. For high-speed field I/O, Omron's own CompoBus/S offers an unsurpassed ease of installation. Fully user-configurable serial and CAN-based communication can be used to emulate a variety of application-specific protocols. EtherNet/IP units provide data link functions to share large amounts of data between PLCs. The new PROFINET-IO controller together with the SmartSlice modular I/O system offers Ethernet based I/O with controller- and network redundancy.

## Ordering information

| Type | Ports | Data transfer | Protocols | Unit class | Width | Connection type | Order code |
|---|---|---|---|---|---|---|---|
| Serial | 2 × RS-232C | | CompoWay/F, Host link, NT link, Modbus, User-defined | CPU bus unit | 31 mm | 9-pin D-Sub | CJ1W-SCU21-V1 |
| Serial | 2 × RS-232C | High-speed | CompoWay/F, Host link, NT link, Modbus, User-defined | CPU bus unit | 31 mm | 9-pin D-Sub | CJ1W-SCU22 |
| Serial | 2 × RS-422A/RS-485 | | CompoWay/F, Host link, NT link, Modbus, User-defined | CPU bus unit | 31 mm | 9-pin D-Sub | CJ1W-SCU31-V1 |
| Serial | 2 × RS-422A/RS-485 | High-speed | CompoWay/F, Host link, NT link, Modbus, User-defined | CPU bus unit | 31 mm | 9-pin D-Sub | CJ1W-SCU32 |
| Serial | 1 × RS-232C + 1 × RS-422/RS-485 | | CompoWay/F, Host link, NT link, Modbus, User-defined | CPU bus unit | 31 mm | 9-pin D-Sub | CJ1W-SCU41-V1 |
| Serial | 1 × RS-232C + 1 × RS-422/RS-485 | High-speed | CompoWay/F, Host link, NT link, Modbus, User-defined | CPU bus unit | 31 mm | 9-pin D-Sub | CJ1W-SCU42 |
| Ethernet | 1 × 100 Base-Tx | | UDP, TCP/IP, FTP server,SMTP (e-mail), SNTP (time adjust), FINS routing, socket service | CPU bus unit | 31 mm | RJ45 | CJ1W-ETN21 |
| EtherNet/IP | 1 × 100 Base-Tx | | EtherNet/IP, UDP, TCP/IP, FTP server, SNTP, SNMP | CPU Bus unit | 31 mm | RJ45 | CJ1W-EIP21 |
| Controller link | 2-wire twisted pair | | Omron proprietary | CPU bus unit | 31 mm | 2-wire screw + GND | CJ1W-CLK23 |
| DeviceNet | 1 × CAN | | DeviceNet | CPU bus unit | 31 mm | 5-p detachable | CJ1W-DRM21 |
| PROFIBUS-DP | 1 × RS-485 (Master) | | DP, DPV1 | CPU bus unit | 31 mm | 9-pin D-Sub | CJ1W-PRM21 |
| PROFIBUS-DP | 1 × RS-485 (Slave) | | DP | Special I/O unit | 31 mm | 9-pin D-Sub | CJ1W-PRT21 |
| PROFINET-IO | 1 × 100 Base-Tx | | PROFINET-IO Controller, FINS/UDP | CPU Bus unit | 31 mm | RJ45 | CJ1W-PNT21 |
| CAN | 1 × CAN | | User-defined, supports 11-bit and 29-bit identifiers | CPU bus unit | 31 mm | 5-p detachable | CJ1W-CORT21 |
| CompoNet | 4-wire, data + power to slaves (Master) | | CompoNet (CIP-based) | Special I/O unit | 31 mm | 4-p detachable IDC or screw | CJ1W-CRM21 |
| CompoBus/S | 2-wire (Master) | | Omron proprietary | Special I/O unit | 20 mm | 2-wire screw + 2-wire power | CJ1W-SRM21 |

### Accessories

| Description | Connection type | Order code |
|---|---|---|
| RS-232C to RS-422/RS-485 signal converter. Mounts directly on serial port. | 9-pin D-sub to screw clamp terminals | CJ1W-CIF11 |
| Controller link PCI board with support software | PCI, wired CLK | 3G8F7-CLK23-E |
| Controller link repeater unit (wire to wire) | Screw - Screw | CS1W-RPT01 |
| Controller link repeater unit (wire to HPCF fiber) | Screw - HPCF connector | CS1W-RPT02 |
| Controller link repeater unit (wire to graded-index glass fiber) | Screw - ST connector | CS1W-RPT03 |
| PROFIBUS DP to RS-422/RS-485 Serial Gateway. User-configurable, with Omron protocols built-in. | 9-pin D-sub to screw clamp terminals | PRT1-SCU11 |
| PROFINET IO + ModBus/TCP to Modbus/RTU (RS-485) Gateway. | 3 × RJ45 to screw clamp terminals | EJ1N-HFU-ETN |

**Note:** For Ethernet Cables and Accessories, see page 81

## Fast and powerful CPUs for any task

Omron's CS1-series CPUs are available in two processor speeds, each in various memory capacities. Besides the basic CPU models, versions are available for dual redundant operation, supporting I/O hot-swapping. All CPUs have one dedicated board slot with a direct CPU-bus connection, in which a serial communication board or a loop control board can be mounted. All CPU units support IEC61131-3 structured text and ladder language.
Omron's extensive function block library helps to reduce your programming effort, while you can create your own function blocks to suit your specific needs.



## Ordering information

| Max. Digital I/O points | Program capacity | Data memory capacity | Logic execution speed | Max. I/O units | Additional functions | Order code |
|---|---|---|---|---|---|---|
| 5120 | 250K steps | 448K words | 20 ns | 80 | – | CS1H-CPU67H |
| | | | | 71 | Supports duplex power supply and I/O hot-swapping | CS1D-CPU67S |
| | | | | 68 | CPU for full dual-redundancy | CS1D-CPU67H |
| | | | | | CPU for full dual-redundancy, with loop control board | CS1D-CPU67P |
| | 120K steps | 256K words | | 80 | – | CS1H-CPU66H |
| | 60K steps | 128K words | | 80 | – | CS1H-CPU65H |
| | | | | 71 | Supports duplex power supply and I/O hot-swapping | CS1D-CPU65S |
| | | | | 68 | CPU for full dual-redundancy | CS1D-CPU65H |
| | | | | | CPU for full dual-redundancy, with loop control board | CS1D-CPU65P |
| | 30K steps | 64K words | | 80 | – | CS1H-CPU64H |
| | 20K steps | | | | – | CS1H-CPU63H |
| | 60K steps | | 40 ns | | – | CS1G-CPU45H |
| 1280 | 30K steps | | | 40 | – | CS1G-CPU44H |
| | | | | 35 | Supports duplex power supply and I/O hot-swapping | CS1D-CPU44S |
| 960 | 20K steps | | | 30 | – | CS1G-CPU43H |
| | 10K steps | | | | – | CS1G-CPU42H |
| | | | | 26 | Supports duplex power supply and I/O hot-swapping | CS1D-CPU42S |

### Accessories

| Description | Remarks | Order code |
|---|---|---|
| High-speed data collection and storage unit, with CF card slot and Ethernet port | CPU bus unit | CS1W-SPU01-V2 |
| High-speed data collection and storage unit, with CF card slot and 2 Ethernet ports | CPU bus unit | CS1W-SPU02-V2 |
| Duplex unit, required for CS1D-CPU6_H systems | – | CS1D-DPL01 |
| Serial communication option board, 2 x RS-232C | – | CS1W-SCB21-V1 |
| Serial communication option board, 1 x RS-232C + 1 x RS422/RS-485 | – | CS1W-SCB41-V1 |
| Loop control option board | 50 control blocks max. | CS1W-LCB01 |
| Loop control option board | 300 control blocks max. | CS1W-LCB05 |
| Replacement battery set, for all CS1 CPUs | – | CS1W-BAT01 |
| Compact Flash memory card, 128 MB, for all models (not required for operation) | Industrial grade | HMC-EF183 |
| Compact Flash memory card, 256 MB, for all models (not required for operation) | Industrial grade | HMC-EF283 |
| Compact Flash memory card, 512 MB, for all models (not required for operation) | Industrial grade | HMC-EF583 |
| Compact Flash PC-Card adapter | – | HMC-AP001 |
| CX-One, integrated software for programming and configuration of all Omron control system components | – | CX-ONE-AL__C-E |
| Connection cable, D-Sub 9-pin PC serial port to PLC peripheral port | length: 2.0 m | CS1W-CN226 |
| Connection cable, D-Sub 9-pin PC serial port to PLC peripheral port | length: 6.0 m | CS1W-CN626 |
| USB to serial conversion cable | – | CS1W-CIF31 |

## Expand with up to 7 racks

CS1 systems can operate on 24 VDC power supply, or on 100-240 VAC mains. For small-scale systems with mainly digital I/O a low cost, small capacity power supply can be used. For systems with many analog I/Os and control/communication units, it may be necessary to use a larger power supply unit.
PLC racks are available in several sizes, from 2 to 10 slots wide. Special backplanes are required for duplex systems. Depending on the CPU type, up to 7 expansions can be connected to the CPU rack, giving a total capacity of 80 I/O units. The total length of the expansion cables of one system may be up to 12 m.

## Ordering information

### Power supplies

| Input range | Power consumption | Output capacity 5 VDC | Output capacity 26 VDC | Max. output power | Extra functions | Order code |
|---|---|---|---|---|---|---|
| 19.2 to 28.8 VDC | 40 W max. | 6.6 A | 0.62 A | 30 W | – | C200HW-PD024 |
| | | 4.3 A | 0.56 A | 28 W | Power supply for dual-redundant system | CS1D-PD024 |
| | 55 VA max. | 5.3 A | 1.3 A | 40 W | – | C200HW-PD025 |
| | | | | | Power supply for dual-redundant system | CS1D-PD025 |
| 85 to 264 VAC 50/60 Hz | 120 VA max. | 4.6 A | 0.62 A | 30 W | Maintenance status display | C200HW-PA204C |
| 85 to 132 VAC, 170 to 264 VAC, 50/60 Hz | | | | | – | C200HW-PA204 |
| | | | | | Service output 24 VDC, 0.8 A | C200HW-PA204S |
| | | | | | Run status output (SPST relay) | C200HW-PA204R |
| | 180 VA max. | 9.0 A | 1.3 A | 45 W | Run status output (SPST relay) | C200HW-PA209R |
| | 150 VA max. | 7.0 A | 1.3 A | 35 W | Power supply for dual-redundant system | CS1D-PA207R |

### Backplanes

| Type | Slots | Expansion connector | Width | Special functions | Order code |
|---|---|---|---|---|---|
| CPU backplane | 2 | No | 200 mm | – | CS1W-BC023 |
| CPU backplane | 3 | Yes | 260 mm | – | CS1W-BC033 |
| CPU backplane | 5 | Yes | 330 mm | – | CS1W-BC053 |
| CPU backplane | 8 | Yes | 435 mm | – | CS1W-BC083 |
| CPU backplane | 10 | Yes | 505 mm | – | CS1W-BC103 |
| Expansion backplane | 3 | Yes | 260 mm | – | CS1W-BI033 |
| Expansion backplane | 5 | Yes | 330 mm | – | CS1W-BI053 |
| Expansion backplane | 8 | Yes | 435 mm | – | CS1W-BI083 |
| Expansion backplane | 10 | Yes | 505 mm | – | CS1W-BI103 |
| CPU backplane | 5 | Yes | 505 mm | For Duplex CPU + Power supplies | CS1D-BC052 |
| CPU backplane | 8 | Yes | 505 mm | For Duplex Power supplies | CS1D-BC082S |
| Expansion backplane | 9 | Yes | 505 mm | For Duplex Power supplies | CS1D-BI092 |

### Accessories

| Type | Remarks | Order code |
|---|---|---|
| I/O Expansion cable to connect CS1 CPU backplane or Expansion backplane to next Expansion backplane. | 0.3 m | CS1W-CN313 |
| | 0.7 m | CS1W-CN713 |
| | 2.0 m | CS1W-CN223 |
| | 3.0 m | CS1W-CN323 |
| | 5.0 m | CS1W-CN523 |
| | 10.0 m | CS1W-CN133 |
| | 12.0 m | CS1W-CN133-B2 |

## Up to 96 I/O points per unit – input, output or mixed

Digital I/O units serve as the PLC's interface to achieve fast, reliable sequence control. A full range of units, from high-speed DC inputs to relay outputs, let you adapt CS1 to your needs.
CS1 units are available with various I/O densities and connection technologies. Up to 16 I/O points can be wired to units with detachable M3 screw terminals directly. High-density 32- and 64- point I/O units are equipped with standard 40-pin connectors. Prefabricated cables and wiring terminals are available for easy interfacing to high-density I/O units.



## Ordering information

| Points | Type | Rated voltage | Rated current | Remarks | Connection type | Order code*1 |
|---|---|---|---|---|---|---|
| 16 | AC or DC input | 120 VAC or VDC | 10 mA | – | M3 | CS1W-IA111 |
| 16 | AC input | 240 VAC | 10 mA | – | M3 | CS1W-IA211 |
| 16 | DC input | 24 VDC | 7 mA | – | M3 | CS1W-ID211 |
| 16 | DC input | 24 VDC | 7 mA | Inputs start interrupt tasks in PLC program | M3 | CS1W-INT01 |
| 16 | DC input | 24 VDC | 7 mA | Latches pulses down to 50 µs pulse width | M3 | CS1W-IDP01 |
| 32 | DC input | 24 VDC | 6 mA | – | 1 × 40 pt Fujitsu | CS1W-ID231 |
| 64 | DC input | 24 VDC | 6 mA | – | 2 × 40 pt Fujitsu | CS1W-ID261 |
| 96 | DC input | 24 VDC | 5 mA | – | 2 × 56 pt Fujitsu | CS1W-ID291 |
| 8 | Triac output | 250 VAC | 1.2 A | – | M3 | CS1W-OA201 |
| 16 | Triac output | 250 VAC | 0.5 A | – | M3 | CS1W-OA211 |
| 8 | Relay output | 250 VAC | 2.0 A | – | M3 | CS1W-OC201 |
| 16 | Relay output | 250 VAC | 2.0 A | – | M3 | CS1W-OC211 |
| 16 | DC output (sink) | 12 to 24 VDC | 0.5 A | – | M3 | CS1W-OD211 |
| 16 | DC output (source) | 24 VDC | 0.5 A | With short-circuit protection, alarm | M3 | CS1W-OD212 |
| 32 | DC output (sink) | 12 to 24 VDC | 0.5 A | – | 1 × 40 pt Fujitsu | CS1W-OD231 |
| 32 | DC output (source) | 24 VDC | 0.5 A | With short-circuit protection, alarm | 1 × 40 pt Fujitsu | CS1W-OD232 |
| 64 | DC output (sink) | 12 to 24 VDC | 0.3 A | – | 2 × 40 pt Fujitsu | CS1W-OD261 |
| 64 | DC output (source) | 24 VDC | 0.3 A | With short-circuit protection, alarm | 2 × 40 pt Fujitsu | CS1W-OD262 |
| 96 | DC output (sink) | 12 to 24 VDC | 0.1 A | – | 2 × 56 pt Fujitsu | CS1W-OD291 |
| 96 | DC output (source) | 24 VDC | 0.1 A | – | 2 × 56 pt Fujitsu | CS1W-OD292 |
| 32+32 | DC output (sink) | 12 to 24 VDC | 0.3 A | – | 2 × 40 pt Fujitsu | CS1W-MD261 |
| 32+32 | DC in+out (source) | 24 VDC | 0.3 A | With short-circuit protection, alarm | 2 × 40 pt Fujitsu | CS1W-MD262 |
| 48+48 | DC output (sink) | 12 to 24 VDC | 0.1 A | – | 2 × 56 pt Fujitsu | CS1W-MD291 |
| 48+48 | DC in+out (source) | 12 to 24 VDC | 0.1 A | – | 2 × 56 pt Fujitsu | CS1W-MD292 |

*1 C200H I/O units can also be mounted, except on CS1D systems.

**Note:** All Digital I/O units are designated as Basic I/O units.

### Accessories

| Description | Connection type | Order code |
|---|---|---|
| Connection cable between I/O terminal block and I/O unit with 40-pt Fujitsu connector ( _ _ _ = length in cm) | Fujitsu (40pt) | XW2Z-___B |
| I/O terminal block for input unit with 40-pt Fujitsu connector | Push-in | XW2R-P34G-C1 |
| I/O terminal block for output unit with 40-pt Fujitsu connector | Push-in | XW2R-P34G-C3 |
| I/O terminal block for input unit with 40-pt Fujitsu connector | Clamp | XW2R-E34G-C1 |
| I/O terminal block for output unit with 40-pt Fujitsu connector | Clamp | XW2R-E34G-C3 |
| I/O terminal block for input unit with 40-pt Fujitsu connector | M3 Screws | XW2R-J34G-C1 |
| I/O terminal block for output unit with 40-pt Fujitsu connector | M3 Screws | XW2R-J34G-C3 |

**Note:** For I/O Cables and Terminal Blocks, see page 72

## From basic analog I/O to process control

CS1 offers a wide choice of analog input units, fit for any application, from low-speed, multi-channel temperature measurement to high-speed, high-accuracy data acquisition. Analog outputs can be used for accurate control or external indication. Advanced units with built-in scaling, filtering and alarm functions reduce the need for complex PLC programming. High-accuracy process I/O units support an extensive range of sensors, for fast and accurate data acquisition. All process and temperature I/O units provide isolation between all individual channels.

## Ordering information

| Points | Type | Ranges | Resolution | Accuracy*1 | Conversion time | Remarks | Connection type | Order code |
|---|---|---|---|---|---|---|---|---|
| 4 | Analog input | 0 to 5 V, 0 to 10 V, –10 to 10 V, 1 to 5 V, 4 to 20 mA | 1/8,000 | V: 0.2% of PV I: 0.4% of PV | 250 µs/point | Offset/gain adjustment, peak hold, moving average, alarms | M3 | CS1W-AD041-V1 |
| 8 | Analog input | | | | | | M3 | CS1W-AD081-V1 |
| 16 | Analog input | | | 0.2% of PV | | | 2 × MIL (34p.) | CS1W-AD161 |
| 4 | Analog output | 0 to 5 V, 0 to 10 V, –10 to 10 V, 1 to 5 V, 4 to 20 mA | 1/4,000 | V: 0.3% of PV I: 0.5% of PV | 1 ms/point | Offset/gain adjustment | M3 | CS1W-DA041 |
| 8 | Voltage output | 0 to 5 V, 0 to 10 V, –10 to 10 V, 1 to 5 V | | 0.3% of PV | | Offset/gain adjustment, output hold | M3 | CS1W-DA08V |
| 8 | Current output | 4 to 20 mA | | 0.5% of PV | | | M3 | CS1W-DA08C |
| 4 + 4 | Analog in + output | 0 to 5 V, 0 to 10 V, –10 to 10 V, 1 to 5 V (4 to 20 mA input) | 1/8,000 | V in: 0.2% of PV I in: 0.4% of PV out: 0.3% of PV | 1 ms/point | Offset/gain adjustment, scaling, peak hold, moving average, alarms, output hold | M3 | CS1W-MAD44 |
| 4 | Process input | 4 to 20 mA, 0 to 20 mA, 0 to 10 V, –10 to 10 V, 0 to 5 V, –5 to 5 V, 1 to 5 V, 1 to 1.25 V, –1.25 to 1.25 V | 1/64,000 | 0.05% of PV | 5 ms/point | Configurable alarms, maintenance functions, user-defined scaling, zero/span adjustment, square root, totaliser. | M3 | CS1W-PDC11 |
| 8 | Process input | –10 to 10 V, 0 to 5 V, 1 to 5 V, 4 to 20 mA | 1/16,000 | 0.3% of PV | 62.5 ms/point | Configurable alarms, zero/span adjustment, square root | M3 | CS1W-PDC55 |
| 4 | Thermocouple input | B, E, J, K, L, N, R, S, T, U, WRe5-26, PLII, –100 to 100 mV | 1/64,000 | 0.05% of PV | 5 ms/point | Configurable alarms (absolute + rate-of-change), peak hold, maintenance functions | M3 | CS1W-PTS11 |
| 4 | Resistance thermometer input | Pt50, Pt100 JPt100, Ni508.4 | 1/64,000 | 0.05% of PV | 5 ms/point | Configurable alarms (absolute + rate-of-change), peak hold, maintenance functions | M3 | CS1W-PTS12 |
| 4 | Thermocouple input | B, J, K, L, R, S, T | 0.1°C | 0.3% of PV | 62.5 ms/point | 4 configurable alarm outputs | M3 | CS1W-PTS51 |
| 4 | Resistance thermometer input | Pt100, JPt100 | 0.1°C | 0.3% of PV | 62.5 ms/point | 4 configurable alarm outputs | M3 | CS1W-PTS52 |
| 8 | Thermocouple input | B, J, K, L, R,S, T | 0.1°C | 0.3% of PV | 31.2 ms/point | Configurable alarms per channel | M3 | CS1W-PTS55 |
| 8 | Resistance thermometer input | Pt100, JPt100 | 0.1°C | 0.3% of PV | 31.2 ms/point | Configurable alarms per channel | M3 | CS1W-PTS56 |
| 4 | 2-Wire transmitter input | 1 to 5 V, 4 to 20 mA | 1/4,096 | 0.2% of FS | 25 ms/point | Built-in power supply for transmitter, configurable alarms, square root, rate-of-change, etc. | M3 | CS1W-PTW01 |
| 8 | Power transducer input | –1 to 1 mA, 0 to 1 mA | 1/4,096 | 0.2% of FS | 25 ms/point | Inrush current limiter, configurable alarms, averaging, etc. | M3 | CS1W-PTR01 |
| 8 | Power transducer input | –100 to 100 mV, 0 to 100 mV | 1/4,096 | 0.2% of FS | 25 ms/point | Inrush current limiter, configurable alarms, averaging, etc. | M3 | CS1W-PTR02 |
| 4 | Pulse rate input | 20000 pps, voltage, open collector, contact | up to 1/32,000 | – | 25 ms/point | Averaging, totaliser | M3 | CS1W-PPS01 |

| Points | Type | Ranges | Resolution | Accuracy*1 | Conversion time | Remarks | Connection type | Order code |
|---|---|---|---|---|---|---|---|---|
| 4 | Isolated control output | 1 to 5 V,<br>4 to 20 mA | 1/4,000 | I: 0.1% of FS<br>V: 0.2% of FS | 25 ms/point | Output readback, high/low/rate limiting, disconnection alarm, zero/span adjustment | M3 | CS1W-PMV01 |
| 4 | Isolated control output | –10 to 10 V,<br>0 to 10 V,<br>–5 to 5 V,<br>0 to 5 V,<br>–1 to 1 V,<br>0 to 1 V | 1/4,000 | 0.1% of FS | 10 ms/point | High/low/rate limiting, output hold, zero/span adjustment | M3 | CS1W-PMV02 |

*1 Accuracy for Voltage and Current Inputs/Outputs as percentage of full scale and typical value at 25°C ambient temperature (Consult the operation manual for details)
Accuracy for Temperature Inputs/Outputs as percentage of process value and typical value at 25°C ambient temperature (Consult the operation manual for details)

**Note:** All analog I/O units are designated as special I/O units

## Add motion control to any CS1 PLC

From simple position measurement to multi-axis synchronised motion control, CS1 offers a full range of units:

- Counter units gather position information from SSI- or incremental encoders. Actual positions are compared with internally stored target values.
- Position control units are used for point-to-point positioning with servo drives or stepper motors. Target data and acceleration/deceleration curves can be adjusted on-the-fly.
- Position- and motion control units equipped with MECHATROLINK-II interface can control multiple drives through a single high-speed link. Message routing through multiple communication layers allows the attached drives to be configured from any point in the control network.

## Ordering information

| Channels/ Axes | Type | Signal type | Unit class | Remarks | Connection type | Order code |
|---|---|---|---|---|---|---|
| 2 | SSI inputs (absolute position data) | Synchronous serial protocol | Special I/O unit | Baud rate, encoding type, data length, etc. can be set per channel 2 digital outputs, NPN/PNP selectable. | M3 screw | CS1W-CTS21 |
| 2 | 500 kHz Counter | 24 V, 12 V, line driver | Special I/O unit | 4 configurable digital inputs + 4 configurable digital outputs Target values trigger interrupt to CPU | 1 × Fujitsu (40 pt) | CS1W-CT021 |
| 4 | | | | | 2 × Fujitsu (40 pt) | CS1W-CT041 |
| 1 | Position control unit | 24 V open collector | Special I/O unit | 500 kpps pulse outputs, inputs for origin, limit switches, stop, interrupt | 1 × Fujitsu (40 pt) | CS1W-NC113 |
| 2 | Position control unit | 24 V open collector | Special I/O unit | 500 kpps pulse outputs, inputs for origin, limit switches, stop, interrupt | 1 × Fujitsu (40 pt) | CS1W-NC213 |
| 4 | Position control unit | 24 V open collector | Special I/O unit | 500 kpps pulse outputs, inputs for origin, limit switches, stop, interrupt | 2 × Fujitsu (40 pt) | CS1W-NC413 |
| 1 | Position control unit | Line driver | Special I/O unit | 500 kpps pulse outputs, inputs for origin, limit switches, stop, interrupt | 1 × Fujitsu (40 pt) | CS1W-NC133 |
| 2 | Position control unit | Line driver | Special I/O unit | 500 kpps pulse outputs, inputs for origin, limit switches, stop, interrupt | 1 × Fujitsu (40 pt) | CS1W-NC233 |
| 4 | Position control unit | Line driver | Special I/O unit | 500 kpps pulse outputs, inputs for origin, limit switches, stop, interrupt | 2 × Fujitsu (40 pt) | CS1W-NC433 |
| 2 | Motion control unit | Analog | Special I/O unit | Closed loop with automatic trapezoid or S-curve acceleration/deceleration | Snap-on connectors (3M) | CS1W-MC221-V1 |
| 4 | Motion control unit | Analog | Special I/O unit | Closed loop with automatic trapezoid or S-curve acceleration/deceleration | Snap-on connectors (3M) | CS1W-MC421-V1 |

### Accessories

| Description | Connection type | Order code |
|---|---|---|
| Servo relay unit 1-Axis position control unit | – | XW2B-20J6-1B |
| Servo relay unit 2-Axes position control unit | – | XW2B-40J6-2B |
| Cable connecting servo relay unit to Position control unit CS1W-NC113, cable length 1 m. For Accurax G5 servo drives. | – | XW2Z-100J-A6 |
| Cable connecting servo relay unit to Position control unit CS1W-NC213/413, cable length 1 m. For Accurax G5 servo drives. | – | XW2Z-100J-A7 |
| Cable connecting servo relay unit to Position control unit CS1W-NC113, cable length 1 m. For SmartStep 2 servo drives. | – | XW2Z-100J-A6 |
| Cable connecting servo relay unit to Position control unit CS1W-NC213/413, cable length 1 m. For SmartStep 2 servo drives. | – | XW2Z-100J-A7 |
| Cable connecting servo relay unit to Position control unit CS1W-NC133, cable length 1 m. For Accurax G5 servo drives. | – | XW2Z-100J-A10 |
| Cable connecting servo relay unit to Position control unit CS1W-NC233/433, cable length 1 m. Accurax G5 servo drives. | – | XW2Z-100J-A11 |
| Cable connecting servo relay unit to Position control unit CS1W-NC133, cable length 1 m. For SmartStep 2 servo drives. | – | XW2Z-100J-A10 |
| Cable connecting servo relay unit to Position control unit CS1W-NC233/433, cable length 1 m. For SmartStep 2 servo drives. | – | XW2Z-100J-A11 |
| Cable connecting servo relay unit to Accurax G5 servo drives, cable length 1 m. | – | XW2Z-100J-B25 |
| Cable connecting servo relay unit to SmartStep 2 servo drive, cable length 1 m. | – | XW2Z-100J-B29 |

**Note:** For General-purpose I/O Cables and Terminal Blocks, see page 72

## Open to any communication, standard or user-defined

CS1 provides both standardised open networks interfaces, and cost efficient, high-speed proprietary network links. Datalinks between PLCs, or to higher-level information systems can be made using Serial or Ethernet links, or the easy-to-use Controller Link network.
Omron supports the 2 major field networks, DeviceNet and PROFIBUS-DP. For high-speed field I/O, Omron's own CompoBus/S offers an unsurpassed ease of installation. Fully user-configurable serial and CAN-based communication can be used to emulate a variety of application-specific protocols. EtherNet/IP units provide data link functions to share large amounts of data between PLCs. The PROFINET-IO controller together with the SmartSlice modular I/O system offers ethernet-based I/O with controller- and network redundancy.



## Ordering information

| Type | Ports | Protocols | Unit class | Remarks | Connection type | Order code |
|---|---|---|---|---|---|---|
| Serial | 2 × RS-232C | CompoWay/F, Host Link, NT link, Modbus, User-defined | CPU bus unit | – | 9-pin D-Sub | CS1W-SCU21-V1 |
| Serial | 2 × RS-232C/RS-485 | CompoWay/F, Host Link, NT link, Modbus, User-defined | CPU bus unit | – | 9-pin D-Sub | CS1W-SCU31-V1 |
| Serial | 2 × RS-232C | CompoWay/F, Host Link, NT link, Modbus, User-defined | CPU option board | – | 9-pin D-Sub | CS1W-SCB21-V1 |
| Serial | 1 × RS-232C + 1 × RS-422/RS-485 | CompoWay/F, Host Link, NT link, Modbus, User-defined | CPU option board | – | 9-pin D-Sub | CS1W-SCB41-V1 |
| GP-IB | Master/Slave selectable | GP-IB instrument communication | Special I/O unit | – | GP-IB | CS1W-GPI01 |
| Ethernet | 1 × 100 Base-Tx | UDP, TCP/IP, FTP server, SMTP (e-mail), SNTP (time adjust), FINS routing, socket service | CPU bus unit | – | RJ45 | CS1W-ETN21 |
| Controller link | 2-wire twisted pair | Omron proprietary | CPU bus unit | – | 2-wire screw + GND | CS1W-CLK23 |
| | Optical HPCF | | | – | 2 × HPCF connector | CS1W-CLK13 |
| | Optical graded-index fiber | | | – | 4 × ST connector | CS1W-CLK53 |
| EtherNet/IP | 1 × 100 Base-Tx | EtherNet/IP, UDP, TCP/IP, FTP server, SNTP, SNMP | CPU Bus unit | 31 mm | RJ45 | CS1W-EIP21 |
| DeviceNet | 1 × CAN | DeviceNet | CPU bus unit | – | 5-p detachable | CS1W-DRM21-V1 |
| CompoNet | 4-wire, data + power to slaves (Master) | CompoNet (CIP-based) | Special I/O unit | – | 4-p detachable IDC or screw | CS1W-CRM21 |
| CompoBus/S | 2-wire (Master) | Omron proprietary | Special I/O unit | – | 2-wire screw + 2-wire power | CS1W-SRM21 |
| PROFIBUS-DP | 1 × RS-485 (Master) | DP, DPV1 | CPU bus unit | – | 9-pin D-Sub | CS1W-PRM21 |
| CAN | 1 × CAN | CANopen, User-defined | CPU bus unit | – | 5-p detachable | CS1W-CORT21 |
| PROFINET IO | 1 × 100 Base-Tx PROFINET IO controller | FINS UDP | CPU bus unit | – | RJ45 | CS1W-PNT21 |
| PROFIBUS-DP | 1 × RS-485 (Slave) | DP | C200H special I/O unit | C200H units cannot be used on CS1D systems | 9-pin D-Sub | C200HW-PRT21 |

### Accessories

| Description | Connection type | Order code |
|---|---|---|
| RS-232C to RS-422/RS-485 signal converter. Mounts directly on serial port. | 9-pin D-sub to screw clamp terminals | CJ1W-CIF11 |
| Controller link PCI board with support software | PCI, wired CLK | 3G8F7-CLK23-E |
| Controller link PCI board with support software | PCI, HPCF connectors | 3G8F7-CLK13-E |
| Controller link PCI board with support software | PCI, ST connectors | 3G8F7-CLK53-E |
| Controller link repeater unit (wire to wire) | Screw - Screw | CS1W-RPT01 |
| Controller link repeater unit (wire to HPCF fiber) | Screw - HPCF connector | CS1W-RPT02 |
| Controller link repeater unit (wire to graded-index glass fiber) | Screw - ST connector | CS1W-RPT03 |
| PROFIBUS DP to RS-422/RS-485 Serial Gateway. User-configurable, with Omron protocols built-in. | 9-pin D-sub to screw clamp terminals | PRT1-SCU11 |
| PROFINET IO + ModBus/TCP to Modbus/RTU (RS-485) Gateway. | 3 × RJ45 to screw clamp terminals | EJ1N-HFU-ETN |

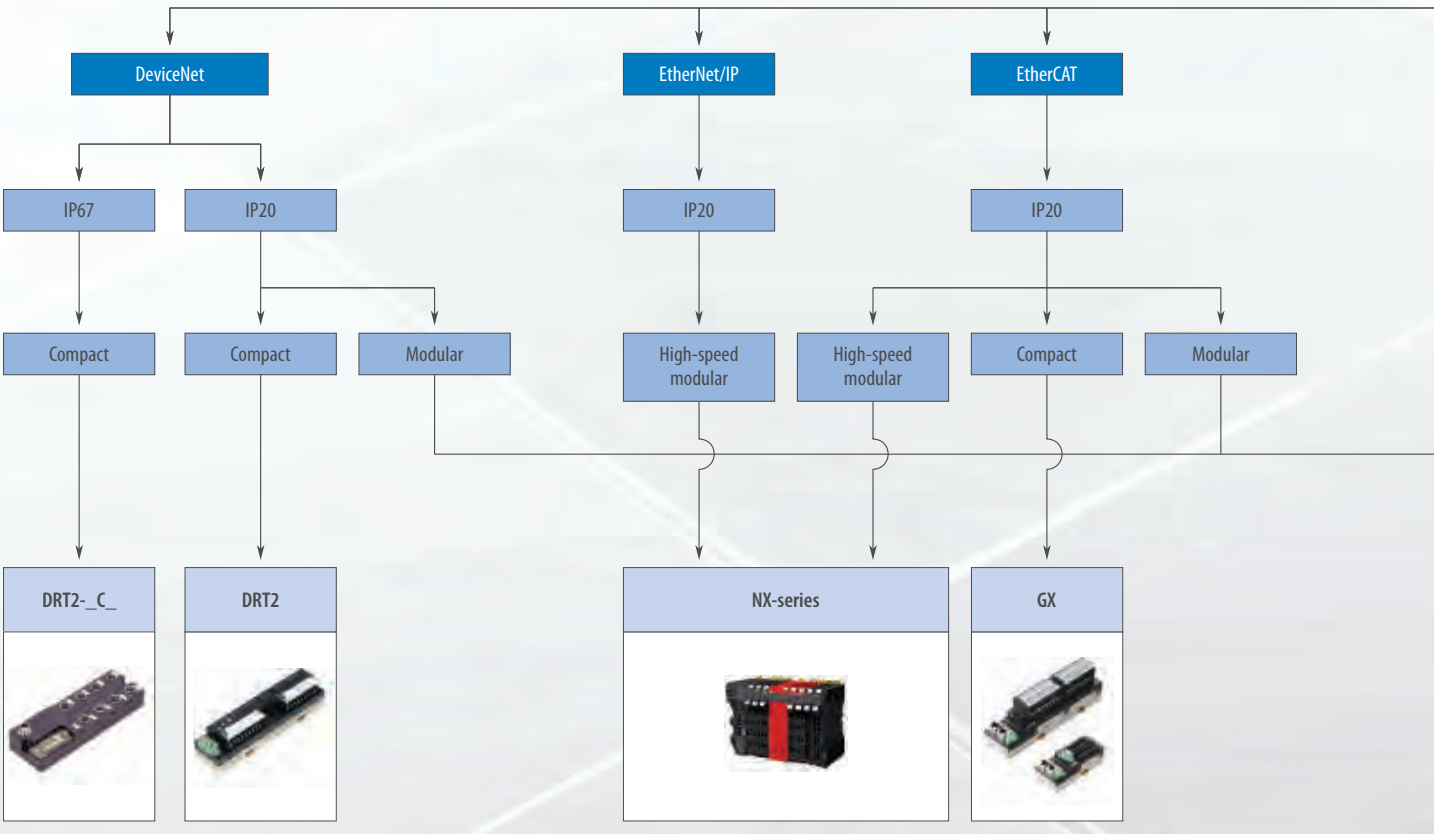
**Note:** For Ethernet Cables and Accessories, see page 81

# I/O SYSTEMS TO MEET EVERY NEED

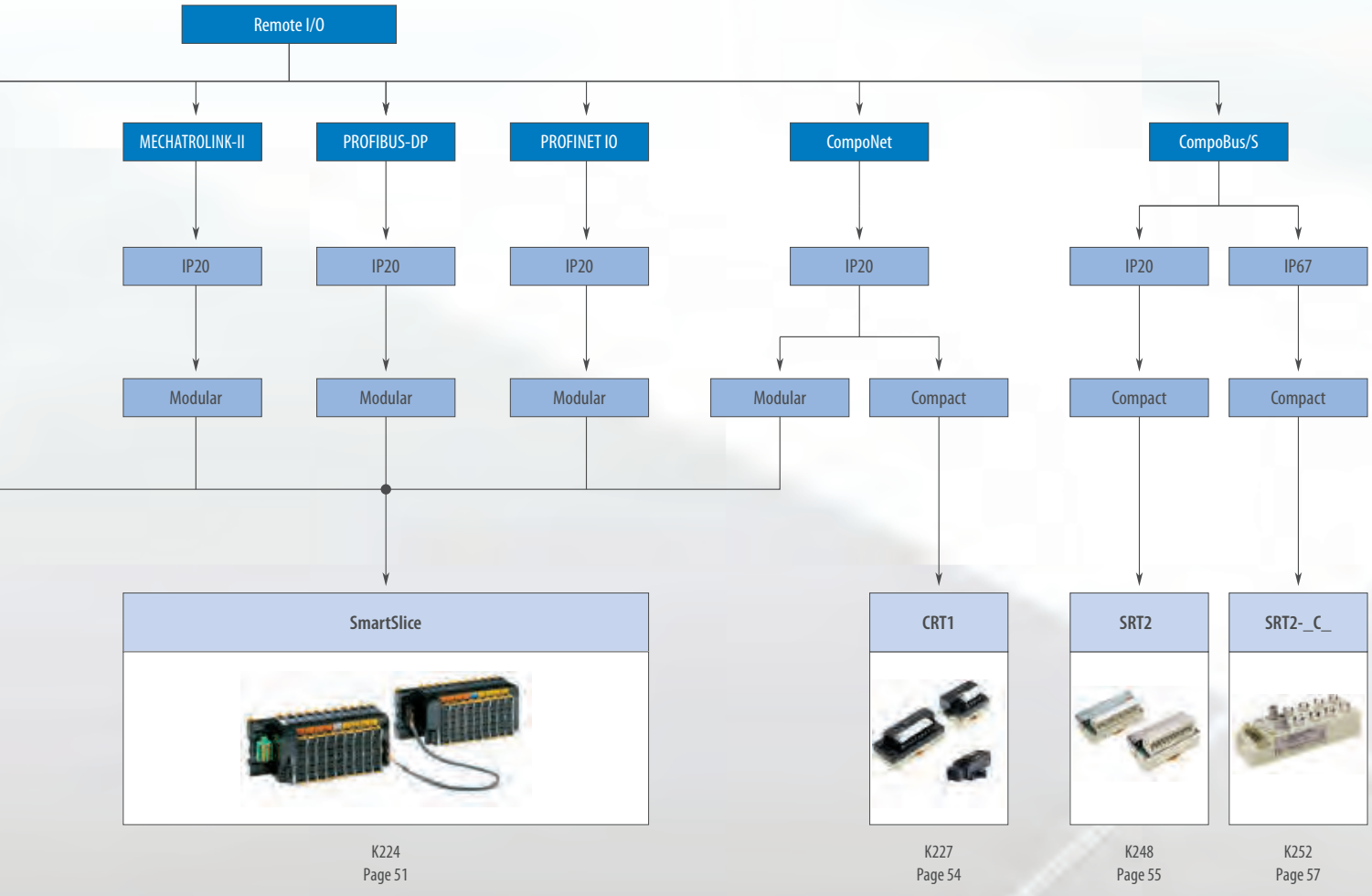
## Choose by network, style and flexibility

Compact remote I/O units combine a fixed number of I/O points in a space-saving housing. Built-in smart monitoring functions for voltage level, broken wire, actuator and cycle time will assist in planning preventive maintenance for machines and eliminating costly downtime. Compact smart slaves are available for the open EtherCAT, DeviceNet and CompoNet networks, and Omron's CompoBus/S offers a more simple and cost-efficient solution.

Modular remote I/O systems offer the possibility to install just the right number and type of I/O's where you need them. I/O modules range from basic and economical digital I/O's to high-performance modules with intelligent functions. With a choice of communication couplers for various open networks, you can adapt to existing installations and end-user demands, or make the right trade-off between performance and ease-of-use. Besides EtherCAT as main machine automation network, Omron offers connectivity to EtherNet/IP, DeviceNet, CompoNet, PROFINET IO, PROFIBUS DP, and MECHATROLINK-II.




K247 Page 56
K234 Page 53
H249 Page 48
K246 Page 52




K224
Page 51

K227
Page 54

K248
Page 55

K252
Page 57

| | Modular I/O | | Compact I/O | | |
|---|---|---|---|---|---|
| |  |  |  |  |  |
| **Model** | **NX-series** | **SmartSlice** | **GX** | **DRT2** | **CRT1** |
| **Network connection** | EtherCAT in- and outgoing connections by RJ45 ethernet ports, EtherNet/IP with built-in Ethernet switch and 2 RJ45 ports | DeviceNet, CompoNet, PROFIBUS DP, PROFINET I/O, EtherCAT, MECHATROLINK-II | EtherCAT in- and outgoing connections by RJ45 ethernet plug | DeviceNet with open-style push-in terminal block | CompoNet, unshielded 4-wire flat cable and IDC connectors, or general-purpose 2-wire cable by screw terminals |
| **I/0 types** | Digital standard and high-speed synchronous, analog standard and high-speed, temperature, encoders, pulse output, safety I/O | Digital I/O, analog I/O, temperature inputs, high-speed counter with control outputs | 8 DI + 8 DO<br>16 DI+extension<br>16 DO+extension<br>16 relay out<br>4 AI (V/I)<br>2 AO (V/I)<br>Incremental encoder (24 V/line driver) | 8/16 DI+extension,<br>8/16 DO+extenstion,<br>8 DI + 8 DO<br>16 relay out,<br>4 AI (V/I, TC, Pt100),<br>2 AO (V/I), | 8/16 DI+extension,<br>8/16 DO+extenstion,<br>8 DI + 8 DO<br>4 AI, 2 AO, 2 DI, 2 DO |
| **I/0 Connection technology** | Push-in wiring on removable terminal block, MIL connectors | Push-in wiring on removable terminal block | M3 screw terminals (1- or 3-wire DI) | M3 screw terminals (1- or 3-wire DI) | M3 screw terminals |
| **Smart features** | Synchronous I/O and time-stamping on EtherCAT, safety I/O | I/O and power supply diagnostics, operation timers and counters per I/O point | Automatic or fixed address allocation | I/O and power supply diagnostics, operation timers and counters per I/O point, analog value calculations and alarms | I/O and power supply diagnostics, operation timers and counters for each I/O point, analog value calculations and alarms |
| **Ingress Protection class** | IP20 (DIN rail mounting in cabinets) | IP20 (DIN rail mounting in cabinets) | IP20 (DIN rail mounting in cabinets) | IP20 (DIN rail mounting in cabinets) | IP20 (DIN rail mounting in cabinets) |
| **Page/Quick Link** | 48 | 51 | 52 | 53 | 54 |

| | Compact I/O | Field I/0 | |
|---|---|---|---|
| |  |  |  |
| **Model** | **SRT2** | **DRT2-_C_** | **SRT2-_C_** |
| **Network connection** | CompoBus/S, (2-wire + power) by M3 screw terminals | DeviceNet with M12 micro connector | CompoBus/S, by 4-wire M12 connector, unshielded |
| **I/0 types** | 4/8/16 DI,<br>4/8/16 DO,<br>8/16 relay out,<br>4 AI (V/I) 2 AO (V/I) | 8/16 DI, 8/16 DO, 8DI + 8 DO | 4/8 DI, 4/8 DO |
| **I/0 Connection technology** | M3 screw terminals (1- or 3-wire DI) | M12, 1 or 2 I/O signals per connector, 7/8" I/O Power connector | M12 connectors, one I/O point per connector |
| **Smart features** | I/O isolation, status indication | I/O and power supply diagnostics, operation timers and counters per I/O point | I/O isolation, status indication |
| **Ingress Protection class** | IP20 (DIN rail mounting in cabinets) | IP67, flat mounting by two M5 screws | IP67, flat mounting by three M5 screws |
| **Page/Quick Link** | 55 | 56 | 57 |

## Performance and practicality for machine control

Modern machine control requires system-wide synchronisation of motion axes with microsecond accuracy. The NX I/O system offers this timing accuracy and repeatability for a wide variety of in- and outputs. Its ultra-fast internal bus system is synchronised with the Distributed Clock of the EtherCAT network, resulting in system-wide deterministic I/O operation.

Alternatively, NX-series I/O can be used in non-synchronous "Free Run" mode on EtherNet/IP, the open CIP-based network supported by our CJ2-series PLC's.

NX-series I/O covers a full range of units, including standard and high-speed digital I/O's, various performance levels in analog I/O, encoder inputs and pulse outputs. The series continues to expand with time-stamped I/O, safety I/O and application-specific modules.

- Ideal match with Sysmac machine automation controllers and CJ2-series PLC's
- Synchronous I/O updates, system-wide, with less than 1 µs jitter using EtherCAT
- High density: up to 16 digital or 8 analog signals in 12 mm width
- Removable wiring terminals for easy system assembly and testing

## Ordering information

### Communication and Control Units

| Module Type | Protocol | Connection | Specification | Width | Order Code |
|---|---|---|---|---|---|
| Communication Coupler | EtherCAT Slave | 2 RJ45 ports<br>(in + out) | Up to 63 I/O units.<br>Max. 1,024 bytes in + 1,024 bytes out<br>Supports Distributed Clock<br>I/O Power Supply up to 10 A | 46 mm | NX-ECC202 |
| | EtherNet/IP Slave | 2 RJ45 ports<br>with built-in switch | Up to 63 I/O units.<br>Max. 512 bytes in + 512 bytes out<br>Supports local safety communication<br>Free run I/O refresh mode only<br>I/O Power Supply up to 10 A | 46 mm | NX-EIC202 |
| Safety Controller | FSoE Protocol | 128 Safety Connections | For up to 1,024 Safety I/O points | 30 mm | NX-SL3500 |
| | | 32 Safety Connections | For up to 256 Safety I/O points | 30 mm | NX-SL3300 |

## Digital I/O Units

| Module type | Channels, Signal type | Performance*1, I/O Refresh Mode | Connection type*2 | Width | Order Code | NPN-type*3 |
|---|---|---|---|---|---|---|
| AC Digital Input | 4 inputs, 200 to 240 VAC, 50/60 Hz | Free Run | Screwless push-in (NX-TBA082) | 12 mm | NX-IA3117 | – |
| Safety Digital Input | 4 inputs + 2 test outputs | Free Run | Screwless push-in (NX-TBA082) | 12 mm | NX-SIH400 | – |
| | 8 inputs + 2 test outputs | Free Run | Screwless push-in (NX-TBA162) | 12 mm | NX-SID800 | – |
| DC Digital Input | 4 inputs, 3-wire connection | High-speed Synchronous Time Stamp | Screwless push-in (NX-TBA122) | 12 mm | NX-ID3444 | NX-ID3344 |
| | | High-speed Synchronous/Free Run | Screwless push-in (NX-TBA122) | 12 mm | NX-ID3443 | NX-ID3343 |
| | | Synchronous/Free Run | Screwless push-in (NX-TBA122) | 12 mm | NX-ID3417 | NX-ID3317 |
| | 8 inputs, 2-wire connection | Synchronous/Free Run | Screwless push-in (NX-TBA162) | 12 mm | NX-ID4442 | NX-ID4342 |
| | 16 inputs, 1-wire connection | Synchronous/Free Run | Screwless push-in (NX-TBA162) | 12 mm | NX-ID5442 | NX-ID5342 |
| | | Synchronous/Free Run | 1 × 20-pin MIL connector | 30 mm | NX-ID5142-5 | same |
| | 32 inputs, 1-wire connection | Synchronous/Free Run | 1 × 40-pin MIL connector | 30 mm | NX-ID6142-5 | same |
| DC Digital I/O | 16 inputs + 16 outputs 0.5 A, 1-wire connection + common | Synchronous/Free Run | 2 × 20-pin MIL connector | 30 mm | NX-MD6256-5 | NX-MD6121-5 |
| DC Digital Output | 2 outputs 0.5 A, 3-wire connection | High-speed Synchronous Time Stamp | Screwless push-in (NX-TBA082) | 12 mm | NX-OD2258 | NX-OD2154 |
| | 4 outputs 0.5 A, 3-wire connection | High-speed Synchronous/Free Run | Screwless push-in (NX-TBA122) | 12 mm | NX-OD3257 | NX-OD3153 |
| | | Synchronous/Free Run | Screwless push-in (NX-TBA122) | 12 mm | NX-OD3256 | NX-OD3121 |
| | 8 outputs 0.5 A, 2-wire connection | Synchronous/Free Run | Screwless push-in (NX-TBA162) | 12 mm | NX-OD4256 | NX-OD4121 |
| | 16 outputs 0.5 A, 1-wire connection | Synchronous/Free Run | Screwless push-in (NX-TBA162) | 12 mm | NX-OD5256 | NX-OD5121 |
| | | Synchronous/Free Run | 1 × 20-pin MIL connector | 30 mm | NX-OD5256-5 | NX-OD5121-5 |
| | 32 outputs 0.5 A, 1-wire connection | Synchronous/Free Run | 1 × 40-pin MIL connector | 30 mm | NX-OD6256-5 | NX-OD6121-5 |
| Safety Digital Output | 2 outputs, 2.0 A | Free Run | Screwless push-in (NX-TBA082) | 12 mm | NX-SOH200 | – |
| | 4 outputs, 0.5 A | Free Run | Screwless push-in (NX-TBA082) | 12 mm | NX-SOD400 | – |
| Relay Digital Output | 2 outputs, N.O., 2.0 A | Free Run | Screwless push-in (NX-TBA082) | 12 mm | NX-OC2633 | – |
| | 2 outputs, N.O.+ N.C., 2.0 A | Free Run | Screwless push-in (NX-TBA082) | 12 mm | NX-OC2733 | – |

## Position Control Units

| Module type | Channels, Signal type | Performance, I/O Refresh Mode | Connection type*2 | Width | Order Code | NPN-type*3 |
|---|---|---|---|---|---|---|
| Encoder Input | 1 SSI encoder, 2 MHz | Synchronous/Free Run | Screwless push-in (NX-TBA122) | 12 mm | NX-ECS112 | – |
| | 2 SSI encoders, 2 MHz | Synchronous/Free Run | Screwless push-in (NX-TBA122) | 12 mm | NX-ECS212 | – |
| | 1 incremental encoder line driver 4 MHz + 3 Digital Inputs (1 µs) | Synchronous/Free Run | Screwless push-in (NX-TBA122 + NX-TBB122) | 24 mm | NX-EC0142 | NX-EC0132 |
| | 1 incremental encoder open collector 500 kHz + 3 Digital Inputs (1 µs) | Synchronous/Free Run | Screwless push-in (NX-TBA162) | 12 mm | NX-EC0122 | NX-EC0112 |
| | 2 incremental encoders open collector 500 kHz | Synchronous/Free Run | Screwless push-in (NX-TBA122) | 12 mm | NX-EC0222 | NX-EC0212 |
| Pulse Output | 1 Pulse Up/Down or Pulse/Direction open collector 500 kHz + 2 Digital Inputs + 1 Digital Output (1 µs) | Synchronous | Screwless push-in (NX-TBA162) | 12 mm | NX-PG0122 | NX-PG0112 |

*1 Digital I/O performance

| Digital I/O performance | | Standard | | High Speed | |
|---|---|---|---|---|---|
| | | ON delay | OFF delay | ON delay | OFF delay |
| Input | PNP | 0.02 ms | 0.4 ms | 100 ns | 100 ns |
| | NPN | | | | |
| | AC | 10 ms | 40 ms | N.A. | N.A. |
| Output | PNP | 0.5 ms | 1.0 ms | 300 ns | 300 ns |
| | NPN | 0.1 ms | 0.8 ms | | |
| | Relay | 15 ms | 15 ms | N.A. | N.A. |

*2 Units with screwless push-in connections are supplied with the appropriate terminal connector. Units with MIL connectors are supplied without matching plugs; for connecting cables see page 72

*3 Order codes are for PNP-type signals (positive switching, 0V common). Most models are also available as NPN-type (negative switching, 24V common). Inputs of MIL-connector versions can be used as NPN or PNP.

## Analog I/O Units

| Module type | Signal type | Performance, I/O Refresh Mode | Channels | Connection type *1 | Width | Order Code |
|---|---|---|---|---|---|---|
| Temperature Sensor Input | Thermocouple type B,E,J,K,L,N,R,S,T,U,WRe5-26,PLII | 0.1°C resolution, 200 ms/unit Free Run | 2 | Screwless push-in terminal block(s) with cold junction sensor, calibrated individually at the factory | 12 mm | NX-TS2101 |
| | | | 4 | | 24 mm | NX-TS3101 |
| | | 0.01°C resolution, 10 ms/unit Free Run | 2 | | 12 mm | NX-TS2102 |
| | | | 4 | | 24 mm | NX-TS3102 |
| | | 0.001°C resolution, 60 ms/unit Free Run | 2 | | 12 mm | NX-TS2104 |
| | | | 4 | | 24 mm | NX-TS3104 |
| | RTD type Pt100 (3-wire), Pt1000, Ni508.4 | 0.1°C resolution, 200 ms/unit Free Run | 2 | Screwless push-in (NX-TBA162) | 12 mm | NX-TS2201 |
| | | | 4 | Screwless push-in (NX-TBA162 + NX-TBB162) | 24 mm | NX-TS3201 |
| | | 0.01°C resolution, 10 ms/unit Free Run | 2 | Screwless push-in (NX-TBA162) | 12 mm | NX-TS2202 |
| | | | 4 | Screwless push-in (NX-TBA162 + NX-TBB162) | 24 mm | NX-TS3202 |
| | | 0.001°C resolution, 60 ms/unit Free Run | 2 | Screwless push-in (NX-TBA162) | 12 mm | NX-TS2204 |
| | | | 4 | Screwless push-in (NX-TBA162 + NX-TBB162) | 24 mm | NX-TS3204 |
| Analog Input | 4 to 20 mA single ended | 1/8000 resolution, 250 µs/channel Free Run | 2 | Screwless push-in (NX-TBA082) | 12 mm | NX-AD2203 |
| | | | 4 | Screwless push-in (NX-TBA122) | 12 mm | NX-AD3203 |
| | | | 8 | Screwless push-in (NX-TBA162) | 12 mm | NX-AD4203 |
| | 4 to 20 mA differential | 1/8000 resolution, 250 µs/channel Free Run | 2 | Screwless push-in (NX-TBA082) | 12 mm | NX-AD2204 |
| | | | 4 | Screwless push-in (NX-TBA122) | 12 mm | NX-AD3204 |
| | | | 8 | Screwless push-in (NX-TBA162) | 12 mm | NX-AD4204 |
| | | 1/30000 resolution,10 µs/channel Synchronous/Free Run | 2 | Screwless push-in (NX-TBA082) | 12 mm | NX-AD2208 |
| | | | 4 | Screwless push-in (NX-TBA122) | 12 mm | NX-AD3208 |
| | | | 8 | Screwless push-in (NX-TBA162) | 12 mm | NX-AD4208 |
| | –10 to 10 V single ended | 1/8000 resolution, 250 µs/channel Free Run | 2 | Screwless push-in (NX-TBA082) | 12 mm | NX-AD2603 |
| | | | 4 | Screwless push-in (NX-TBA122) | 12 mm | NX-AD3603 |
| | | | 8 | Screwless push-in (NX-TBA162) | 12 mm | NX-AD4603 |
| | –10 to 10 V differential | 1/8000 resolution, 250 µs/channel Free Run | 2 | Screwless push-in (NX-TBA082) | 12 mm | NX-AD2604 |
| | | | 4 | Screwless push-in (NX-TBA122) | 12 mm | NX-AD3604 |
| | | | 8 | Screwless push-in (NX-TBA162) | 12 mm | NX-AD4604 |
| | | 1/30000 resolution,10 µs/channel Synchronous/Free Run | 2 | Screwless push-in (NX-TBA082) | 12 mm | NX-AD2608 |
| | | | 4 | Screwless push-in (NX-TBA122) | 12 mm | NX-AD3608 |
| | | | 8 | Screwless push-in (NX-TBA162) | 12 mm | NX-AD4608 |
| Analog Output | 4 to 20 mA | 1/8000 resolution, 250 µs/channel Free Run | 2 | Screwless push-in (NX-TBA082)i | 12 mm | NX-DA2203 |
| | | | 4 | Screwless push-in (NX-TBA122) | 12 mm | NX-DA3203 |
| | | 1/30000 resolution,10 µs/channel Synchronous/Free Run | 2 | Screwless push-in (NX-TBA082) | 12 mm | NX-DA2205 |
| | | | 4 | Screwless push-in (NX-TBA122) | 12 mm | NX-DA3205 |
| | –10 to 10 V | 1/8000 resolution, 250 µs/channel Free Run | 2 | Screwless push-in (NX-TBA082) | 12 mm | NX-DA2603 |
| | | | 4 | Screwless push-in (NX-TBA122) | 12 mm | NX-DA3603 |
| | | 1/30000 resolution,10 µs/channel Synchronous/Free Run | 2 | Screwless push-in (NX-TBA082) | 12 mm | NX-DA2605 |
| | | | 4 | Screwless push-in (NX-TBA122) | 12 mm | NX-DA3605 |

## Other Units

| Module type | Description | Connection type *1 | Width | Order Code |
|---|---|---|---|---|
| Power Unit | NX bus power supply unit, 24 V DC input, non-isolated | Screwless push-in (NX-TBC082) | 12 mm | NX-PD1000 |
| | I/O power feed unit, for separation of power groups, up to 10 A | Screwless push-in (NX-TBA082) | 12 mm | NX-PF0730 |
| | I/O power connection unit, 16 × IOV | Screwless push-in (NX-TBA162) | 12 mm | NX-PC0020 |
| | I/O power connection unit, 16 × IOG | Screwless push-in (NX-TBA162) | 12 mm | NX-PC0010 |
| | I/O power connection, 8 × IOV + 8 x IOG | Screwless push-in (NX-TBA162) | 12 mm | NX-PC0030 |
| System Units and Accessories | Grounding terminal, 16 points | Screwless push-in (NX-TBC162) | 12 mm | NX-TBX01 |
| | End cover (included with Communication Coupler) | – | 12 mm | NX-END01 |
| | Replacement front connector with 8 wiring terminals (marked A+B) | Screwless push-in | 12 mm | NX-TBA082 |
| | Replacement front connector with 12 wiring terminals (marked A+B) | Screwless push-in | 12 mm | NX-TBA122 |
| | Replacement front connector with 16 wiring terminals (marked A+B) | Screwless push-in | 12 mm | NX-TBA162 |
| | Replacement front connector with 12 wiring terminals (marked C+D) | Screwless push-in | 12 mm | NX-TBB122 |
| | Replacement front connector with 16 wiring terminals (marked C+D) | Screwless push-in | 12 mm | NX-TBB162 |
| | Replacement front connector with 8 wiring terminals (marked A+B+FG) | Screwless push-in | 12 mm | NX-TBC082 |
| | Replacement front connector with 16 wiring terminals (marked A+B+FG) | Screwless push-in | 12 mm | NX-TBC162 |
| | DIN rail insulation spacers, set of 3 pcs | | – | NX-AUX01 |
| | 30 Unit pins + 30 Terminal keying pins, to prevent mismatch of unit and terminal block (one set is enough for 10 units) | | – | NX-AUX02 |

*1 Units with screwless push-in connections are supplied with the appropriate terminal connector.

## The smartest modular I/O system

Omron's SmartSlice I/O system is compact, intelligent and easy. When used with Omron's CS1/CJ1 DeviceNet master units it is plug-and-work, no configuration tool is required. By using built-in functions such as pre-scaling, totalising, differentiation and alarming in analog I/O units, PLC programming can be minimised. Preventive maintenance data can be accessed using CX-Integrator software, standard PLC function blocks or NS-series Smart Active Parts.

- Most compact in the market (84 mm high)
- Easy set-up, backup and restore functions
- Diagnostics and preventive maintenance data at I/O level
- Detachable terminal blocks allow hot-swapping without re-wiring
- 3-wire connection with 'push-in' technology, no screwdriver required for installation



## Ordering information

| Model | Function | Specifications | Size in mm (H×W×D) | Order code |
|---|---|---|---|---|
| Interface units | DeviceNet interface unit | For up to 64 I/O units | 84×58×70 | GRT1-DRT |
| | CompoNet interface unit | For up to 64 I/O units (limited to 32 byte in + 32 byte out) | 84×58×70 | GRT1-CRT |
| | PROFIBUS-DP interface unit | For up to 64 I/O units | 84×58×70 | GRT1-PRT |
| | PROFINET-IO interface unit | For up to 64 I/O units | 84×58×70 | GRT1-PNT |
| | MECHATROLINK-II interface unit | For up to 64 I/O units (slave to Trajexia motion controller) | 84×58×70 | GRT1-ML2 |
| | EtherCAT interface unit | For up to 64 I/O units (slave to Trajexia and Sysmac controller) | 84×58×70 | GRT1-ECT |
| | End plate | One unit required per bus interface | 84×20×58 | GRT1-END |
| | End plate with memory function | Supports toolless replacement of PROFINET-IO interface unit | 84×20×58 | GRT1-END-M |
| I/O units | 4 NPN inputs | 24 VDC, 6 mA, 3-wire connection | 84×15×74 | GRT1-ID4 |
| | 4 PNP inputs | 24 VDC, 6 mA, 3-wire connection | 84×15×74 | GRT1-ID4-1 |
| | 8 NPN inputs | 24 VDC, 4 mA, 1-wire connection + 4×G | 84×15×74 | GRT1-ID8 |
| | 8 PNP inputs | 24 VDC, 4 mA, 1-wire connection + 4×V | 84×15×74 | GRT1-ID8-1 |
| | 4 AC inputs | 110 VAC, 2-wire connection | 84×15×74 | GRT1-IA4-1 |
| | 4 AC inputs | 230 VAC, 2-wire connection | 84×15×74 | GRT1-IA4-2 |
| | 4 NPN outputs | 24 VDC, 500 mA, 2-wire connection | 84×15×74 | GRT1-OD4 |
| | 4 PNP outputs | 24 VDC, 500 mA, 2-wire connection | 84×15×74 | GRT1-OD4-1 |
| | 4 PNP outputs with short-circuit protection | 24 VDC, 500 mA, 3-wire connection | 84×15×74 | GRT1-OD4G-1 |
| | 4 PNP outputs with short-circuit protection | 24 VDC, 2 A, 2-wire connection | 84×15×74 | GRT1-OD4G-3 |
| | 8 NPN outputs | 24 VDC, 500 mA, 1-wire connection + 4×V | 84×15×74 | GRT1-OD8 |
| | 8 PNP outputs | 24 VDC, 500 mA, 1-wire connection + 4×G | 84×15×74 | GRT1-OD8-1 |
| | 8 PNP outputs with short-circuit protection | 24 VDC, 500 mA, 1-wire connection + 4×G | 84×15×74 | GRT1-OD8G-1 |
| | 2 relay outputs | 240 VAC, 2A, normally-open contacts | 84×15×74 | GRT1-ROS2 |
| | 60 kHz Counter unit, NPN | A+B encoder inputs + 1 Z/control input + 1 output (NPN-type) | 84×15×74 | GRT1-CT1 |
| | 60 kHz Counter unit, PNP | A+B encoder inputs + 1 Z/control input + 1 output (PNP-type) | 84×15×74 | GRT1-CT1-1 |
| | 100 kHz Counter / Positioner unit | A+B+Z encoder inputs (line driver or 24 V selectable) + 1 control input + 2 outputs (PNP-type) | 84×15×74 | GRT1-CP1-L |
| | 2 analog inputs, current/voltage | ±10 V, 0-10 V, 0-5 V, 1-5 V, 0-20 mA, 4-20 mA | 84×15×74 | GRT1-AD2 |
| | 2 analog outputs, voltage | ±10 V, 0-10 V, 0-5 V, 1-5 V | 84×15×74 | GRT1-DA2V |
| | 2 analog outputs, current | 0-20 mA, 4-20 mA | 84×15×74 | GRT1-DA2C |
| | 2 Pt100 inputs | Pt100, 2-wire or 3-wire connection | 84×15×74 | GRT1-TS2P |
| | 2 Pt1000 inputs | Pt1000, 2-wire or 3-wire connection | 84×15×74 | GRT1-TS2PK |
| | 2 Thermocouple inputs | Types B, E, J, K, N, R, S, T, U, W, PL2, with cold junction compensation | 84×15×74 | GRT1-TS2T |

| Model | Description | Size in mm (H×W×D) | Order code |
|---|---|---|---|
| Other units | I/O power feed unit, separates power supply between groups of I/O units | 84×15×74 | GRT1-PD2 |
| | I/O power feed unit with electronic overload protection, separates power supply between groups of I/O units | 84×15×74 | GRT1-PD2G |
| | I/O power feed and distribution unit, separates power supply between groups of I/O units, 8×V + 4×G | 84×15×74 | GRT1-PD8 |
| | I/O power feed and distribution unit, separates power supply between groups of I/O units, 4×V + 8×G | 84×15×74 | GRT1-PD8-1 |
| | I/O power connection unit, 8×V + 4×G | 84×15×74 | GRT1-PC8 |
| | I/O power connection unit, 4×V + 8×G | 84×15×74 | GRT1-PC8-1 |
| | Turnback unit, right-hand side | 84×20×58 | GRT1-TBR |
| | Turnback unit, left-hand side | 84×58×70 | GRT1-TBL |
| | Turnback cable, one meter | 1 m | GCN2-100 |

### Accessories

| Description | Order code |
|---|---|
| Replacement front connectors, pack of 5 pcs. | GRT1-BT1-5 |
| PROFIBUS-DP connector, 9-pin D-sub | PROFIBUS Connector 839550 |
| PROFIBUS-DP connector, 9-pin D-sub, with bus termination | PROFIBUS Term. Conn. 846086 |
| PROFINET RJ45 connector | IE-PS-RJ45-FH-BK |
| CompoNet connectors | See page 54 |

## When speed counts: EtherCAT I/O

EtherCAT is an extremely fast industrial automation network, which uses standard ethernet cabling. It makes very efficient use of the standard Ethernet transmission frame, with each node accessing the entire frame on the fly. This reduces the delay in each slave to microsecond level.
Its deterministic nature makes EtherCAT extremely suitable for motion control. Omron provides PLC-based as well as stand-alone motion control solutions based on EtherCAT.
The GX-series I/O units provide the basic in- and outputs for such systems, including high-speed encoder inputs which can feed position information into the controller.

## Ordering information

| Unit Type | Specification | Size in mm (H×W×D) | Remarks | Order code |
|---|---|---|---|---|
| 16-point NPN input unit | 24 VDC, 6 mA per point | 52×135×57 | Expandable with one XWT unit | GX-ID1611 |
| 16-point NPN input unit | 24 VDC, 6 mA per point | 52×200×69 | 3-tier connection for direct sensor wiring | GX-ID1612 |
| 16-point PNP input unit | 24 VDC, 6 mA per point | 52×135×57 | Expandable with one XWT unit | GX-ID1621 |
| 16-point PNP input unit | 24 VDC, 6 mA per point | 52×200×69 | 3-tier connection for direct sensor wiring | GX-ID1622 |
| 16-point relay output unit | 2 A per point, max. 8 A per common | 52×160×58 | with easy-to-replace relays, expandable with one XWT unit | GX-OC1601 |
| 16-point NPN output unit | 24 VDC, 0.5 A per point | 52×135×57 | Expandable with one XWT unit | GX-OD1611 |
| 16-point NPN output unit | 24 VDC, 0.5 A per point | 52×200×69 | 3-tier connection for direct sensor wiring | GX-OD1612 |
| 16-point PNP output unit | 24 VDC, 0.5 A per point | 52×135×57 | Expandable with one XWT unit | GX-OD1621 |
| 16-point PNP output unit | 24 VDC, 0.5 A per point | 52×200×69 | 3-tier connection for direct sensor wiring | GX-OD1622 |
| 8-point input + 8-point output unit (NPN) | 24 VDC, input 6 mA, output 0.5 A per point | 52×135×57 | – | GX-MD1611 |
| 8-point input + 8-point output unit (NPN) | 24 VDC, input 6 mA, output 0.5 A per point | 52×200×69 | 3-tier connection for direct sensor wiring | GX-MD1612 |
| 8-point input + 8-point output unit (PNP) | 24 VDC, input 6 mA, output 0.5 A per point | 52×135×57 | – | GX-MD1621 |
| 8-point input + 8-point output unit (PNP) | 24 VDC, input 6 mA, output 0.5 A per point | 52×200×69 | 3-tier connection for direct sensor wiring | GX-MD1622 |
| 4-Channel analog input unit | 1 to 5 V, 1 to 5 V, 0 to 10 V, -10 to 10 V, 4 to 20 mA, | 52×135×57 | Resolution 1/6000, conversion time 4 ms (4 inputs) | GX-AD0471 |
| 2-Channel analog output unit | 1 to 5 V, 1 to 5 V, 0 to 10 V, -10 to 10 V, 4 to 20 mA, | 52×135×57 | Resolution 1/6000, conversion time 2 ms (2 outputs) | GX-DA0271 |
| 1-Channel incremental encoder input (24V) | Open collector, up to 125 kHz | 52×215×69 | A, B, Z, 2 × Latch, Reset inputs | GX-EC0211 |
| 1-Channel incremental encoder input (line driver) | RS422 signal level, up to 1 MHz | 52×215×69 | A, B, Z, 2 × Latch, Reset inputs | GX-EC0241 |

### Expansion units

| Unit Type | Specification | Size in mm (H×W×D) | Remarks | Order code |
|---|---|---|---|---|
| 8-point PNP input expansion unit | 24 VDC, 6 mA per point | 50×66×50 | Expansion unit for GX, DRT2 and CRT1 series | XWT-ID08-1 |
| 16-point PNP input expansion unit | 24 VDC, 6 mA per point | 50×94×50 | Expansion unit for GX, DRT2 and CRT1 series | XWT-ID16-1 |
| 8-point PNP output expansion unit | 24 VDC, 0.5 A per point | 50×66×50 | Expansion unit for GX, DRT2 and CRT1 series | XWT-OD08-1 |
| 16-point PNP output expansion unit | 24 VDC, 0.5 A per point | 50×94×50 | Expansion unit for GX, DRT2 and CRT1 series | XWT-OD16-1 |
| 3 port branching uni | 24 VDC, 3 x RJ45 | 90×25×78 | EtherCAT junction box for T-branching | GX-JC03 |
| 6 port branching unit | 24VDC, 6 x RJ45 | 90×48×78 | EtherCAT junction box for star branching | GX-JC06 |

**Note:** To order models with NPN (sinking) outputs and corresponding inputs (+V common), omit the "–1" from the model code.

## Smart DeviceNet I/O

Compact DeviceNet I/O units with extensive diagnostic functions. Data regarding power supply status, I/O response times, operation counters and on-time are continuously recorded and checked against user-defined limits. Any deviation is reported to the control system, as indication to perform machine maintenance and prevent unplanned downtime. Smart DeviceNet I/Os are supported by PLC Function Blocks and HMI Smart Active Parts, allowing program-less visualisation and monitoring from the CJ1 PLCs and NS operator terminals.

- Compact size IP20 housing
- Expandable digital I/Os
- Built-in diagnostics and preventive maintenance functions
- Detachable I/O terminal blocks
- Analog I/O with data pre-processing and alarm functions



## Ordering information

| Unit type | Specifications | Size in mm (H×W×D) | Remarks | Order code |
|---|---|---|---|---|
| 8-point PNP input unit | 24 VDC, 6 mA per point | 50×115×50 | – | DRT2-ID08-1 |
| 16-point PNP input unit | 24 VDC, 6 mA per point | 50×115×50 | Expandable with one XWT unit | DRT2-ID16-1 |
| 16-point PNP input unit | 24 VDC, 6 mA per point | 50×180×58 | 3-tier connection for direct sensor wiring | DRT2-ID16TA-1 |
| 8-point PNP output unit | 24 VDC, 0.5 A per point | 50×115×50 | – | DRT2-OD08-1 |
| 16-point PNP output unit | 24 VDC, 0.5 A per point | 50×115×50 | Expandable with one XWT unit | DRT2-OD16-1 |
| 16-point PNP output unit | 24 VDC, 0.5 A per point | 50×180×58 | 3-tier connection for direct actuator wiring | DRT2-OD16TA-1 |
| 16-point relay output unit | 2 A per point, max. 8 A per common | 50×125×52 | with easy-to-replace relays, expandable with one XWT unit | DRT2-ROS16 |
| 8-point input + 8-point output unit (PNP) | 24 VDC, input 6 mA, output 0.5 A per point | 50×115×50 | – | DRT2-MD16-1 |
| 8-point input + 8-point output unit (PNP) | 24 VDC, input 6 mA, output 0.5 A per point | 50×180×58 | 3-tier connection for direct sensor/actuator wiring | DRT2-MD16TA-1 |
| 4-Channel analog input unit | 0 to 5 V, 1 to 5 V, 0 to 10 V, -10 to 10 V, 0 to 20 mA, 4 to 20 mA | 50×115×50 | Resolution 1/6000, conversion time 4 ms (4 inputs) | DRT2-AD04 |
| 4-Channel analog input unit | 1 to 5 V, 1 to 5 V, 0 to 10 V, -10 to 10 V, 0 to 20 mA, 4 to 20 mA | 50×115×50 | Resolution 1/30000, conversion time 250 ms (4 inputs) | DRT2-AD04H |
| 2-Channel analog output unit | 0 to 5 V, 1 to 5 V, 0 to 10 V, -10 to 10 V, 0 to 20 mA, 4 to 20 mA | 50×115×50 | Resolution 1/6000, conversion time 2 ms (2 outputs) | DRT2-DA02 |
| 4-Channel temperature input unit | Platinum Resistance Thermometer types Pt100, JPt100 | 50×115×50 | 0.3% accuracy, conversion time 250 ms (4 inputs) | DRT2-TS04P |
| 4-Channel temperature input unit | Thermocouple types R, S, K, J, T, B, L, E, U, N, W, and PL2 | 50×115×50 | 0.3% accuracy, conversion time 250 ms (4 inputs) | DRT2-TS04T |

### Expansion units

| Unit type | Specifications | Size in mm (H×W×D) | Remarks | Order code |
|---|---|---|---|---|
| 8-point PNP input expansion unit | 24 VDC, 6 mA per point | 50×66×50 | Expansion unit for GX, DRT2 and CRT1 series | XWT-ID08-1 |
| 16-point PNP input expansion unit | 24 VDC, 6 mA per point | 50×94×50 | Expansion unit for GX, DRT2 and CRT1 series | XWT-ID16-1 |
| 8-point PNP output expansion unit | 24 VDC, 0.5 A per point | 50×66×50 | Expansion unit for GX, DRT2 and CRT1 series | XWT-OD08-1 |
| 16-point PNP output expansion unit | 24 VDC, 0.5 A per point | 50×94×50 | Expansion unit for GX, DRT2 and CRT1 series | XWT-OD16-1 |

**Note:** To order models with NPN (sinking) outputs and corresponding inputs (+V common), omit the "-1" from the model code.

### Accessories

| Type | Order code |
|---|---|
| Power supply tap with 2 fuses, 2 bus connectors and termination resistor | DCN1-1P |
| T-branch tap with 3 bus connectors (screw clamp) and terminating resistor | DCN1-1C |
| T-branch tap with 3 bus connectors (screwless) | DCN1-1NC |
| T-branch tap with 5 bus connectors (screw clamp) and terminating resistor | DCN1-3C |
| T-branch tap with 5 bus connectors (screwless) | DCN1-3NC |
| Terminating resistor with screw terminals | DRS1-T |

## Smart CompoNet I/O

Combining the smart features of DRT2 DeviceNet I/O and the speed and ease of use of CompoBus/S, CompoNet is ideal for high-speed machine control with a flexible and expandable architecture. The special flat cable and IDC connectors make installation quick and easy. The use of repeaters allows wide-area networks with free topology, ideal for conveyor- and warehouse automation.

- Compact size IP20 housing
- Expandable digital I/Os with detachable terminal blocks
- Easy network wiring with IDC connections
- Built-in diagnostics and preventive maintenance functions
- Analog I/O with data pre-processing and alarm functions

## Ordering information

| Unit type | Specifications | Size in mm (H×W×D) | Remarks | Order code |
|---|---|---|---|---|
| 4-point PNP input unit | 24 VDC, 6 mA per point | 24×80×20 | Screwless I/O connector, power supply via CompoNet cable | CRT1B-ID04SL-1-300 |
| 8-point PNP input unit | 24 VDC, 6 mA per point | 50×115×57.6 | Screw terminals, common power terminals per 8 points | CRT1-ID08-1 |
| 8-point PNP input unit | 24 VDC, 6 mA per point | 50×96×60 | 3 push-in terminals per I/O point (signal + power) | CRT1-ID08SL-1 |
| 16-point PNP input unit | 24 VDC, 6 mA per point | 50×115×50 | Expandable with one XWT unit. | CRT1-ID16-1 |
| 16-point PNP input unit | 24 VDC, 6 mA per point | 52×180×69 | 3 terminals per I/O point (for power distribution) | CRT1-ID16TA-1 |
| 4-point PNP output unit | 24 VDC, 0.2 A per point | 24×80×20 | Screwless I/O connector, power supply via CompoNet cable | CRT1B-OD04SL-1-300 |
| 8-point PNP output unit | 24 VDC, 0.5 A per point | 50×115×57.6 | Screw terminals, common power terminals per 8 points | CRT1-OD08-1 |
| 8-point PNP output unit | 24 VDC, 0.5 A per point | 50×96×60 | 3 push-in terminals per I/O point (signal + power) | CRT1-OD08SL-1 |
| 16-point PNP output unit | 24 VDC, 0.5 A per point | 50×115×50 | Expandable with one XWT unit. | CRT1-OD16-1 |
| 16-point PNP output unit | 24 VDC, 0.5 A per point | 52×180×69 | 3 terminals per I/O point (for power distribution) | CRT1-OD16TA-1 |
| 8-point SSR output unit | 265 V AC, 0.3 A per point | 50×95×57.6 | Screw terminals, common power terminals per 8 points | CRT1-ROF08 |
| 8-point relay output unit | 250 VAC, 2 A per point, 8 A per common | 50×95×57.6 | Screw terminals, common power terminals per 8 points | CRT1-ROS08 |
| 16-point relay output unit | 250 VAC, 2 A per point, 8 A per common | 50×140×57.6 | 8 outputs per common | CRT1-ROS16 |
| 2-point input + 2-point output unit, PNP | 24 VDC, 0.1 A per point | 24×80×20 | Screwless I/O connector, power supply via CompoNet cable | CRT1-MD04SL-1-300 |
| 8-point input + 8-point output unit, PNP | 24 VDC, 0.5 A per point | 50×115×57.6 | Screw terminals, common power terminals | CRT1-MD16-1 |
| 8-point input + 8-point output unit, PNP | 24 VDC, 0.5 A per point | 50×170×60 | 3 push-in terminals per I/O point (signal + power) | CRT1-MD16SL-1 |
| 8-point input + 8-point output unit PNP | 24 VDC, 0.5 A per point | 52×180×69 | 3 terminals per I/O point (for power distribution) | CRT1-MD16TA-1 |
| 4-Channel analog input unit | 0 to 5 V, 1 to 5 V, 0 to 10 V, -10 to 10 V, 0 to 20 mA, 4 to 20 mA | 50×115×50 | Resolution 1/6000, conversion time 4 ms (4 inputs) | CRT1-AD04 |
| 2-Channel analog output unit | 0 to 5 V, 1 to 5 V, 0 to 10 V, -10 to 10 V, 0 to 20 mA, 4 to 20 mA | 50×115×50 | Resolution 1/6000, conversion time 2 ms (2 outputs) | CRT1-DA02 |
| 4-Channel Temperature input unit | Platinum Resistance Thermometer type Pt100 | 50×115×50 | 0.3% accuracy, conversion time 250 ms (4 inputs) | CRT1-TS04P |
| 4-Channel Temperature input unit | Thermocouple types R, S, K, J, T, B, L, E, U, N, W and PL2 | 50×115×50 | 0.3% accuracy, conversion time 250 ms (4 inputs) | CRT1-TS04T |

### Expansion units

| Unit type | Specifications | Size in mm (H×W×D) | Remarks | Order code |
|---|---|---|---|---|
| 8-point PNP input expansion unit | 24 VDC, 6 mA per point | 50×66×50 | Expansion unit for GX, DRT2 and CRT1 series | XWT-ID08-1 |
| 16-point PNP input expansion unit | 24 VDC, 6 mA per point | 50×94×50 | Expansion unit for GX, DRT2 and CRT1 series | XWT-ID16-1 |
| 8-point PNP output expansion unit | 24 VDC, 0.5 A per point | 50×66×50 | Expansion unit for GX, DRT2 and CRT1 series | XWT-OD08-1 |
| 16-point PNP output expansion unit | 24 VDC, 0.5 A per point | 50×94×50 | Expansion unit for GX, DRT2 and CRT1 series | XWT-OD16-1 |

**Note:** To order models with NPN (sinking) outputs and corresponding inputs (+V common), omit the "-1" from the model code.

### Accessories

| Unit type | Specifications | Size in mm (H×W×D) | Remarks | Order code |
|---|---|---|---|---|
| CompoNet Repeater unit | 1 upstream port + 1 downstream port | 50×95×43 | For extending CompoNet trunk lines, or creating branch lines | CRS1-RPT01 |
| CompoNet 4-wire flat cable | For IP20 use | 100 m | For power supply + communication, use with DCN4-connectors | DCA4-4F10 |
| CompoNet Branch connector for trunk line | For IP20 use | – | To create a branching point on a trunk line | DCN4-TR4 |
| CompoNet Branch line end connector | For IP20 use | – | To connect a branch line to a trunk line | DCN4-BR4 |
| CompoNet Y-connector | For IP20 use | – | To connect two line connectors to one slave unit | DCN4-MD4 |
| CompoNet Screw terminal connector | For IP20 use | – | To provide conventional screw terminals for masters or slaves | DCN4-TB4 |
| CompoNet Terminator | For IP20 use | – | Plugs in to DCN4-MD4 or DCN4-TR4 | DCN4-TM4 |
| CompoNet connector tool | For DCN4-connectors | – | To attach DCN4-connectors to DCA4-4F10 flat cable | DWT-A01 |
| CompoNet Screw terminal connector | For IP20 use, box of 10 pcs | – | To provide conventional screw terminals for 4-point bit slaves | HCN-TB4LMZG-B10+ |
| Bit slave flat cable plug | For CRT1B-_D04SL-1-300 slaves | – | Allows mounting bit slaves directly on flat cable | DCN4-MR4 |
| Bit slave mounting plate | For CRT1B-_D04SL-1-300 slaves | – | Mount with two screws, bit slave clips in place | CRT1-ATT03 |

## Fast and easy over CompoBus/S

Omron's unique CompoBus/S is the original I/O bus for machine automation. With free topology and up to 500 m bus length in long-distance mode, it can be used as a remote I/O system. In high-speed mode (100 m max.) the guaranteed sub-millisecond cycle time makes it ideal for efficient machine control. Used with the compact CPM2C-S PLC as master, your machine control system will fit in the smallest spaces.

- Compact size in IP20 housing
- Fast cycle time; less than 1 ms per 256 I/O points
- Easy set-up; no software required
- Choice of 4- 8- and 16-point Digital I/O; transistor-, and relay models
- Analog In/Outputs and customisable modules available



## Ordering information

| Unit type | Specifications | Size in mm (H×W×D) | Remarks | Order code |
|---|---|---|---|---|
| 4-point PNP input unit | 24 VDC, 6 mA per point | 48×80×50 | Compact IP20 I/O | SRT2-ID04-1 |
| 8-point PNP input unit | 24 VDC, 6 mA per point | 48×80×50 | Compact IP20 I/O | SRT2-ID08-1 |
| 16-point PNP input unit | 24 VDC, 6 mA per point | 48×105×50 | Compact IP20 I/O | SRT2-ID16-1 |
| 16-point PNP input unit | 24 VDC, 6 mA per point | 50×180×59 | 3-tier connection for direct sensor wiring | SRT2-ID16T-1 |
| 4-point PNP output unit | 24 VDC, 0.3 A per point | 48×80×50 | Compact IP20 I/O | SRT2-OD04-1 |
| 8-point PNP output unit | 24 VDC, 0.3 A per point | 48×80×50 | Compact IP20 I/O | SRT2-OD08-1 |
| 16-point PNP output unit | 24 VDC, 0.3 A per point | 48×105×50 | Compact IP20 I/O | SRT2-OD16-1 |
| 16-point PNP output unit | 24 VDC, 0.5 A per point | 50×180×59 | 3-tier connection for direct sensor/actuator wiring | SRT2-OD16T-1 |
| 8-point input + 8-point output unit (PNP) | 24 VDC, input 6 mA, output 0.3 A per point | 50×180×59 | 3-tier connection for direct actuator wiring | SRT2-MD16T-1 |
| 8-point relay output unit | Max. 3 A per point | 50×100×50 | with easy-to-replace relays | SRT2-ROC08 |
| 16-point relay output unit | Max. 3 A per point | 50×155×50 | with easy-to-replace relays | SRT2-ROC16 |
| 4-Channel analog input unit | 0 to 5 V, 1 to 5 V, 0 to 10 V, -10 to 10 V, 0 to 20 mA, 4 to 20 mA | 48×105×50 | Resolution 1/6000, conversion time 4 ms (4 inputs) | SRT2-AD04 |
| 2-Channel analog output unit | 0 to 5 V, 1 to 5 V, 0 to 10 V, -10 to 10 V, 0 to 20 mA, 4 to 20 mA | 48×105×50 | Resolution 1/6000, conversion time 2 ms (2 outputs) | SRT2-DA02 |

**Note:** To order models with NPN (sinking) outputs and corresponding inputs (+V common), omit the "-1" from the model code.

### Accessories

| Type | Order code |
|---|---|
| CompoBus/S 4-wire flatcable for power and communication (100 m) | SCA1-4F10 |
| CompoBus/S branch connector (IDC) for flatcable | SCN1-TH4 |
| CompoBus/S termination connector (IDC) for flatcable | SCN1-TH4T |
| CompoBus/S termination block (screw connection) | SRS1-T |

## DeviceNet I/O for harsh environments

Rugged I/O units for field mounting. The DRT2 slave units feature internal diagnostic and maintenance data collection, which can be accessed over the network. Power supply status, I/O response times, operation counters and on-time monitor data is available at all times, and is internally checked against user-defined limits. Maintenance warnings will be generated when limits are exceeded. Using CX-One or NS-series HMI with Smart Active Parts for visualisation, this allows more efficient system setup, commissioning and troubleshooting without any additional programming.

- IP67 protection, DRT2 versions are also oil- and welding-spatter proof
- Internal circuits powered by DeviceNet; fewer connections means less installation errors
- Smart Slave functions for diagnostics and preventive maintenance
- Indication of broken wire and short-circuit in I/O signals
- M12 connectors for fast installation

## Ordering information

| Unit type | Specifications | Size in mm (H×W×D) | Remarks | Order code |
|---|---|---|---|---|
| 4-point PNP input unit | 24 V, 6 mA | 123×60×44 | Separate I/O power supply connection | DRT2-ID04CL-1 |
| 8-point PNP input unit | 24 V, 6 mA | 175×60×44 | Separate I/O power supply connection | DRT2-ID08CL-1 |
| 8-point PNP input unit | 24 V, 11 mA, with power short-circuit and sensor disconnection detection | 175×60×38 | Unit power supply via DeviceNet cable | DRT2-ID08C-1 |
| 16-point PNP input unit | 24 V, 6 mA, 2 inputs per M12 connector | 175×60×44 | Separate I/O power supply connection | DRT2-HD16CL-1 |
| 16-point PNP input unit | 24 V, 11 mA, 2 inputs per M12 connector, with power short-circuit and sensor disconnection detection | 175×60×38 | Unit power supply via DeviceNet cable | DRT2-HD16C-1 |
| 4-point PNP output unit | 24 V, 0.5 A per point | 123×60×44 | Separate I/O power supply connection | DRT2-OD04CL-1 |
| 8-point PNP output unit | 24 V, 0.5 A per point | 175×60×44 | Separate I/O power supply connection | DRT2-OD08CL-1 |
| 8-point PNP output unit | 24 V, 1.5 A per point (8 A total), with short-circuit protection + indication | 175×60×44 | Separate I/O power supply connection | DRT2-OD08C-1 |
| 16-point PNP output unit | 24 V, 0.5 A per point, 2 points per M12 connector | 175×60×44 | Separate I/O power supply connection | DRT2-WD16CL-1 |
| 8-point input + 8-point PNP output unit | 24 V, 6 mA input, 0.5 A output per point, 2 points per M12 connector | 175×60×44 | Separate I/O power supply connection | DRT2-MD16CL-1 |

**Note:** To order models with NPN (sinking) outputs and corresponding inputs (+V common), omit the "-1" from the model code.

### Accessories

| Unit type | Specifications | Order code |
|---|---|---|
| DeviceNet thin cable | with one M12 socket connector (female), 1 m | DCA1-5CN01F1 |
| DeviceNet thin cable | with one M12 socket connector (female), 2 m | DCA1-5CN02F1 |
| DeviceNet thin cable | with one M12 socket connector (female), 5 m | DCA1-5CN05F1 |
| DeviceNet thin cable | with one M12 socket connector (female) and one M12 plug connector (male), 1 m | DCA1-5CN01W1 |
| DeviceNet thin cable | with one M12 socket connector (female) and one M12 plug connector (male), 2 m | DCA1-5CN02W1 |
| DeviceNet thin cable | with one M12 socket connector (female) and one M12 plug connector (male), 5 m | DCA1-5CN05W1 |
| DeviceNet T-connector for thin cable | with two M12 socket connectors (female) + one M12 plug connector (male) | DCN2-1 |
| DeviceNet terminator | with M12 plug connector | DRS2-1 |
| Power supply cable | with one 7/8 inches socket connector (female), 2 m | XS4F-D421-102-A |
| Power supply cable | with one 7/8 inches socket connector (female), 5 m | XS4F-D421-105-A |
| Power supply cable | with one 7/8 inches socket connector (female) and one 7/8 inches plug connector (male), 2 m | XS4W-D421-102-A |
| Power supply cable | with one 7/8 inches socket connector (female) and one 7/8 inches plug connector (male), 5 m | XS4W-D421-105-A |
| Power supply T-connector | with two 7/8 inches socket connectors (female) + one 7/8 inches plug connector (male) | XS4R-D424-5 |
| 4-wire I/O connection cable | with one M12 plug connector (male), 1 m | XS2H-D421-C80-A |
| 4-wire I/O connection cable | with one M12 plug connector (male), 2 m | XS2H-D421-D80-A |
| 4-wire I/O connection cable | with one M12 plug connector (male), 5 m | XS2H-D421-G80-A |
| 4-wire I/O connection cable | with one M12 socket connector (female) and one M12 plug connector (male), 1 m | XS2W-D421-C81-A |
| 4-wire I/O connection cable | with one M12 socket connector (female) and one M12 plug connector (male), 2 m | XS2W-D421-D81-A |
| 4-wire I/O connection cable | with one M12 socket connector (female) and one M12 plug connector (male), 5 m | XS2W-D421-G81-A |
| Y-connector for 16-point I/O units | Splits the 2 I/O points per M12 connector to two M12 connectors | XS2R-D426-1 |
| Y-connector cable for 16-point I/O units | Splits the 2 I/O points per M12 connector to two M12 connectors, 1 m | XS2R-D426-C11-F |
| M12 connector | M12 plug connector (male), solder type | XS2G-D421 |
| M12 connector | M12 socket connector (female), solder type | XS2C-D421 |
| IP67 cap for M12 sockets | Metal cap for unused I/O connections | XS2Z-12 |

## Dust- and waterproof CompoBus I/O

Rugged I/O units for field mounting. Omron's unique CompoBus/S is the most efficient I/O bus for machine automation. With free topology and up to 500 m bus length in long-distance mode, it can be used as a remote I/O system. In high-speed mode (100 m max.) the guaranteed sub-millisecond cycle time makes it ideal for efficient machine control. With IP67 slave modules distributed throughout the machine, the need for protective enclosures is minimised.

- IP67 protection against dust and water
- Fast cycle time; less than 1 ms for 256 I/O points
- Easy setup; no software required
- Choice of 4- and 8-point Digital I/O
- M12 connectors for easy field wiring



## Ordering information

| Unit type | Specifications | Size in mm (H×W×D) | Order code |
|---|---|---|---|
| 4-point PNP input unit | 24 V, 6 mA | 114×54×45 | SRT2-ID04CL-1 |
| 8-point PNP input unit | 24 V, 6 mA | 114×54×45 | SRT2-ID08CL-1 |
| 4-point PNP output unit | 24 V, 0.5 A per point | 114×54×45 | SRT2-OD04CL-1 |
| 8-point PNP output unit | 24 V, 0.5 A per point | 114×54×45 | SRT2-OD08CL-1 |

**Note:** To order models with NPN (sinking) outputs and corresponding inputs (+V common), omit the "-1" from the model code.

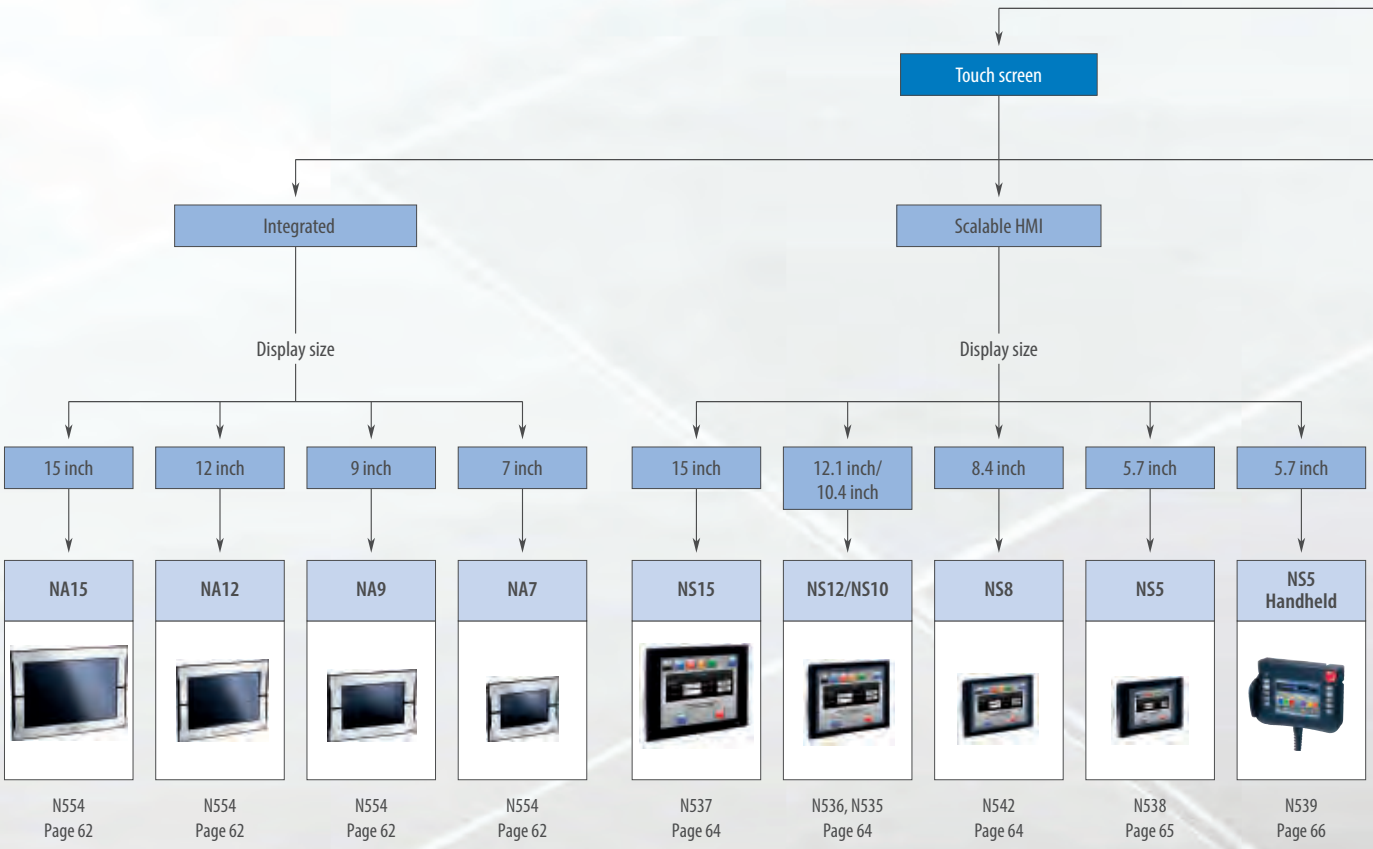
### Accessories

| Unit type | Specifications | Remarks | Order code |
|---|---|---|---|
| CompoBus/S terminator | with M12 plug connector | – | SRS2-1 |
| M12 connector | M12 plug connector (male), screw type | For CompoBus/S 4-wire round cable | XS2G-D4S7 |
| M12 connector | M12 socket connector (female), screw type | For CompoBus/S 4-wire round cable | XS2C-D4S7 |
| M12 T-connector (4-wire) | with two M12 socket connectors (female) + one M12 plug connector (male) | – | XS2R-D427-5 |
| 4-wire I/O connection cable | with one M12 plug connector (male), 1 m | – | XS2H-D421-C80-A |
| 4-wire I/O connection cable | with one M12 plug connector (male), 2 m | – | XS2H-D421-D80-A |
| 4-wire I/O connection cable | with one M12 plug connector (male), 5 m | – | XS2H-D421-G80-A |
| 4-wire I/O connection cable | with one M12 socket connector (female) and one M12 plug connector (male), 1 m | – | XS2W-D421-C81-A |
| 4-wire I/O connection cable | with one M12 socket connector (female) and one M12 plug connector (male), 2 m | – | XS2W-D421-D81-A |
| 4-wire I/O connection cable | with one M12 socket connector (female) and one M12 plug connector (male), 5 m | – | XS2W-D421-G81-A |
| Y-connector for 16-point I/O units | Splits the 2 I/O points per M12 connector to two M12 connectors | – | XS2R-D426-1 |
| Y-connector cable for 16-point I/O units | Splits the 2 I/O points per M12 connector to two M12 connectors, 1 m | – | XS2R-D426-C11-F |
| M12 connector | M12 plug connector (male), solder type | – | XS2G-D421 |
| M12 connector | M12 socket connector (female), solder type | – | XS2C-D421 |
| IP67 cap for M12 sockets | Metal cap for unused I/O connections | – | XS2Z-12 |

# NA AND NB SERIES

If you are looking for a smart and dependable HMI for use with our compact and modular PLC's, look no further than the NB series. It offers you - among various other features – an LED backlighted TFT LCD, a portrait and landscape mode and USB memory stick support. It is available with screen sizes from 3.5 to 10 inches.

For faster, more efficient control and monitoring, the scalable NA series HMI offers a more natural, proactive machine/operator environment that will evolve to meet your ever-changing needs. Based on the Sysmac Platform, the NA series is fully aware of the total machine and brings together all areas of automation including: logic, motion, vision, safety and visualization. It gives you a clear view in one integrated project. The high resolution wide screens are available in 7" and 9" (800 × 480 pixel ) as well as 12" and 15" (1280 × 800 pixel)



Interaction type

- Function keys
  - 4 lines
    - NT11 —  — N526, Page 70
  - 2 lines
    - NT2S —  — N527, Page 71
- Compact HMI
  - Display size
    - 10.1 inch
      - NB10W —  — N547, Page 68
    - 7 inch
      - NB7W —  — N548, Page 68
    - 5.6 inch
      - NB5Q —  — N549, Page 68
    - 3.5 inch
      - NB3Q —  — N552, Page 68

# Selection table

| | Integrated | | | |
|---|---|---|---|---|
| |  |  |  |  |
| **Model** | **NA15** | **NA12** | **NA9** | **NA7** |
| **Display** | 15 inch widescreen TFT color | 12 inch widescreen TFT color | 9 inch widescreen TFT color | 7 inch widescreen TFT color |
| **Resolution** | 1280 × 800 pixels | 1280 × 800 pixels | 800 × 400 pixels | 800 × 400 pixels |
| **Colors** | 24 bit | 24 bit | 24 bit | 24 bit |
| **Communication** | 3 × USB<br>2 × Ethernet<br>1 × RS-232<br>SD Card<br>24 VDC | 3 × USB<br>2 × Ethernet<br>1 × RS-232<br>SD Card<br>24 VDC | 3 × USB<br>2 × Ethernet<br>1 × RS-232<br>SD Card<br>24 VDC | 3 × USB<br>2 × Ethernet<br>1 × RS-232<br>SD Card<br>24 VDC |
| **Dimensions in mm (H×W×D)** | 420×291<br>391×267 (cut-out) | 340×244<br>309×220 (cut-out) | 290×190<br>260×165 (cut-out) | 236×165<br>196×140 (cut-out) |
| **Page/Quick Link** | 62 | | | |

| | Scalable HMI | | | | | |
|---|---|---|---|---|---|---|
| |  |  |  |  |  |  |
| **Model** | **NS15** | **NS12** | **NS10** | **NS8** | **NS5** | **NS5 handheld** |
| **Display** | 15 inch TFT color | 12.1 inch TFT color | 10.4 inch TFT color | 8.4 inch TFT color | 5.7 inch TFT color | 5.7 inch STN color |
| **Resolution** | 1024 × 768 pixels (XGA) | 800 × 600 pixels (SVGA) | 640 × 480 pixels (VGA) | 640 × 480 pixels (VGA) | 320 × 240 pixels (QVGA) | 320 × 240 pixels (QVGA) |
| **Number of colors** | 256<br>(32,768 for image data) | 256<br>(32,768 for image data) | 256<br>(32,768 for image data) | 256<br>(32,768 for image data) | 256<br>(32,768 for image data) | 256<br>(4,096 for image data) |
| **Memory Size** | 60 MB screen memory | 60 MB screen memory,<br>32,768 words +<br>32,768 bits internal memory and<br>8192 words + 8192 bits retentative memory | 60 MB screen memory,<br>32,768 words +<br>32,768 bits internal memory and<br>8192 words + 8192 bits retentative memory | 60 MB screen memory,<br>32,768 words +<br>32,768 bits internal memory and<br>8192 words + 8192 bits retentative memory | 60 MB screen memory,<br>32,768 words +<br>32,768 bits internal memory and<br>8192 words + 8192 bits retentative memory | 60 MB screen memory,<br>32,768 words +<br>32,768 bits internal memory and<br>8192 words + 8192 bits retentative memory |
| **Options** | Controller Link,<br>Video input board<br>(NS-CA002) | Ethernet, Controller Link,<br>Video input board<br>(RGB/Composite) | Ethernet, Controller Link,<br>Video input board<br>(RGB/Composite) | Ethernet, Video input board (RGB/Composite) | Ethernet | RS-232 or RS-422 communication depending on cable |
| **Dimensions in mm (H×W×D)** | 300×400×80 | 241×315×48.5 | 241×315×48.5 | 177×195×48.5 | 142×195×54 | 176×223×70.5<br>(excl. emergency button) |
| **Page/Quick Link** | 64 | | | | 65 | 66 |

| | | Compact HMI | | | |
|---|---|---|---|---|---|
| | |  |  |  |  |
| **Model** | | **NB10W** | **NB7W** | **NB5Q** | **NB3Q** |
| **Display** | | 10.1 inch Wide TFT LCD | 7 inch Wide TFT LCD | 5.6 inch TFT LCD | 3.5 inch TFT LCD |
| **Resolution** | | 800 × 480 pixels | 800 × 480 pixels | 320 × 234 pixels | 320 × 240 pixels |
| **Number of colors** | | 65,536 | 65,536 | 65,536 | 65,536 |
| **Memory** | | 128 MB (including system area) | 128 MB (including system area) | 128 MB (including system area) | 128 MB (including system area) |
| **Communication ports** | **Serial Communication** | 1 × RS-232C & 1 × RS-232C/422A/485 | 1 × RS-232C & 1 × RS-232C/422A/485 | 1 × RS-232C & 1 × RS-232C/422A/485 | 1 × RS-232C/422A/485 |
| | **USB (USB Host only on TW01 model)** | 1 × USB Host & 1 × USB Slave | 1 × USB Host & 1 × USB Slave | 1 × USB Host & 1 × USB Slave | 1 × USB Host & 1 × USB Slave |
| | **Ethernet** | 1 × Ethernet | 1 × Ethernet (TW01 model) | 1 × Ethernet (TW01 model) | 1 × Ethernet (TW01 model) |
| **Dimensions in mm (H×W×D)** | | 210.8×268.8×54.0 | 148×202×46 | 142×184×46 | 103.8×129.8×52.8 |
| **Page/Quick Link** | | 68 | | | |

| | Function-key HMI | | | |
|---|---|---|---|---|
| |  |  | | |
| **Model** | **NT11** | **NT2S** | | |
| **Type of Display** | LED backlight LCD | LED backlight LCD | | |
| **Number of F-keys** | 22 | 6 or 20 depending on model | | |
| **Number of characters** | 20 × 4 lines | 16 × 2 lines | | |
| **Printer connection** | Yes | Depending on model | | |
| **Number of screens** | 250 | 65,000 (limited by memory) | | |
| **Size in mm (H×W×D)** | 113×218×38.2 | 6 F-keys 60×109×43<br>20 F-keys 107×107×43 | | |
| **Page/Quick Link** | 70 | 71 | | |

## Bringing technology to life…

An HMI that is dynamic, intuitive and predictive makes industrial machines more attractive and competitive. Our Sysmac HMI enables faster, more efficient control and monitoring – and a more natural, proactive relationship between operator and machine.

- Complete functionality scalable with widescreen across 7", 9", 12", 15" range
- Available in black or silver
- High resolution (1280 × 800 pixel for 12" and 15", 800 × 480 pixel for 7" and 9")

## Ordering information

### Machine interface

| Display | Colors | Resolution | Frame color | Order code |
|---|---|---|---|---|
| 15.4 inch wide screen, TFT LCD | 24 bit full color | 1280 × 800 pixels | Silver | NA5-15W101S |
| | | | Black | NA5-15W101B |
| 12.1 inch wide screen, TFT LCD | | 1280 × 800 pixels | Silver | NA5-12W101S |
| | | | Black | NA5-12W101B |
| 9 inch wide screen, TFT LCD | | 800 × 480 pixels | Silver | NA5-9W001S |
| | | | Black | NA5-9W001B |
| 7 inch wide screen, TFT LCD | | 800 × 480 pixels | Silver | NA5-7W001S |
| | | | Black | NA5-7W001B |

### Accessories

| Type | Specifications | | Order code |
|---|---|---|---|
| SD memory card | 2 GB | | HMC-SD291 |
| | 4 GB | | HMC-SD491 |
| USB memory | 2 GB | | FZ-MEM2G |
| | 8 GB | | FZ-MEM8G |
| Replacement battery | Battery life: 5 years (at 25°C). This Battery is provided as an accessory. | | CJ1W-BAT01 |
| Anti-reflection sheets | Attach a Sheet to the screen to protect against diffused reflections and dirt. The entire Sheet is colorless and transparent. Five Sheets are provided in one set. | For NA5-15W | NA-15KBA04 |
| | | For NA5-12W | NA-12KBA04 |
| | | For NA5-9W | NA-9KBA04 |
| | | For NA5-7W | NA-7KBA04 |

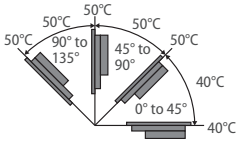
### Computer software

| Specifications | Order code |
|---|---|
| Sysmac Studio version 1.10 or higher | SYSMAC-SE2___ |

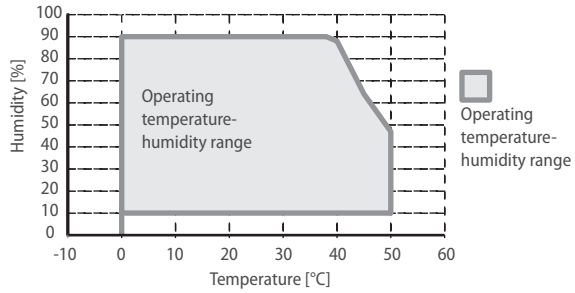
## Specifications

| Item | Specification | | | |
|---|---|---|---|---|
| | NA5-15W_ | NA5-12W_ | NA5-9W_ | NA5-7W_ |
| Rated supply voltage | 24 VDC | | | |
| Allowable power supply voltage range | 19.2 to 28.8 VDC (24 VDC ±20%) | | | |
| Power consumption | 47 W max. | 45 W max. | 40 W max. | 35 W max. |
| Ambient operating temperature | 0 to 50°C *1 *2 | | | |
| Ambient storage temperature | –20 to +60°C *3 | | | |
| Ambient operating humidity | 10 to 90% *2<br>Must be no condensation. | | | |
| Atmosphere | Must be free from corrosive gases. | | | |
| Pollution degree | 2 or less: JIS B 3502, IEC 61131-2 | | | |
| Noise immunity | 2 kV on power supply line (Conforms to IEC 61000-4-4.) | | | |
| Vibration resistance (during operation) | Conforms to IEC 60068-2-6.<br>5 to 8.4 Hz with 3.5 mm half amplitude and 8.4 to 150 Hz with 9.8 $m/s^2$ for 100 minutes each in X,Y, and Z directions<br>(Time coefficient of 10 minutes × coefficient factor of 10 = total time of 100 min.) | | | |
| Shock resistance (during operation) | Conforms to IEC 60028-2-27.<br>147 $m/s^2$ 3 times each in X, Y, and Z directions | | | |
| Dimensions (W×H×D) | 420 × 291 × 69 mm | 340 × 244 × 69 mm | 290 × 190 × 69 mm | 236 × 165 × 69 mm |
| Panel cutout dimensions | $392^{+1}_{0}$ × $268^{+1}_{0}$ mm<br>(horizontal × vertical)<br>Panel thickness: 1.6 to 6.0 mm | $310^{+1}_{0}$ × $221^{+1}_{0}$ mm<br>(horizontal × vertical)<br>Panel thickness: 1.6 to 6.0 mm | $261^{+1}_{0}$ × $166^{+1}_{0}$ mm<br>(horizontal × vertical)<br>Panel thickness: 1.6 to 6.0 mm | $197^{+0.5}_{0}$ × $141^{+0.5}_{0}$ mm<br>(horizontal × vertical)<br>Panel thickness: 1.6 to 6.0 mm |
| Weight | 3.2 kg max. | 2.3 kg max. | 1.7 kg max. | 1.3 kg max. |
| Degree of protection | Front-panel controls: IP65 oil-proof type, UL type 4X | | | |
| Battery life | Battery life: 5 years at 25°C<br>The RTC will be backed up for 5 days after the battery runs low. The RTC will be backed up by a super capacitor for 5 minutes after removing the old battery.<br>(This assumes that the power is first turned ON for at least 5 minutes and then turned OFF.) | | | |
| International standards | UL 508/CSA standard C22.2 No.142 *4<br>EMC Directive (2004/108/EC) EN 61131-2:2007<br>Shipbuilding standards LR, DNV, and NK<br>IP65 oil-proof, UL type 4X (front panel only)<br>ANSI 12.12.01 Class 1 Division 2/CSA standard C22.2<br>RoHS Directive (2002/95/EC)<br>KC Standards KN 61000-6-2:2012-06 for EMS and KN 61000-6-4:2012-06 for EMI<br>RCM | | | |

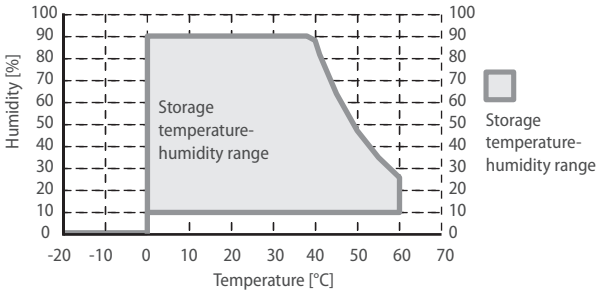
*1 The ambient operating temperature is subject to the following restrictions, depending on the mounting angle.
- The ambient operating temperature is 0° to 40°C when the mounting angle is 0° or more and less than 45° to the horizontal.
- The ambient operating temperature is 0° to 50°C when the mounting angle is 45° or more and 90° or less to the horizontal.
- The ambient operating temperature is 0° to 50°C when the mounting angle is 90° or more and 135° or less to the horizontal.




*2 Use the Programmable Terminal within the following temperature and humidity ranges.




*3 Store the Programmable Terminal within the following temperature and humidity ranges.




*4 Use power supply Class 2 to conform to UL Standards.

## One-touch machine management

The NS-series is our advanced HMI series that covers a large range from 5.7" Monochrome STN to 15" TFT. Easily programmed it offers advanced features like, multiple communication possibilities, good synergy with our PLC's and other devices with Ladder monitor, Smart Active Parts and proven reliability.

- Perfect clarity and fast switching screens
- Extremely long backlight life (up to 50,000 hours)
- Support all European languages, Asian and Cyrillic
- Easy data logging on compact flash
- Large Memory size (60 MB)
- Support for several non-Omron PLC's

## Ordering information

| Type | | | Order Code |
|---|---|---|---|
| TFT, 15", 1024 x 768 pixels | with Ethernet | Black | NS15-TX01B-V2 |
| | | Silver | NS15-TX01S-V2 |
| TFT, 12", 800 x 600 pixels | no Ethernet | Black | NS12-TS00B-V2 |
| | | Ivory | NS12-TS00-V2 |
| | with Ethernet | Black | NS12-TS01B-V2 |
| | | Ivory | NS12-TS01-V2 |
| TFT, 10", 640 x 480 pixels | no Ethernet | Black | NS10-TV00B-V2 |
| | | Ivory | NS10-TV00-V2 |
| | with Ethernet | Black | NS10-TV01B-V2 |
| | | Ivory | NS10-TV01-V2 |
| TFT, 8.4", 640 x 480 pixels | no Ethernet | Black | NS8-TV00B-V2 |
| | | Ivory | NS8-TV00-V2 |
| | with Ethernet | Black | NS8-TV01B-V2 |
| | | Ivory | NS8-TV01-V2 |

**Note:** For the accessories, please refer to page 67

## Specifications

| Item | NS15 | NS12 | NS10 | NS8 |
|---|---|---|---|---|
| **Display type** | 15 inch color TFT | 12 inch color TFT | 10 inch color TFT | 8 inch color TFT |
| **Display resolution** | 1024×768 (XGA) | 800×600 (SVGA) | 640×480 (VGA) | |
| **Number of colors** | 256 (32.768 for image data) | | | |
| **Backlight** | 2×CCFL | 1×LED | | |
| **Backlight lifetime** | Min. 50000 hours | | | |
| **View angle** | Left/right ±85°, Top 70°, Bottom 80° | Left/right ±60°, Top 45°, Bottom 75° | Left/right ±60°, Top 35°, Bottom 65° | Left/right ±65°, Top 50°, Bottom 60° |
| **Touch panel** | Analog resistive touch | Matrix resistive touch | | |
| **Number of functional keys** | 3 | – | | |
| **Dimensions in mm (H×W×D)** | 304×405×75.8 | 241×315×48.5 | | 177×232×48.5 |
| **Weight** | 4.2 kg max. | 2.5 kg max. | | 2.0 kg max. |
| **Screen data capacity** | 60 MB | | | |
| **Internal memory** | Bit memory: 32,767 bits, Word memory: 32,767 words, Retentative memory: 8,192 bits and 8,192 words. | | | |
| **Memory card interface** | 1 slot ATA Compact Flash card | | | |
| **Printer connection** | PictBridge support | | | |
| **Serial (COM1)** | 1×RS-232 | | | |
| **Serial (COM2)** | 1×RS-232/422/485 | 1×RS-232 | | |
| **USB Slave** | For programming & printing | | | |
| **Ethernet** | IEEE 802.3u 10Base-T/100Base-TX | | | |
| **Expansion module** | Optional network/video unit | | | Optional video unit |
| **Line voltage** | 24 VDC ±15% | | | |
| **Power consumption** | 45 W max. | 25 W max. | | |
| **Battery** | CJ1W-BAT01 | | | |
| **Battery lifetime** | 5 years (at 25°C) | | | |
| **Enclosure rating (front side)** | IP65F (equivalent to NEMA4) | | | |
| **Obtained standards** | UL 1604 Class 1 Diff. 2, cUL, CE, Lloyds, DNV | | | |
| **Operating environment** | No corrosive gases | | | |
| **Noise immunity** | Conforms to IEC61000-4-4, 2 KV (power lines) | | | |
| **Ambient operating temperature** | 0 to 50°C*1 | | | |
| **Ambient operating humidity** | 35% to 85% (0 to 40°C) with no condensation, 35% to 60% (40 to 50°C) with no condensation | | | |

*1 see manual for details.

## More power, smaller size

The smallest NS HMI is available in two brightness variations, both with a vivid color TFT touchscreen. It is equipped with a USB connection for project download/upload and the possibility to communicate over Ethernet. One great advantage with the NS is that you can make use of Omron's unique Smart Active Parts (SAP) that save you time when configuring, commissioning and maintaining your machine. SAP are pre-programmed, pre-tested visualisation objects with embedded communication code, bringing 'drag and drop' simplicity to HMI design.

- Perfect clarity and fast switching screens
- Extremely long backlight life (up to 75,000 hours)
- Support all European languages, Asian and Cyrillic
- Easy data logging on compact flash
- Large Memory size (60 MB)
- Support for several non-Omron PLC's



## Ordering information

| Type | | | | Order Code |
|---|---|---|---|---|
| NS5-TQ | TFT, 5.7", 320×240 pixels | no Ethernet | Black | NS5-TQ10B-V2 |
| | | | Ivory | NS5-TQ10-V2 |
| | | with Ethernet | Black | NS5-TQ11B-V2 |
| | | | Ivory | NS5-TQ11-V2 |
| NS5-SQ | TFT, 5.7", 320×240 pixels | no Ethernet | Black | NS5-SQ10B-V2 |
| | | | Ivory | NS5-SQ10-V2 |
| | | with Ethernet | Black | NS5-SQ11B-V2 |
| | | | Ivory | NS5-SQ11-V2 |

**Note:** For the accessories, please refer to page 67

## Specifications

| Item | NS5-TQ | NS5-SQ |
|---|---|---|
| Display type | 5.7 inch color TFT | |
| Display resolution | 340×240 (QVGA) | |
| Number of colors | 256 (32.768 for image data) | |
| Backlight | LED | |
| Backlight lifetime | Min. 75000 hours | |
| View angle | Left/right ±80°, Top 80°, Bottom 60° | |
| Touch panel | Matrix resistive touch | |
| Number of functional keys | – | |
| Dimensions in mm (H×W×D) | 142×195×54 | |
| Weight | 1.0 kg max. | |
| Screen data capacity | 60 MB | |
| Internal memory | Bit memory: 32,767 bits, Word memory: 32,767 words, Retentative memory: 8,192 bits and 8,192 words. | |
| Memory card interface | 1 slot ATA Compact Flash card | |
| Printer connection | PictBridge support | |
| Serial (COM1) | 1×RS-232 | |
| Serial (COM2) | 1×RS-232 | |
| USB Slave | For programming & printing | |
| Ethernet | IEEE 802.3u 10Base-T/100Base-TX | |
| Expansion module | – | |
| Line voltage | 24 VDC ±15% | |
| Power consumption | 15 W max. | |
| Battery | CJ1W-BAT01 | |
| Battery lifetime | 5 years (at 25°C) | |
| Enclosure rating (front side) | IP65F (equivalent to NEMA4) | |
| Obtained standards | UL 1604 Class 1 Diff. 2, cUL, CE, Lloyds, DNV | |
| Operating environment | No corrosive gases | |
| Noise immunity | Conforms to IEC61000-4-4, 2 KV (power lines) | |
| Ambient operating temperature | 0 to 50°C*1 | |
| Ambient operating humidity | 35% to 85% (0 to 40°C) with no condensation, 35% to 60% (40 to 50°C) with no condensation | |

*1 See manual for details.

## NS5 handheld, suitable for use in harsh conditions

The NS series has evolved into a mobile format. Based on the standard 5.7" TFT color version, we can offer a handheld version of the NS series. Offering 10 Function keys for the most used functions and with a protection degree of IP65 it is the product to use in harsh environment where freedom of movement is needed.

- 10 Function keys, 4 hardwired for inching
- Emergency switch on front plus enable switch on back of unit
- Well protected against water, IP65
- Compact Flash, Serial and USB interface

## Ordering information

| Type | | | Order code |
|---|---|---|---|
| NSH5 | TFT, 5.7", 320×240 pixels | Black | NSH5-SQR10B-V2 |

### Accessories

| Type | Order code |
|---|---|
| Bracket NS handheld protecting emergency button from accidental activation | NSH5-ATT01 |
| Bracket NS handheld for wall mounting | NSH5-ATT02 |
| Cable NS handheld, RS-422, 10m UL | NSH5-422UL-10M |
| Cable NS handheld, RS-232, 10m UL | NSH5-232UL-10M |
| Cable NS handheld, RS-232, 3m UL | NSH5-232UL-3M |

## Specifications

| | |
|---|---|
| **Memory card interface** | 1 slot ATA Compact Flash card |
| **Serial (COM1)** | 1×RS-232/RS-422A |
| **USB Slave** | For programming |
| **Line voltage** | 24 VDC ±15% |
| **Power consumption** | 10 W max. |
| **Battery** | CJ1W-BAT01 |
| **Battery lifetime** | 5 years (at 25°C) |
| **Enclosure rating** | IP65*1 |
| **Obtained standards** | UL 1604 Class 1 Diff. 2, cUL, CE, NEMA equivalent |
| **Operating environment** | No corrosive gases |
| **Noise immunity** | Conforming to IEC 61000-4-4: 2 kV (power supply line) |
| **Ambient operating temperature** | 0 to 40°C |
| **Ambient operating humidity** | 35% to 85% max. (with no condensation) |
| **Vibration resistance (during operation)** | 10 to 57 Hz with amplitude of 0.075 mm, 57 to 150 Hz with acceleration of 9.8 $m/s^2$ three minutes each in X, Y, and Z directions |
| **Shock resistance (during operation)** | 147 $m/s^2$ three times each in X, Y, and Z directions |
| **Drop test*1** | Dropped from 1 m. Conforming to JIS B 3502/IEC61131-2 |

*1 see manual for details.

## Ordering information

| Type | Description | | Order code |
|---|---|---|---|
| Cable | Serial programming cable | | XW2Z-S002 |
| | USB programming cable, 2 m | | CP1W-CN221 |
| PT-to-PLC Connecting Cable | PT connection: 9 pins<br>PLC connection: 9 pins | Length: 2 m | XW2Z-200T |
| | | Length: 5 m | XW2Z-500T |
| Accessories | Video input | Inputs: 4 channels NTSC / PAL | NS-CA001 |
| | | Inputs: 2 channels NTSC / PAL, 1 channel RGB | NS-CA002 |
| | Cable to connect NS-CA00_ to Video console unit | | F150-VKP (2 m) |
| | | | F150-VKP (5 m) |
| | Controller link interface unit | | NS-CLK21 |
| | RS-422A/485 adapter (50 m) | | CJ1W-CIF11 |
| | RS-422A adapter (500 m) | | NS-AL002 |
| | Anti-reflection sheets (5 sheets) | NS15 | NS15-KBA04 |
| | | NS12/10 | NS12-KBA04 |
| | | NS8 | NS7-KBA04 |
| | | NS5 | NT30-KBA04 |
| | Anti-reflection protective covers (5 pack) | NS12/10 | NS12-KBA05 |
| | | NS8 | NS7-KBA05 |
| | | NS5 | NT31C-KBA05 |
| | Transparent protective covers (5 pack) | NS15 (1 cover) | NS15-KBA05N |
| | | NS12/10 | NS12-KBA05N |
| | | NS8 | NS7-KBA05N |
| | | NS5 | NT31C-KBA05N |
| | Chemical-resistant cover (1 cover) | NS5 | NT30-KBA01 |
| | Attachment adapter | (NT625C/631/631C series to NS12 series) | NS12-ATT01 |
| | | (NT625C/631/631C series to NS12 series) Black | NS12-ATT01B |
| | | (NT620S/620C/600S series to NS8 series) | NS8-ATT01 |
| | | (NT600M/600G/610G/612G series to NS8 series) | NS8-ATT02 |
| | Memory card | 128 MB | HMC-EF183 |
| | | 256 MB | HMC-EF283 |
| | | 512 MB | HMC-EF583 |
| | Memory card adapter for PC | | HMC-AP001 |
| | Battery | | CJ1W-BAT01 |

## The feature-rich, cost-effective HMI

The combination of high quality and rich features add up to give outstanding value for an HMI in the economy class. The NB-Designer software to create your HMI application is free of charge and can be downloaded from our website.

- More than 65,000 display colors TFT touch screen
- Available in sizes ranging from 3.5 to 10 inches
- Long-life LED backlight
- Serial, USB or Ethernet communication
- USB memory stick support (TW01 model only)
- 128 MB internal memory
- Vector and bitmap graphics

## Ordering information

### HMI panels

| Product name | Specifications | Order code |
|---|---|---|
| NB3Q | 3.5 inch, TFT LCD, Color, 320 × 240 dots | NB3Q-TW00B |
| | 3.5 inch, TFT LCD, Color, 320 × 240 dots, USB Host, Ethernet | NB3Q-TW01B |
| NB5Q | 5.6 inch, TFT LCD, Color, 320 × 234 dots | NB5Q-TW00B |
| | 5.6 inch, TFT LCD, Color, 320 × 234 dots, USB Host, Ethernet | NB5Q-TW01B |
| NB7W | 7 inch, TFT LCD, Color, 800 × 480 dots | NB7W-TW00B |
| | 7 inch, TFT LCD, Color, 800 × 480 dots, USB Host, Ethernet | NB7W-TW01B |
| NB10W | 10.1 inch, TFT LCD, Color, 800 × 480 dots, USB Host, Ethernet | NB10W-TW01B |

### Options

| Product item | Specifications | Order code |
|---|---|---|
| NB-to-PLC Connecting cable | For NB to PLC via RS-232C (CP/CJ/CS), 2m | XW2Z-200T |
| | For NB to PLC via RS-232C (CP/CJ/CS), 5m | XW2Z-500T |
| | For NB to PLC via RS-422A/485, 2m | NB-RSEXT-2M |
| Software | Supported Operating Systems: Windows 7, Windows Vista®, Windows XP*1 (SP1 or higher). Download from the Omron website. | NB-Designer*2 |
| Display protective sheets | For the NB3Q contains 5 sheets | NB3Q-KBA04 |
| | For the NB5Q contains 5 sheets | NB5Q-KBA04 |
| | For the NB7W contains 5 sheets | NB7W-KBA04 |
| | For the NB10W contains 5 sheets | NB10W-KBA04 |
| Attachment | Mounting bracket for NT31/NT31C series to NB5Q series | NB5Q-ATT01 |

*1 Except for Windows XP 64-bit version
*2 The NB5Q-TW01B and NB7W-TW01B are supported by NB-Designer version 1.10 or higher.
The NB3Q-TW0_B and NB10W-TW01B are supported by NB-Designer version 1.20 or higher.

| Model | Panel cutout (H × V mm) |
|---|---|
| NB3Q | 119.0 (+0.5/–0) × 93.0 (+0.5/–0) |
| NB5Q | 172.4 (+0.5/–0) × 131.0 (+0.5/–0) |
| NB7W | 191.0 (+0.5/–0) × 137.0 (+0.5/–0) |
| NB10W | 258.0 (+0.5/–0) × 200.0 (+0.5/–0) |

**Note:** Applicable panel thickness: 1.6 to 4.8 mm.

## Specifications

### HMI

| Specifications | NB3Q | | NB5Q | | NB7W | | NB10W |
|---|---|---|---|---|---|---|---|
| | TW00B | TW01B | TW00B | TW01B | TW00B | TW01B | TW01B |
| Display type | 3.5 inch TFT LCD | | 5.6 inch TFT LCD | | 7 inch TFT LCD | | 10.1 inch TFT LCD |
| Display resolution (H×V) | 320×240 | | 320×234 | | 800×480 | | 800×480 |
| Number of colors | 65,536 | | | | | | |
| Backlight | LED | | | | | | |
| Backlight lifetime | 50,000 hours of operating time at the normal temperature (25°C)*1 | | | | | | |
| Touch panel | Analog resistive membrane, resolution 1024×1024, life: 1 million touch operations | | | | | | |
| Dimensions in mm (H×W×D) | 103.8×129.8×52.8 | | 142×184×46 | | 148×202×46 | | 210.8×268.8×54.0 |
| Weight | 310 g max. | 315 g max. | 620 g max. | 625 g max. | 710 g max. | 715 g max. | 1,545 g max. |

*1 This is the estimated time when the luminous intensity is decreased by 50% per LED at room temperature and humidity. It is a typical value.

### Functionality

| Specifications | NB3Q | | NB5Q | | NB7W | | NB10W |
|---|---|---|---|---|---|---|---|
| | TW00B | TW01B | TW00B | TW01B | TW00B | TW01B | TW01B |
| Internal memory | 128MB (including system area) | | | | | | |
| Memory interface | – | USB Memory | – | USB Memory | – | USB Memory | USB Memory |
| Serial (COM1) | RS-232C/422A/485 (not isolated), Transmission distance: 15m Max. (RS-232C), 500m Max. (RS-422A/485), Connector: D-Sub 9-pin | | RS-232C, Transmission distance: 15 m Max., Connector: D-Sub 9-pin | | | | |
| Serial (COM2) | – | | RS-232C/422A/485 (not isolated), Transmission distance: 15m Max. (RS-232C), 500m Max. (RS-422A/485), Connector: D-Sub 9-pin | | | | |
| USB Host | Equivalent to USB 2.0 full speed, type A, Output power 5V, 150mA | | | | | | |
| USB Slave | Equivalent to USB 2.0 full speed, type B, Transmission distance: 5m | | | | | | |
| Printer connection | PictBridge support | | | | | | |
| Ethernet | – | 10/100 base-T | – | 10/100 base-T | – | 10/100 base-T | 10/100 base-T |

### General

| Specifications | NB3Q | | NB5Q | | NB7W | | NB10W |
|---|---|---|---|---|---|---|---|
| | TW00B | TW01B | TW00B | TW01B | TW00B | TW01B | TW01B |
| Line voltage | 20.4 to 27.6 VDC (24 VDC –15 to 15%) | | | | | | |
| Power consumption | 5 W | 9 W | 6 W | 10 W | 7 W | 11 W | 14 W |
| Battery lifetime | 5 years (at 25°C) | | | | | | |
| Enclosure rating (front side) | Front operation part: IP65 (Dust proof and drip proof only from the front of the panel) | | | | | | |
| Obtained standards | EC Directives, KC, cUL508 | | | | | | |
| Operating environment | No corrosive gases. | | | | | | |
| Noise immunity | Compliant with IEC61000-4-4, 2KV (Power cable) | | | | | | |
| Ambient operating temperature | 0 to 50°C | | | | | | |
| Ambient operating humidity | 10% to 90% RH (without condensation) | | | | | | |

## Applicable Controllers

| Brand | Series |
|---|---|
| OMRON | Omron C Series Host Link |
| | Omron CJ/CS Series Host Link |
| | Omron CP Series |
| Mitsubishi | Mitsubishi Q_QnA (Link Port) |
| | Mitsubishi FX-485ADP/485BD/422BD (Multi-station) |
| | Mitsubishi FX0N/1N/2N/3G |
| | Mitsubishi FX1S |
| | Mitsubishi FX2N-10GM/20GM |
| | Mitsubishi FX3U |
| | Mitsubishi Q series (CPU Port) |
| | Mitsubishi Q00J (CPU Port) |
| | Mitsubishi Q06H |
| Panasonic | FP series |
| Siemens | Siemens S7-200 |
| | Siemens S7-300/400 (PC Adapter Direct) |
| Allen-Bradley*1 (Rockwell) | AB DF1<br>AB CompactLogix/ControlLogix |

| Brand | Series |
|---|---|
| Schneider | Schneider Modicon Uni-TelWay |
| | Schneider Twido Modbus RTU |
| Delta | Delta DVP |
| LG (LS) | LS Master-K Cnet |
| | LS Master-K CPU Direct |
| | LS Master-K Modbus RTU |
| | LS XGT CPU Direct |
| | LS XGT Cnet |
| GE Fanuc Automation*1 | GE Fanuc Series SNP<br>GE SNP-X |
| Modbus | Modbus ASCII |
| | Modbus RTU |
| | Modbus RTU Slave |
| | Modbus RTU Extend |
| | Modbus TCP |

*1 AB and GE will be supported by NB-Designer version 1.20 or higher.

**Note:** For details, refer to NB Series Host Connection Manual (Cat.No V108).


## HMI with four text lines and 22 F-keys

The NT11 is a Function key HMI with four text lines that can each hold up to 20 characters. It has a parallel printer connection next to a serial port for connection to a PLC. It has a LED backlight that has a life expectancy of at least 50,000 hours.

- Easy programming software.
- Small size and installation depth.
- Customisable F-Keys
- Printer connection.
- Cost effective solution.

## Ordering information

| Type | | | Order code |
|---|---|---|---|
| STN monochrome | Ten-key type | Ivory | NT11-SF121-EV1 |
| | | Black | NT11-SF121B-EV1 |

### Accessories

| Type | Description | | | Order code |
|---|---|---|---|---|
| Cables | For screen transfer | | | XW2Z-S002 |
| | For PLC connection | PT: 9-pin<br>PLC: 9-pin | Cable length: 2 m | XW2Z-200T |
| | | | Cable length: 5 m | XW2Z-500T |
| | | PT: 9-pin<br>PLC: Mini-peripheral | Cable length: 2 m | NT-CN221 |

### Software

| Type | Order code |
|---|---|
| NTST Version 4.8 | NTZJCAT1EV4 |
| Upgrade NTST Version 4.8 | NTZJCAT1EV4S |

## Specifications

| | |
|---|---|
| **Size in mm (H×W×D)** | 113×218×38.2 |
| **Effective display area** | 100×40mm (160×64 pixels) |
| **Line voltage** | 24 VDC ±15% |
| **Function keys** | 22 keys |
| **Touch panel** | – |
| **Obtained standards** | CE, cULus |
| **No. of display characters (standard characters)** | 20 characters × 4 lines |
| **No. of registered screens** | 250 |
| **Screen data capacity (standard)** | 32 KB |
| **Expansion memory** | – |
| **Memory card interface** | – |
| **Printer connection** | Supported |
| **Backlight life** | 50,000 hours average |


## HMI with two text lines, 6 or 20 F-keys and up to two serial ports

The NT2S is the smallest HMI that we can offer you. It is based on a 16 × 2 lines LCD display with 6 or 20 Function keys. It offers IP65 protection, an optional RTC and printer connection.

- Easy and free programming software.
- Small size and installation depth.
- Real Time Clock (depending on model).
- Printer connection (depending on model).
- Cost effective solution.



## Ordering information

| Type | | | Order code |
|---|---|---|---|
| STN monochrome | Programmable | 6-key type, Black | NT2S-SF121B-EV2 |
| | | | NT2S-SF122B-EV2 |
| | PLC controlled | | NT2S-SF123B-EV2 |
| | Programmable | 20-key type, Black | NT2S-SF125B-E |
| | | | NT2S-SF126B-E |
| | PLC controlled | | NT2S-SF127B-E |

### Accessories

| Type | Description | Order code |
|---|---|---|
| NT2S-SF121/125 and NT3S | peripheral port CPM series except CPM2C, 2 m | NT2S-CN212-V1 |
| NT2S-SF121/125 and NT3S | peripheral port CPM series except CPM2C, 5 m | NT2S-CN215-V1 |
| NT2S-SF122/SF123/SF126/SF127 | peripheral port CPM series except CPM2C, 2 m | NT2S-CN222-V1 |
| NT2S-SF122/SF123/SF126/SF127 | peripheral port CPM series except CPM2C, 5 m | NT2S-CN225-V2 |
| NT2S-SF121/125 and NT3S | mini-peripheral port CJ1/CS1 and CPM2C series, 2 m | NT2S-CN223-V2 |
| NT2S-SF122/SF123/SF126/SF127 | mini-peripheral port CJ1/CS1 and CPM2C series, 2 m | NT2S-CN224-V1 |
| NT2S-SF121/125 and NT3S | serial port CJ1/CS1/CP1/CPM2/CQM1(H), 2 m | NT2S-CN232-V1 |
| NT2S-SF121/125 and NT3S | serial port CJ1/CS1/CP1/CPM2/CQM1(H), 5 m | NT2S-CN235-V1 |
| NT2S-SF122/SF126 | serial port CJ1/CS1/CP1/CPM2/CQM1(H), 2 m | NT2S-CN242-V1 |
| All NT2S and NT3S models | serial programming cable, 2 m | NT2S-CN002 |

### Software

| Type | Order code |
|---|---|
| This software is provided free of charge and features Windows fonts, a Multi language import/export utility, a character map to design your own characters and can be used to place bitmaps in your application. | NTXS |

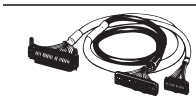
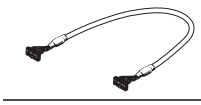
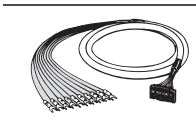
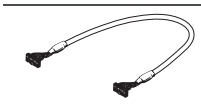
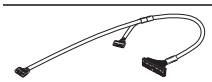
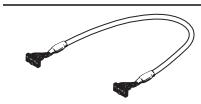
## Specifications

| | |
|---|---|
| **Size in mm (H×W×D)** | 60×109×43 (6 F-keys), 107×107×43 (20 F-keys) |
| **Effective display area** | 56×11 mm |
| **Line voltage** | 24 VDC ±10% |
| **Touch panel** | – |
| **Obtained standards** | CE, cULus |
| **No. of display characters (standard characters)** | 16 characters x 2 lines |
| **No. of registered screens** | 65,000 max. |
| **Screen data capacity (standard)** | 24 KB in Programmable models |
| **Expansion memory** | – |
| **Memory card interface** | – |
| **Internal memory** | 1K words data, 1K words retentative memory |
| **Printer connection** | Supported |
| **Multi-Vendor support** | Supported for several non-Omron PLCs. *1 |
| **Backlight life** | LED, min. 50,000 hours |

*1 Please contact Omron for a list of available drivers.

## Ordering information

### I/O cables

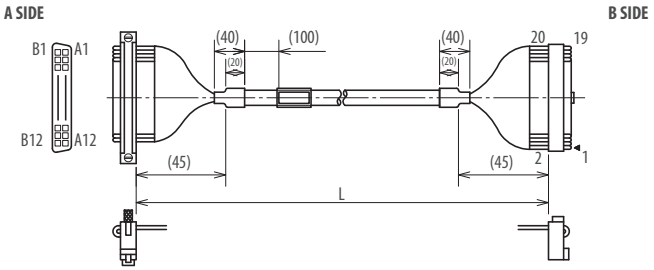
| Shape | PLC connection | Terminal connection | Length in cm | | | | | | | | | | Wiring | Order code |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 30 | 50 | 75 | 100 | 150 | 200 | 250 | 300 | 400 | 500 | | |
|  | FCN24 | MIL20 | – | ■ | – | ■ | – | ■ | – | ■ | – | – | Straight | XW2Z-[....]AD-L |
|  | | Open ends | – | – | – | ■ | – | ■ | – | ■ | – | – | n. a. | XW2Z-[....]AL-L |
|  | FCN40 | MIL20 × 2 | – | – | – | ■ | ■ | ■ | – | ■ | ■ | ■ | Straight | XW2Z-[....]BH-L01 |
| | | | | | | | | | | | | | Reverse | XW2Z-[....]BH-L02 |
|  | | MIL40 | – | ■ | – | ■ | ■ | ■ | – | ■ | – | ■ | Straight | XW2Z-[....]BF-L |
|  | | Open ends | – | – | – | ■ | – | ■ | – | ■ | – | ■ | n. a. | XW2Z-[....]BN-L |
|  | FCN56 | MIL20 × 3 | – | – | – | – | ■ | ■ | – | ■ | – | – | Straight | XW2Z-[....]CJ-L01 |
| | | | | | | | | | | | | | Reverse | XW2Z-[....]CJ-L02 |
|  | | MIL20 + MIL40 | – | – | – | – | ■ | ■ | – | – | – | – | Straight | XW2Z-[....]CK-L01 |
| | | | | | | | | | | | | | Reverse | XW2Z-[....]CK-L02 |
|  | | MIL60 | – | – | – | ■ | – | ■ | – | ■ | – | – | Straight | XW2Z-[....]CG-L |
|  | MIL20 | MIL20 | – | ■ | – | ■ | – | ■ | – | | – | – | Straight | XW2Z-[....]DD-L |
|  | | Open ends | – | ■ | – | ■ | ■ | ■ | – | ■ | – | ■ | n. a. | XW2Z-[....]DL-L |
|  | | Fork terminals | – | ■ | – | ■ | ■ | ■ | – | ■ | – | ■ | n. a. | XW2Z-[....]DM-L |
|  | MIL34 | MIL34 | – | – | – | – | – | ■ | – | – | – | – | Straight | XW2Z-[....]EE-L |
|  | MIL40 | MIL20 × 2 | – | – | ■ | ■ | – | ■ | – | ■ | – | ■ | Reverse | XW2Z-[....]FH-L01 |
| | | | | | | | | | | | | | Straight | XW2Z-[....]FH-L02 |
|  | | MIL40 | ■ | ■ | – | ■ | ■ | ■ | – | ■ | – | ■ | Straight | XW2Z-[....]FF-L |
|  | | Open ends | – | – | – | ■ | ■ | ■ | ■ | ■ | – | ■ | n. a. | XW2Z-[....]FN-L |

**Note:** For [….] fill in the 4-digit length in cm

## I/O cables XW2Z

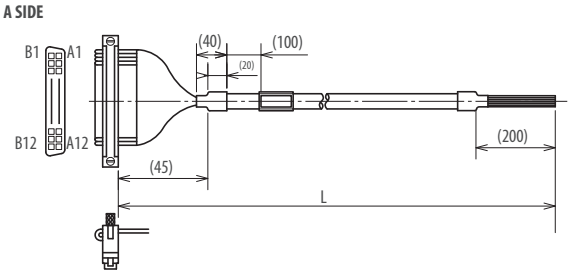
### XW2Z-_AD-L

| PLC connection | Terminal connection | Wiring | Length in cm (L) | | | | | | | | | | Order code |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 30 | 50 | 75 | 100 | 150 | 200 | 250 | 300 | 400 | 500 | |
| 24-pin FCN Connector | 20-pin MIL Connector | Straight | – | ■ | – | – | – | – | – | – | – | – | XW2Z-0050AD-L |
| | | | – | – | – | ■ | – | – | – | – | – | – | XW2Z-0100AD-L |
| | | | – | – | – | – | – | ■ | – | – | – | – | XW2Z-0200AD-L |
| | | | – | – | – | – | – | – | – | ■ | – | – | XW2Z-0300AD-L |



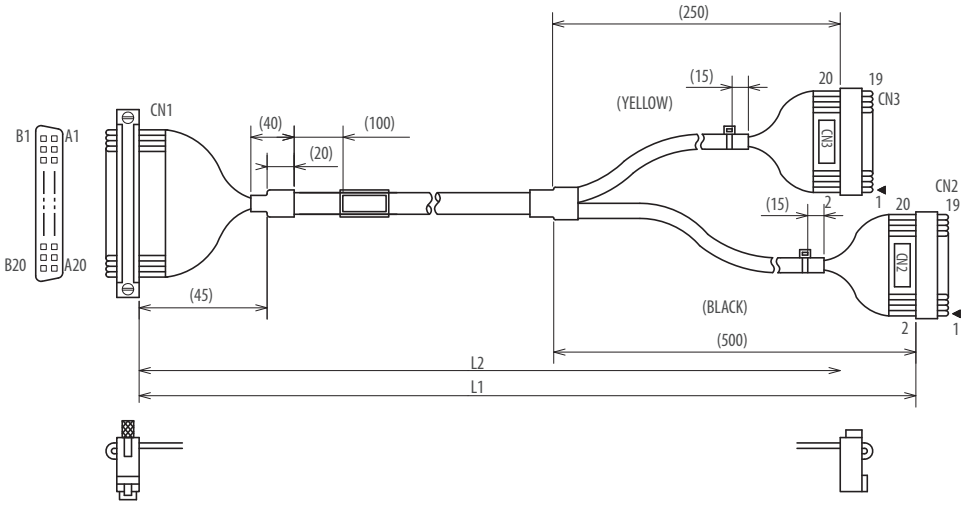

### XW2Z-_AL-L

| PLC connection | Terminal connection | Wiring | Length in cm (L) | | | | | | | | | | Order code |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 30 | 50 | 75 | 100 | 150 | 200 | 250 | 300 | 400 | 500 | |
| 24-pin FCN | Loose Wires | Straight | – | – | – | ■ | – | – | – | – | – | – | XW2Z-0100AL-L |
| | | | – | – | – | – | – | ■ | – | – | – | – | XW2Z-0200AL-L |
| | | | – | – | – | – | – | – | – | ■ | – | – | XW2Z-0300AL-L |



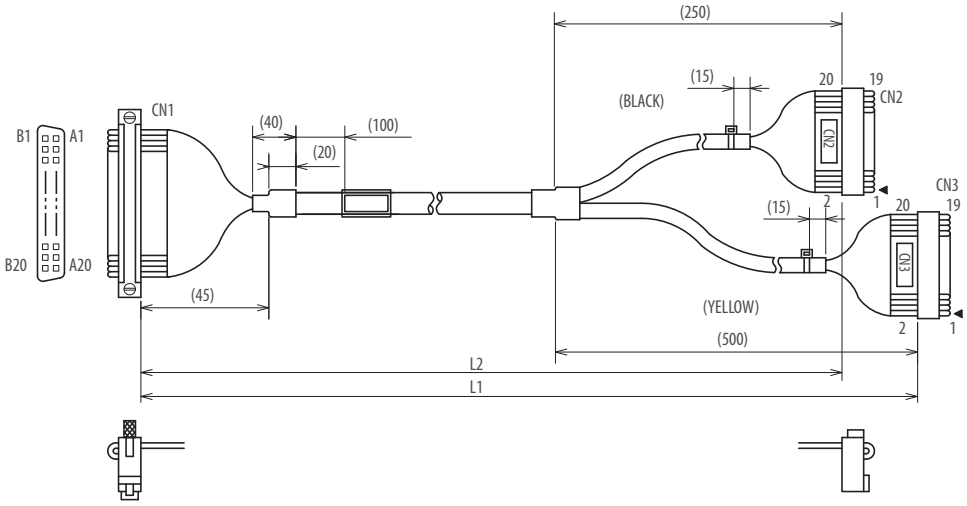

### XW2Z-_BH-L01

| PLC connection | Terminal connection | Wiring | Length in cm (L1) | | | | | | Length in cm (L2) | | | | | | Order code |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 100 | 150 | 200 | 300 | 400 | 500 | 75 | 125 | 175 | 275 | 375 | 475 | |
| 40-pin FCN | Two 20-pin MIL | Straight | ■ | – | – | – | – | – | ■ | – | – | – | – | – | XW2Z-0100BH-L01 |
| | | | – | ■ | – | – | – | – | – | ■ | – | – | – | – | XW2Z-0150BH-L01 |
| | | | – | – | ■ | – | – | – | – | – | ■ | – | – | – | XW2Z-0200BH-L01 |
| | | | – | – | – | ■ | – | – | – | – | – | ■ | – | – | XW2Z-0300BH-L01 |
| | | | – | – | – | – | ■ | – | – | – | – | – | ■ | – | XW2Z-0400BH-L01 |
| | | | – | – | – | – | – | ■ | – | – | – | – | – | ■ | XW2Z-0500BH-L01 |



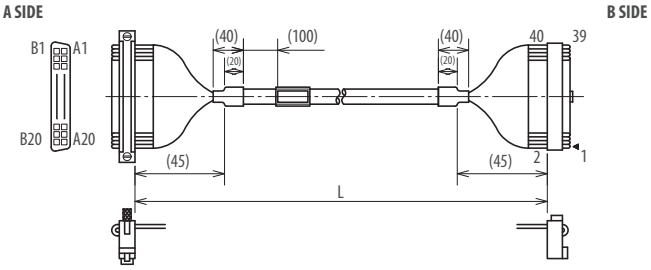
### XW2Z-_BH-L02

| PLC connection | Terminal connection | Wiring | Length in cm (L1) | | | | | | Length in cm (L2) | | | | | | Order code |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 100 | 150 | 200 | 300 | 400 | 500 | 75 | 125 | 175 | 275 | 375 | 475 | |
| 40-pin FCN | Two 20-pin MIL | Reverse | ■ | – | – | – | – | – | ■ | – | – | – | – | – | XW2Z-0100BH-L02 |
| | | | – | ■ | – | – | – | – | – | ■ | – | – | – | – | XW2Z-0150BH-L02 |
| | | | – | – | ■ | – | – | – | – | – | ■ | – | – | – | XW2Z-0200BH-L02 |
| | | | – | – | – | ■ | – | – | – | – | – | ■ | – | – | XW2Z-0300BH-L02 |
| | | | – | – | – | – | ■ | – | – | – | – | – | ■ | – | XW2Z-0400BH-L02 |
| | | | – | – | – | – | – | ■ | – | – | – | – | – | ■ | XW2Z-0500BH-L02 |



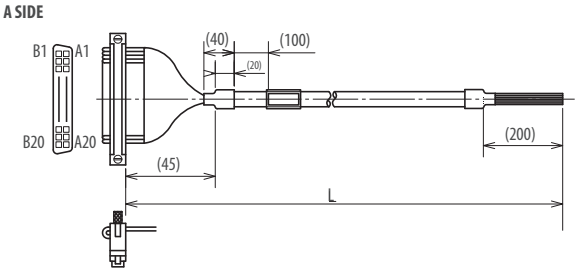

### XW2Z-_BF-L

| PLC connection | Terminal connection | Wiring | Length in cm (L) | | | | | | | | | | Order code |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 30 | 50 | 75 | 100 | 150 | 200 | 250 | 300 | 400 | 500 | |
| 40-pin FCN | 40-pin MIL | Straight | – | ■ | – | – | – | – | – | – | – | – | XW2Z-0050BF-L |
| | | | – | – | – | ■ | – | – | – | – | – | – | XW2Z-0100BF-L |
| | | | – | – | – | – | ■ | – | – | – | – | – | XW2Z-0150BF-L |
| | | | – | – | – | – | – | ■ | – | – | – | – | XW2Z-0200BF-L |
| | | | – | – | – | – | – | – | – | ■ | – | – | XW2Z-0300BF-L |
| | | | – | – | – | – | – | – | – | – | – | ■ | XW2Z-0500BF-L |



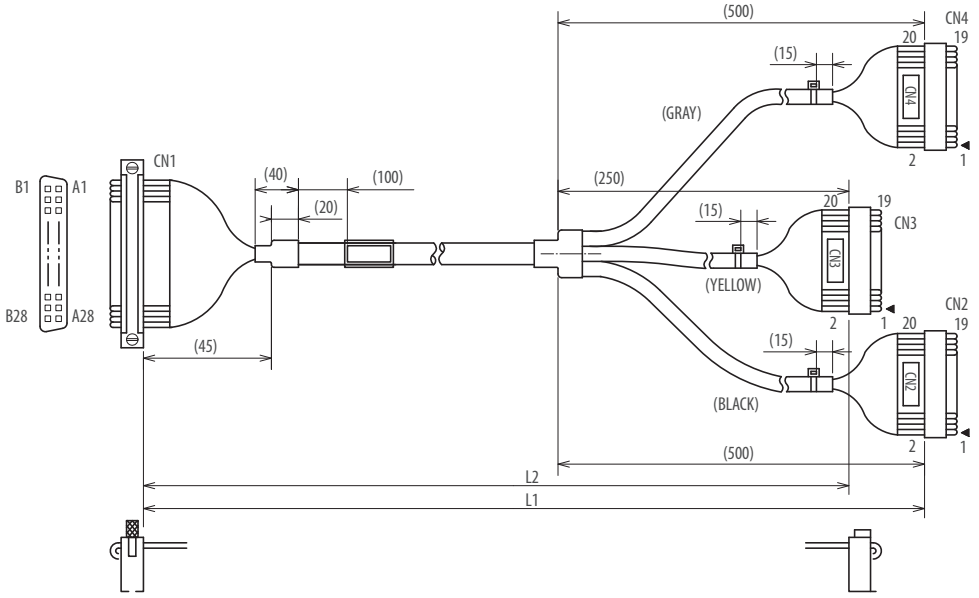

### XW2Z-_BN-L

| PLC connection | Terminal connection | Wiring | Length in cm (L) | | | | | | | | | | Order code |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 30 | 50 | 75 | 100 | 150 | 200 | 250 | 300 | 400 | 500 | |
| 40-pin FCN | Loose Wires | Straight | – | – | – | ■ | – | – | – | – | – | – | XW2Z-0100BN-L |
| | | | – | – | – | – | – | ■ | – | – | – | – | XW2Z-0200BN-L |
| | | | – | – | – | – | – | – | – | ■ | – | – | XW2Z-0300BN-L |
| | | | – | – | – | – | – | – | – | – | – | ■ | XW2Z-0500BN-L |



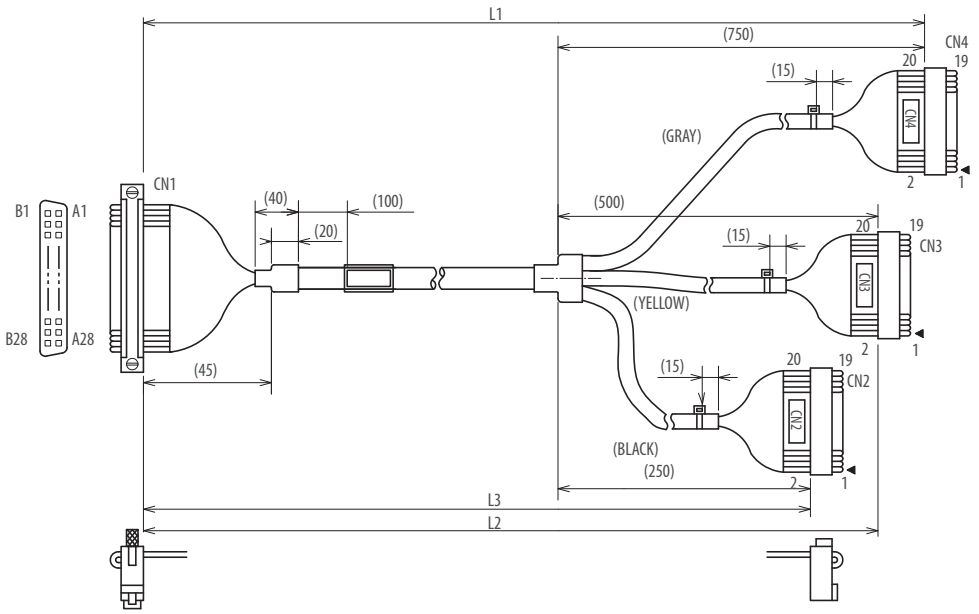
### XW2Z-_CJ-L01

| PLC connection | Terminal connection | Wiring | Length in cm (L1) | | | | | | Length in cm (L2) | | | | | | Order code |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 100 | 150 | 200 | 300 | 400 | 500 | 75 | 125 | 175 | 275 | 375 | 475 | |
| 56-pin FCN | Three 20-pin MIL | Straight | – | ■ | – | – | – | – | – | ■ | – | – | – | – | XW2Z-0150CJ-L01 |
| | | | – | – | ■ | – | – | – | – | – | ■ | – | – | – | XW2Z-0200CJ-L01 |
| | | | – | – | – | ■ | – | – | – | – | – | ■ | – | – | XW2Z-0300CJ-L01 |



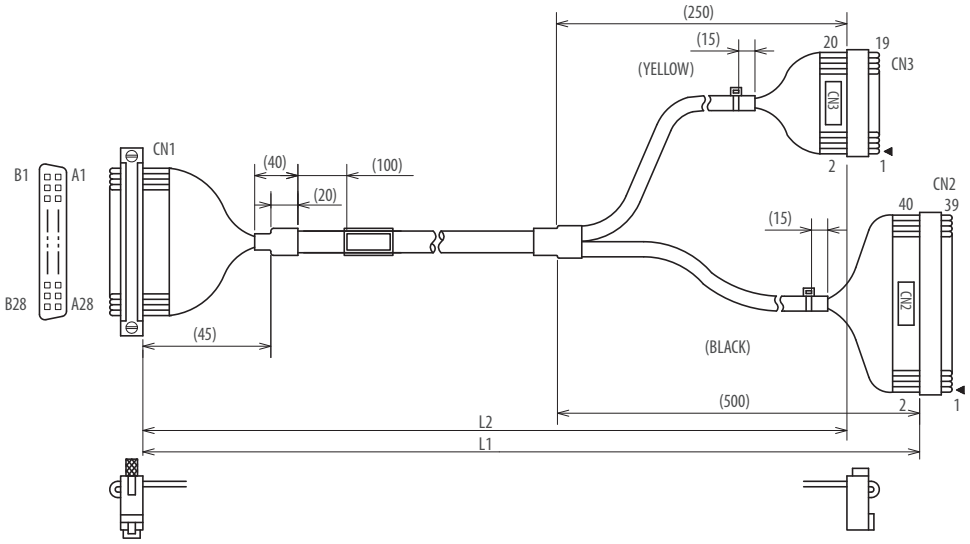

### XW2Z-_CJ-L02

| PLC connection | Terminal connection | Wiring | Length in cm (L1) | | | | | | Length in cm (L2) | | | | | | Length in cm (L3) | | | | | Order code |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 100 | 150 | 200 | 300 | 400 | 500 | 75 | 125 | 175 | 275 | 375 | 475 | 50 | 100 | 150 | 250 | 300 | |
| 56-pin FCN | Three 20-pin MIL | Reverse | – | ■ | – | – | – | – | – | ■ | – | – | – | – | – | ■ | – | – | – | XW2Z-0150CJ-L02 |
| | | | – | – | ■ | – | – | – | – | – | ■ | – | – | – | – | – | ■ | – | – | XW2Z-0200CJ-L02 |
| | | | – | – | – | ■ | – | – | – | – | – | ■ | – | – | – | – | – | ■ | – | XW2Z-0300CJ-L02 |



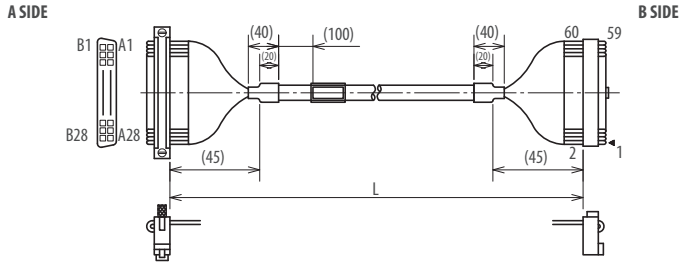
### XW2Z-_CK-L0_

| PLC connection | Terminal connection | Wiring | Length in cm (L1) | | | | | | Length in cm (L2) | | | | | | Order code |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 100 | 150 | 200 | 300 | 400 | 500 | 75 | 125 | 175 | 275 | 375 | 475 | |
| 56-pin | 40-pin MIL | Straight | – | ■ | – | – | – | – | – | ■ | – | – | – | – | XW2Z-0150CK-L01 |
| | | Reverse | – | ■ | – | – | – | – | – | ■ | – | – | – | – | XW2Z-0150CK-L02 |
| | | Straight | – | – | ■ | – | – | – | – | – | ■ | – | – | – | XW2Z-0200CK-L01 |
| | | Reverse | – | – | ■ | – | – | – | – | – | ■ | – | – | – | XW2Z-0200CK-L02 |



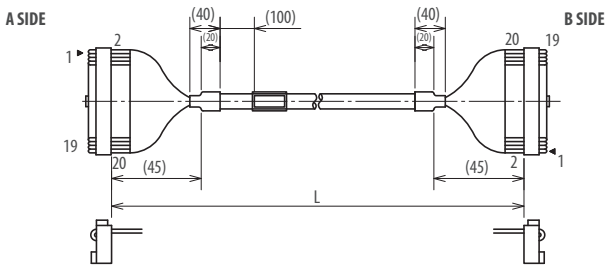

### XW2Z-_CG-L

| PLC connection | Terminal connection | Wiring | Length in cm (L) | | | | | | | | | | Order code |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 30 | 50 | 75 | 100 | 150 | 200 | 250 | 300 | 400 | 500 | |
| 56-pin FCN | 60-pin MIL | Straight | – | – | – | ■ | – | – | – | – | – | – | XW2Z-0100CG-L |
| | | | – | – | – | – | – | ■ | – | – | – | – | XW2Z-0200CG-L |
| | | | – | – | – | – | – | – | – | ■ | – | – | XW2Z-0300CG-L |




### XW2Z-_DD-L

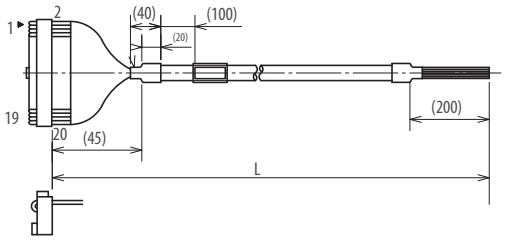
| PLC connection | Terminal connection | Wiring | Length in cm (L) | | | | | | | | | | Order code |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 30 | 50 | 75 | 100 | 150 | 200 | 250 | 300 | 400 | 500 | |
| 20-pin MIL | 20-pin MIL | Straight | – | ■ | – | – | – | – | – | – | – | – | XW2Z-0050DD-L |
| | | | – | – | – | ■ | – | – | – | – | – | – | XW2Z-0100DD-L |
| | | | – | – | – | – | – | ■ | – | – | – | – | XW2Z-0200DD-L |



### XW2Z-_DL-L

| PLC connection | Terminal connection | Wiring | Length in cm (L1) | | | | | | | | | | Order code |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 30 | 50 | 75 | 100 | 150 | 200 | 250 | 300 | 400 | 500 | |
| 20-pin MIL | Loose Wires | Straight | – | ■ | – | – | – | – | – | – | – | – | XW2Z-0050DL-L |
| | | | – | – | – | ■ | – | – | – | – | – | – | XW2Z-0100DL-L |
| | | | – | – | – | – | ■ | – | – | – | – | – | XW2Z-0150DL-L |
| | | | – | – | – | – | – | ■ | – | – | – | – | XW2Z-0200DL-L |
| | | | – | – | – | – | – | – | – | ■ | – | – | XW2Z-0300DL-L |
| | | | – | – | – | – | – | – | – | – | – | ■ | XW2Z-0500DL-L |

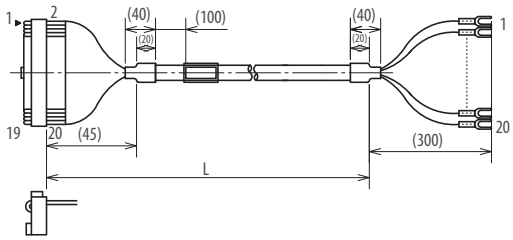
A SIDE




### XW2Z-_DM-L

| PLC connection | Terminal connection | Wiring | Length in cm (L1) | | | | | | | | | | Order code |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 30 | 50 | 75 | 100 | 150 | 200 | 250 | 300 | 400 | 500 | |
| 20-pin MIL | Loose Wires with Fork Terminals | Straight | – | ■ | – | – | – | – | – | – | – | – | XW2Z-0050DM-L |
| | | | – | – | – | ■ | – | – | – | – | – | – | XW2Z-0100DM-L |
| | | | – | – | – | – | ■ | – | – | – | – | – | XW2Z-0150DM-L |
| | | | – | – | – | – | – | ■ | – | – | – | – | XW2Z-0200DM-L |
| | | | – | – | – | – | – | – | – | ■ | – | – | XW2Z-0300DM-L |
| | | | – | – | – | – | – | – | – | – | – | ■ | XW2Z-0500DM-L |

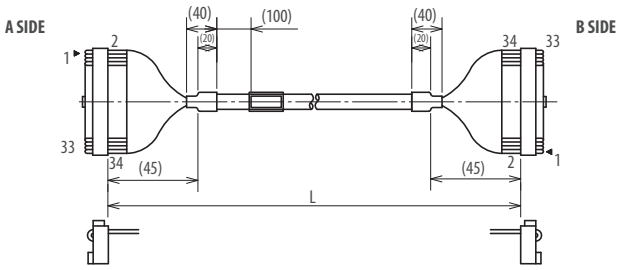
A SIDE B SIDE




### XW2Z-0200EE-L

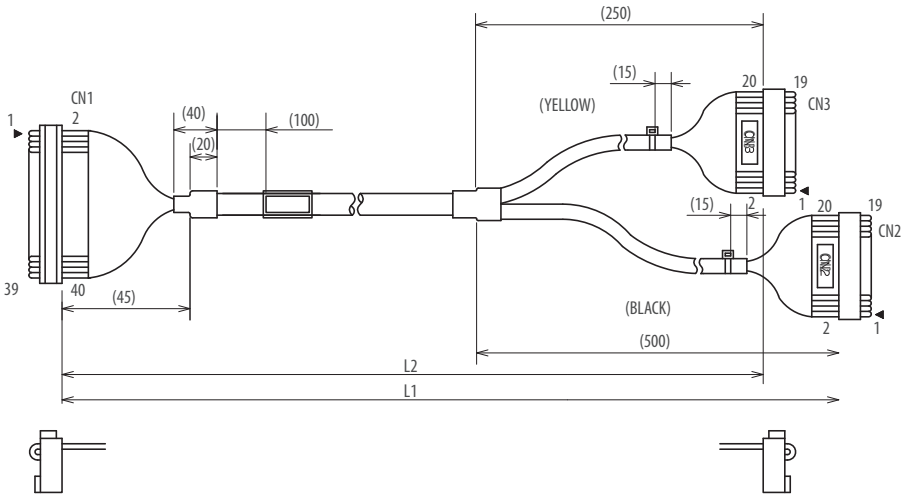
| PLC connection | Terminal connection | Wiring | Length in cm (L1) | | | | | | | | | | Order code |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 30 | 50 | 75 | 100 | 150 | 200 | 250 | 300 | 400 | 500 | |
| 34-pin MIL | 34-pin MIL | Straight | – | – | – | – | – | ■ | – | – | – | – | XW2Z-0200EE-L |

A SIDE B SIDE



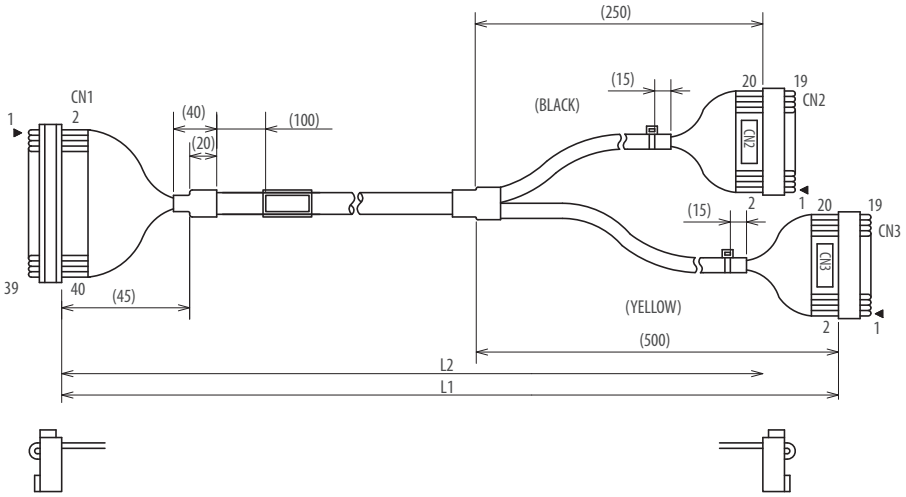
### XW2Z-_FH-L01

| PLC connection | Terminal connection | Wiring | Length in cm (L1) | | | | | | Length in cm (L2) | | | | | | Order code |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 75 | 100 | 200 | 300 | 400 | 500 | 50 | 75 | 175 | 275 | 375 | 475 | |
| 40-pin MIL | Two 20-pin MIL | Reverse | ■ | – | – | – | – | – | ■ | – | – | – | – | – | XW2Z-0075FH-L01 |
| | | | – | ■ | – | – | – | – | – | ■ | – | – | – | – | XW2Z-0100FH-L01 |
| | | | – | – | ■ | – | – | – | – | – | ■ | – | – | – | XW2Z-0200FH-L01 |
| | | | – | – | – | ■ | – | – | – | – | – | ■ | – | – | XW2Z-0300FH-L01 |
| | | | – | – | – | – | – | ■ | – | – | – | – | – | ■ | XW2Z-0500FH-L01 |



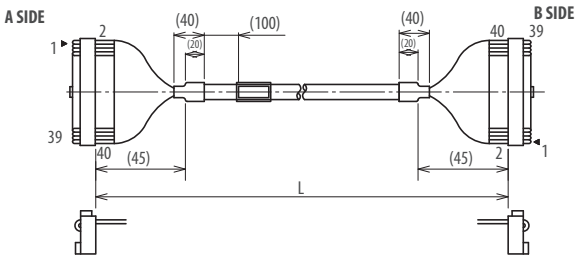

### XW2Z-_FH-L02

| PLC connection | Terminal connection | Wiring | Length in cm (L1) | | | | | | Length in cm (L2) | | | | | | Order code |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 75 | 100 | 200 | 300 | 400 | 500 | 50 | 75 | 175 | 275 | 375 | 475 | |
| 40-pin MIL | Two 20-pin MIL | Straight | ■ | – | – | – | – | – | ■ | – | – | – | – | – | XW2Z-0075FH-L02 |
| | | | – | ■ | – | – | – | – | – | ■ | – | – | – | – | XW2Z-0100FH-L02 |
| | | | – | – | ■ | – | – | – | – | – | ■ | – | – | – | XW2Z-0200FH-L02 |
| | | | – | – | – | ■ | – | – | – | – | – | ■ | – | – | XW2Z-0300FH-L02 |
| | | | – | – | – | – | – | ■ | – | – | – | – | – | ■ | XW2Z-0500FH-L02 |



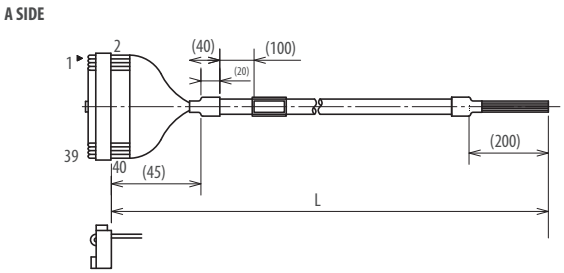
### XW2Z-_FF-L

| PLC connection | Terminal connection | Wiring | Length in cm (L1) | | | | | | | | | | Order code |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 30 | 50 | 75 | 100 | 150 | 200 | 250 | 300 | 400 | 500 | |
| 40-pin MIL | 40-pin MIL | Straight | ■ | | – | – | – | – | – | – | – | – | XW2Z-0030FF-L |
| | | | – | ■ | – | – | – | – | – | – | – | – | XW2Z-0050FF-L |
| | | | – | – | – | ■ | – | – | – | – | – | – | XW2Z-0100FF-L |
| | | | – | – | – | – | ■ | – | – | – | – | – | XW2Z-0150FF-L |
| | | | – | – | – | – | – | ■ | – | – | – | – | XW2Z-0200FF-L |
| | | | – | – | – | – | – | – | – | ■ | – | – | XW2Z-0300FF-L |
| | | | – | – | – | – | – | – | – | – | – | ■ | XW2Z-0500FF-L |



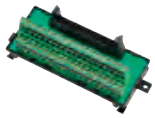

### XW2Z-_FN-L

| PLC connection | Terminal connection | Wiring | Length in cm (L1) | | | | | | | | | | Order code |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 30 | 50 | 75 | 100 | 150 | 200 | 250 | 300 | 400 | 500 | |
| 40-pin MIL | Loose Wires | Straight | – | – | – | ■ | – | – | – | – | – | – | XW2Z-0100FN-L |
| | | | – | – | – | | ■ | – | – | – | – | – | XW2Z-0150FN-L |
| | | | – | – | – | – | – | ■ | – | – | – | – | XW2Z-0200FN-L |
| | | | – | – | – | – | – | – | ■ | – | – | – | XW2Z-0250FN-L |
| | | | – | – | – | – | – | – | – | ■ | – | – | XW2Z-0300FN-L |
| | | | – | – | – | – | – | – | – | – | – | ■ | XW2Z-0500FN-L |

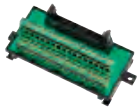


## I/O terminal blocks

### General purpose I/O terminals

| Shape | Connection type | Number of points | Order code |
|---|---|---|---|
|  | Push-in | 20 pt | XW2R-P20G-T |
| | | 34 pt | XW2R-P34G-T |
| | | 40 pt | XW2R-P40G-T |
| | | 50 pt | XW2R-P50G-T |
| | | 60 pt | XW2R-P60G-T |
|  | Clamp | 20 pt | XW2R-E20G-T |
| | | 34 pt | XW2R-E34G-T |
| | | 40 pt | XW2R-E40G-T |
| | | 50 pt | XW2R-E50G-T |
| | | 60 pt | XW2R-E60G-T |
|  | Screw | 20 pt | XW2R-J20G-T |
| | | 34 pt | XW2R-J34G-T |
| | | 40 pt | XW2R-J40G-T |
| | | 50 pt | XW2R-J50G-T |
| | | 60 pt | XW2R-J60G-T |

### Omron PLC I/O terminals

| Shape | Connection type | I/O unit type | Order code |
|---|---|---|---|
|  | Push-in | 32 inputs Fujitsu (FCN) | XW2R-P34G-C1 |
| | | 32 inputs MIL | XW2R-P34G-C2 |
| | | 32 outputs Fujitsu (FCN) | XW2R-P34G-C3 |
| | | 32 outputs MIL | XW2R-P34G-C4 |
|  | Clamp | 32 inputs Fujitsu (FCN) | XW2R-E34G-C1 |
| | | 32 inputs MIL | XW2R-E34G-C2 |
| | | 32 outputs Fujitsu (FCN) | XW2R-E34G-C3 |
| | | 32 outputs MIL | XW2R-E34G-C4 |
|  | Screw | 32 inputs Fujitsu (FCN) | XW2R-J34G-C1 |
| | | 32 inputs MIL | XW2R-J34G-C2 |
| | | 32 outputs Fujitsu (FCN) | XW2R-J34G-C3 |
| | | 32 outputs MIL | XW2R-J34G-C4 |

### Ethernet patch cables, standard RJ45 connectors

| Shape | Connector 1 | Connector 2 | Material | Cable | Color | Length in cm | | | | | | | | | | | | Order code |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 20 | 30 | 50 | 100 | 150 | 200 | 300 | 500 | 750 | 1000 | 1500 | 2000 | |
|  | RJ45 std. | RJ45 std. | LSZH | Cat6a S/FTP 4 pairs | Blue | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | XS6W-6LSZH8SS[...]CM-B |
|  | RJ45 std. | RJ45 std. | LSZH | Cat6a S/FTP 4 pairs | Yellow | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | XS6W-6LSZH8SS[...]CM-Y |
|  | RJ45 std. | RJ45 std. | LSZH | Cat6a S/FTP 4 pairs | Green | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | XS6W-6LSZH8SS[...]CM-G |
|  | RJ45 std. | RJ45 std. | PUR | Cat5e S/FTP 4 pairs | Green | – | – | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | XS6W-5PUR8SS[...]CM-G |

**Note:** For […] fill in the length in cm.

### Ethernet patch cables, RJ45/M12 connectors

| Shape | Connector 1 | Connector 2 | Material | Cable | Color | Length in cm | | | | | | | | Order code |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 30 | 50 | 100 | 200 | 300 | 500 | 1000 | 1500 | |
|  | RJ45 | RJ45 | PVC | Cat5e Shielded Quad | Light Blue | A | B | C | D | E | G | J | K | XS5W-T421-[.]MD-K |
|  | M12 straight | M12 straight | PVC | Cat5e Shielded Quad | Light Blue | – | B | C | D | E | G | J | K | XS5W-T421-[.]M2-K |
|  | M12 straight | RJ45 | PVC | Cat5e Shielded Quad | Light Blue | A | B | C | D | E | G | J | K | XS5W-T421-[.]MC-K |
|  | M12 angled | M12 angled | PVC | Cat5e Shielded Quad | Light Blue | – | B | C | D | E | G | J | K | XS5W-T422-[.]M2-K |
|  | M12 angled | RJ45 | PVC | Cat5e Shielded Quad | Light Blue | A | B | C | D | E | G | J | K | XS5W-T422-[.]MC-K |

**Note:** For [.] fill in the 1-character length code.

## Specifications

| Item | XS6W-6LSZH8SS_CM-_ | XS6W-5PUR8SS_CM-G |
|---|---|---|
| Rated current | 1 A (at 50°C) | |
| Withstand voltage | 1,000 VDC for 60 s (leakage current: 1 mA max.) | |
| Ambient operating temperature | –20 to 60°C | –40 to 85°C |
| Ambient storage temperature | –20 to 60°C | –40 to 85°C |
| Ambient installation temperature | 0 to 50°C | –10 to 60°C |
| Protective structure | IP20 | IP20 |

## Accessories

| Type | Connector | Specification | Color | Length | Order code |
|---|---|---|---|---|---|
| Ethernet installation cable  | none | CAT 5, SF/UTP, 4 × 2 × AWG 24/1 (solid core), Polyurethane (PUR) | Green | 100 m | WM IE-5IC4x2xAWG24/1-PUR |
| Ethernet installation cable  | none | CAT 5, SF/UTP, 4 × 2 × AWG 26/7 (stranded core), Polyurethane (PUR) | | 100 m | WM IE-5CC4x2xAWG26/7-PUR |
| Ethernet socket  | RJ45 socket | DIN-rail mount socket to terminate installation cable in the cabinet | Grey | 60 × 17.5 × 67 mm | WM IE-TO-RJ45-FJ-B |
| Ethernet field-mount plugs  | Metal RJ45 | for AWG22 to AWG26 | Chrome | 52 mm | WM IE-PS-RJ45-FH-BK |
| Ethernet field-mount plugs  | Plastic RJ45 | for AWG22 to AWG24 | Black | 52 mm | XS6G-T421-1 |

### Industrial switching hubs

| Shape | Functions | Ports | Failure detection | Power supply voltage | Order code |
|---|---|---|---|---|---|
|  | Quality of Service (QoS): EtherNet/IP control data priority<br>Failure detection: Broadcast storm and LSI error detection<br>10/100BASE-TX, Auto-negotiation | 3 | – | 24.0 VDC±5% | W4S1-03B |
|  | | 5 | | | W4S1-05B |
| | | | ■ | | W4S1-05C |

### EtherCAT junction slave

| Shape | Functions | Ports | Power supply voltage | Order code |
|---|---|---|---|---|
|  | Creation of star- and tree topologies in EtherCAT networks.<br>Distributed Clock (DC) is supported. | 3 | 20.4 to 28.8 VDC (24 VDC –15% to 20%) | GX-JC03 |
|  | | 6 | | GX-JC06 |

## Industrial Wireless LAN unit

WE70 utilises spread-spectrum modulation technology based on radio waves to enable communication between devices in a limited area. This gives users the mobility to move around within a broad coverage area and still be connected to the network. The smart roaming function enables high speed roaming therefore moving equipment and mobile objects can communicate reliably at high speed.

- Conforms to IEEE 802.11a/b/g.
- Same noise and environment resistance level as a PLC.
- Features Omron's original security system.
- Signals can be observed with LED indicators.
- Conforms to radio wave standards for the USA, Europe, and China.



## Ordering information

| Area | Type | Order code |
|---|---|---|
| Europe | Access Point (Master) | WE70-AP-EU |
| | Client (Slave) | WE70-CL-EU |
| USA | Access Point (Master) | WE70-AP-US |
| | Client (Slave) | WE70-CL-US |
| China | Access Point (Master) | WE70-AP-CN |
| | Client (Slave) | WE70-CL-CN |

### Accessories

| Type | Specifications | Order code |
|---|---|---|
| Directional Magnetic-base Antenna | 1 set with two Antennas, 2.4 GHz/5 GHz Dual-band compatible | WE70-AT001H |

| Type | Order code |
|---|---|
| DIN Rail Mounting Bracket (for TH35 7.5) | WT30-FT001 |
| DIN Rail Mounting Bracket (for TH35 15) | WT30-FT002 |
| Antenna Extension Cable (5 m) | WE70-CA5M |

**Note:** For Ethernet Cables and Accessories, see page 81

## Find information fast!

Quick Links shortens your search. Quick Links are unique codes assigned to Omron products listed in this guide. Enter Quick Link codes in the search box on industrial.omron.eu to access detailed information on products in this guide.

Content

# Motion & Drives

## Motion controllers



## Servo systems



## Frequency inverters

# Motion controllers

## NJ-Series Machine Controller

- Integration of logic and motion in one Intel CPU
- Scalable control: CPUs for 4, 8, 16, 32 and 64 axes
- EtherCAT and EtherNet/IP ports embedded
- Linear, circular and spiral (helical) interpolation

sysmac
always in control

Which motion architecture do you need?

**Machine controller**

Sequence, Motion, Vision, Safety, Robotics and Database connection functionality

**NJ Series**

Integration of logic and motion in one Intel CPU, advanced motion, up to 64 axes

H245, H248, H246, H252
Page 14

**Accurax G5 EtherCAT**

50 W to 15 kW

**Indexer functionality into the drive**

**Accurax G5 A/P**

50 W to 15 kW

**Stand-alone controller**

2 axes + 1 axis pulse train output

**Trajexia 2.5 axes motion controller**

Advanced motion, e-cam, 2 axes synchronisation

F422
Page 93

**G-Series A/P**

50 W to 1.5 kW

**SmartStep2**

50 to 750 W

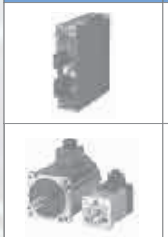
EtherCAT, MECHATROLINK-II, analog output and pulse train output

**Trajexia motion controller**

Advanced motion, e-cam, multi-axis synchronization

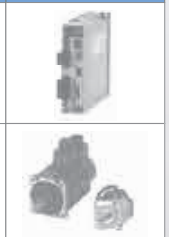
F422
Page 90

**Accurax G5 ML2**



50 W to 5 kW

**G-Series ML2**



50 W to 1.5 kW

## Trajexia with EtherCAT

- Perfect control of 64 axes
- Scalability with EtherCAT masters for 4, 16 and 64 axes
- Supports servos, inverters, vision systems and distributed I/O modules

EtherCAT®

## CJ-Series PLC with EtherCAT

- Position control unit CJ1W-NC with EtherCAT
- Support for up to 16 axes and 64 inverters, vision systems and distributed I/O modules

EtherCAT®

Based in OMRON PLC

Drive control method?

### EtherCAT

**NC EtherCAT**

Single to multi-axis PTP applications with linear and circular interpolation

F434
Page 95

**Accurax G5 EtherCAT**

50 W to 15 kW

### MECHATROLINK-II

**Trajexia-PLC**

Advanced motion, e-cam, multi-axis synchronization

F425
Page 97

**NC MECHATROLINK-II**

Single to multi-axis PTP applications

F426
Page 99

**Accurax G5 ML2**

50 W to 5 kW

**G-Series ML2**

50 W to 1.5 kW

### Pulse train output

**NCs**

Up to 4-axis PTP applications

F429, F432
Page 100/101

**Accurax G5 A/P**

50 W to 15 kW

**G-Series A/P**

50 W to 1.5 kW

**SmartStep2**

50 to 750 W

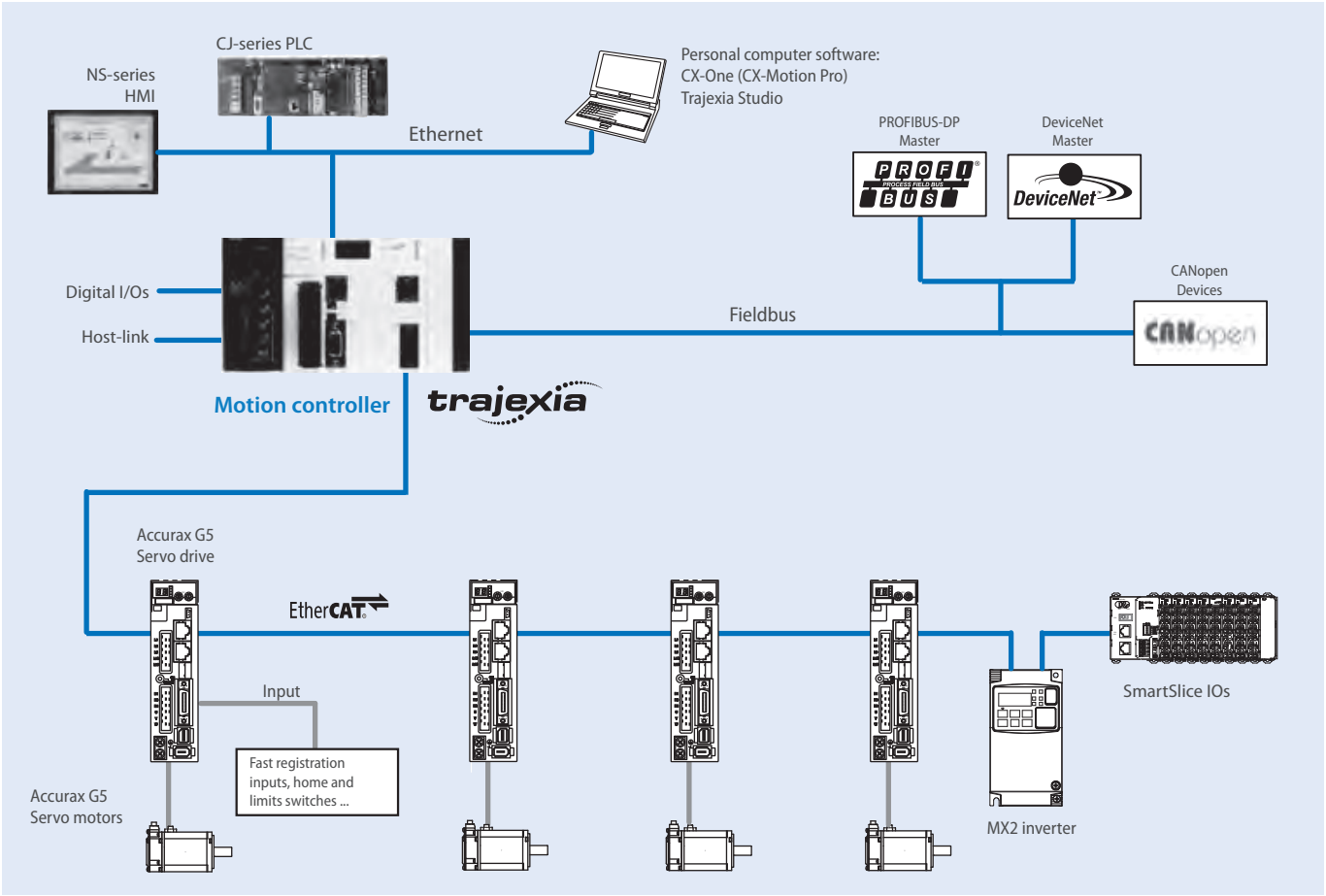
| Motion controllers | | | | |
|---|---|---|---|---|
| |  |  |  |  |
| **Model** | **NJ Series machine controller** | **Trajexia stand-alone** | | **NC EtherCAT** |
| | Sequence, Motion, Robotics and Database connection functionality | The advanced stand-alone motion controller | Trajexia 2.5 axes motion controller | 16-axis point-to-point positioning controller |
| **Axes control method** | EtherCAT | EtherCAT, MECHATROLINK-II, analog output and pulse-train output | 2 axes for position, speed and torque control and 1 axis for pulse train output in open loop | EtherCAT |
| **Number of axes** | 4, 8, 16, 32, 64 | 4, 16, 64 | 2 | 2, 4, 8, 16 |
| **Applicable servo drive** | Accurax G5 | Accurax G5 and G-Series | Accurax-G5 | Accurax G5 |
| **Application** | Advance motion including robotics | Advanced motion, e-cam, ELS, Phase shift, Registration | Advanced motion, e-cam, ELS, Phase shift, Registration | From simple PTP to multi axis PTP with linear and circular interpolation |
| **Servo control mode** | Position, speed and torque | Position, speed and torque | Position, speed and torque | Position, speed and torque |
| **PLC series** | NJ Series machine controller | Stand-alone motion controller: Serial and Ethernet/IP built-in, PROFIBUS-DP, DeviceNet and CANopen communication options | Stand-alone motion controller: Serial and EtherNet/IP built-in, PROFIBUS-DP, DeviceNet and CANopen communication options | CJ |
| **Page/Quick Link** | 14 | 90 | 93 | 95 |

| Motion controllers | | | | |
|---|---|---|---|---|
| |  |  |  |  |
| **Model** | **Trajexia-PLC** | **NC MECHATROLINK-II** | **CJ1W-NC__3** | **CJ1W-NC__4** |
| | Advanced multi-axes motion controller in a PLC | 16-axis point-to-point positioning controller | 4-axis point-to-point positioning controller | 4-axis point-to-point positioning controller with synchronization |
| **Axes control method** | MECHATROLINK-II | MECHATROLINK-II | Pulse train output | Pulse train output |
| **Number of axes** | 4, 30 | 2, 4, 16 | 1, 2, 4 | 2, 4 |
| **Applicable servo drive** | Accurax G5 and G-Series | Accurax G5 and G-Series | SmartStep 2 and Accurax G5 | SmartStep 2 and Accurax G5 |
| **Application** | Advanced motion, e-cam, ELS, Phase shift, Registration | From simple PTP to multi axis PTP coordinated systems | Point to point applications | Point-to-point with complex interpolations |
| **Servo control mode** | Position, speed and torque | Position, speed and torque | Open loop position with linear interpolation | Open loop position with linear and circular interpolation |
| **PLC series** | CJ | CJ and CS1 | CJ an CS1 | CJ |
| **Page/Quick Link** | 97 | 99 | 100 | 101 |

## Stand-alone advanced motion controller over EtherCAT

- Perfect motion control of up to 64 axes. Scalability with EtherCAT masters for 4, 16 and 64 axes
- Supports position, speed and torque control
- Multi-tasking controller capable of running up to 22 tasks simultaneously
- Advanced motion control such as linear, circular, helical or spherical interpolation, electronic cams and gearboxes via simple motion commands
- Control of servos, inverters, vision systems and distributed I/Os over a single EtherCAT network
- Support for EtherNet/IP communications
- Advanced debugging tools including data trace and oscilloscope functions
- Open communication: Serial and EtherNet/IP built-in, PROFIBUS-DP, DeviceNet and CANopen

## Ordering information




### Trajexia motion controller

| Name | Order code |
|---|---|
| Trajexia motion controller Unit, up to 64 axes. (Trajexia end cover unit TJ1-TER is included) | TJ2-MC64 |
| Trajexia motion controller unit, up to 16 axes. (Trajexia end cover unit TJ1-TER is included) | TJ1-MC16 |
| Trajexia motion controller unit, up to 4 axes. (Trajexia end cover unit TJ1-TER is included) | TJ1-MC04 |
| Power supply for Trajexia system, 100 to 240 VAC | CJ1W-PA202 |
| Power supply for Trajexia system, 24 VDC | CJ1W-PD022 |

### Trajexia – axes control modules

| Name | Order code |
|---|---|
| Trajexia EtherCAT master unit (up to 64 servo drives)*1 | TJ2-ECT64 |
| Trajexia EtherCAT master unit (up to 16 servo drives) | TJ2-ECT16 |
| Trajexia EtherCAT master unit (up to 4 servo drives) | TJ2-ECT04 |
| Trajexia MECHATROLINK-II master unit (up to 16 stations)*2 | TJ1-ML16 |
| Trajexia MECHATROLINK-II master unit (up to 4 stations)*2 | TJ1-ML04 |
| Trajexia flexible axis unit (for 2 stations) | TJ1-FL02 |

*1 The number of servo drives is currently limited to 32 when using TJ2-MC64 motion controller with firmware 2.0132.
*2 The TJ1-ML04 and TJ1-ML16 supported by the TJ2-MC64 motion controller are V2 (Version 2) and lot number equal or above Lot. No.091019 (YYMMDD).

## Trajexia – communication modules

| Name | Order code |
|---|---|
| Trajexia DeviceNet slave unit | TJ1-DRT |
| Trajexia PROFIBUS-DP slave unit | TJ1-PRT |
| Trajexia CANopen unit | TJ1-CORT |

## EtherCAT – related devices

### Servo system and frequency inverters

| Name | | Order code |
|---|---|---|
| Accurax G5 servo drive EtherCAT built-in | | R88D-KN___-ECT |
| MX2 inverter with EtherCAT option board | Frequency inverter | 3G3MX2-A_ |
| | EtherCAT option board | 3G3AX-MX2-ECT |

**Note:** Refer to servo systems and frequency inverter sections for detailed specs and ordering information

### SmartSlice IOs system

| Function | Specification | Order code |
|---|---|---|
| SmartSlice Interface unit | SmartSlice EtherCAT inteface unit | GRT1-ECT |
| End plate, one unit required per bus interface | | GRT1-END |
| 4 NPN inputs | 24 VDC, 6 mA, 3-wire connection | GRT1-ID4 |
| 4 PNP inputs | 24 VDC, 6 mA, 3-wire connection | GRT1-ID4-1 |
| 8 NPN inputs | 24 VDC, 4 mA, 1-wire connection + 4xG | GRT1-ID8 |
| 8 PNP inputs | 24 VDC, 4 mA, 1-wire connection + 4xV | GRT1-ID8-1 |
| 4 AC inputs | 110 VAC, 2-wire connection | GRT1-IA4-1 |
| 4 AC inputs | 230 VAC, 2-wire connection | GRT1-IA4-2 |
| 4 NPN outputs | 24 VDC, 500 mA, 2-wire connection | GRT1-OD4 |
| 4 PNP outputs | 24 VDC, 500 mA, 2-wire connection | GRT1-OD4-1 |
| 4 PNP outputs with short-circuit protection | 24 VDC, 500 mA, 3-wire connection | GRT1-OD4G-1 |
| 4 PNP outputs with short-circuit protection | 24 VDC, 2 A, 2-wire connection | GRT1-OD4G-3 |
| 8 NPN outputs | 24 VDC, 500 mA, 1-wire connection + 4xV | GRT1-OD8 |
| 8 PNP outputs | 24 VDC, 500 mA, 1-wire connection + 4xG | GRT1-OD8-1 |
| 8 PNP outputs with short-circuit protection | 24 VDC, 500 mA, 1-wire connection + 4xG | GRT1-OD8G-1 |
| 2 relay outputs | 240 VAC, 2 A, normally-open contacts | GRT1-ROS2 |
| 2 analog inputs, current/voltage | ±10 V, 0 to 10 V, 0 to 5 V, 1 to 5 V, 0 to 20 mA, 4 to 20 mA | GRT1-AD2 |
| 2 analog outputs, voltage | ±10 V, 0 to 10 V, 0 to 5 V, 1 to 5 V | GRT1-DA2V |
| 2 analog outputs, current | 0 to 20 mA, 4 to 20 mA | GRT1-DA2C |
| 2 Pt100 inputs | Pt100, 2-wire or 3-wire connection | GRT1-TS2P |
| 2 Pt1000 inputs | Pt1000, 2-wire or 3-wire connection | GRT1-TS2K |
| 2 Thermocouple inputs | Types B, E, J , K, N, R, S, T, U, W, PL2, with cold junction compensation | GRT1-TS2T |

**Note:** Refer to Automation systems catalogue for detailed specs and accesories information

### GX-Series I/O Blocks

| Name | | Order code |
|---|---|---|
| 16 NPN inputs | 24 VDC, 6 mA, 1-wire connection, expandable | GX-ID1611 |
| 16 PNP inputs | 24 VDC, 6 mA, 1-wire connection, expandable | GX-ID1621 |
| 16 NPN outputs | 24 VDC, 500 mA, 1-wire connection, expandable | GX-OD1611 |
| 16 PNP outputs | 24 VDC, 500 mA, 1-wire connection, expandable | GX-OD1621 |
| 8 inputs and 8 outputs, NPN | 24 VDC, 6 mA input, 500 mA output, 1-wire connection | GX-MD1611 |
| 8 inputs and 8 outputs, PNP | 24 VDC, 6 mA input, 500 mA output, 1-wire connection | GX-MD1621 |
| 16 NPN inputs | 24 VDC, 6 mA, 3-wire connection | GX-ID1612 |
| 16 PNP inputs | 24 VDC, 6 mA, 3-wire connection | GX-ID1622 |
| 16 NPN outputs | 24 VDC, 500 mA, 3-wire connection | GX-OD1612 |
| 16 PNP outputs | 24 VDC, 500 mA, 3-wire connection | GX-OD1622 |
| 8 inputs and 8 outputs, NPN | 24 VDC, 6 mA input, 500 mA output, 3-wire connection | GX-MD1612 |
| 8 inputs and 8 outputs, PNP | 24 VDC, 6 mA input, 500 mA output, 3-wire connection | GX-MD1622 |
| 16 relay outputs | 250 VAC, 2 A,1-wire connection, expandable | GX-OC1601 |
| 4 analog inputs, current/voltage | ±10 V, 0 to 10 V, 0 to 5 V, 1 to 5 V, 4 to 20 mA | GX-AD0471 |
| 2 analog outputs, current/voltage | ±10 V, 0 to 10 V, 0 to 5 V, 1 to 5 V, 4 to 20 mA | GX-DA0271 |
| 2 encoder open collector inputs | 500 kHz Open collector input | GX-EC0211 |
| 2 encoder line-driver inputs | 4 MHz Line driver input | GX-EC0241 |

**Note:** The GX-Series I/O blocks are only supported by the T2-MC64 motion controller and with official firmware release above 2.0132.

### Vision system

| Name | Specification | Order code |
|---|---|---|
| Vision system with EtherCAT interface | NPN | FZM1-350-ECT |
| | PNP | FZM1-355-ECT |
| Smart camera with EtherCAT interface | NPN/Color camera | FQ-MS120-ECT |
| | NPN/Monocrome camera | FQ-MS120-M-ECT |
| | PNP/Color camera | FQ-MS125-ECT |
| | PNP/Monocrome camera | FQ-MS125-M-ECT |

**Note:** The vision systems are only supported by the T2-MC64 motion controller and with official firmware release above 2.0132.

## MECHATROLINK-II – related devices

### Servo system and frequency inverters

| Name | | Order code |
|---|---|---|
| Accurax G5 servo drive ML-II built-in | | R88D-KN_ _ _-ML2 |
| G-Series servo drive ML-II built-in | | R88D-GN_ _H-ML2 |
| MX2 inverter with MECHATROLINK-II option board | Frequency inverter | 3G3MX2-A_ |
| | ML2 option board | 3G3AX-MX2-MRT |

**Note:** Refer to servo systems and frequency inverter sections for detailed specs and ordering information

### SmartSlice IOs system

| Function | Specification | Order code |
|---|---|---|
| SmartSlice Interface unit | SmartSlice MECHATROLINK-II inteface unit | GRT1-ML2[*1] |
| End plate, one unit required per bus interface | | GRT1-END |
| 4 NPN inputs | 24 VDC, 6 mA, 3-wire connection | GRT1-ID4 |
| 4 PNP inputs | 24 VDC, 6 mA, 3-wire connection | GRT1-ID4-1 |
| 8 NPN inputs | 24 VDC, 4 mA, 1-wire connection + 4xG | GRT1-ID8 |
| 8 PNP inputs | 24 VDC, 4 mA, 1-wire connection + 4xV | GRT1-ID8-1 |
| 4 AC inputs | 110 VAC, 2-wire connection | GRT1-IA4-1 |
| 4 AC inputs | 230 VAC, 2-wire connection | GRT1-IA4-2 |
| 4 NPN outputs | 24 VDC, 500 mA, 2-wire connection | GRT1-OD4 |
| 4 PNP outputs | 24 VDC, 500 mA, 2-wire connection | GRT1-OD4-1 |
| 4 PNP outputs with short-circuit protection | 24 VDC, 500 mA, 3-wire connection | GRT1-OD4G-1 |
| 4 PNP outputs with short-circuit protection | 24 VDC, 2 A, 2-wire connection | GRT1-OD4G-3 |
| 8 NPN outputs | 24 VDC, 500 mA, 1-wire connection + 4xV | GRT1-OD8 |
| 8 PNP outputs | 24 VDC, 500 mA, 1-wire connection + 4xG | GRT1-OD8-1 |
| 8 PNP outputs with short-circuit protection | 24 VDC, 500 mA, 1-wire connection + 4xG | GRT1-OD8G-1 |
| 2 relay outputs | 240 VAC, 2 A, normally-open contacts | GRT1-ROS2 |
| 2 analog inputs, current/voltage | ±10 V, 0 to 10 V, 0 to 5 V, 1 to 5 V, 0 to 20 mA, 4 to 20 mA | GRT1-AD2 |
| 2 analog outputs, voltage | ±10 V, 0 to 10 V, 0 to 5 V, 1 to 5 V | GRT1-DA2V |
| 2 analog outputs, current | 0 to 20 mA, 4 to 20 mA | GRT1-DA2C |
| 2 Pt100 inputs | Pt100, 2-wire or 3-wire connection | GRT1-TS2P |
| 2 Pt1000 inputs | Pt1000, 2-wire or 3-wire connection | GRT1-TS2K |
| 2 Thermocouple inputs | Types B, E, J , K, N, R, S, T, U, W, PL2, with cold junction compensation | GRT1-TS2T |

[*1] The GRT1-ML2 supports the GRT1-IA4-1, GRT1-IA4-2, GRT1-OD4G-3, GRT1-TS2P, GRT1-TS2K and GRT1-TS2T slice units only in combination with TJ2-MC64 motion controller. They are not supported in combination with TJ1-MC16/04.

**Note:** Refer to Automation systems catalogue for detailed specs and accesories information

### MECHATROLINK-II cables

| Name | Remarks | Order code |
|---|---|---|
| MECHATROLINK-II cables | 0.5 meter | JEPMC-W6003-A5 |
| | 1 meter | JEPMC-W6003-01 |
| | 3 meters | JEPMC-W6003-03 |
| | 5 meters | JEPMC-W6003-05 |
| | 10 meters | JEPMC-W6003-10 |
| | 20 meters | JEPMC-W6003-20 |
| | 30 meters | JEPMC-W6003-30 |
| MECHATROLINK-II terminator | Terminating resistor | JEPMC-W6022 |
| MECHATROLINK-II repeater | Network repeater | JEPMC-REP2000 |

## Computer software

| Specifications | Order code |
|---|---|
| CX-Motion Pro V1.3.3 or higher | CX-One |
| Trajexia Studio[*1] V1.3.3 or higher | TJ1-Studio |

[*1] When the Trajexia Studio software is included in CX-One, then it is called CX-Motion Pro.

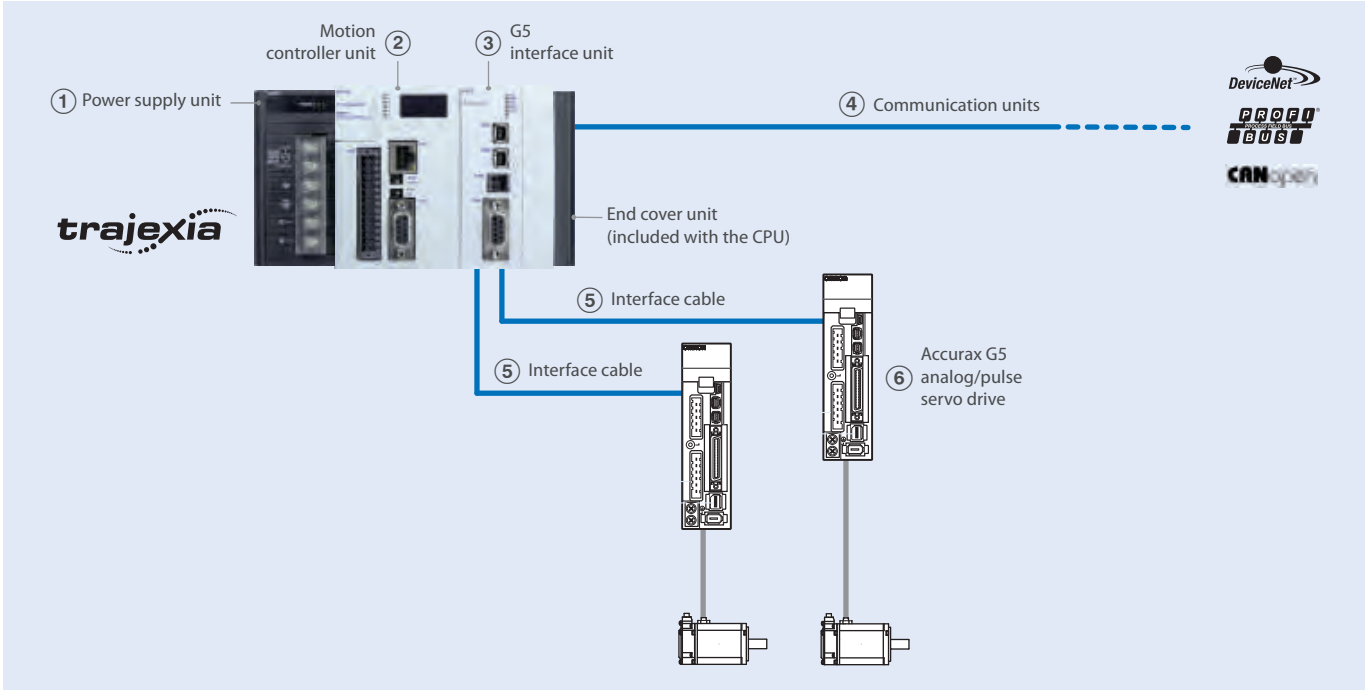
trajexia

## Stand-alone motion controller for compact and simple machines

- Perfect motion control of 2 axes
- Supports position, speed and torque control
- Serial port for master encoder axis
- Multi-tasking controller capable of running up to 22 tasks simultaneously
- 2 fast-registration inputs
- Single axis moves and axes interpolation
- Electronic cams and gearboxes
- Motion basic programming and dedicated motion commands
- Open communication: Serial and EtherNet/IP built-in, PROFIBUS-DP, DeviceNet and CANopen options



## Ordering information



## Trajexia system

### Power supply unit

| Symbol | Specifications | Order code |
|---|---|---|
| ① | Power supply unit for Trajexia system (100 to 240 VAC) | CJ1W-PA202 |
| | Power supply unit for Trajexia system (24 VDC) | CJ1W-PD025 |

### Motion controller unit

| Symbol | Specifications | Order code |
|---|---|---|
| ② | Trajexia motion controller unit, up to 64 axes (Trajexia end cover unit TJ1-TER is included) | TJ2-MC64 |
| | Trajexia motion controller unit, up to 2 axes (Trajexia end cover unit TJ1-TER is included) | TJ2-MC02 |

### G5 interface unit

| Symbol | Specifications | Order code |
|---|---|---|
| ③ | G5 interface unit | TJ2-KS02 |

### Communication unit

| Symbol | Specifications | Order code |
|---|---|---|
| ④ | Trajexia DeviceNet slave unit | TJ1-DRT |
| | Trajexia PROFIBUS-DP slave unit | TJ1-PRT |
| | Trajexia CANopen unit | TJ1-CORT |

**Note:** The TJ2-MC02 supports a maximum of one TJ1-CORT unit.
The TJ2-MC02 supports a maximum of one TJ1-PRT or TJ1-DRT unit. No both at the same time.

### Accessories

| Symbol | Specifications | | Order code |
|---|---|---|---|
| ⑤ | Interface cable | 1 m | TJ2-KC01M |
| | | 3 m | TJ2-KC03M |

### Servo drive related device

| Symbol | Specifications | Order code |
|---|---|---|
| ⑥ | Accurax G5 Analog/pulse servo drive (100 W to 15 kW) | R88D-KT_ |

### Computer software

| Specifications | Order code |
|---|---|
| CX-Motion Pro (version 1.4.2 or higher) | CX-One |
| Trajexia Studio[*1] (version 1.4.2 or higher) | TJ1-Studio |

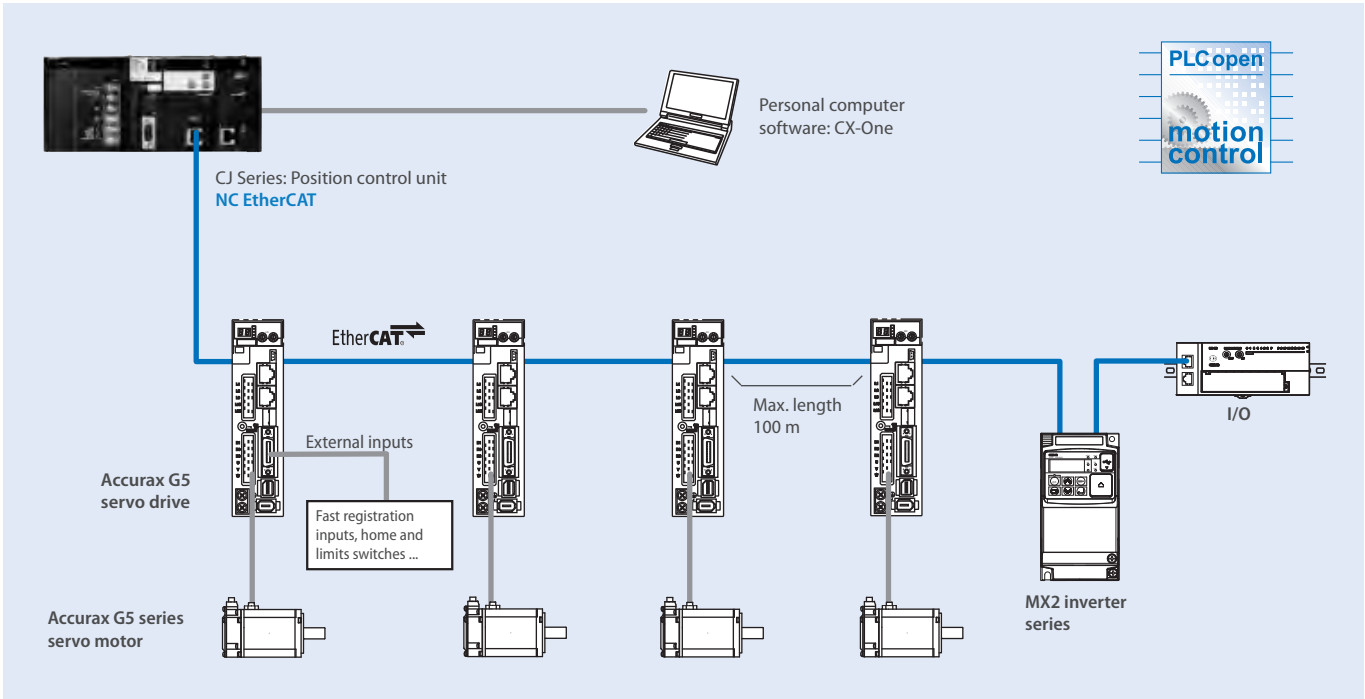
[*1] When the Trajexia Studio software is included in CX-One, then it is called CX-Motion Pro.

## Multi-axis point-to-point positioning controller over EtherCAT

- Position control units with 2, 4, 8 or 16 axes
- NC_82 models support up to 64 additional nodes: inverters, vision systems and distributed I/Os
- Linear and circular interpolation
- Linear and infinite axes management
- Programming languages: ladder and function blocks. Certified PLCopen motion control function blocks
- The unit can perfom various operation sequences in the memory operation data.
- CX-Programmer software for unit setup, EtherCAT network configuration and PLC programming



## Ordering information




### Position controller unit

| Name | Order code |
|---|---|
| Position controller unit - EtherCAT – 16 axes + 64 nodes for remote I/O | CJ1W-NCF82 |
| Position controller unit - EtherCAT – 8 axes + 64 nodes for remote I/O | CJ1W-NC882 |
| Position controller unit - EtherCAT – 4 axes + 64 nodes for remote I/O | CJ1W-NC482 |
| Position controller unit - EtherCAT – 16 axes | CJ1W-NCF81 |
| Position controller unit - EtherCAT – 8 axes | CJ1W-NC881 |
| Position controller unit - EtherCAT – 4 axes | CJ1W-NC481 |
| Position controller unit - EtherCAT – 2 axes | CJ1W-NC281 |

### EtherCAT related devices

#### Servo system and frequency inverter

| Name | | Order code |
|---|---|---|
| Accurax G5 servo drive EtherCAT built-in | | R88D-KN___-ECT |
| MX2 inverter with EtherCAT option board | Frequency inverter | 3G3MX2-A_ |
| | EtherCAT option board | 3G3AX-MX2-ECT |

**Note:** Refer to servo system and frequency inverter sections for detailed specs and ordering information.

#### GX-Series I/O Blocks

| Name | | Order code |
|---|---|---|
| 16 NPN inputs | 24 VDC, 6 mA, 1-wire connection, expandable | GX-ID1611 |
| 16 PNP inputs | 24 VDC, 6 mA, 1-wire connection, expandable | GX-ID1621 |
| 16 NPN outputs | 24 VDC, 500 mA, 1-wire connection, expandable | GX-OD1611 |
| 16 PNP outputs | 24 VDC, 500 mA, 1-wire connection, expandable | GX-OD1621 |
| 8 inputs and 8 outputs, NPN | 24 VDC, 6 mA input, 500 mA output, 1-wire connection | GX-MD1611 |
| 8 inputs and 8 outputs, PNP | 24 VDC, 6 mA input, 500 mA output, 1-wire connection | GX-MD1621 |

| Name | | Order code |
|---|---|---|
| 16 NPN inputs | 24 VDC, 6 mA, 3-wire connection | GX-ID1612 |
| 16 PNP inputs | 24 VDC, 6 mA, 3-wire connection | GX-ID1622 |
| 16 NPN outputs | 24 VDC, 500 mA, 3-wire connection | GX-OD1612 |
| 16 PNP outputs | 24 VDC, 500 mA, 3-wire connection | GX-OD1622 |
| 8 inputs and 8 outputs, NPN | 24 VDC, 6 mA input, 500 mA output, 3-wire connection | GX-MD1612 |
| 8 inputs and 8 outputs, PNP | 24 VDC, 6 mA input, 500 mA output, 3-wire connection | GX-MD1622 |
| 16 relay outputs | 250 VAC, 2 A,1-wire connection, expandable | GX-OC1601 |
| 4 analog inputs, current/voltage | ±10 V, 0 to 10 V, 0 to 5 V, 1 to 5 V, 4 to 20 mA | GX-AD0471 |
| 2 analog outputs, current/voltage | ±10 V, 0 to 10 V, 0 to 5 V, 1 to 5 V, 4 to 20 mA | GX-DA0271 |
| 2 encoder open collector inputs | 500 kHz Open collector input | GX-EC0211 |
| 2 encoder line-driver inputs | 4 MHz Line driver input | GX-EC0241 |

**Note:** Refer to Automation systems catalogue for detailed specs and ordering information.

### Vision system

| Name | Specification | Order code |
|---|---|---|
| Vision system with EtherCAT interface | NPN | FZM1-350-ECT |
| | PNP | FZM1-355-ECT |

**Note:** Refer to vision system documentation for detailed specs and ordering information.

### Computer software

| Specifications | Order code |
|---|---|
| CX-One version 4 or higher | CX-One |
| CX-Programmer version 9.12 or higher | CX-Programmer |

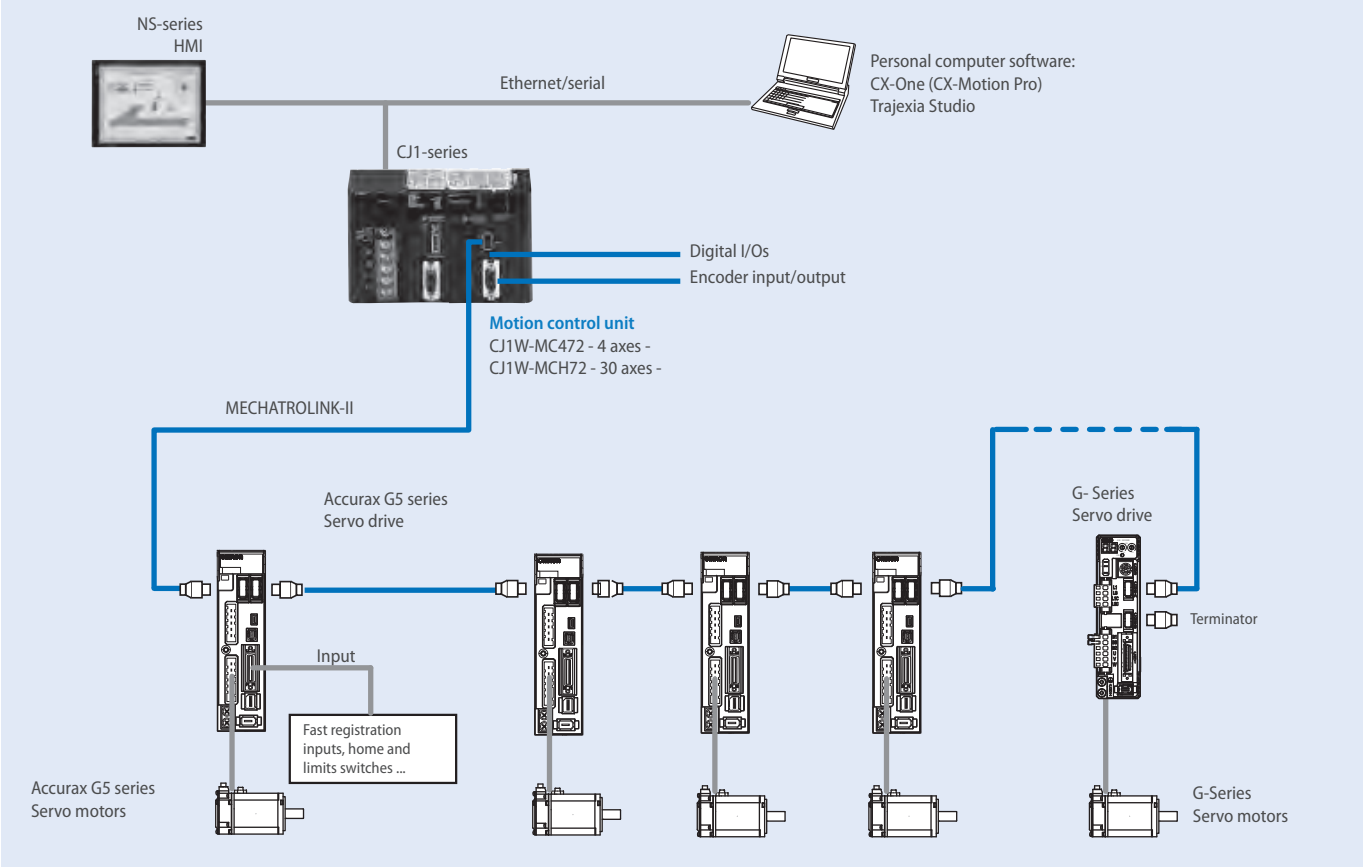
## Trajexia motion controller integrated with your PLC

Trajexia, the family of advanced motion controllers that put you in control, now has a compact and integrated version. Meet Trajexia-PLC, the motion controller that has all the flexibility and modularity of Omron PLCs, plus the outstanding motion-control features of the Trajexia platform.

- Control of up to 30 physical axes
- Control of servos and inverters over a single motion network
- Advanced motion control such as CAM control, registration control, interpolation and axes synchronization via simple motion commands
- Serial port for external encoder
- Embedded digital I/Os
- I/O data exchange with the PLC CPU



## Ordering information




### Motion controller

| Name | Order code |
|---|---|
| Trajexia motion control unit, up to 30 MECHATROLINK-II axes | CJ1W-MCH72 |
| Trajexia motion control unit, up to 4 MECHATROLINK-II axes | CJ1W-MC472 |

### MECHATROLINK-II – related devices

#### Servo system

| Name | | Order code |
|---|---|---|
| Accurax G5 servo drive ML-II built-in | | R88D-KN____-ML2 |
| G-Series servo drive ML-II built-in | | R88D-GN___H-ML2 |
| MX2 inverter with MECHATROLINK-II option board | Frequency inverter | 3G3MX2-A_ |
| | MECHATROLINK-II option board | 3G3AX-MX2-MRT |

**Note:** Refer to servo systems and frequency inverter sections for detailed specs and ordering information

### MECHATROLINK-II cables

| Name | Remarks | Order code |
|---|---|---|
| MECHATROLINK-II cables | 0.5 meter | JEPMC-W6003-A5 |
| | 1 meter | JEPMC-W6003-01 |
| | 3 meters | JEPMC-W6003-03 |
| | 5 meters | JEPMC-W6003-05 |
| | 10 meters | JEPMC-W6003-10 |
| | 20 meters | JEPMC-W6003-20 |
| | 30 meters | JEPMC-W6003-30 |
| MECHATROLINK-II terminator | Terminating resistor | JEPMC-W6022 |
| MECHATROLINK-II repeater | Network repeater | JEPMC-REP2000 |

### Computer software

| Specifications | Order code |
|---|---|
| CX-Motion Pro V1.3.3 or higher | CX-One |
| Trajexia Studio[*1] V1.3.3 or higher | TJ1-Studio |

[*1] When the Trajexia Studio software is included in CX-One, then it is called CX-Motion Pro.

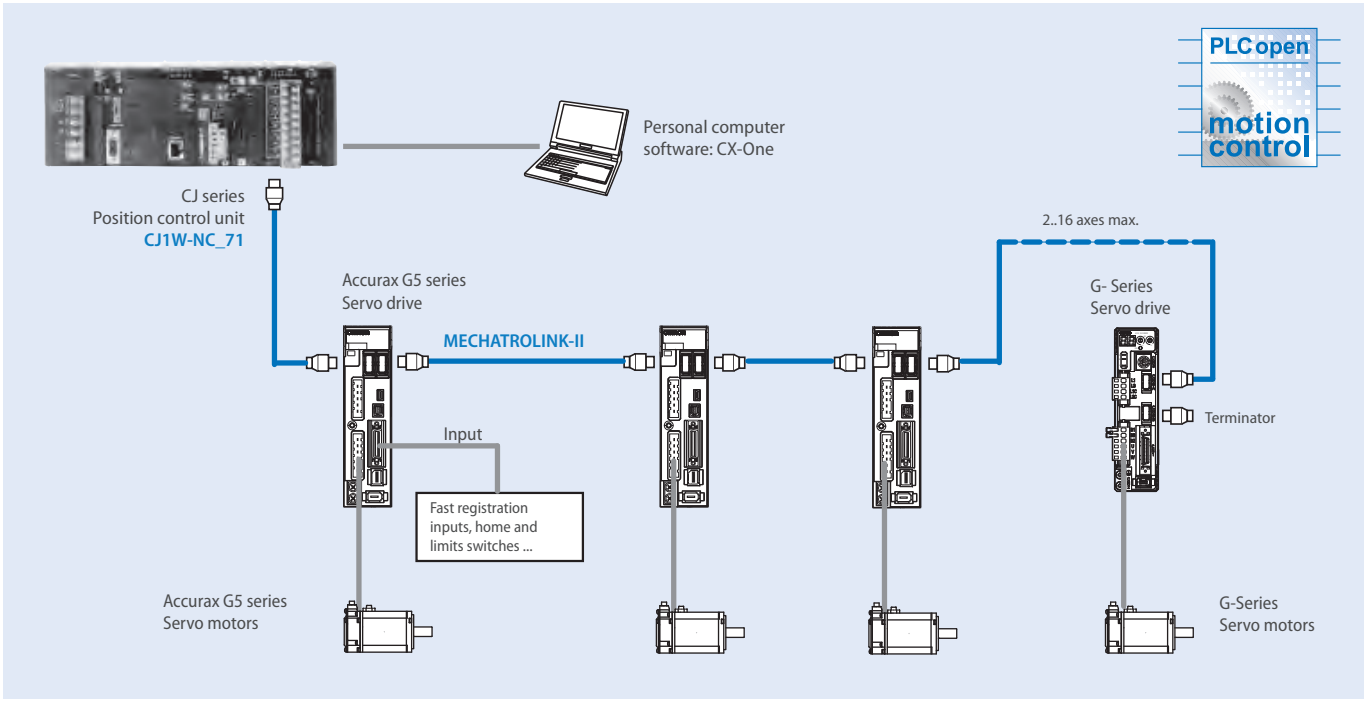
## 2, 4 and 16-axis point-to-point positioning controller over MECHATROLINK-II

NC_71 is a powerful controller for point-to-point applications. It is based on MECHATROLINK-II motion bus, which reduces programming and development and maintenance costs. Supports PLC open function blocks.

- Supports position, speed and torque control.
- Programming languages: ladder, function blocks. Supports PLC Open Function Blocks.
- Smart active parts for Omron HMIs terminals reduce engineering time.
- Access to the complete system from one point. Network setup, servo drives configuring and monitoring, and PLC programming.



## Ordering information




### Position controller unit

| Name | Order code |
|---|---|
| MECHATROLINK-II position controller unit – 16 axes | CJ1W-NCF71 |
| MECHATROLINK-II position controller unit – 4 axes | CJ1W-NC471 |
| MECHATROLINK-II position controller unit – 2 axes | CJ1W-NC271 |

### Computer software

| Specifications | Order code |
|---|---|
| CX-One version 2.0 (CX-Motion NCF 1.70 or higher)<br>CX-One version 3.0 (CX-Motion NCF 1.90 or higher)<br>CX-One version 4.0 or higher | CX-One |

### MECHATROLINK-II related devices

#### Servo system

| Name | Order code |
|---|---|
| Accurax G5 servo drive ML-II built-in | R88D-KN___-ML2 |
| G-Series servo drive ML-II built-in | R88D-GN__H-ML2 |

**Note:** Refer to servo systems section for detailed specs and ordering information

#### MECHATROLINK-II cables

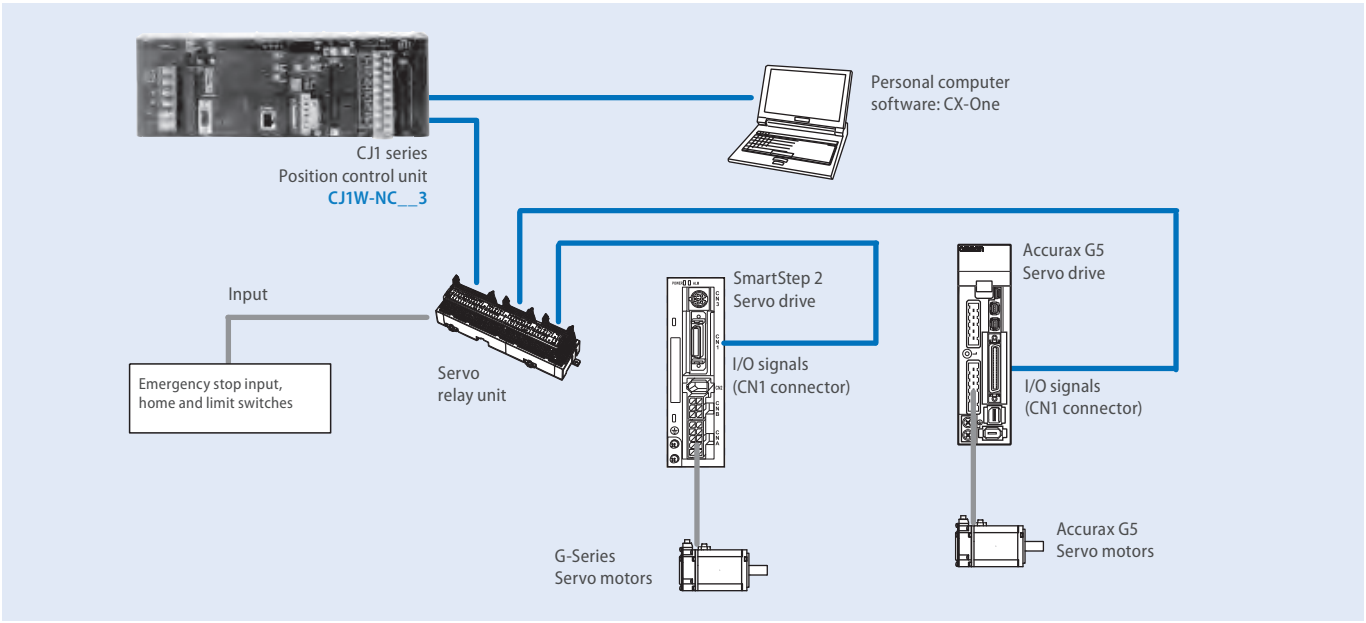
| Name | Remarks | Order code |
|---|---|---|
| MECHATROLINK-II terminator | Terminating resistor | JEPMC-W6022 |
| MECHATROLINK-II cables | 0.5 meter | JEPMC-W6003-A5 |
| | 1 meter | JEPMC-W6003-01 |
| | 3 meters | JEPMC-W6003-03 |
| | 5 meters | JEPMC-W6003-05 |
| | 10 meters | JEPMC-W6003-10 |
| | 20 meters | JEPMC-W6003-20 |
| | 30 meters | JEPMC-W6003-30 |

## 1, 2 or 4-axis point-to-point positioning controller with pulse train output

The NC motion controllers support positioning control via pulse-train outputs. Positioning is performed using trapezoidal or S-curve acceleration and deceleration. Ideal for controlling simple positioning in stepper motors and servos with pulse-train input.

- Positioning can be done by direct ladder commands
- Position and speed control
- Linear interpolation
- Interrupt feeding function
- Positioning of 100 points done from memory
- Positioning data is saved in internal flash memory, eliminating the need to maintain a backup battery.

## Ordering information




### Position control unit

| Name | Order code |
|---|---|
| 1 axis position control unit. Open-collector output. | CJ1W-NC113 |
| 2 axes position control unit. Open-collector output. | CJ1W-NC213 |
| 4 axes position control unit. Open-collector output. | CJ1W-NC413 |
| 1 axis position control unit. Line-driver output. | CJ1W-NC133 |
| 2 axes position control unit. Line-driver output. | CJ1W-NC233 |
| 4 axes position control unit. Line-driver output. | CJ1W-NC433 |

### Servo drive cables

**Note:** Refer the selected servo systems section for cable and servo relay units information.

### Computer software

| Specifications | Order code |
|---|---|
| CX-One | CX-One |

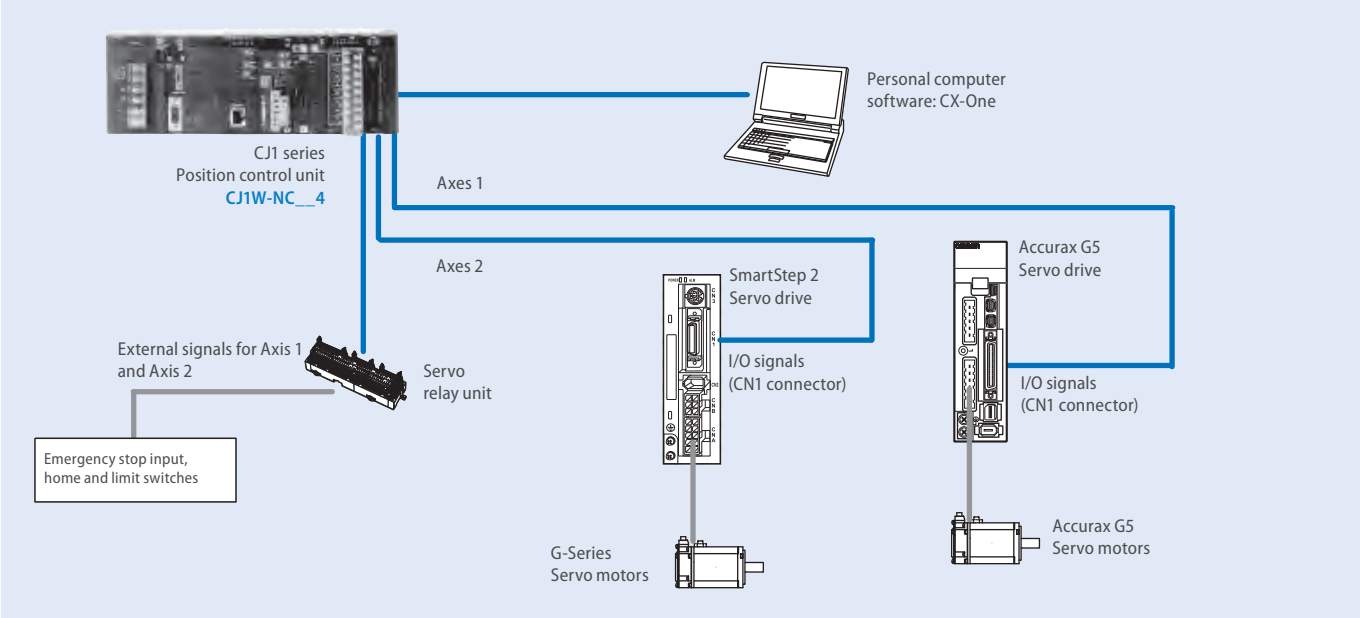
## 2 or 4-axis point-to-point positioning controller with pulse train output and motion control unit functionality

The NC motion controllers support positioning control via pulse-train outputs. Positioning is performed using trapezoidal or S-curve acceleration and deceleration. Ideal for controlling simple positioning in stepper motors and servos with pulse-train input. When the CJ1W-NC__4 unit is used in a CJ2 CPU, it can perform also synchronous operation by use of electronic CAMs and other function blocks.

- Position and speed control
- Linear interpolation and feeder control function
- Electronic CAM profiles and axes synchronization
- Positioning of 500 points done from memory
- Programming languages: ladder, function blocks.



## Ordering information




### Position control unit

| Name | Order code |
|---|---|
| 2 axes position control unit. Open-collector output. | CJ1W-NC214 |
| 4 axes position control unit. Open-collector output. | CJ1W-NC414 |
| 2 axes position control unit. Line-driver output. | CJ1W-NC234 |
| 4 axes position control unit. Line-driver output. | CJ1W-NC434 |

### Servo drive cables

**Note:** Refer to selected servo systems section for cable and servo relay units information.

### Computer software

| Specifications | Order code |
|---|---|
| CX-One | CX-One |

# EXTREME MECHATRONICS MEETS X-STREAM AUTOMATION

## At the heart of every great machine

Great machines are born from a perfect match between control and mechanics. Accurax G5 gives you the extra edge to build more accurate, faster, smaller and safer machines. You will benefit from an almost 25% reduction in motor weight, and gain 50% cabinet space. You will achieve sub micron precision and ms settling time. Some might call it perfection, we just call it tireless innovation to help you build great machines.

- EtherCAT, ML-II and analog/pulse models
- High response frequency of 2 kHz
- Safety built-in conforming ISO13849-1 PL-d
- High accuracy provided by 20 bit encoder

Which motion architecture do you need?

**Machine controller**

Sequence, Motion, Vision, Safety, Robotics and Database connection functionality

**NJ Series**

Integration of logic and motion in one Intel CPU, advanced motion, up to 64 axes

**Accurax G5 EtherCAT**

50 W to 15 kW

F354, F356
Page 106, 125

**Indexer functionality into the drive**

**Accurax G5 A/P**

50 W to 15 kW

F354, F356
Page 106, 125

**G-Series A/P**

50 W to 1.5 kW

F352, F355
Page 114, 141

**SmartStep2**

50 to 750 W

F353, F355
Page 120, 141

**Stand-alone controller**

**2 axes + 1 axis pulse train output**

**Trajexia 2.5 axes motion controller**

Advanced motion, e-cam, 2 axes synchronisation

**EtherCAT, MECHATROLINK-II, analog output and pulse train output**

**Trajexia motion controller**

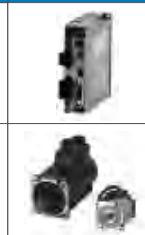
Advanced motion, e-cam, multi-axis synchronization

**Accurax G5 ML2**

50 W to 5 kW

F354, F356
Page 106, 125

**G-Series ML2**



50 W to 1.5 kW

F352, F355
Page 114, 141

Based in OMRON PLC

Drive control method?

## EtherCAT

### NC EtherCAT

Single to multi-axis PTP applications with linear and circular interpolation

### Accurax G5 EtherCAT

50 W to 15 kW

F354, F356
Page 106, 125

## MECHATROLINK-II

### Trajexia-PLC

Advanced motion, e-cam, multi-axis synchronization

### Accurax G5 ML2

50 W to 5 kW

F354, F356
Page 106, 125

### G-Series ML2

50 W to 1.5 kW

F352, F355
Page 114, 141

### NC MECHATROLINK-II

Single to multi-axis PTP applications

## Pulse train output

### NCs

Up to 4-axis PTP applications

### Accurax G5 A/P

50 W to 15 kW

F354, F356
Page 106, 125

### G-Series A/P

50 W to 1.5 kW

F352, F355
Page 114, 141

### SmartStep2

50 to 750 W

F353, F355
Page 120, 141

# Selection table

| | Servo drives | | |
|---|---|---|---|
| |  |  |  |
| | **Accurax G5** | **G-Series** | **SmartStep 2** |
| | EtherCAT network and safety built-in | Compact size and ML2 motion bus | Pulse train input with ultra-compact size |
| **Ratings 230 V single-phase** | 100 W to 1.5 kW | 100 W to 1.5 kW | 100 W to 750 W |
| **Ratings 400 V three-phase** | 600 W to 15 kW | N/A | N/A |
| **Applicable servomotor** | Accurax G5 and G-Series rotary motors | G-Series | G-Series |
| **Position control** | EtherCAT, MECHATROLINK-II or Pulse train input | MECHATROLINK-II or Pulse train input | Pulse train input |
| **Speed control** | EtherCAT, MECHATROLINK-II or Analog input ±10 V | MECHATROLINK-II or Analog input ±10 V | N/A |
| **Torque control** | EtherCAT, MECHATROLINK-II or Analog input ±10 V | MECHATROLINK-II or Analog input ±10 V | Torque limits only |
| | Embedded indexer functionality | N/A | N/A |
| **Safety approvals** | ISO13849-1:2008 (PL d), EN 954-1:1996 (Cat-3) | N/A | N/A |
| **Full closed loop** | Built-in | N/A | N/A |
| **Page/Quick Link** | 106 | 114 | 120 |

| | Accurax G5 servo motors | | | |
|---|---|---|---|---|
| |  |  |  |  |
| | **Standard models** | | | |
| | **3,000 r/min motor** | **2,000 r/min motor** | **1,500 r/min motor** | **1,000 r/min motor** |
| **Rated speed** | 3,000 rpm | 2,000 rpm | 1,500 rpm | 1,000 rpm |
| **Maximum speed** | 4,500 to 6,000 rpm | 3,000 rpm | 2,000 to 3,000 rpm | 2,000 rpm |
| **Rated torque** | 0.16 Nm to 15.9 Nm | 1.91 Nm to 23.9 Nm | 47.8 Nm to 95.5 Nm | 8.59 Nm to 28.7 Nm |
| **Sizes** | 50 W to 5 kW | 400 W to 5 kW | 7.5 kW to 15 kW | 900 W to 6 kW |
| **Applicable servo drive** | Accurax G5 servo drive | Accurax G5 servo drive | Accurax G5 servo drive | Accurax G5 servo drive |
| **Encoder resolution** | 20-bit incremental/ 17-bit absolute | 20-bit incremental/ 17-bit absolute | 17-bit absolute | 20-bit incremental/ 17-bit absolute |
| **IP rating** | IP67 | IP67 | IP67 | IP67 |
| **Page/Quick Link** | 125 | | | |

| | G-Series servo motors – Cylindrical type – | | | G-Series servo motors – Flat type – |
|---|---|---|---|---|
| |  |  |  |  |
| | **3,000 r/min motor** | **2,000 r/min motor** | **1,000 r/min motor** | **3,000 r/min motor** |
| **Rated speed** | 3,000 rpm | 2,000 rpm | 1,000 rpm | 3,000 rpm |
| **Maximum speed** | 4,500 to 5,000 rpm | 3,000 rpm | 2,000 rpm | 5,000 rpm |
| **Rated torque** | 0.16 Nm to 4.77 Nm | 4.8 Nm to 7.15 Nm | 8.62 Nm | 0.32 Nm to 1.3 Nm |
| **Sizes** | 50 to 1,500 W | 1 to 1.5 kW | 900 W | 100 to 400 W |
| **Applicable servo drive** | SmartStep 2, G-Series and Accurax G5 servo drives | SmartStep 2, G-Series and Accurax G5 servo drives | SmartStep 2, G-Series and Accurax G5 servo drives | SmartStep 2, G-Series and Accurax G5 servo drives |
| **Encoder resolution** | 10,000 pulses/revolution or 17-bit absolute/incremental | 10,000 pulses/revolution or 17-bit absolute/incremental | 10,000 pulses/revolution or 17-bit absolute/incremental | 10,000 pulses/revolution or 17-bit absolute/incremental |
| **IP rating** | IP65 | IP65 | IP65 | IP65 |
| **Page/Quick Link** | 141 | | | |

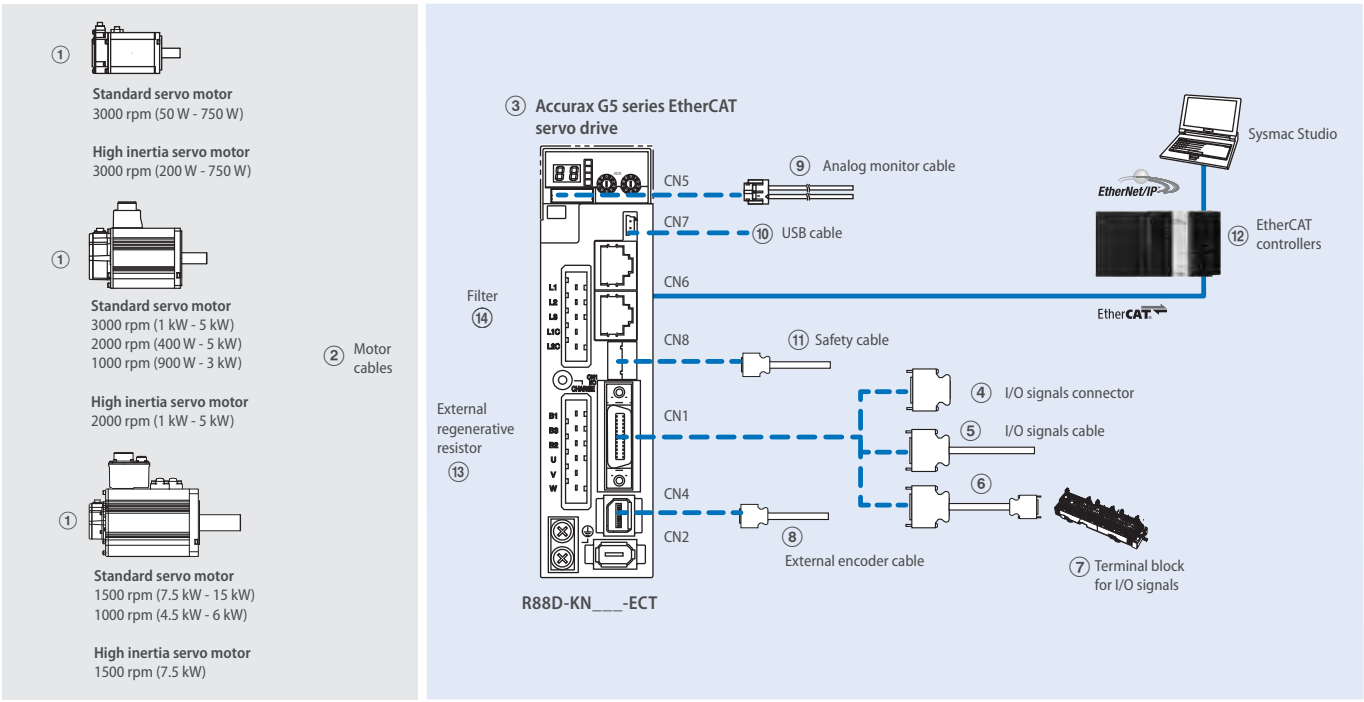
| | Accurax G5 servo motors | | |
|---|---|---|---|
| |  |  |  |
| | High inertia models | | |
| | 3,000 r/min motor | 2,000 r/min motor | 1,500 r/min motor |
| Rated speed | 3,000 rpm | 2,000 rpm | 1,500 rpm |
| Maximum speed | 5,000 rpm | 3,000 rpm | 2,000 to 3,000 rpm |
| Rated torque | 0.64 Nm to 2.4 Nm | 4.77 Nm to 23.9 Nm | 47.8 Nm |
| Sizes | 200 W to 750 W | 1 kW to 5 kW | 7.5 kW |
| Applicable servo drive | Accurax G5 servo drive | Accurax G5 servo drive | Accurax G5 servo drive |
| Encoder resolution | 20-bit incremental/<br>17-bit absolute | 20-bit incremental/<br>17-bit absolute | 17-bit absolute |
| IP rating | IP65 | IP67 | IP67 |
| Page/Quick Link | 125 | | |

## Accurate motion control in a compact size servo drive family. EtherCAT and safety built-in

- EtherCAT, ML-II and analog/pulse servo drive models
- Safety conforming ISO13849-1 PL-d
- High-response frequency of 2 kHz
- High resolution provided by 20 bits encoder
- Drive Programming: embedded indexer functionality in the analog/pulse models
- External encoder input for full closed loop
- Real time auto-tuning
- Advanced tuning algorithms (anti-vibration function, torque feedforward, disturbance observer)

## Ordering information

### Accurax G5 series EtherCAT reference configuration




**Note:** The symbols ①②③④⑤… show the recommended sequence to select the components in Accurax G5 servo system

### Servo motors, power and encoder cables

**Note:** ①② Refer to the Accurax G5 servo motor chapter for servomotor, motor cables or connectors selection

### Servo drives

| Symbol | Specifications | | ① Compatible G5 series rotary servo motors | | Servo drive models |
|---|---|---|---|---|---|
| | | | Standard models | High Inertia models | Order code |
| ③ | 1 phase 230 VAC | 100 W | R88M-K05030(H/T)-_ | – | R88D-KN01H-ECT |
| | | | R88M-K10030(H/T)-_ | – | |
| | | 200 W | R88M-K20030(H/T)-_ | R88M-KH20030(H/T)-_ | R88D-KN02H-ECT |
| | | 400 W | R88M-K40030(H/T)-_ | R88M-KH40030(H/T)-_ | R88D-KN04H-ECT |
| | | 750 W | R88M-K75030(H/T)-_ | R88M-KH75030(H/T)-_ | R88D-KN08H-ECT |
| | | 1.0 kW | R88M-K1K020(H/T)-_ | – | R88D-KN10H-ECT |
| | | 1.5 kW | R88M-K1K030(H/T)-_ | – | R88D-KN15H-ECT |
| | | | R88M-K1K530(H/T)-_ | – | |
| | | | R88M-K1K520(H/T)-_ | – | |
| | | | R88M-K90010(H/T)-_ | – | |
| | 3 phase 400 VAC | 600 W | R88M-K40020(F/C)-_ | – | R88D-KN06F-ECT |
| | | | R88M-K60020(F/C)-_ | – | |
| | | 1.0 kW | R88M-K75030(F/C)-_ | – | R88D-KN10F-ECT |
| | | | R88M-K1K020(F/C)-_ | R88M-KH1K020(F/C)-_ | |
| | | 1.5 kW | R88M-K1K030(F/C)-_ | – | R88D-KN15F-ECT |
| | | | R88M-K1K530(F/C)-_ | – | |
| | | | R88M-K1K520(F/C)-_ | R88M-KH1K520(F/C)-_ | |
| | | | R88M-K90010(F/C)-_ | – | |

| Symbol | Specifications | | ① Compatible G5 series rotary servo motors | | Servo drive models |
|---|---|---|---|---|---|
| | | | Standard models | High Inertia models | Order code |
| ③ | 3 phase 400 VAC | 2.0 kW | R88M-K2K030(F/C)-_ | – | R88D-KN20F-ECT |
| | | | R88M-K2K020(F/C)-_ | R88M-KH2K020(F/C)-_ | |
| | | 3.0 kW | R88M-K3K030(F/C)-_ | – | R88D-KN30F-ECT |
| | | | R88M-K3K020(F/C)-_ | R88M-KH3K020(F/C)-_ | |
| | | | R88M-K2K010(F/C)-_ | – | |
| | | 5.0 kW | R88M-K4K030(F/C)-_ | – | R88D-KN50F-ECT |
| | | | R88M-K5K030(F/C)-_ | – | |
| | | | R88M-K4K020(F/C)-_ | R88M-KH4K020(F/C)-_ | |
| | | | R88M-K5K020(F/C)-_ | R88M-KH5K020(F/C)-_ | |
| | | | R88M-K4K510C-_ | – | |
| | | | R88M-K3K010(F/C)-_ | – | |
| | | 7.5 kW | R88M-K6K010C-_ | – | R88D-KN75F-ECT |
| | | | R88M-K7K515C-_ | R88M-KH7K515C-_ | |
| | | 15 kW | R88M-K11K015C-_ | – | R88D-KN150F-ECT |
| | | | R88M-K15K015C-_ | – | |

### Signals cables for I/O general purpose (CN1)

| Symbol | Description | Connect to | Length | Order code |
|---|---|---|---|---|
| ④ | I/O connector kit (26 pins) | For I/O general purpose | – | R88A-CNW01C |
| ⑤ | I/O signals cable | For I/O general purpose | 1 m | R88A-CPKB001S-E |
| | | | 2 m | R88A-CPKB002S-E |
| ⑥ | Terminal block cable | For I/O general purpose | 1 m | XW2Z-100J-B34 |
| | | | 2 m | XW2Z-200J-B34 |
| ⑦ | Terminal block (M3 screw and for pin terminals) | | – | XW2B-20G4 |
| | Terminal block (M3.5 screw and for fork/round terminals) | | – | XW2B-20G5 |
| | Terminal block (M3 screw and for fork/round terminals) | | – | XW2D-20G6 |

### External encoder cable (CN4)

| Symbol | Name | Length | Order code |
|---|---|---|---|
| ⑧ | External encoder cable | 5 m | R88A-CRKM005SR-E |
| | | 10 m | R88A-CRKM010SR-E |
| | | 20 m | R88A-CRKM020SR-E |

### Analog monitor (CN5)

| Symbol | Name | Length | Order code |
|---|---|---|---|
| ⑨ | Analog monitor cable | 1 m | R88A-CMK001S |

### USB personal computer cable (CN7)

| Symbol | Name | Length | Order code |
|---|---|---|---|
| ⑩ | USB mini-connector cable | 2 m | AX-CUSBM002-E |

### Cable for safety (CN8)

| Symbol | Name | Length | Order code |
|---|---|---|---|
| ⑪ | Safety cable | 3 m | R88A-CSK003S-E |

### EtherCAT controllers

| Symbol | Name | | Order code |
|---|---|---|---|
| ⑫ | NJ-series | CPU unit | NJ501-1500 (64 axes) |
| | | | NJ501-1400 (32 axes) |
| | | | NJ501-1300 (16 axes) |
| | | | NJ301-1200 (8 axes) |
| | | | NJ301-1100 (4 axes) |
| | | Power supply unit | NJ-PA3001 (220 VAC) |
| | | | NJ-PD3001 (24 VDC) |
| | Trajexia stand-alone | Motion control unit | TJ2-MC64 (64 axes) |
| | | EtherCAT master unit | TJ2-ECT64 (64 axes) |
| | | | TJ2-ECT16 (16 axes) |
| | | | TJ2-ECT04 (4 axes) |
| | Position controller unit for CJ1 PLC series | | CJ1W-NCF8_ (16 axes) |
| | | | CJ1W-NC88_ (8 axes) |
| | | | CJ1W-NC48_ (4 axes) |
| | | | CJ1W-NC281 (2 axes) |

### External regenerative resistor

| Symbol | Specifications | Order code |
|---|---|---|
| ⑬ | 50 Ω, 80 W | R88A-RR08050S |
| | 100 Ω, 80 W | R88A-RR080100S |
| | 47 Ω, 220 W | R88A-RR22047S |
| | 20 Ω, 500 W | R88A-RR50020S |

### Filters

| Symbol | Applicable servodrive | Rated current | Leakage current | Rated voltage | Order code |
|---|---|---|---|---|---|
| ⑭ | R88D-KN01H-ECT, R88D-KN02H-ECT | 2.4 A | 3.5 mA | 250 VAC single-phase | R88A-FIK102-RE |
| | R88D-KN04H-ECT | 4.1 A | 3.5 mA | | R88A-FIK104-RE |
| | R88D-KN08H-ECT | 6.6 A | 3.5 mA | | R88A-FIK107-RE |
| | R88D-KN10H-ECT, R88D-KN15H-ECT | 14.2 A | 3.5 mA | | R88A-FIK114-RE |
| | R88D-KN06F-ECT, R88D-KN10F-ECT, R88D-KN15F-ECT | 4 A | 0.3 mA/32 mA*1 | 400 VAC three-phase | R88A-FIK304-RE |
| | R88D-KN20F-ECT | 6 A | 0.3 mA/32 mA*1 | | R88A-FIK306-RE |
| | R88D-KN30F-ECT, R88D-KN50F-ECT | 12.1 A | 0.3 mA/32 mA*1 | | R88A-FIK312-RE |
| | R88D-KN75F-ECT | 22 A | 0.3 mA/40 mA*1 | | R88A-FIK330-RE |
| | R88D-KN150F-ECT | 44 A | 2 mA/130 mA*1 | | R88A-FIK350-RE |

*1 Momentary peak leakage current for the filter at switch-on/off.

### Connectors

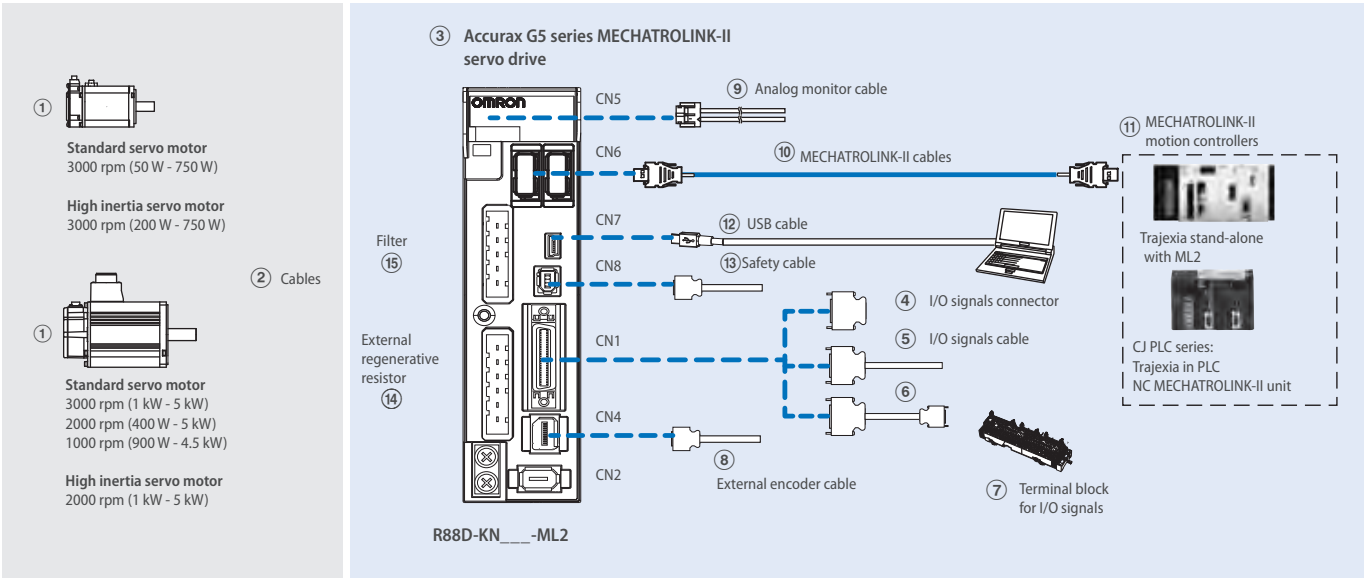
| Specifications | Order code |
|---|---|
| External encoder connector (for CN4) | R88A-CNK41L |
| Safety I/O signal connector (for CN8) | R88A-CNK81S |

### Computer software

| Specifications | Order code |
|---|---|
| Sysmac Studio version 1.0 or higher | SYSMAC-SE2___ |
| CX-Drive version 2.10 or higher | CX-DRIVE 2.10 |
| CX-One software package including CX-Drive 2.10 or higher | CX-ONE |

**Note:** If CX-One is installed on the same computer as Sysmac Studio, it must be CX-One v4.2 or higher.

### Accurax G5 series MECHATROLINK-II reference configuration




**Note:** The symbols ①②③④⑤… show the recommended sequence to select the components in Accurax G5 servo system

### Servo motors, power and encoder cables

**Note:** ①② Refer to the Accurax G5 servo motor section for servomotor, motor cables or connectors selection

### Servo drives

| Symbol | Specifications | | ① Compatible G5 series rotary servo motors | | Servo drive models |
|---|---|---|---|---|---|
| | | | Standard models | High inertia models | Order code |
| ③ | 1 phase 230 VAC | 100 W | R88M-K05030(H/T)-_ | – | R88D-KN01H-ML2 |
| | | | R88M-K10030(H/T)-_ | – | |
| | | 200 W | R88M-K20030(H/T)-_ | R88M-KH20030(H/T)-_ | R88D-KN02H-ML2 |
| | | 400 W | R88M-K40030(H/T)-_ | R88M-KH40030(H/T)-_ | R88D-KN04H-ML2 |
| | | 750 W | R88M-K75030(H/T)-_ | R88M-KH75030(H/T)-_ | R88D-KN08H-ML2 |
| | | 1.0 kW | R88M-K1K020(H/T)-_ | – | R88D-KN10H-ML2 |
| | | 1.5 kW | R88M-K1K030(H/T)-_ | – | R88D-KN15H-ML2 |
| | | | R88M-K1K530(H/T)-_ | – | |
| | | | R88M-K1K520(H/T)-_ | – | |
| | | | R88M-K90010(H/T)-_ | – | |
| | 3 phase 400 VAC | 600 W | R88M-K40020(F/C)-_ | – | R88D-KN06F-ML2 |
| | | | R88M-K60020(F/C)-_ | – | |
| | | 1.0 kW | R88M-K75030(F/C)-_ | – | R88D-KN10F-ML2 |
| | | | R88M-K1K020(F/C)-_ | R88M-KH1K020(F/C)-_ | |
| | | 1.5 kW | R88M-K1K030(F/C)-_ | – | R88D-KN15F-ML2 |
| | | | R88M-K1K530(F/C)-_ | – | |
| | | | R88M-K1K520(F/C)-_ | R88M-KH1K520(F/C)-_ | |
| | | | R88M-K90010(F/C)-_ | – | |
| | | 2.0 kW | R88M-K2K030(F/C)-_ | – | R88D-KN20F-ML2 |
| | | | R88M-K2K020(F/C)-_ | R88M-KH2K020(F/C)-_ | |
| | | 3.0 kW | R88M-K3K030(F/C)-_ | – | R88D-KN30F-ML2 |
| | | | R88M-K3K020(F/C)-_ | R88M-KH3K020(F/C)-_ | |
| | | | R88M-K2K010(F/C)-_ | – | |
| | | 5.0 kW | R88M-K4K030(F/C)-_ | – | R88D-KN50F-ML2 |
| | | | R88M-K5K030(F/C)-_ | – | |
| | | | R88M-K4K020(F/C)-_ | R88M-KH4K020(F/C)-_ | |
| | | | R88M-K5K020(F/C)-_ | R88M-KH5K020(F/C)-_ | |
| | | | R88M-K4K510C-_ | – | |
| | | | R88M-K3K010(F/C)-_ | – | |

### Control cables (CN1)

| Symbol | Description | Connect to | Length | Order code |
|---|---|---|---|---|
| ④ | I/O connector kit (26 pins) | For I/O general purpose | – | R88A-CNW01C |
| ⑤ | I/O signals cable | | 1 m | R88A-CPKB001S-E |
| | | | 2 m | R88A-CPKB002S-E |
| ⑥ | Terminal block cable | For I/O general purpose | 1 m | XW2Z-100J-B34 |
| | | | 2 m | XW2Z-200J-B34 |
| ⑦ | Terminal block (M3 screw and for pin terminals) | | – | XW2B-20G4 |
| | Terminal block (M3.5 screw and for fork/round terminals) | | – | XW2B-20G5 |
| | Terminal block (M3 screw and for fork/round terminals) | | – | XW2D-20G6 |

### External encoder cable (CN4)

| Symbol | Name | Length | Order code |
|---|---|---|---|
| ⑧ | External encoder cable | 5 m | R88A-CRKM005SR-E |
| | | 10 m | R88A-CRKM010SR-E |
| | | 20 m | R88A-CRKM020SR-E |

### Analog monitor (CN5)

| Symbol | Name | Length | Order code |
|---|---|---|---|
| ⑨ | Analog monitor cable | 1 m | R88A-CMK001S |

### MECHATROLINK-II cables (CN6)

| Symbol | Specifications | Length | Order code |
|---|---|---|---|
| ⑩ | MECHATROLINK-II Terminator resistor | - | JEPMC-W6022-E |
| | MECHATROLINK-II cables | 0.5 m | JEPMC-W6003-A5-E |
| | | 1 m | JEPMC-W6003-01-E |
| | | 3 m | JEPMC-W6003-03-E |
| | | 5 m | JEPMC-W6003-05-E |
| | | 10 m | JEPMC-W6003-10-E |
| | | 20 m | JEPMC-W6003-20-E |
| | | 30 m | JEPMC-W6003-30-E |

### MECHATROLINK-II motion controllers

| Symbol | Name | | Order code |
|---|---|---|---|
| ⑪ | Trajexia stand-alone | Motion control unit | TJ2-MC64 (64 axes) |
| | | | TJ1-MC16 (16 axes) |
| | | | TJ1-MC04 (4 axes) |
| | | ML2 master unit | TJ1-ML16 (16 axes) |
| | | | TJ1-ML04 (4 axes) |
| | Trajexia-PLC motion controller | | CJ1W-MCH72 (30 axes) |
| | | | CJ1W-MC472 (4 axes) |
| | Position controller unit for CJ1 PLC | | CJ1W-NCF71 (16 axes) |
| | | | CJ1W-NC471 (4 axes) |
| | | | CJ1W-NC271 (2 axes) |
| | Position controller unit for CS1 PLC | | CS1W-NCF71 (16 axes) |
| | | | CS1W-NC471 (4 axes) |
| | | | CS1W-NC271 (2 axes) |

### USB personal computer cable (CN7)

| Symbol | Name | Length | Order code |
|---|---|---|---|
| ⑫ | USB mini-connector cable | 2 m | AX-CUSBM002-E |

### Cable for safety functions (CN8)

| Symbol | Description | Order code |
|---|---|---|
| ⑬ | Safety connector with 3 m cable (with loose wires at one end) | R88A-CSK003S-E |

### External regenerative resistor

| Symbol | Specifications | Order code |
|---|---|---|
| ⑭ | 50 Ω, 80 W | R88A-RR08050S |
| | 100 Ω, 80 W | R88A-RR080100S |
| | 47 Ω, 220 W | R88A-RR22047S |
| | 20 Ω, 500 W | R88A-RR50020S |

### Filters

| Symbol | Applicable servodrive | Rated current | Leakage current | Rated voltage | Order code |
|---|---|---|---|---|---|
| ⑮ | R88D-KN01H-ML2, R88D-KN02H-ML2 | 2.4 A | 3.5 mA | 250 VAC single-phase | R88A-FIK102-RE |
| | R88D-KN04H-ML2 | 4.1 A | 3.5 mA | | R88A-FIK104-RE |
| | R88D-KN08H-ML2 | 6.6 A | 3.5 mA | | R88A-FIK107-RE |
| | R88D-KN10H-ML2, R88D-KN15H-ML2 | 14.2 A | 3.5 mA | | R88A-FIK114-RE |
| | R88D-KN06F-ML2, R88D-KN10F-ML2, R88D-KN15F-ML2 | 4 A | 0.3 mA /32 mA[*1] | 400 VAC three-phase | R88A-FIK304-RE |
| | R88D-KN20F-ML2 | 6 A | 0.3 mA /32 mA[*1] | | R88A-FIK306-RE |
| | R88D-KN30F-ML2, R88D-KN50F-ML2 | 12.1 A | 0.3 mA /32 mA[*1] | | R88A-FIK312-RE |

[*1] Momentary peak leakage current for the filter at switch-on/off.

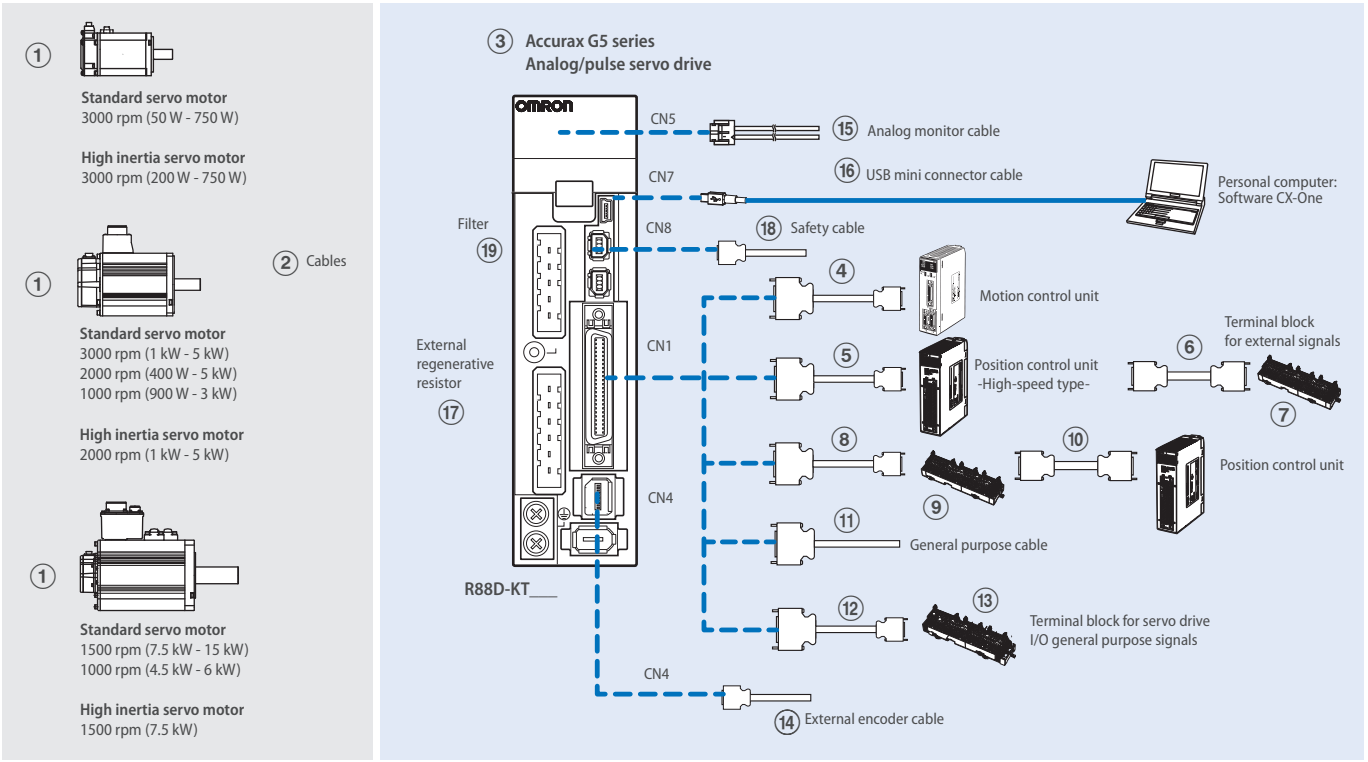
### Connectors

| Specifications | Order code |
|---|---|
| External encoder connector (for CN4) | R88A-CNK41L |
| Safety I/O signal connector (for CN8) | R88A-CNK81S |

### Computer software

| Specifications | Order code |
|---|---|
| CX-Drive version 1.91 or higher | CX-DRIVE 1.91 |
| CX-One software package including CX-Drive 1.91 or higher | CX-ONE |

## Accurax G5 series analog/pulse reference configuration




**Note:** The symbols ①②③④⑤… show the recommended sequence to select the components in Accurax G5 servo system

### Servo motors, power and encoder cables

**Note:** ①② Refer to the Accurax G5 servo motor section for servomotor, motor cables or connectors selection

### Servo drives

| Symbol | Specifications | | ① Compatible Accurax G5 series rotary servo motors | | Servo drive models*1 |
|---|---|---|---|---|---|
| | | | Standard models | High inertia models | Order code |
| ③ | 1 phase 230 VAC | 100 W | R88M-K05030(H/T)-_ | – | R88D-KT01H |
| | | | R88M-K10030(H/T)-_ | – | |
| | | 200 W | R88M-K20030(H/T)-_ | R88M-KH20030(H/T)-_ | R88D-KT02H |
| | | 400 W | R88M-K40030(H/T)-_ | R88M-KH40030(H/T)-_ | R88D-KT04H |
| | | 750 W | R88M-K75030(H/T)-_ | R88M-KH75030(H/T)-_ | R88D-KT08H |
| | | 1.0 kW | R88M-K1K020(H/T)-_ | – | R88D-KT10H |
| | | 1.5 kW | R88M-K1K030(H/T)-_ | – | R88D-KT15H |
| | | | R88M-K1K530(H/T)-_ | – | |
| | | | R88M-K1K520(H/T)-_ | – | |
| | | | R88M-K90010(H/T)-_ | – | |
| | 3 phase 400 VAC | 600 W | R88M-K40020(F/C)-_ | – | R88D-KT06F |
| | | | R88M-K60020(F/C)-_ | – | |
| | | 1.0 kW | R88M-K75030(F/C)-_ | – | R88D-KT10F |
| | | | R88M-K1K020(F/C)-_ | R88M-KH1K020(F/C)-_ | |
| | | 1.5 kW | R88M-K1K030(F/C)-_ | – | R88D-KT15F |
| | | | R88M-K1K530(F/C)-_ | – | |
| | | | R88M-K1K520(F/C)-_ | R88M-KH1K520(F/C)-_ | |
| | | | R88M-K90010(F/C)-_ | – | |
| | | 2.0 kW | R88M-K2K030(F/C)-_ | – | R88D-KT20F |
| | | | R88M-K2K020(F/C)-_ | R88M-KH2K020(F/C)-_ | |
| | | 3.0 kW | R88M-K3K030(F/C)-_ | – | R88D-KT30F |
| | | | R88M-K3K020(F/C)-_ | R88M-KH3K020(F/C)-_ | |
| | | | R88M-K2K010(F/C)-_ | – | |
| | | 5.0 kW | R88M-K4K030(F/C)-_ | – | R88D-KT50F |
| | | | R88M-K5K030(F/C)-_ | – | |
| | | | R88M-K4K020(F/C)-_ | R88M-KH4K020(F/C)-_ | |
| | | | R88M-K5K020(F/C)-_ | R88M-KH5K020(F/C)-_ | |
| | | | R88M-K4K510C-_ | – | |
| | | | R88M-K3K010(F/C)-_ | – | |
| | | 7.5 kW | R88M-K6K010C-_ | – | R88D-KT75F |
| | | | R88M-K7K515C-_ | R88M-KH7K515C-_ | |
| | | 15 kW | R88M-K11K015C-_ | – | R88D-KT150F |
| | | | R88M-K15K015C-_ | – | |

*1 Drive Programming – embedded indexer functionality – is available in the Accurax G5 analog/pulse models with firmware 1.10 or higher.

### Control cables (CN1)

| Symbol | Description | Connect to | Length | Order code |
|---|---|---|---|---|
| ④ | Control cable (1 axis) | Motion control units CS1W-MC221 CS1W-MC421 | 1 m | R88A-CPG001M1 |
| | | | 2 m | R88A-CPG002M1 |
| | | | 3 m | R88A-CPG003M1 |
| | | | 5 m | R88A-CPG005M1 |
| | Control cable (2 axes) | Motion control units CS1W-MC221 CS1W-MC421 | 1 m | R88A-CPG001M2 |
| | | | 2 m | R88A-CPG002M2 |
| | | | 3 m | R88A-CPG003M2 |
| | | | 5 m | R88A-CPG005M2 |
| ⑤ | Control cable (line-driver output for 1 axis) | Position control units (high-speed type) CJ1W-NC234 CJ1W-NC434 | 1 m | XW2Z-100J-G9 |
| | | | 5 m | XW2Z-500J-G9 |
| | | | 10 m | XW2Z-10MJ-G9 |
| | Control cable (open-collector output for 1 axis) | Position control units (high-speed type) CJ1W-NC214 CJ1W-NC414 | 1 m | XW2Z-100J-G13 |
| | | | 3 m | XW2Z-300J-G13 |
| | Control cable (line-driver output for 2 axes) | Position control units (high-speed type) CJ1W-NC234 CJ1W-NC434 | 1 m | XW2Z-100J-G1 |
| | | | 5 m | XW2Z-500J-G1 |
| | | | 10 m | XW2Z-10MJ-G1 |
| | Control cable (open-collector output for 2 axes) | Position control units (high-speed type) CJ1W-NC214 CJ1W-NC414 | 1 m | XW2Z-100J-G5 |
| | | | 3 m | XW2Z-300J-G5 |
| ⑥ | Terminal block cable for external signals (for input common, forward/reverse run prohibited inputs, emergency stop input, origin proximity input and interrupt input) | Position control units (high-speed type) CJ1W-NC234 CJ1W-NC434 CJ1W-NC214 CJ1W-NC414 | 0.5 m | XW2Z-C50X |
| | | | 1 m | XW2Z-100X |
| | | | 2 m | XW2Z-200X |
| | | | 3 m | XW2Z-300X |
| | | | 5 m | XW2Z-500X |
| | | | 10 m | XW2Z-010X |
| ⑦ | Terminal block for external signals (M3 screw, pin terminals) | | – | XW2B-20G4 |
| | Terminal block for ext. signals (M3.5 screw, fork/round terminals) | | – | XW2B-20G5 |
| | Terminal block for ext. signals (M3 screw, fork/round terminals) | | – | XW2D-20G6 |
| ⑧ | Cable from servo relay unit to servo drive | CS1W-NC1□3, CJ1W-NC1□3, C200HW-NC113, CS1W-NC2□3/4□3, CJ1W-NC2□3/4□3, C200HW-NC213/413, CQM1H-PLB21 or CQM1-CPU43 | 1 m | XW2Z-100J-B25 |
| | | | 2 m | XW2Z-200J-B25 |
| | | CJ1M-CPU21/22/23 | 1 m | XW2Z-100J-B31 |
| | | | 2 m | XW2Z-200J-B31 |
| ⑨ | Servo relay unit | Position control units CS1W-NC1□3, CJ1W-NC1□3 or C200HW-NC113 | – | XW2B-20J6-1B (1 axis) |
| | | Position control units CS1W-NC2□3/4□3, CJ1W-NC2□3/4□3 or C200HW-NC213/413 | – | XW2B-40J6-2B (2 axes) |
| | | CQM1H-PLB21 or CQM1-CPU43 | – | XW2B-20J6-3B (1 axis) |
| | | CJ1M-CPU21/22/23 | – | XW2B-20J6-8A (1 axis) XW2B-40J6-9A (2 axes) |
| ⑩ | Position control unit connecting cable | CQM1H-PLB21 | 0.5 m | XW2Z-050J-A3 |
| | | | 1 m | XW2Z-100J-A3 |
| | | CS1W-NC113 or C200HW-NC113 | 0.5 m | XW2Z-050J-A6 |
| | | | 1 m | XW2Z-100J-A6 |
| | | CS1W-NC213/413 or C200HW-NC213/413 | 0.5 m | XW2Z-050J-A7 |
| | | | 1 m | XW2Z-100J-A7 |
| | | CS1W-NC133 | 0.5 m | XW2Z-050J-A10 |
| | | | 1 m | XW2Z-100J-A10 |
| | | CS1W-NC233/433 | 0.5 m | XW2Z-050J-A11 |
| | | | 1 m | XW2Z-100J-A11 |
| | | CJ1W-NC113 | 0.5 m | XW2Z-050J-A14 |
| | | | 1 m | XW2Z-100J-A14 |
| | | CJ1W-NC213/413 | 0.5 m | XW2Z-050J-A15 |
| | | | 1 m | XW2Z-100J-A15 |
| | | CJ1W-NC133 | 0.5 m | XW2Z-050J-A18 |
| | | | 1 m | XW2Z-100J-A18 |
| | | CJ1W-NC233/433 | 0.5 m | XW2Z-050J-A19 |
| | | | 1 m | XW2Z-100J-A19 |
| | | CJ1M-CPU21/22/23 | 0.5 m | XW2Z-050J-A33 |
| | | | 1 m | XW2Z-100J-A33 |
| ⑪ | General purpose cable | For general purpose controllers | 1 m | R88A-CPG001S |
| | | | 2 m | R88A-CPG002S |
| ⑫ | Terminal block cable | For general purpose controllers | 1 m | XW2Z-100J-B24 |
| | | | 2 m | XW2Z-200J-B24 |
| ⑬ | Terminal block (M3 screw and for pin terminals) | | – | XW2B-50G4 |
| | Terminal block (M3.5 screw and for fork/round terminals) | | – | XW2B-50G5 |
| | Terminal block (M3 screw and for fork/round terminals) | | – | XW2D-50G6 |

### External encoder cable (CN4)

| Symbol | Name | Length | Order code |
|---|---|---|---|
| ⑭ | External encoder cable | 5 m | R88A-CRKM005SR-E |
| | | 10 m | R88A-CRKM010SR-E |
| | | 20m | R88A-CRKM020SR-E |

### Analog monitor (CN5)

| Symbol | Name | Length | Order code |
|---|---|---|---|
| ⑮ | Analog monitor cable | 1 m | R88A-CMK001S |

### USB personal computer cable (CN7)

| Symbol | Name | Length | Order code |
|---|---|---|---|
| ⑯ | USB mini-connector cable | 2 m | AX-CUSBM002-E |

### External regenerative resistor

| Symbol | Specifications | Order code |
|---|---|---|
| ⑰ | 50 Ω, 80 W | R88A-RR08050S |
| | 100 Ω, 80 W | R88A-RR080100S |
| | 47 Ω, 220 W | R88A-RR22047S |
| | 20 Ω, 500 W | R88A-RR50020S |

### Cable for safety functions (CN8)

| Symbol | Description | Order code |
|---|---|---|
| ⑱ | Safety connector with 3 m cable (with loose wires at one end) | R88A-CSK003S-E |

### Filters

| Symbol | Applicable servodrive | Rated current | Leakage current | Rated voltage | Order code |
|---|---|---|---|---|---|
| ⑲ | R88D-KT01H, R88D-KT02H | 2.4 A | 3.5 mA | 250 VAC single-phase | R88A-FIK102-RE |
| | R88D-KT04H | 4.1 A | 3.5 mA | | R88A-FIK104-RE |
| | R88D-KT08H | 6.6 A | 3.5 mA | | R88A-FIK107-RE |
| | R88D-KT10H, R88D-KT15H | 14.2 A | 3.5 mA | | R88A-FIK114-RE |
| | R88D-KT06F, R88D-KT10F, R88D-KT15F | 4 A | 0.3 mA/32 mA*1 | 400 VAC three-phase | R88A-FIK304-RE |
| | R88D-KT20F | 6 A | 0.3 mA/32 mA*1 | | R88A-FIK306-RE |
| | R88D-KT30F, R88D-KT50F | 12.1 A | 0.3 mA/32 mA*1 | | R88A-FIK312-RE |
| | R88D-KT75F | 22 A | 0.3 mA/40 mA*1 | | R88A-FIK330-RE |
| | R88D-KT150F | 44 A | 2 mA/130 mA*1 | | R88A-FIK350-RE |

*1 Momentary peak leakage current for the filter at switch-on/off.

### Connectors

| Specifications | Model |
|---|---|
| I/O connector kit – 50 pins – (for CN1) | R88A-CNU11C |
| External encoder connector (for CN4) | R88A-CNK41L |
| Safety I/O signal connector (for CN8) | R88A-CNK81S |

### Computer software

| Specifications | Order code |
|---|---|
| CX-Drive version 2.10 or higher | CX-DRIVE 2.10 |
| CX-One software package including CX-Drive 2.10 or higher | CX-ONE |

## Specifications

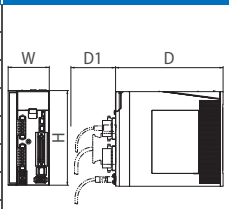
### Single-phase, 230 V

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Servo drive type | | | R88D-K_ | 01H_ | 02H_ | 04H_ | 08H_ | 10H_ | 15H_ |
| Applicable servo motor | | | R88M-K_ | 05030(H/T)-_ | 20030(H/T)-_ | 40030(H/T)-_ | 75030(H/T)-_ | 1K020(H/T)-_ | 1K030(H/T)-_ |
| | | | | 10030(H/T)-_ | – | – | – | – | 1K530(H/T)-_ |
| | | | | – | – | – | – | – | 1K520(H/T)-_ |
| | | | | – | – | – | – | – | 90010(H/T)-_ |
| Basic specifications | Max. applicable motor capacity | | W | 100 | 200 | 400 | 750 | 1,000 | 1,500 |
| | Continuous output current | | Arms | 1.2 | 1.6 | 2.6 | 4.1 | 5.9 | 9.4 |
| | Input power | Main circuit | | Single-phase/3-phase, 200 to 240 VAC + 10% to –15% (50/60 Hz) | | | | | |
| | Supply | Control circuit | | Single-phase, 200 to 240 VAC + 10% to –15% (50/60 Hz) | | | | | |
| | Control method | | | IGBT-driven PWM method, sinusoidal drive | | | | | |
| | Feedback | | | Serial encoder (incremental/absolute value) | | | | | |
| | Conditions: Usage/storage temperature | | | 0 to 55°C/–20 to 65°C | | | | | |
| | Conditions: Usage/storage humidity | | | 90% RH or less (non-condensing) | | | | | |
| | Conditions: Altitude | | | 1,000 m or less above sea level | | | | | |
| | Conditions: Vibration/shock resistance (max.) | | | 5.88 m/s$^2$ 10–60 Hz (Continuous operation at resonance point is not allowed)/19.6 m/s$^2$ | | | | | |
| | Configuration | | | Base mounted | | | | | |
| | Approx. weight | | kg | 0.8 | | 1.1 | 1.6 | 1.8 | |

### Three-phase, 400 V

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Servo drive type | | | R88D-K_ | 06F_ | 10F_ | 15F_ | 20F_ | 30F_ | 50F_ | 75F_ | 150F_ |
| Applicable servo motor | | | R88M-K_ | 40020(F/C)-_ | 75030(F/C)-_ | 1K030(F/C)-_ | 2K030(F/C)-_ | 3K030(F/C)-_ | 4K030(F/C)-_ | 6K010C-_ | 11K015C-_ |
| | | | | 60020(F/C)-_ | 1K020(F/C)-_ | 1K530(F/C)-_ | 2K020(F/C)-_ | 3K020(F/C)-_ | 5K030(F/C)-_ | 7K515C-_ | 15K015C-_ |
| | | | | – | – | 1K520(F/C)-_ | – | 2K010(F/C)-_ | 4K020(F/C)-_ | – | – |
| | | | | – | – | 90010(F/C)-_ | – | – | 5K020(F/C)-_ | – | – |
| | | | | – | – | – | – | – | 4K510C-_ | – | – |
| | | | | – | – | – | – | – | 3K010(F/C)-_ | – | – |
| Basic specifications | Max. applicable motor capacity | | W | 0.6 | 1.0 | 1.5 | 2.0 | 3.0 | 5.0 | 7.5 | 15.0 |
| | Continuous output current | | Arms | 2.9 | | 4.7 | 6.7 | 9.4 | 16.5 | 22.0 | 33.4 |
| | Input power | Main circuit | | 3-phase, 380 to 480 VAC + 10% to –15% (50/60Hz) | | | | | | | |
| | Supply | Control circuit | | 24 VDC±15% | | | | | | | |
| | Control method | | | IGBT-driven PWM method, sinusoidal drive | | | | | | | |
| | Feedback | | | Serial encoder (incremental/absolute value) | | | | | | Absolute encoder | |
| | Conditions: Usage/storage temperature | | | 0 to 55°C/–20 to 65°C | | | | | | | |
| | Conditions: Usage/storage humidity | | | 90% RH or less (non-condensing) | | | | | | | |
| | Conditions: Altitude | | | 1,000 m or less above sea level | | | | | | | |
| | Conditions: Vibration/shock resistance | | | 5.88 m/s$^2$ 10–60 Hz (Continuous operation at resonance point is not allowed)/19.6 m/s$^2$ | | | | | | | |
| | Configuration | | | Base mounted | | | | | | | |
| | Approx. weight | | kg | 1.9 | | | 2.7 | 4.7 | | 13.5 | 21.0 |

## Dimensions

| Drive model | Specification | | EtherCAT model | | | | ML2 model | | | | Analog/pulse model | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | H | W | D | D1 | H | W | D | D1 | H | W | D | D1 | |
| R88D-KT01/02H, R88D-KN01/02H-_ | 230 V | 100–200 W | 150 | 40 | 132 | 70 | 150 | 40 | 132 | 70 | 150 | 40 | 130 | 70 |   |
| R88D-KT04H, R88D-KN04H-_ | | 400 W | 150 | 55 | 132 | 70 | 150 | 55 | 132 | 70 | 150 | 55 | 130 | 70 | |
| R88D-KT08H, R88D-KN08H-_ | | 750 W | 150 | 65 | 172 | 70 | 150 | 65 | 172 | 70 | 150 | 65 | 170 | 70 | |
| R88D-KT10/15H, R88D-KN10/15H-_ | | 1–1.5 kW | 150 | 86 | 172 | 70 | 150 | 86 | 172 | 70 | 150 | 85 | 170 | 70 | |
| R88D-KT06/10/15F, R88D-KN06/10/15F-_ | 400 V | 600 W–1.5 kW | 150 | 92 | 172 | 70 | 150 | 92 | 172 | 70 | 150 | 91 | 170 | 70 | |
| R88D-KT20F, R88D-KN20F-_ | | 2 kW | 198 | 94 | 195 | 70 | 198 | 94 | 195 | 70 | 198 | 94 | 193.5 | 70 | |
| R88D-KT30/50F, R88D-KN30/50F-_ | | 3-5 kW | 250 | 130 | 214 | 70 | 250 | 130 | 214 | 70 | 250 | 130 | 212 | 70 | |
| R88D-KT75F, R88D-KN75H-ECT | | 7.5 kW | 250 | 233 | 334 | 70 | – | – | – | – | 250 | 233 | 334 | 70 | |
| R88D-KT150F,R88D-KN150H-ECT | | 15 kW | 450 | 261 | 271 | 70 | – | – | – | – | 450 | 261 | 270 | 70 | |

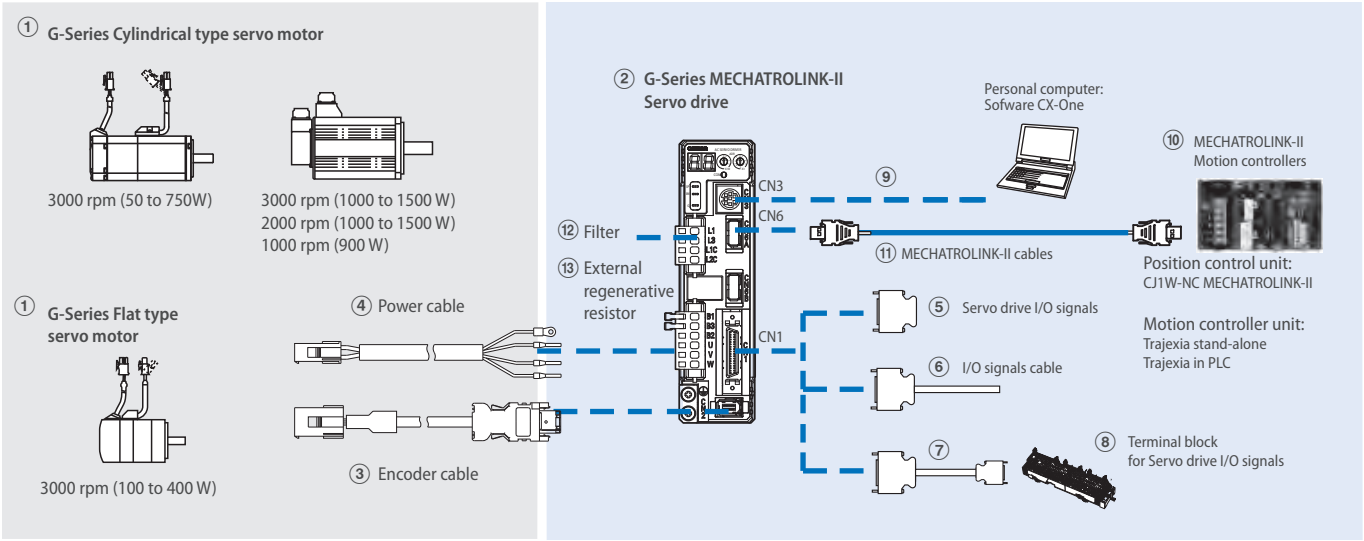
## Compact in size, big in features. Save space, save wiring, save time

The G-series servo drive with built-in MECHATROLINK-II significantly reduces wiring and set-up time, while saving up to 30% of cabinet space. So you not only save on space, wiring and installation time, but also significantly reduce the chance of connection errors.

- High response frequency of 1 kHZ
- Auto-tuning for easy and quick start-up
- Vibration suppression and adaptive resonance suppression filter
- Positioning, speed and torque control modes
- Fast and accurate positioning
- Separated supply for main power and control power
- Incremental and absolute encoder available

## Ordering information

### G-Series MECHATROLINK-II model reference configuration




**Note:** The symbols ①②③④⑤ ... show the recommended sequence to select the components in a G-Series servo system

### Servo motors, power & encoder cables

**Note:** ①③④ Refer to the G-Series servo motor section for servomotor, motor cables or connectors selection

### Servo drives

| Symbol | Specifications | | ① Compatible rotary servo motors | | Servo drive model |
|---|---|---|---|---|---|
| | | | Cylindrical type | Flat type | Order code |
| ② | 1 phase 200 VAC | 100 W | R88M-G05030_ | R88M-GP10030_ | R88D-GN01H-ML2 |
| | | | R88M-G10030_ | | |
| | | 200 W | R88M-G20030_ | R88M-GP20030_ | R88D-GN02H-ML2 |
| | | 400 W | R88M-G40030_ | R88M-GP40030_ | R88D-GN04H-ML2 |
| | | 750 W | R88M-G75030_ | – | R88D-GN08H-ML2 |
| | | 1.0 kW | R88M-G1K020T_ | – | R88D-GN10H-ML2 |
| | | 1.5 kW | R88M-G90010T_ | – | R88D-GN15H-ML2 |
| | | | R88M-G1K030T_ | – | |
| | | | R88M-G1K520T_ | – | |
| | | | R88M-G1K530T_ | – | |

### Control cables (for CN1)

| Symbol | Name | Connect to | Length | Order code |
|---|---|---|---|---|
| ⑤ | I/O connector kit | Servo drive I/O signals | - | R88A-CNU01C |
| ⑥ | General purpose cable | | 1 m | R88A-CPGB001S-E |
| | | | 2 m | R88A-CPGB002S-E |
| ⑦ | Terminal block cable | | 1 m | XW2Z-100J-B33 |
| | | | 2 m | XW2Z-200J-B33 |
| ⑧ | Terminal block | | – | XW2B-20G4 |
| | | | | XW2B-20G5 |
| | | | | XW2D-20G6 |

### Computer cable (for CN3)

| Symbol | Name | Length | Order code |
|---|---|---|---|
| ⑨ | Computer cable RS232 | 2 m | R88A-CCG002P2 |

### MECHATROLINK-II Motion controllers

| Symbol | Name | Axes | Order code |
|---|---|---|---|
| ⑩ | Trajexia stand-alone motion controller | 4 | TJ1-MC04 |
| | | 16 | TJ1-MC16 |
| | | 64 | TJ2-MC64 |
| | Trajexia-PLC motion controller, | 4 | CJ1W-MC472 |
| | | 30 | CJ1W-MCH72 |
| | Position controller unit for CJ1 PLC | 2 | CJ1W-NC271 |
| | | 4 | CJ1W-NC471 |
| | | 16 | CJ1W-NCF71 |
| | Position controller unit for CS1 PLC | 2 | CS1W-NC271 |
| | | 4 | CS1W-NC471 |
| | | 16 | CS1W-NCF71 |

### MECHATROLINK-II cables (for CN6)

| Symbol | Specifications | Length | Order code |
|---|---|---|---|
| ⑪ | MECHATROLINK-II Terminator resistor | - | JEPMC-W6022-E |
| | MECHATROLINK-II cables | 0.5 m | JEPMC-W6003-A5-E |
| | | 1 m | JEPMC-W6003-01-E |
| | | 3 m | JEPMC-W6003-03-E |
| | | 5 m | JEPMC-W6003-05-E |
| | | 10 m | JEPMC-W6003-10-E |
| | | 20 m | JEPMC-W6003-20-E |
| | | 30 m | JEPMC-W6003-30-E |

### Filters

| Symbol | Applicable servodrive | Rated current | Leakage current | Rated voltage | Order code |
|---|---|---|---|---|---|
| ⑫ | R88D-GN01H_<br>R88D-GN02H_ | 2.4 A | 3.5 mA | 250 VAC single-phase | R88A-FIK102-RE |
| | R88D-GN04H_ | 4.1 A | 3.5 mA | | R88A-FIK104-RE |
| | R88D-GN08H_ | 6.6 A | 3.5 mA | | R88A-FIK107-RE |
| | R88D-GN10H_<br>R88D-GN15H_ | 14.2 A | 3.5 mA | | R88A-FIK114-RE |

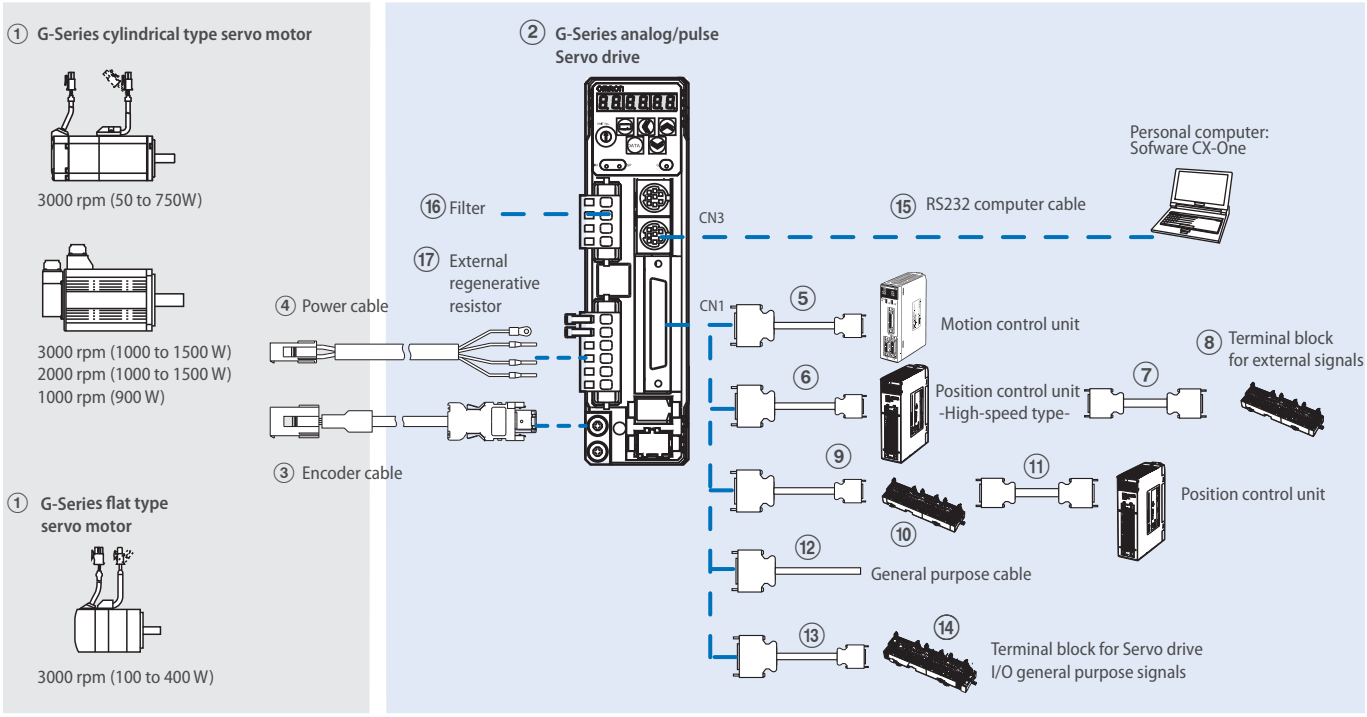
### External regenerative resistor

| Symbol | Specifications | Order code |
|---|---|---|
| ⑬ | 50 Ω, 80 W | R88A-RR08050S |
| | 100 Ω, 80 W | R88A-RR080100S |
| | 47 Ω, 220 W | R88A-RR22047S |
| | 20 Ω, 500 W | R88A-RR50020S |

### Computer software

| Specifications | Order code |
|---|---|
| Configuration and monitoring software tool for servo drives and inverters. (CX-Drive version 1.70 or higher) | CX-Drive |
| Complete Omron software package including CX-Drive. (CX-One version 3.10 or higher) | CX-One |

### G-Series analog/pulse model reference configuration




**Note:** The symbols ①②③④⑤... show the recommended sequence to select the components in a G-Series servo system

### Servo motors, power & encoder cables

**Note:** ①③④ Refer to the G-Series servo motor section for servomotor, motor cables or connectors selection

### Servo drives

| Symbol | Specifications | | ① Compatible rotary servo motors | | Servo drive model |
|---|---|---|---|---|---|
| | | | Cylindrical type | Flat type | Order code |
| ② | 1 phase 200 VAC | 100 W | R88M-G05030_ | R88M-GP10030_ | R88D-GT01H |
| | | | R88M-G10030_ | | |
| | | 200 W | R88M-G20030_ | R88M-GP20030_ | R88D-GT02H |
| | | 400 W | R88M-G40030_ | R88M-GP40030_ | R88D-GT04H |
| | | 750 W | R88M-G75030_ | – | R88D-GT08H |
| | | 1.0 kW | R88M-G1K020T_ | – | R88D-GT10H |
| | | 1.5 kW | R88M-G90010T_ | – | R88D-GT15H |
| | | | R88M-G1K030T_ | – | |
| | | | R88M-G1K520T_ | – | |
| | | | R88M-G1K530T_ | – | |

**Control cables (for CN1)**

| Symbol | Description | Connect to | Length | Order code |
|---|---|---|---|---|
| ⑤ | Control cable (1 axis) | Motion control units CS1W-MC221 CS1W-MC421 | 1 m | R88A-CPG001M1 |
| | | | 2 m | R88A-CPG002M1 |
| | | | 3 m | R88A-CPG003M1 |
| | | | 5 m | R88A-CPG005M1 |
| | Control cable (2 axis) | Motion control units CS1W-MC221 CS1W-MC421 | 1 m | R88A-CPG001M2 |
| | | | 2 m | R88A-CPG002M2 |
| | | | 3 m | R88A-CPG003M2 |
| | | | 5 m | R88A-CPG005M2 |
| ⑥ | Control cable (line-driver output for 1 axis) | Position control units (high-speed type) CJ1W-NC234 CJ1W-NC434 | 1 m | XW2Z-100J-G9 |
| | | | 5 m | XW2Z-500J-G9 |
| | | | 10 m | XW2Z-10MJ-G9 |
| | Control cable (open-collector output for 1 axis) | Position control units (high-speed type) CJ1W-NC214 CJ1W-NC414 | 1 m | XW2Z-100J-G13 |
| | | | 3 m | XW2Z-300J-G13 |
| | Control cable (line-driver output for 2 axis) | Position control units (high-speed type) CJ1W-NC234 CJ1W-NC434 | 1 m | XW2Z-100J-G1 |
| | | | 5 m | XW2Z-500J-G1 |
| | | | 10 m | XW2Z-10MJ-G1 |
| | Control cable (open-collector output for 2 axis) | Position control units (high-speed type) CJ1W-NC214 CJ1W-NC414 | 1 m | XW2Z-100J-G5 |
| | | | 3 m | XW2Z-300J-G5 |
| ⑦ | Terminal block cable for external signals (for input common, forward/reverse run prohibited inputs, emergency stop input, origin proximity input and interrupt input) | Position control units (high-speed type) CJ1W-NC234 CJ1W-NC434 CJ1W-NC214 CJ1W-NC414 | 0.5 m | XW2Z-C50X |
| | | | 1 m | XW2Z-100X |
| | | | 2 m | XW2Z-200X |
| | | | 3 m | XW2Z-300X |
| | | | 5 m | XW2Z-500X |
| | | | 10 m | XW2Z-010X |
| ⑧ | Terminal block for external signals (M3 screw, pin terminals) | | – | XW2B-20G4 |
| | Terminal block for ext. signals (M3.5 screw, fork/round terminals) | | – | XW2B-20G5 |
| | Terminal block for ext. signals (M3 screw, fork/round terminals) | | – | XW2D-20G6 |
| ⑨ | Cable from servo relay unit to servo drive | CS1W-NC1□3, CJ1W-NC1□3, C200HW-NC113, CS1W-NC2□3/4□3, CJ1W-NC2□3/4□3, C200HW-NC213/413, CQM1H-PLB21 or CQM1-CPU43 | 1 m | XW2Z-100J-B25 |
| | | | 2 m | XW2Z-200J-B25 |
| | | CJ1M-CPU21/22/23 | 1 m | XW2Z-100J-B31 |
| | | | 2 m | XW2Z-200J-B31 |
| ⑩ | Servo relay unit | Position control units CS1W-NC1□3, CJ1W-NC1□3 or C200HW-NC113 | – | XW2B-20J6-1B (1 axis) |
| | | Position control units CS1W-NC2□3/4□3, CJ1W-NC2□3/4□3 or C200HW-NC213/413 | – | XW2B-40J6-2B (2 axes) |
| | | CQM1H-PLB21 or CQM1-CPU43 | – | XW2B-20J6-3B (1 axis) |
| | | CJ1M-CPU21/22/23 | – | XW2B-20J6-8A (1 axis) XW2B-40J6-9A (2 axes) |
| ⑪ | Position control unit connecting cable | CQM1H-PLB21 or CQM1-CPU43 | 0.5 m | XW2Z-050J-A3 |
| | | | 1 m | XW2Z-100J-A3 |
| | | CS1W-NC113 or C200HW-NC113 | 0.5 m | XW2Z-050J-A6 |
| | | | 1 m | XW2Z-100J-A6 |
| | | CS1W-NC213/413 or C200HW-NC213/413 | 0.5 m | XW2Z-050J-A7 |
| | | | 1 m | XW2Z-100J-A7 |
| | | CS1W-NC133 | 0.5 m | XW2Z-050J-A10 |
| | | | 1 m | XW2Z-100J-A10 |
| | | CS1W-NC233/433 | 0.5 m | XW2Z-050J-A11 |
| | | | 1 m | XW2Z-100J-A11 |
| | | CJ1W-NC113 | 0.5 m | XW2Z-050J-A14 |
| | | | 1 m | XW2Z-100J-A14 |
| | | CJ1W-NC213/413 | 0.5 m | XW2Z-050J-A15 |
| | | | 1 m | XW2Z-100J-A15 |
| | | CJ1W-NC133 | 0.5 m | XW2Z-050J-A18 |
| | | | 1 m | XW2Z-100J-A18 |
| | | CJ1W-NC233/433 | 0.5 m | XW2Z-050J-A19 |
| | | | 1 m | XW2Z-100J-A19 |
| | | CJ1M-CPU21/22/23 | 0.5 m | XW2Z-050J-A33 |
| | | | 1 m | XW2Z-100J-A33 |
| ⑫ | General purpose cable | For general purpose controllers | 1 m | R88A-CPG001S |
| | | | 2 m | R88A-CPG002S |
| ⑬ | Terminal block cable | For general purpose controllers | 1 m | XW2Z-100J-B24 |
| | | | 2 m | XW2Z-200J-B24 |
| ⑭ | Terminal block (M3 screw and for pin terminals) | | – | XW2B-50G4 |
| | Terminal block (M3.5 screw and for fork/round terminals) | | – | XW2B-50G5 |
| | Terminal block (M3 screw and for fork/round terminals) | | – | XW2D-50G6 |

### Computer cable (for CN3)

| Symbol | Name | Length | Order code |
|---|---|---|---|
| ⑮ | Computer cable RS232 | 2 m | R88A-CCG002P2 |

### Filters

| Symbol | Applicable servodrive | Rated current | Leakage current | Rated voltage | Order code |
|---|---|---|---|---|---|
| ⑯ | R88D-GT1H_<br>R88D-GT02H_ | 2.4 A | 3.5 mA | 250 VAC single-phase | R88A-FIK102-RE |
| | R88D-GT04H_ | 4.1 A | 3.5 mA | | R88A-FIK104-RE |
| | R88D-GT08H_ | 6.6 A | 3.5 mA | | R88A-FIK107-RE |
| | R88D-GT10H_<br>R88D-GT15H_ | 14.2 A | 3.5 mA | | R88A-FIK114-RE |

### External regenerative resistor

| Symbol | Specifications | Order code |
|---|---|---|
| ⑰ | 50 Ω, 80 W | R88A-RR08050S |
| | 100 Ω, 80 W | R88A-RR080100S |
| | 47 Ω, 220 W | R88A-RR22047S |
| | 20 Ω, 500 W | R88A-RR50020S |

### Connectors

| Specifications | Order code |
|---|---|
| I/O connector kit, 50 pins (for CN1) | R88A-CNU11C |

### Computer software

| Specifications | Order code |
|---|---|
| Configuration and monitoring software tool for servo drives and inverters. (CX-Drive version 1.70 or higher) | CX-Drive |
| Complete Omron software package including CX-Drive. (CX-One version 3.10 or higher) | CX-One |

## Specifications

### General specifications

| Servo drive type R88D-G_ | | | 01H_ | 02H_ | 04H_ | 08H_ | 10H_ | 15H_ |
|---|---|---|---|---|---|---|---|---|
| Applicable servomotor | | R88M-G_ | 05030_/10030_ | 20030_ | 40030_ | 75030_ | G1K020T_ | 90010T_ /1K030T_ / 1K5_0T_ |
| | | R88M-GP_ | 10030_ | 20030_ | 40030_ | – | – | – |
| Basic specifications | Max. applicable motor capacity W | | 100 | 200 | 400 | 750 | 1,000 | 1,500 |
| | Continuous output current Arms | | 1.16 | 1.6 | 2.7 | 4.0 | 5.9 | 9.8 |
| | Max. output current Arms | | 3.5 | 5.3 | 7.1 | 14.1 | 21.2 | 28.3 |
| | Input power | Main circuit | For single-phase, 200 to 240 VAC + 10% to –15% (50/60 Hz) | | | For single-phase/three-phase, 200 to 240 VAC + 10% to –15% (50/60 Hz) | | |
| | Supply | Control circuit | For single-phase, 200 to 240 VAC + 10% to –15% (50/60 Hz) | | | | | |
| | Control method | | IGBT-driven PWM method | | | | | |
| | Feedback | | Serial encoder (incremental/absolute) | | | | | |
| | Conditions: Usage/storage temperature | | 0 to 55°C/–20 to 65°C | | | | | |
| | Conditions: Usage/storage humidity | | 90% RH or less (non-condensing) | | | | | |
| | Conditions: Altitude | | 1,000m or less above sea level | | | | | |
| | Conditions: Vibration/shock resistance | | 5.88 $m/s^2$/19.6 $m/s^2$ | | | | | |
| | Configuration | | Base mounted | | | | | |
| | Approx. weight Kg | | 0.8 | | 1.1 | 1.5 | 1.7 | |

### MECHATROLINK-II servo drive specifications

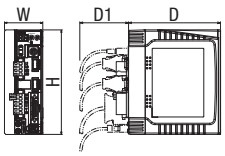
| | | | | |
|---|---|---|---|---|
| Position/Speed/torque control mode | Performance | Speed variance | Load variance | During 0% to 100% load ±0.01 max. (at rated speed) |
| | | | Voltage variance | 0% at ±10% of rated voltage (at rated speed) |
| | | | Temperature variance | 0 to 50°C ±0.1% max. (at rated speed) |
| | | Frequency characteristics | | 1 kHz |
| | | Torque control accuracy (reproducibility) | | ±3% (at 20% to 100% of rated torque) |
| | | Soft start time setting | | 0 to 10 s (acceleration time and deceleration time can be set) |
| | Command input | MECHATROLINK communication | | MECHATROLINK-II commands<br>(for sequence, motion, data setting/reference, monitor, adjustament and other commands) |
| I/O signal | Sequence input signal | | | Emergency stop, 3 external latch signals, forward/reverse torque limit, forward/reverse run prohibit, origin proximity, 3 general-purpose inputs |
| | Sequence output signal | | | It is possible to output three types of signals: positioning completed, speed coincidence, rotation speed detection, servo ready, current limit, speed limit, brake release and warning signal |

| | | | | |
|---|---|---|---|---|
| Integrated functions | Communications | RS-232 communications | Interface | Personal computer |
| | | | Transmission rate | From 2,400 to 57,600 bps |
| | | | Functions | Parameter setting, status display, alarm display (monitor, clear, history), servo drive data tracing function, test run/autotuning operations, real time trace, absolute encoder setting, default values function |
| | | MECHATROLINK communications | Communications protocol | MECHATROLINK-II |
| | | | Transmission rate | 10 Mbps |
| | | | Data length | 32 bytes |
| | | | Functions | Parameter setting, status display, alarm display (monitor, clear, history), default values function |
| | Tuning | | | Horizontal and vertical axis mode. One parameter rigidity setting. Load inertia detection. |
| | Dynamic brake (DB) | | | Operates when main power OFF, servo alarm, overtravel or servo OFF |
| | Regenerative processing | | | Built-in regeneration resistor in models from 750 W to 1.5 kW. External regeneration resistor optionally. |
| | Overtravel (OT) prevention function | | | Dynamic brake, disables torque or emergency stop torque during POT and NOT operation |
| | Emergency stop (STOP) | | | Emergency stop input |
| | Encoder divider function | | | Optional division pulses possible |
| | Electronic gearing | | | 0,01<Numerator/Denominator<100 |
| | Internal speed setting function | | | 8 internal speeds |
| | Protective functions | | | Overvoltage, undervoltage, overcurrent, overload, regeneration overload, servo drive overheat |
| | Analog monitor ouput | | | The actual servomotor speed, command speed, torque and number of accumulated pulses can be measured using an oscilloscope or other device. |
| | Panel operator | | Display functions | A 2-digit 7-segment LED display shows the servo drive status, alarm codes, parameters, etc. |
| | | | | MECHATROLINK-II communications status LED indicator (COM) |
| | | | Switches | Rotary switch for setting the MECHATROLINK-II node address |

## Analog/pulse servo drive specifications

| | | | | |
|---|---|---|---|---|
| Control mode | | | | Position, speed and torque control mode |
| Performance | Speed variance | | Load variance | During 0% to 100% load ±0.01 max. (at rated speed) |
| | | | Voltage variance | 0% at ±10% of rated voltage (at rated speed) |
| | | | Temperature dependence | 0 to 50°C ±0.1% max. (at rated speed) |
| | Frequency characteristics | | | 1 kHz |
| | Torque control accuracy (reproducibility) | | | ±3% (at 20% to 100% of rated torque) |
| | Soft start time setting | | | 0 to 10 s (acceleration time and deceleration time can be set) |
| Position control | Input signal | Command pulse | Input pulse type | Signal + pulse, 90° phase displacement 2-phase pulse (phase A/B) or reverse and forward pulses (CW/CCW) |
| | | | Input pulse frequency | 500 kpps max. line-driver input, 200 kpps max. open-collector input |
| | | | Electronic gearing | 0,01<Numerator/Denominator<100 |
| Speed/torque control | Input signal | Speed control | Speed reference voltage | 10 VDC at 3,000 r/min: set at delivery (the scale can be set by parameters) |
| | | | Torque limit | 3 VDC at rated torque (torque can be limited separately in positive/negative direction) |
| | | | Preset speed control | Preset speed is selectable from 8 internal settings by digital inputs. |
| | | Torque control | Torque reference voltage | 3 VDC at rated torque: set at delivery (the scale and polarity can be set by parameters). |
| | | | Speed limit | Speed limit can be set by parameter. |
| I/O signal | Sequence input signal | | | Forward/reverse run prohibit, deviation counter reset, alarm reset, control mode switch, pulse prohibited, speed selection, gain switch, zero speed designation, origin proximity |
| | Sequence output signal | | | Brake release, servo ready and alarm output. It is possible also to output two types of configurable signals: current limit, rotation speed detection, warning signal, speed coincidence, positioning completed |
| Integrated functions | Communications | RS-232 communications | Interface | Personal computer |
| | | | Transmission rate | From 2,400 to 57,600 bps |
| | | | Functions | Parameter setting, status display, alarm display (monitor, clear, history), servo drive data tracing function, test run/autotuning operations, real time trace, absolute encoder setting, default values function |
| | | RS-485 communications data | Interface | Communication data interface between servo drives.and personal computer. |
| | | | Transmission rate | From 2,400 to 57,600 bps |
| | | | Functions | Parameter setting, status display, alarm display (monitor, clear, history), servo drive data tracing function, test run/autotuning operations, real time trace, absolute encoder setting, default values function |
| | Tuning | | | Horizontal and vertical axis mode. One parameter rigidity setting. Load inertia detection. |
| | Dynamic brake (DB) | | | Operates when main power OFF, servo alarm, overtravel or servo OFF |
| | Regenerative processing | | | Built-in regeneration resistor in models from 750 W to 1.5 kW. External regeneration resistor optionally. |
| | Overtravel (OT) prevention function | | | Dynamic brake, disables torque or emergency stop torque during POT and NOT operation |
| | Emergency stop (STOP) | | | Emergency stop input |
| | Encoder divider function | | | Optional division pulses possible |
| | Protective functions | | | Overvoltage, undervoltage, overcurrent, overload, regeneration overload, servo drive overheat |
| | Analog monitor Ouput | | | The actual servomotor speed, command speed, torque and number of accumulated pulses can be measured using an oscilloscope or other device. |
| | Panel operator | | Display functions | A 6-digit 7-segment LED display shows the servo drive status, alarm codes, parameters, etc. |
| | | | Switches | Unit No. switch for serial communications. Value from 0 to F. To identify which servo drive the computer is accesing in RS232 communications when multiple servo drives. |

## Dimensions

| Drive model | Specification | | ML2 models | | | | Analog/pulse models | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | H | W | D | D1 | H | W | D | D1 | |
| R88D-GN01/02H-ML2, R88D-GT01/02H | 200 V | 100 to 200 W | 150 mm | 40 mm | 132 mm | 70 mm | 150 mm | 40 mm | 130 mm | 70 mm |   |
| R88D-GN04H-ML2, R88D-GT04H | | 400 W | 150 mm | 55 mm | 132 mm | 70 mm | 150 mm | 55 mm | 130 mm | 70 mm | |
| R88D-GN08H-ML2, R88D-GT08H | | 750 W | 150 mm | 65 mm | 172 mm | 70 mm | 150 mm | 65 mm | 170 mm | 70 mm | |
| R88D-GN10/15H-ML2, R88D-GT10/15H | | 1 kW to 1.5 kW | 150 mm | 85 mm | 172 mm | 70 mm | 150 mm | 85 mm | 170 mm | 70 mm | |

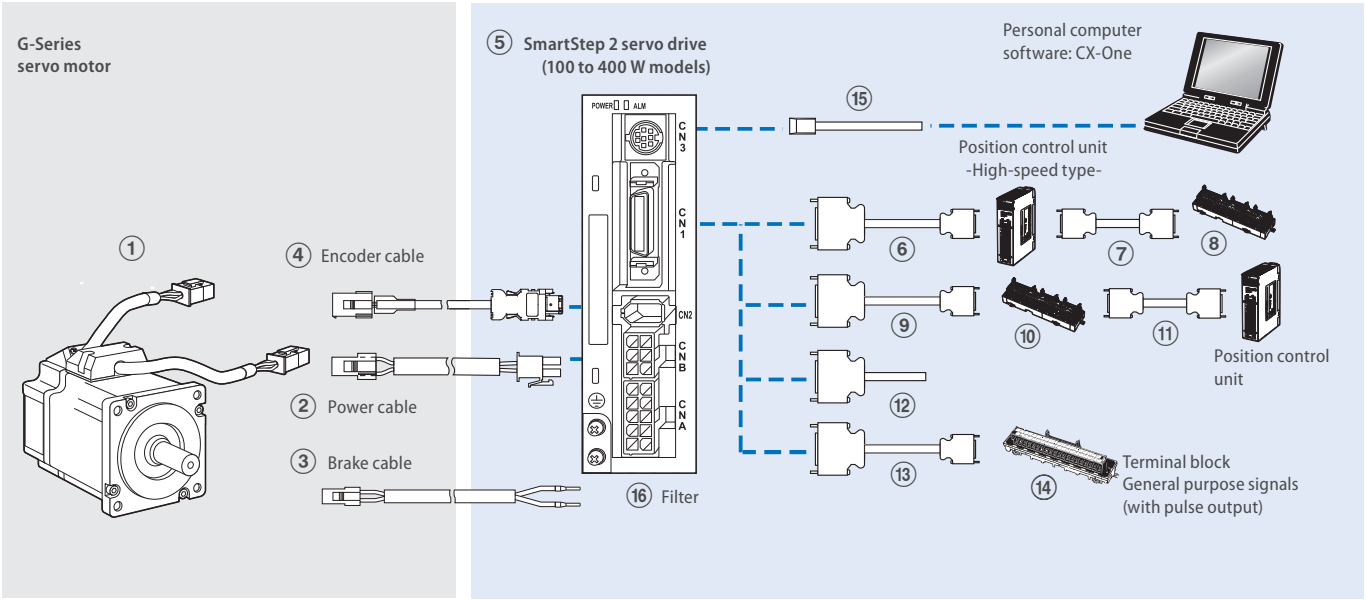
## Another step forward in drive simplicity

The new SmartStep offers an ideal solution for point-to-point motion applications where simplicity is essential. SmartStep 2 keeps things simple whilst combining high performance and advanced features in a cost effective solution.

- On-line Auto-tuning and Easy set up
- Ultra-compact size. The footprint is only 48% compared to the previous SmartStep
- Two torque limits
- Electronic gear, four internal speed settings and wide range of pulse settings
- Adaptive resonance suppression filter
- Position control via pulse input 500 kpps
- Configuration and commissioning using CX Drive-software

## Ordering information

### SmartStep2 servo drive configuration (100-400 W)




**Note:** The symbols ①②③④⑤ ... show the recommended sequence to select the components in a SmartStep 2 servo system

### Servo motor

**Note:** ①②③④ refer to G-Series motor section for detailed motor specifications and selection.

### Servo drives

| Symbol | Specifications | | ① Compatible servo motors | | SmartStep 2 drive model |
|---|---|---|---|---|---|
| | | | Cylindrical type | Flat type | Order code |
| ⑤ | 200 VAC | 100 W | R88M-G05030H-_ | – | R7D-BP01H |
| | | | R88M-G10030H-_ | R88M-GP10030H-_ | |
| | | 200 W | R88M-G20030H-_ | R88M-GP20030H-_ | R7D-BP02HH |
| | | 400 W | R88M-G40030H-_ | R88M-GP40030H-_ | R7D-BP04H |

### Power supply cables (for CNA)

| Symbol | Specifications | Appearance | Order code |
|---|---|---|---|
| ⑤ | Power supply input cable for single-phase power (connectors attached) | | R7A-CLB002S2 |

### Control cables (for CN1)

| Symbol | Description | Connect to | Length | Order code |
|---|---|---|---|---|
| ⑥ | Control cable<br>(line-driver output for 1 axis) | Position control unit (high-speed type)<br>CJ1W-NC234<br>CJ1W-NC434 | 1 m | XW2Z-100J-G12 |
| | | | 5 m | XW2Z-500J-G12 |
| | | | 10 m | XW2Z-10MJ-G12 |
| | Control cable<br>(open-collector output for 1 axis) | Position control unit (high-speed type)<br>CJ1W-NC214<br>CJ1W-NC414 | 1 m | XW2Z-100J-G16 |
| | | | 3 m | XW2Z-300J-G16 |
| | Control cable<br>(line-driver output for 2 axis) | Position control unit (high-speed type)<br>CJ1W-NC234<br>CJ1W-NC434 | 1 m | XW2Z-100J-G4 |
| | | | 5 m | XW2Z-500J-G4 |
| | | | 10 m | XW2Z-10MJ-G4 |
| | Control cable<br>(open-collector output for 2 axis) | Position control unit (high-speed type)<br>CJ1W-NC214<br>CJ1W-NC414 | 1 m | XW2Z-100J-G8 |
| | | | 3 m | XW2Z-300J-G8 |

| Symbol | Description | Connect to | Length | Order code |
|---|---|---|---|---|
| ⑦ | Terminal block cable for external signals (for input common, forward/reverse run prohibited inputs, emergency stop input, origin proximity input and interrupt input) | Position control units (high-speed type) CJ1W-NC234 CJ1W-NC434 CJ1W-NC214 CJ1W-NC414 | 0.5 m | XW2Z-C50X |
| | | | 1 m | XW2Z-100X |
| | | | 2 m | XW2Z-200X |
| | | | 3 m | XW2Z-300X |
| | | | 5 m | XW2Z-500X |
| | | | 10 m | XW2Z-010X |
| ⑧ | Terminal block for external signals ( with M3 screw and for pin terminals) | | – | XW2B-20G4 |
| | Terminal block ext. signals ( with M3.5 screw and for fork/round terminals) | | – | XW2B-20G5 |
| | Terminal block ext. signals ( with M3 screw and fork/round pin terminals) | | – | XW2D-20G6 |
| ⑨ | Cable from servo relay unit to servo drive | CS1W-NC1_3, CJ1W-NC1_3, C200HW-NC113, CS1W-NC2_3/4_3, CJ1W-NC2_3/4_3, C200HW-NC213/413, CQM1H-PLB21 or CQM1-CPU43-V1 | 1 m | XW2Z-100J-B29 |
| | | | 2 m | XW2Z-200J-B29 |
| | | CJ1M-CPU21/22/23 | 1 m | XW2Z-100J-B32 |
| | | | 2 m | XW2Z-200J-B32 |
| ⑩ | Servo relay unit | CS1W-NC1_3, CJ1W-NC1_3 or C200HW-NC113 position control unit | – | XW2B-20J6-1B (1 axis) |
| | | CS1W-NC2_3/4_3, CJ1W-NC2_3/4_3 or C200HW-NC213/413 position control unit | – | XW2B-40J6-2B (2 axes) |
| | | CQM1H-PLB21 or CQM1-CPU43-V1 | – | XW2B-20J6-3B (1 axis) |
| | | CJ1M-CPU21/22/23 | – | XW2B-20J6-8A (1 axis) |
| | | | | XW2B-40J6-9A (2 axes) |
| ⑪ | Position control unit connecting cable | CJ1W-NC133 | 0.5 m | XW2Z-050J-A18 |
| | | | 1 m | XW2Z-100J-A18 |
| | | CJ1W-NC233/433 | 0.5 m | XW2Z-050J-A19 |
| | | | 1 m | XW2Z-100J-A19 |
| | | CS1W-NC133 | 0.5 m | XW2Z-050J-A10 |
| | | | 1 m | XW2Z-100J-A10 |
| | | CS1W-NC233/433 | 0.5 m | XW2Z-050J-A11 |
| | | | 1 m | XW2Z-100J-A11 |
| | | CJ1W-NC113 | 0.5 m | XW2Z-050J-A14 |
| | | | 1 m | XW2Z-100J-A14 |
| | | CJ1W-NC213/413 | 0.5 m | XW2Z-050J-A15 |
| | | | 1 m | XW2Z-100J-A15 |
| | | CS1W-NC113 C200HW-NC113 | 0.5 m | XW2Z-050J-A6 |
| | | | 1 m | XW2Z-100J-A6 |
| | | CS1W-NC213/413 C200HW-NC213/413 | 0.5 m | XW2Z-050J-A7 |
| | | | 1 m | XW2Z-100J-A7 |
| | | CJ1M-CPU21/22/23 | 0.5 m | XW2Z-050J-A33 |
| | | | 1 m | XW2Z-100J-A33 |
| | | CQM1H-PLB21 CQM1-CPU43-V1 | 0.5 m | XW2Z-050J-A3 |
| | | | 1 m | XW2Z-100J-A3 |
| ⑫ | General purpose cable | For general purpose controllers | 1 m | R7A-CPB001S |
| | | | 2 m | R7A-CPB002S |
| ⑬ | Terminal block cable | For general purpose controllers | 1 m | XW2Z-100J-B28 |
| | | | 2 m | XW2Z-200J-B28 |
| ⑭ | Terminal block ( with M3 screw and for pin terminals) | | - | XW2B-34G4 |
| | Terminal block ( with M3.5 screw and for fork/round terminals) | | - | XW2B-34G5 |
| | Terminal block ( with M3 screw and fork/round pin terminals) | | - | XW2D-34G6 |

### Cable for CN3

| Symbol | Name | Length | Order code |
|---|---|---|---|
| ⑮ | Personal Computer Monitor Cable | 2 m | R88A-CCG002P2 |

### Filters

| Symbol | Applicable servo drive | Rated current | Rated voltage | Order code |
|---|---|---|---|---|
| ⑯ | R7D-BP01H/ 02HH/ 04H | 4 A | 1 pH, 230 V | R7A-FIB104-RE |

### Connectors

| Specifications | Order code |
|---|---|
| Main Circuit Connector (CNA) | R7A-CNB01P |
| Servomotor Connector (CNB) | R7A-CNB01A |
| Control I/O Connector (CN1) | R88A-CNW01C |
| Encoder Input Connector (CN2) | R88A-CNW01R |
| Servomotor Connector for Encoder Cable | R88A-CNG02R |
| Servomotor Connector for Servomotor Power Cable | R88A-CNG01A |
| Brake Cable Connector | R88A-CNG01B |

### External regeneration resistor

| Specification | Order code |
|---|---|
| 80 W, 50 Ω | R88A-RR08050S |
| 80 W, 100 Ω | R88A-RR080100S |
| 220 W, 47 Ω | R88A-RR22047S |

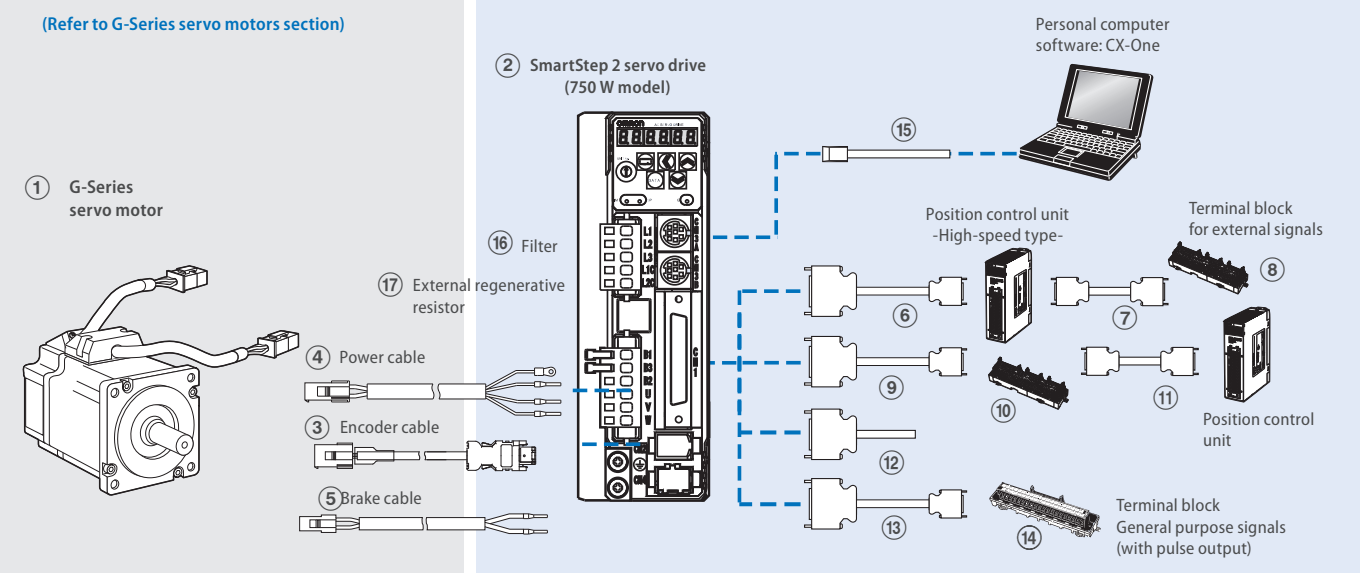
### External regeneration resistor cable

| Specifications | Order code |
|---|---|
| External Regenerative Resistor Connection Cable, 2 meters | R7A-CLB002RG |

### Parameter unit & computer software

| Specifications | Order code |
|---|---|
| Parameter copy unit (with cable) | R88A-PR02G |
| Configuration and monitoring software tool for servo drives and inverters. (CX-Drive version 1.8 or higher) | CX-Drive |

## SmartStep2 servo drive configuration (750 W)




**Note:** The symbols ①②③④⑤ ... show the recommended sequence to select the components in a SmartStep 2 servo system.

### Servo motor

**Note:** ①③④⑤ refer to G-Series motor section for detailed motor specifications and selection.

### Servo drives

| Symbol | Specifications | | ① Compatible rotary servo motors | Servo drive model |
|---|---|---|---|---|
| | | | Cylindrical type | Order code |
| ② | 1 phase 200 VAC | 750 W | R88M-G75030H-_ | R88D-GP08H |

### Control cables (for CN1)

| Symbol | Description | Connect to | Length | Order code |
|---|---|---|---|---|
| ⑥ | Control cable (line-driver output for 1 axis | Position control units (high-speed type) CJ1W-NC234 CJ1W-NC434 | 1 m | XW2Z-100J-G9 |
| | | | 5 m | XW2Z-500J-G9 |
| | | | 10 m | XW2Z-10MJ-G9 |
| | Control cable (open-collector output for 1 axis | Position control units (high-speed type) CJ1W-NC214 CJ1W-NC414 | 1 m | XW2Z-100J-G13 |
| | | | 3 m | XW2Z-300J-G13 |
| | Control cable (line-driver output for 2 axis | Position control units (high-speed type) CJ1W-NC234 CJ1W-NC434 | 1 m | XW2Z-100J-G1 |
| | | | 5 m | XW2Z-500J-G1 |
| | | | 10 m | XW2Z-10MJ-G1 |
| | Control cable (open-collector output for 2 axis | Position control units (high-speed type) CJ1W-NC214 CJ1W-NC414 | 1 m | XW2Z-100J-G5 |
| | | | 3 m | XW2Z-300J-G5 |
| ⑦ | Terminal block cable for external signals (for input common, forward/reverse run prohibited inputs, emergency stop input, origin proximity input and interrupt input) | Position control units (high-speed type) CJ1W-NC234 CJ1W-NC434 CJ1W-NC214 CJ1W-NC414 | 0.5 m | XW2Z-C50X |
| | | | 1 m | XW2Z-100X |
| | | | 2 m | XW2Z-200X |
| | | | 3 m | XW2Z-300X |
| | | | 5 m | XW2Z-500X |
| | | | 10 m | XW2Z-010X |
| ⑧ | Terminal block for external signals (M3 screw, pin terminals) | | – | XW2B-20G4 |
| | Terminal block ext. signals (M3.5 screw, fork/round terminals) | | – | XW2B-20G5 |
| | Terminal block ext. signals (M3 screw, fork/round terminals) | | – | XW2D-20G6 |
| ⑨ | Cable from servo relay unit to servo drive | CS1W-NC1_3, CJ1W-NC1_3, C200HW-NC113/213/413, CS1W-NC2_3/4_3, CJ1W-NC2_3/4_3 or CQM1H-PLB21 | 1 m | XW2Z-100J-B25 |
| | | | 2 m | XW2Z-200J-B25 |
| | | CJ1M-CPU21/22/23 | 1 m | XW2Z-100J-B31 |
| | | | 2 m | XW2Z-200J-B31 |
| ⑩ | Servo relay unit | CS1W-NC1_3, CJ1W-NC1_3 or C200HW-NC113 position control unit | – | XW2B-20J6-1B (1 axis) |
| | | CS1W-NC2_3/4_3, CJ1W-NC2_3/4_3 or C200HW-NC213/413 position control unit | – | XW2B-40J6-2B (2 axes) |
| | | CQM1H-PLB21 | – | XW2B-20J6-3B (1 axis) |
| | | CJ1M-CPU21/22/23 | – | XW2B-20J6-8A (1 axis) |
| | | | | XW2B-40J6-9A (2 axes) |

| Symbol | Description | Connect to | Length | Order code |
|---|---|---|---|---|
| ⑪ | Position control unit connecting cable | CQM1H-PLB21 | 0.5 m | XW2Z-050J-A3 |
| | | | 1 m | XW2Z-100J-A3 |
| | | CS1W-NC113 or C200HW-NC113 | 0.5 m | XW2Z-050J-A6 |
| | | | 1 m | XW2Z-100J-A6 |
| | | CS1W-NC213/413 or C200HW-NC213/413 | 0.5 m | XW2Z-050J-A7 |
| | | | 1 m | XW2Z-100J-A7 |
| | | CS1W-NC133 | 0.5 m | XW2Z-050J-A10 |
| | | | 1 m | XW2Z-100J-A10 |
| | | CS1W-NC233/433 | 0.5 m | XW2Z-050J-A11 |
| | | | 1 m | XW2Z-100J-A11 |
| | | CJ1W-NC113 | 0.5 m | XW2Z-050J-A14 |
| | | | 1 m | XW2Z-100J-A14 |
| | | CJ1W-NC213/413 | 0.5 m | XW2Z-050J-A15 |
| | | | 1 m | XW2Z-100J-A15 |
| | | CJ1W-NC133 | 0.5 m | XW2Z-050J-A18 |
| | | | 1 m | XW2Z-100J-A18 |
| | | CJ1W-NC233/433 | 0.5 m | XW2Z-050J-A19 |
| | | | 1 m | XW2Z-100J-A19 |
| | | CJ1M-CPU21/22/23 | 0.5 m | XW2Z-050J-A33 |
| | | | 1 m | XW2Z-100J-A33 |
| ⑫ | General purpose cable | For general purpose controllers | 1 m | R88A-CPG001S |
| | | | 2 m | R88A-CPG002S |
| ⑬ | Terminal block cable | For general purpose controllers | 1 m | XW2Z-100J-B24 |
| | | | 2 m | XW2Z-200J-B24 |
| ⑭ | Terminal block (M3 screw and for pin terminals) | | – | XW2B-50G4 |
| | Terminal block (M3.5 screw and for fork/round terminals) | | – | XW2B-50G5 |
| | Terminal block (M3 screw and for fork/found terminals) | | – | XW2D-50G6 |

### Computer cable (for CN3)

| Symbol | Name | Length | Order code |
|---|---|---|---|
| ⑮ | Computer cable RS232 | 2 m | R88A-CCG002P2 |

### Filter

| Symbol | Rated current | Leakage current | Rated voltage | Applicable servodrive | Order code |
|---|---|---|---|---|---|
| ⑯ | 6.6 A | 3.5 mA | 250 VAC single-phase | R88D-GP08H | R88A-FIK107-RE |

### External regenerative resistor

| Symbol | Specifications | Order code |
|---|---|---|
| ⑰ | 50 Ω, 80 W | R88A-RR08050S |
| | 100 Ω, 80 W | R88A-RR080100S |
| | 47 Ω, 220 W | R88A-RR22047S |
| | 20 Ω, 500 W | R88A-RR50020S |

### Connectors

| Specifications | Order code |
|---|---|
| I/O connector kit -50 pins- (for CN1) | R88A-CNU11C |
| Power cable connector (motor side) | R88A-CNG01A |
| Encoder connector (Servo drive side CN2) | R88A-CNW01R |
| Incremental encoder cable connector (motor side) | R88A-CNG02R |

### Computer software

| Specifications | Order code |
|---|---|
| Configuration and monitoring software tool for servo drives and inverters (CX-Drive version 1.91 or higher). | CX-Drive |

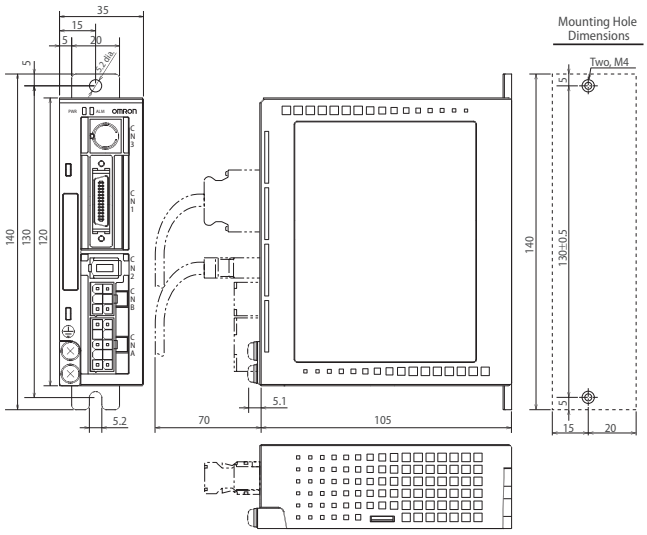
## Specifications

### Performance specifications

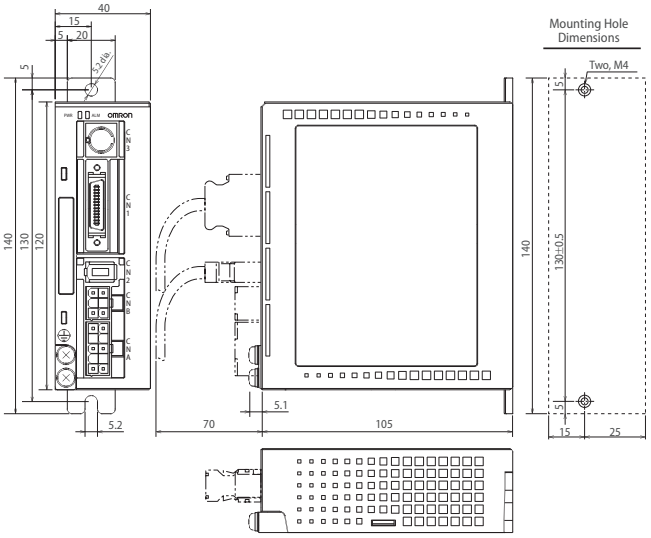
| Item | 200 VAC input type | | | |
|---|---|---|---|---|
| | 100 W | 200 W | 400 W | 750 W |
| | R7D-BP01H | R7D-BP02HH | R7D-BP04H | R88D-GP08H |
| Continuous output current (rms) | 1.0 A | 1.6 A | 2.5 A | 4 A |
| Momentary maximum output current (rms) | 3.3 A | 4.9 A | 7.8 A | 14.1 A |
| Main-circuit power supply | Single-phase 200 to 240 VAC (170 to 264 V), 50/60 Hz | | | Single-phase/three-phase 200 to 240 VAC (170 to 264 V), 50/60 Hz |
| Control circuit input power | – | | | Single-phase 200 to 240 VAC (170 to 264 V) |
| Control method | All-digital method | | | |
| Feedback | 10,000 pulses/revolution incremental encoder | | | |
| Inverter method | PWM method based on IGBT | | | |
| PWM frequency | 12 kHz | | 6 kHz | |
| Weight | 0.35 kg | 0.42 kg | 0.42 kg | 1.5 kg |
| Compatible motor voltage | 200 V | | | |
| Command pulse response | Line drive: 500 kpps | | | |
| Compatible motor capacity | 50 W<br>100 W | 200 W | 400 W | 750 W |
| Applicable servo motor (R88M-) | G05030H<br>G10030H<br>GP10030H | G020030H<br>GP20030H | G40030H<br>GP40030H | G75030H |

## Dimensions

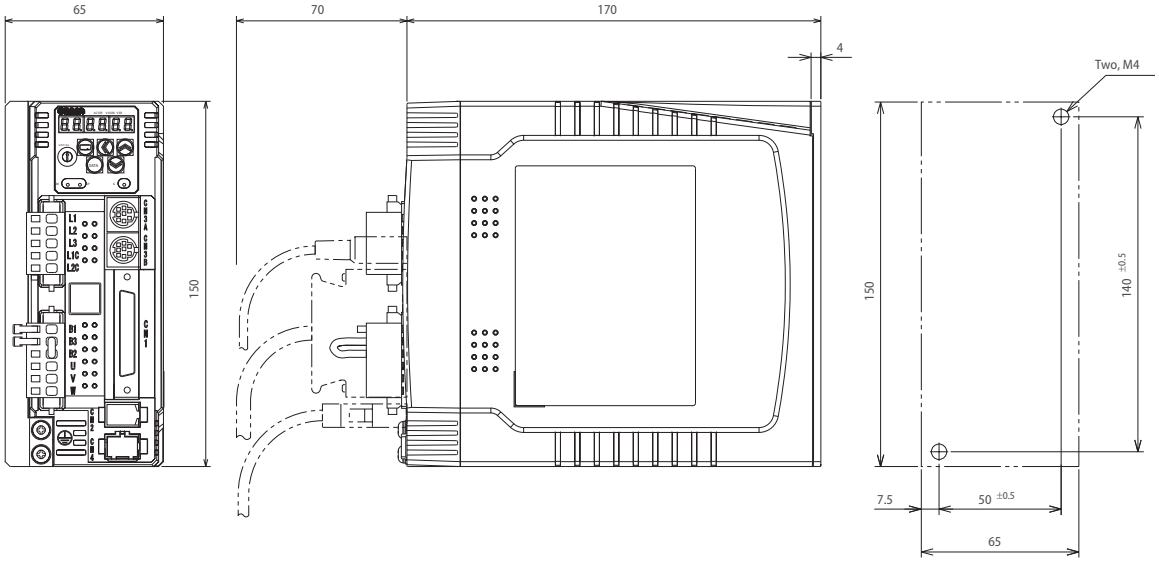
### R7D-BP01H (230 V, 100 W)




### R7D-BP02HH/04H (230 V, 200-400 W)




### R88D-GP08H (230 V, 750 W)



## Servo motor family for accurate motion control

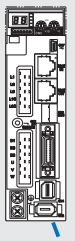
Accurax G5 servo motors include IP67 protection and connectors on the motor body. Use of 10 pole motors and 20 bit encoder results in 40% reduction in motor cogging. The servomotors are 25% lighter and 15% smaller due to patented new stator design PACK & CLAMP technology, 40% iron loss reduction and 15% smaller encoder.

- Standard and high inertia servo motor models
- Peak torque 300% of rated torque during 3 seconds or more depending on model
- High accuracy provided by a 20 bit resolution encoder, ABS encoder as an option
- IP67 protection in all models
- Ultra-light and compact size motor
- Low speed ripple and low torque ripple due to low torque cogging
- Various shaft, brake and seal options



## Ordering information

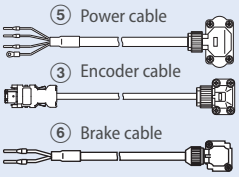
② Drive options



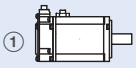
**Accurax G5 servo drives**
EtherCAT, ML2 and analog/pulse models

④ Extension cable for absolute encoder (with battery holder)

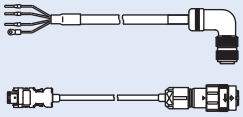
**Standard servo motors**



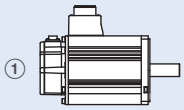
⑤ Power cable
③ Encoder cable
⑥ Brake cable



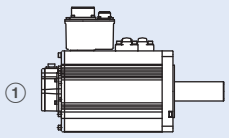
① 3000 rpm (50 W to 750 W)



Power cable/
⑤ power cable with brake
③ Encoder cable

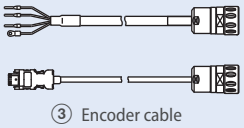


① 3,000 rpm (750 W to 5 kW)
2,000 rpm (400 W to 5 kW)
1,000 rpm (900 W to 3 kW)

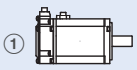


① 1,500 rpm (7.5 kW to 15 kW)
1,000 rpm (4.5 kW to 6 kW)

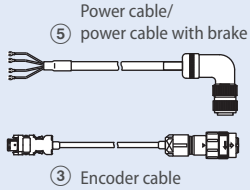
**High inertia servo motors**



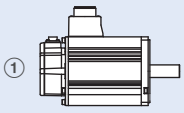
Power cable/
⑤ power cable with brake
③ Encoder cable



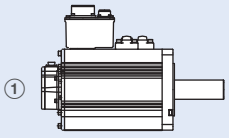
① 3,000 rpm (200 W to 750 W)



Power cable/
⑤ power cable with brake
③ Encoder cable



① 2,000 rpm (1 kW to 5 kW)



① 1,500 rpm (7.5 kW)

**Note:** The symbols ①②③ ... show the recommended sequence to select the servo motor and cables

### Servo motor

① Select motor from R88M-K or R88M-KH families using motor tables in next pages.

### Servo drive

② Refer to Accurax G5 servo drive section for detailed drive specifications and selection of drive accessories.

## Standard servo motors

### Servo motors 3,000 r/min (50 to 5,000 W)

| Symbol | Specifications | | | | | ② Compatible servo drives | | Order code |
|---|---|---|---|---|---|---|---|---|
| | Voltage | Encoder and design | | Rated torque | Capacity | G5 EtherCAT/ML2 | G5 analog/pulse | |
| ①  230 V (50 to 750 W)  230 V (1,000 to 1,500 W) 400 V (750 to 5,000 W) | 230 V | Incremental encoder (20 bit) Straight shaft with key and tap | Without brake | 0.16 Nm | 50 W | R88D-KN01H-_ | R88D-KT01H | R88M-K05030H-S2 |
| | | | | 0.32 Nm | 100 W | R88D-KN01H-_ | R88D-KT01H | R88M-K10030H-S2 |
| | | | | 0.64 Nm | 200 W | R88D-KN02H-_ | R88D-KT02H | R88M-K20030H-S2 |
| | | | | 1.3 Nm | 400 W | R88D-KN04H-_ | R88D-KT04H | R88M-K40030H-S2 |
| | | | | 2.4 Nm | 750 W | R88D-KN08H-_ | R88D-KT08H | R88M-K75030H-S2 |
| | | | | 3.18 Nm | 1,000 W | R88D-KN15H-_ | R88D-KT15H | R88M-K1K030H-S2 |
| | | | | 4.77 Nm | 1,500 W | R88D-KN15H-_ | R88D-KT15H | R88M-K1K530H-S2 |
| | | | With brake | 0.16 Nm | 50 W | R88D-KN01H-_ | R88D-KT01H | R88M-K05030H-BS2 |
| | | | | 0.32 Nm | 100 W | R88D-KN01H-_ | R88D-KT01H | R88M-K10030H-BS2 |
| | | | | 0.64 Nm | 200 W | R88D-KN02H-_ | R88D-KT02H | R88M-K20030H-BS2 |
| | | | | 1.3 Nm | 400 W | R88D-KN04H-_ | R88D-KT04H | R88M-K40030H-BS2 |
| | | | | 2.4 Nm | 750 W | R88D-KN08H-_ | R88D-KT08H | R88M-K75030H-BS2 |
| | | | | 3.18 Nm | 1,000 W | R88D-KN15H-_ | R88D-KT15H | R88M-K1K030H-BS2 |
| | | | | 4.77 Nm | 1,500 W | R88D-KN15H-_ | R88D-KT15H | R88M-K1K530H-BS2 |
| | | Absolute encoder (17 bit) Straight shaft with key and tap | Without brake | 0.16 Nm | 50 W | R88D-KN01H-_ | R88D-KT01H | R88M-K05030T-S2 |
| | | | | 0.32 Nm | 100 W | R88D-KN01H-_ | R88D-KT01H | R88M-K10030T-S2 |
| | | | | 0.64 Nm | 200 W | R88D-KN02H-_ | R88D-KT02H | R88M-K20030T-S2 |
| | | | | 1.3 Nm | 400 W | R88D-KN04H-_ | R88D-KT04H | R88M-K40030T-S2 |
| | | | | 2.4 Nm | 750 W | R88D-KN08H-_ | R88D-KT08H | R88M-K75030T-S2 |
| | | | | 3.18 Nm | 1,000 W | R88D-KN15H-_ | R88D-KT15H | R88M-K1K030T-S2 |
| | | | | 4.77 Nm | 1,500 W | R88D-KN15H-_ | R88D-KT15H | R88M-K1K530T-S2 |
| | | | With brake | 0.16 Nm | 50 W | R88D-KN01H-_ | R88D-KT01H | R88M-K05030T-BS2 |
| | | | | 0.32 Nm | 100 W | R88D-KN01H-_ | R88D-KT01H | R88M-K10030T-BS2 |
| | | | | 0.64 Nm | 200 W | R88D-KN02H-_ | R88D-KT02H | R88M-K20030T-BS2 |
| | | | | 1.3 Nm | 400 W | R88D-KN04H-_ | R88D-KT04H | R88M-K40030T-BS2 |
| | | | | 2.4 Nm | 750 W | R88D-KN08H-_ | R88D-KT08H | R88M-K75030T-BS2 |
| | | | | 3.18 Nm | 1,000 W | R88D-KN15H-_ | R88D-KT15H | R88M-K1K030T-BS2 |
| | | | | 4.77 Nm | 1,500 W | R88D-KN15H-_ | R88D-KT15H | R88M-K1K530T-BS2 |
| | 400 V | Incremental encoder (20 bit) Straight shaft with key and tap | Without brake | 2.39 Nm | 750 W | R88D-KN10F-_ | R88D-KT10F | R88M-K75030F-S2 |
| | | | | 3.18 Nm | 1,000 W | R88D-KN15F-_ | R88D-KT15F | R88M-K1K030F-S2 |
| | | | | 4.77 Nm | 1,500 W | R88D-KN15F-_ | R88D-KT15F | R88M-K1K530F-S2 |
| | | | | 6.37 Nm | 2,000 W | R88D-KN20F-_ | R88D-KT20F | R88M-K2K030F-S2 |
| | | | | 9.55 Nm | 3,000 W | R88D-KN30F-_ | R88D-KT30F | R88M-K3K030F-S2 |
| | | | | 12.7 Nm | 4,000 W | R88D-KN50F-_ | R88D-KT50F | R88M-K4K030F-S2 |
| | | | | 15.9 Nm | 5,000 W | R88D-KN50F-_ | R88D-KT50F | R88M-K5K030F-S2 |
| | | | With brake | 2.39 Nm | 750 W | R88D-KN10F-_ | R88D-KT10F | R88M-K75030F-BS2 |
| | | | | 3.18 Nm | 1,000 W | R88D-KN15F-_ | R88D-KT15F | R88M-K1K030F-BS2 |
| | | | | 4.77 Nm | 1,500 W | R88D-KN15F-_ | R88D-KT15F | R88M-K1K530F-BS2 |
| | | | | 6.37 Nm | 2,000 W | R88D-KN20F-_ | R88D-KT20F | R88M-K2K030F-BS2 |
| | | | | 9.55 Nm | 3,000 W | R88D-KN30F-_ | R88D-KT30F | R88M-K3K030F-BS2 |
| | | | | 12.7 Nm | 4,000 W | R88D-KN50F-_ | R88D-KT50F | R88M-K4K030F-BS2 |
| | | | | 15.9 Nm | 5,000 W | R88D-KN50F-_ | R88D-KT50F | R88M-K5K030F-BS2 |
| | | Absolute encoder (17 bit) Straight shaft with key and tap | Without brake | 2.39 Nm | 750 W | R88D-KN10F-_ | R88D-KT10F | R88M-K75030C-S2 |
| | | | | 3.18 Nm | 1,000 W | R88D-KN15F-_ | R88D-KT15F | R88M-K1K030C-S2 |
| | | | | 4.77 Nm | 1,500 W | R88D-KN15F-_ | R88D-KT15F | R88M-K1K530C-S2 |
| | | | | 6.37 Nm | 2,000 W | R88D-KN20F-_ | R88D-KT20F | R88M-K2K030C-S2 |
| | | | | 9.55 Nm | 3,000 W | R88D-KN30F-_ | R88D-KT30F | R88M-K3K030C-S2 |
| | | | | 12.7 Nm | 4,000 W | R88D-KN50F-_ | R88D-KT50F | R88M-K4K030C-S2 |
| | | | | 15.9 Nm | 5,000 W | R88D-KN50F-_ | R88D-KT50F | R88M-K5K030C-S2 |
| | | | With brake | 2.39 Nm | 750 W | R88D-KN10F-_ | R88D-KT10F | R88M-K75030C-BS2 |
| | | | | 3.18 Nm | 1,000 W | R88D-KN15F-_ | R88D-KT15F | R88M-K1K030C-BS2 |
| | | | | 4.77 Nm | 1,500 W | R88D-KN15F-_ | R88D-KT15F | R88M-K1K530C-BS2 |
| | | | | 6.37 Nm | 2,000 W | R88D-KN20F-_ | R88D-KT20F | R88M-K2K030C-BS2 |
| | | | | 9.55 Nm | 3,000 W | R88D-KN30F-_ | R88D-KT30F | R88M-K3K030C-BS2 |
| | | | | 12.7 Nm | 4,000 W | R88D-KN50F-_ | R88D-KT50F | R88M-K4K030C-BS2 |
| | | | | 15.9 Nm | 5,000 W | R88D-KN50F-_ | R88D-KT50F | R88M-K5K030C-BS2 |

### Servo motors 2,000 r/min (1 to 5 kW)

| Symbol | Specifications | | | | | ② Compatible servo drives | | Order code |
|---|---|---|---|---|---|---|---|---|
| | Voltage | Encoder and design | | Rated torque | Capacity | G5 EtherCAT/ML2 | G5 analog/pulse | |
| ①  | 230 V | Incremental encoder (20 bit) Straight shaft with key and tap | Without brake | 4.77 Nm | 1,000 W | R88D-KN10H-_ | R88D-KT10H | R88M-K1K020H-S2 |
| | | | | 7.16 Nm | 1,500 W | R88D-KN15H-_ | R88D-KT15H | R88M-K1K520H-S2 |
| | | | With brake | 4.77 Nm | 1,000 W | R88D-KN10H-_ | R88D-KT10H | R88M-K1K020H-BS2 |
| | | | | 7.16 Nm | 1,500 W | R88D-KN15H-_ | R88D-KT15H | R88M-K1K520H-BS2 |
| | | Absolute encoder (17 bit) Straight shaft with key and tap | Without brake | 4.77 Nm | 1,000 W | R88D-KN10H-_ | R88D-KT10H | R88M-K1K020T-S2 |
| | | | | 7.16 Nm | 1,500 W | R88D-KN15H-_ | R88D-KT15H | R88M-K1K520T-S2 |
| | | | With brake | 4.77 Nm | 1,000 W | R88D-KN10H-_ | R88D-KT10H | R88M-K1K020T-BS2 |
| | | | | 7.16 Nm | 1,500 W | R88D-KN15H-_ | R88D-KT15H | R88M-K1K520T-BS2 |
| | 400 V | Incremental encoder (20 bit) Straight shaft with key and tap | Without brake | 1.91 Nm | 400 W | R88D-KN06F-_ | R88D-KT06F | R88M-K40020F-S2 |
| | | | | 2.86 Nm | 600 W | R88D-KN06F-_ | R88D-KT06F | R88M-K60020F-S2 |
| | | | | 4.77 Nm | 1,000 W | R88D-KN10F-_ | R88D-KT10F | R88M-K1K020F-S2 |
| | | | | 7.16 Nm | 1,500 W | R88D-KN15F-_ | R88D-KT15F | R88M-K1K520F-S2 |
| | | | | 9.55 Nm | 2,000 W | R88D-KN20F-_ | R88D-KT20F | R88M-K2K020F-S2 |
| | | | | 14.3 Nm | 3,000 W | R88D-KN30F-_ | R88D-KT30F | R88M-K3K020F-S2 |
| | | | | 19.1 Nm | 4,000 W | R88D-KN50F-_ | R88D-KT50F | R88M-K4K020F-S2 |
| | | | | 23.9 Nm | 5,000 W | R88D-KN50F-_ | R88D-KT50F | R88M-K5K020F-S2 |
| | | | With brake | 1.91 Nm | 400 W | R88D-KN06F-_ | R88D-KT06F | R88M-K40020F-BS2 |
| | | | | 2.86 Nm | 600 W | R88D-KN06F-_ | R88D-KT06F | R88M-K60020F-BS2 |
| | | | | 4.77 Nm | 1,000 W | R88D-KN10F-_ | R88D-KT10F | R88M-K1K020F-BS2 |
| | | | | 7.16 Nm | 1,500 W | R88D-KN15F-_ | R88D-KT15F | R88M-K1K520F-BS2 |
| | | | | 9.55 Nm | 2,000 W | R88D-KN20F-_ | R88D-KT20F | R88M-K2K020F-BS2 |
| | | | | 14.3 Nm | 3,000 W | R88D-KN30F-_ | R88D-KT30F | R88M-K3K020F-BS2 |
| | | | | 19.1 Nm | 4,000 W | R88D-KN50F-_ | R88D-KT50F | R88M-K4K020F-BS2 |
| | | | | 23.9 Nm | 5,000 W | R88D-KN50F-_ | R88D-KT50F | R88M-K5K020F-BS2 |
| | | Absolute encoder (17 bit) Straight shaft with key and tap | Without brake | 1.91 Nm | 400 W | R88D-KN06F-_ | R88D-KT06F | R88M-K40020C-S2 |
| | | | | 2.86 Nm | 600 W | R88D-KN06F-_ | R88D-KT06F | R88M-K60020C-S2 |
| | | | | 4.77 Nm | 1,000 W | R88D-KN10F-_ | R88D-KT10F | R88M-K1K020C-S2 |
| | | | | 7.16 Nm | 1,500 W | R88D-KN15F-_ | R88D-KT15F | R88M-K1K520C-S2 |
| | | | | 9.55 Nm | 2,000 W | R88D-KN20F-_ | R88D-KT20F | R88M-K2K020C-S2 |
| | | | | 14.3 Nm | 3,000 W | R88D-KN30F-_ | R88D-KT30F | R88M-K3K020C-S2 |
| | | | | 19.1 Nm | 4,000 W | R88D-KN50F-_ | R88D-KT50F | R88M-K4K020C-S2 |
| | | | | 23.9 Nm | 5,000 W | R88D-KN50F-_ | R88D-KT50F | R88M-K5K020C-S2 |
| | | | With brake | 1.91 Nm | 400 W | R88D-KN06F-_ | R88D-KT06F | R88M-K40020C-BS2 |
| | | | | 2.86 Nm | 600 W | R88D-KN06F-_ | R88D-KT06F | R88M-K60020C-BS2 |
| | | | | 4.77 Nm | 1,000 W | R88D-KN10F-_ | R88D-KT10F | R88M-K1K020C-BS2 |
| | | | | 7.16 Nm | 1,500 W | R88D-KN15F-_ | R88D-KT15F | R88M-K1K520C-BS2 |
| | | | | 9.55 Nm | 2,000 W | R88D-KN20F-_ | R88D-KT20F | R88M-K2K020C-BS2 |
| | | | | 14.3 Nm | 3,000 W | R88D-KN30F-_ | R88D-KT30F | R88M-K3K020C-BS2 |
| | | | | 19.1 Nm | 4,000 W | R88D-KN50F-_ | R88D-KT50F | R88M-K4K020C-BS2 |
| | | | | 23.9 Nm | 5,000 W | R88D-KN50F-_ | R88D-KT50F | R88M-K5K020C-BS2 |

### Servo motors 1,500 r/min (7.5 to 15 KW)

| Symbol | Specifications | | | | | ② Compatible servo drives | | Order code |
|---|---|---|---|---|---|---|---|---|
| | Voltage | Encoder and design | | Rated torque | Capacity | G5 EtherCAT | G5 analog/pulse | |
| ①  | 400 V | Absolute encoder (17 bit) straight shaft with key and tap | Without brake | 47.8 Nm | 7,500 W | R88D-KN75F-ECT | R88D-KT75F | R88M-K7K515C-S2 |
| | | | | 70.0 Nm | 11,000 W | R88D-KN150F-ECT | R88D-KT150F | R88M-K11K015C-S2 |
| | | | | 95.5 Nm | 15,000 W | R88D-KN150F-ECT | R88D-KT150F | R88M-K15K015C-S2 |
| | | | With brake | 47.8 Nm | 7,500 W | R88D-KN75F-ECT | R88D-KT75F | R88M-K7K515C-BS2 |
| | | | | 70.0 Nm | 11,000 W | R88D-KN150F-ECT | R88D-KT150F | R88M-K11K015C-BS2 |
| | | | | 95.5 Nm | 15,000 W | R88D-KN150F-ECT | R88D-KT150F | R88M-K15K015C-BS2 |

### Servo motors 1,000 r/min (900 to 6,000 W)

| Symbol | Specifications | | | | | ② Compatible servo drives | | | Order code |
|---|---|---|---|---|---|---|---|---|---|
| | Voltage | Encoder and design | | Rated torque | Capacity | G5 EtherCAT | G5 analog/pulse | G5 ML2 | |
| ① | 230 V | Incremental encoder (20 bit) straight shaft with key and tap | No brake | 8.59 Nm | 900 W | R88D-KN15H-ECT | R88D-KT15H | R88D-KN15H-ML2 | R88M-K90010H-S2 |
| | | | With brake | 8.59 Nm | 900 W | R88D-KN15H-ECT | R88D-KT15H | R88D-KN15H-ML2 | R88M-K90010H-BS2 |
| | | Absolute encoder (17 bit) straight shaft with key and tap | No brake | 8.59 Nm | 900 W | R88D-KN15H-ECT | R88D-KT15H | R88D-KN15H-ML2 | R88M-K90010T-S2 |
| | | | With brake | 8.59 Nm | 900 W | R88D-KN15H-ECT | R88D-KT15H | R88D-KN15H-ML2 | R88M-K90010T-BS2 |
| | 400 V | Incremental encoder (20 bit) straight shaft with key and tap | No brake | 8.59 Nm | 900 W | R88D-KN15F-ECT | R88D-KT15F | R88D-KN15F-ML2 | R88M-K90010F-S2 |
| | | | | 19.1 Nm | 2,000 W | R88D-KN30F-ECT | R88D-KT30F | R88D-KN30F-ML2 | R88M-K2K010F-S2 |
| | | | | 28.7 Nm | 3,000 W | R88D-KN50F-ECT | R88D-KT50F | R88D-KN50F-ML2 | R88M-K3K010F-S2 |
| 900 W to 3 kW | | | With brake | 8.59 Nm | 900 W | R88D-KN15F-ECT | R88D-KT15F | R88D-KN15F-ML2 | R88M-K90010F-BS2 |
| | | | | 19.1 Nm | 2,000 W | R88D-KN30F-ECT | R88D-KT30F | R88D-KN30F-ML2 | R88M-K2K010F-BS2 |
| | | | | 28.7 Nm | 3,000 W | R88D-KN50F-ECT | R88D-KT50F | R88D-KN50F-ML2 | R88M-K3K010F-BS2 |
| | | Absolute encoder (17 bit) straight shaft with key and tap | No brake | 8.59 Nm | 900 W | R88D-KN15F-ECT | R88D-KT15F | R88D-KN15F-ML2 | R88M-K90010C-S2 |
| | | | | 19.1 Nm | 2,000 W | R88D-KN30F-ECT | R88D-KT30F | R88D-KN30F-ML2 | R88M-K2K010C-S2 |
| | | | | 28.7 Nm | 3,000 W | R88D-KN50F-ECT | R88D-KT50F | R88D-KN50F-ML2 | R88M-K3K010C-S2 |
| | | | | 43.0 Nm | 4,500 W | R88D-KN50F-ECT | R88D-KT50F | R88D-KN50F-ML2 | R88M-K4K510C-S2 |
| 4.5 kW to 6 kW | | | | 57.3 Nm | 6,000 W | R88D-KN75F-ECT | R88D-KT75F | – | R88M-K6K010C-S2 |
| | | | With brake | 8.59 Nm | 900 W | R88D-KN15F-ECT | R88D-KT15F | R88D-KN15F-ML2 | R88M-K90010C-BS2 |
| | | | | 19.1 Nm | 2,000 W | R88D-KN30F-ECT | R88D-KT30F | R88D-KN30F-ML2 | R88M-K2K010C-BS2 |
| | | | | 28.7 Nm | 3,000 W | R88D-KN50F-ECT | R88D-KT50F | R88D-KN50F-ML2 | R88M-K3K010C-BS2 |
| | | | | 43.0 Nm | 4,500 W | R88D-KN50F-ECT | R88D-KT50F | R88D-KN50F-ML2 | R88M-K4K510C-BS2 |
| | | | | 57.3 Nm | 6,000 W | R88D-KN75F-ECT | R88D-KT75F | – | R88M-K6K010C-BS2 |

## High inertia servo motors

### Servo motors 3,000 r/min (200 to 750 W)

| Symbol | Specifications | | | | | ② Compatible servo drives | | Order code |
|---|---|---|---|---|---|---|---|---|
| | Voltage | Encoder and design | | Rated torque | Capacity | G5 EtherCAT/ML2 | G5 analog/pulse | |
| ① | 230 V | Incremental encoder (20 bit) Straight shaft with key and tap | Without brake | 0.64 Nm | 200 W | R88D-KN02H-_ | R88D-KT02H | R88M-KH20030H-S2-D |
| | | | | 1.3 Nm | 400 W | R88D-KN04H-_ | R88D-KT04H | R88M-KH40030H-S2-D |
| | | | | 2.4 Nm | 750 W | R88D-KN08H-_ | R88D-KT08H | R88M-KH75030H-S2-D |
| | | | With brake | 0.64 Nm | 200 W | R88D-KN02H-_ | R88D-KT02H | R88M-KH20030H-BS2-D |
| | | | | 1.3 Nm | 400 W | R88D-KN04H-_ | R88D-KT04H | R88M-KH40030H-BS2-D |
| | | | | 2.4 Nm | 750 W | R88D-KN08H-_ | R88D-KT08H | R88M-KH75030H-BS2-D |
| | | Absolute encoder (17 bit) Straight shaft with key and tap | Without brake | 0.64 Nm | 200 W | R88D-KN02H-_ | R88D-KT02H | R88M-KH20030T-S2-D |
| | | | | 1.3 Nm | 400 W | R88D-KN04H-_ | R88D-KT04H | R88M-KH40030T-S2-D |
| | | | | 2.4 Nm | 750 W | R88D-KN08H-_ | R88D-KT08H | R88M-KH75030T-S2-D |
| | | | With brake | 0.64 Nm | 200 W | R88D-KN02H-_ | R88D-KT02H | R88M-KH20030T-BS2-D |
| | | | | 1.3 Nm | 400 W | R88D-KN04H-_ | R88D-KT04H | R88M-KH40030T-BS2-D |
| | | | | 2.4 Nm | 750 W | R88D-KN08H-_ | R88D-KT08H | R88M-KH75030T-BS2-D |

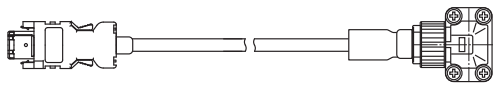
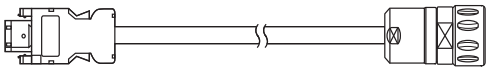
### Servo motors 2,000 r/min (1 to 5 kW)

| Symbol | Specifications | | | | | ② Compatible servo drives | | Servo motor model |
|---|---|---|---|---|---|---|---|---|
| | Voltage | Encoder and design | | Rated torque | Capacity | G5 EtherCAT/ML2 | G5 analog/pulse | Order code |
| ① | 400 V | Incremental encoder (20 bit) Shaft end with key | Without brake | 4.77 Nm | 1,000 W | R88D-_KN10F-_ | R88D-KT10F | R88M-KH1K020F-S1 |
| | | | | 7.16 Nm | 1,500 W | R88D-_KN15F-_ | R88D-KT15F | R88M-KH1K520F-S1 |
| | | | | 9.55 Nm | 2,000 W | R88D-_KN20F-_ | R88D-KT20F | R88M-KH2K020F-S1 |
| | | | | 14.3 Nm | 3,000 W | R88D-_KN30F-_ | R88D-KT30F | R88M-KH3K020F-S1 |
| | | | | 19.1 Nm | 4,000 W | R88D-_KN50F-_ | R88D-KT50F | R88M-KH4K020F-S1 |
| | | | | 23.9 Nm | 5,000 W | R88D-_KN50F-_ | R88D-KT50F | R88M-KH5K020F-S1 |
| | | | With brake | 4.77 Nm | 1,000 W | R88D-_KN10F-_ | R88D-KT10F | R88M-KH1K020F-BS1 |
| | | | | 7.16 Nm | 1,500 W | R88D-_KN15F-_ | R88D-KT15F | R88M-KH1K520F-BS1 |
| | | | | 9.55 Nm | 2,000 W | R88D-_KN20F-_ | R88D-KT20F | R88M-KH2K020F-BS1 |
| | | | | 14.3 Nm | 3,000 W | R88D-_KN30F-_ | R88D-KT30F | R88M-KH3K020F-BS1 |
| | | | | 19.1 Nm | 4,000 W | R88D-_KN50F-_ | R88D-KT50F | R88M-KH4K020F-BS1 |
| | | | | 23.9 Nm | 5,000 W | R88D-_KN50F-_ | R88D-KT50F | R88M-KH5K020F-BS1 |
| | | Absolute encoder (17 bit) Shaft end with key | Without brake | 4.77 Nm | 1,000 W | R88D-_KN10F-_ | R88D-KT10F | R88M-KH1K020C-S1 |
| | | | | 7.16 Nm | 1,500 W | R88D-_KN15F-_ | R88D-KT15F | R88M-KH1K520C-S1 |
| | | | | 9.55 Nm | 2,000 W | R88D-_KN20F-_ | R88D-KT20F | R88M-KH2K020C-S1 |
| | | | | 14.3 Nm | 3,000 W | R88D-_KN30F-_ | R88D-KT30F | R88M-KH3K020C-S1 |
| | | | | 19.1 Nm | 4,000 W | R88D-_KN50F-_ | R88D-KT50F | R88M-KH4K020C-S1 |
| | | | | 23.9 Nm | 5,000 W | R88D-_KN50F-_ | R88D-KT50F | R88M-KH5K020C-S1 |
| | | | With brake | 4.77 Nm | 1,000 W | R88D-_KN10F-_ | R88D-KT10F | R88M-KH1K020C-BS1 |
| | | | | 7.16 Nm | 1,500 W | R88D-_KN15F-_ | R88D-KT15F | R88M-KH1K520C-BS1 |
| | | | | 9.55 Nm | 2,000 W | R88D-_KN20F-_ | R88D-KT20F | R88M-KH2K020C-BS1 |
| | | | | 14.3 Nm | 3,000 W | R88D-_KN30F-_ | R88D-KT30F | R88M-KH3K020C-BS1 |
| | | | | 19.1 Nm | 4,000 W | R88D-_KN50F-_ | R88D-KT50F | R88M-KH4K020C-BS1 |
| | | | | 23.9 Nm | 5,000 W | R88D-_KN50F-_ | R88D-KT50F | R88M-KH5K020C-BS1 |

### Servo motors 1,500 r/min (7.5 kW)

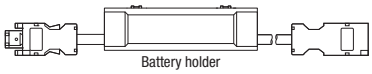
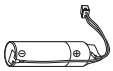
| Symbol | Specifications | | | | | ② Compatible servo drives | | Servo motor model |
|---|---|---|---|---|---|---|---|---|
| | Voltage | Encoder and design | | Rated torque | Capacity | G5 EtherCAT | G5 analog/pulse | Order code |
| ①  | 400 V | Absolute encoder (17 bit)<br>Shaft end with key | Without brake | 47.8 Nm | 7,500 W | R88D-KN75F-ECT | R88D-KT75F | R88M-KH7K515C-S1 |
| | | | With brake | 47.8 Nm | 7,500 W | R88D-KN75F-ECT | R88D-KT75F | R88M-KH7K515C-BS1 |

### Encoder cables for absolute and incremental encoders

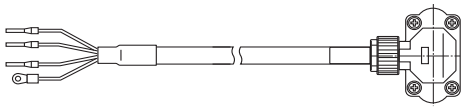
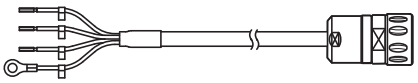
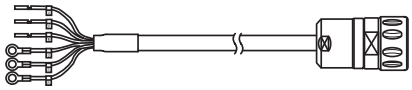
| Symbol | Appearance | Specifications | | Order code |
|---|---|---|---|---|
| ③ |  | Encoder cable for servomotors<br>R88M-K(050/100/200/400/750)30(H/T)_ | 1.5 m | R88A-CRKA001-5CR-E |
| | | | 3 m | R88A-CRKA003CR-E |
| | | | 5 m | R88A-CRKA005CR-E |
| | | | 10 m | R88A-CRKA010CR-E |
| | | | 15 m | R88A-CRKA015CR-E |
| | | | 20 m | R88A-CRKA020CR-E |
| |  | Encoder cable for servomotors<br>R88M-KH(200/400/750)30(H/T)_ | 3 m | R88A-CRWA003C-DE |
| | | | 5 m | R88A-CRWA005C-DE |
| | | | 10 m | R88A-CRWA010C-DE |
| | | | 15 m | R88A-CRWA015C-DE |
| | | | 20 m | R88A-CRWA020C-DE |
| |  | Encoder cable for servomotors<br>R88M-K(1K0/1K5)30(H/T)_<br>R88M-K(750/1K0/1K5/2K0/3K0/4K0/5K0)30(F/C)_<br>R88M-K(400/600/1K0/1K5/2K0/3K0/4K0/5K0)20_<br>R88M-K(7K5/11K0/15K0)15_<br>R88M-K(900/2K0/3K0/4K5/6K0)10_<br>R88M-KH(1K0/1K5/2K0/3K0/4K0/5K0)20(F/C)_<br>R88M-KH7K515C_ | 1.5 m | R88A-CRKC001-5NR-E |
| | | | 3 m | R88A-CRKC003NR-E |
| | | | 5 m | R88A-CRKC005NR-E |
| | | | 10 m | R88A-CRKC010NR-E |
| | | | 15 m | R88A-CRKC015NR-E |
| | | | 20 m | R88A-CRKC020NR-E |

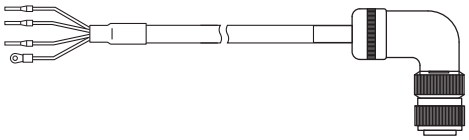
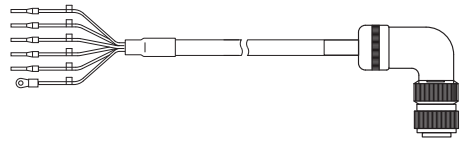
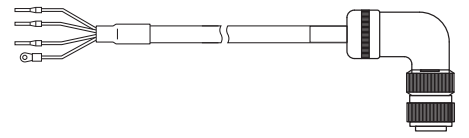
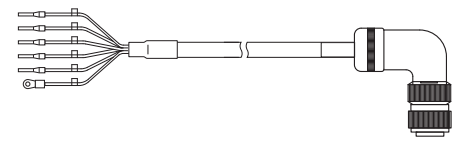
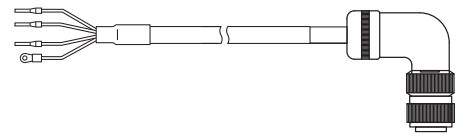
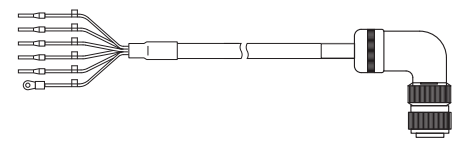
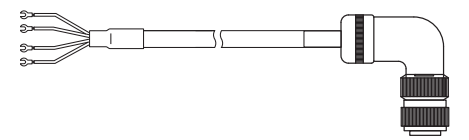
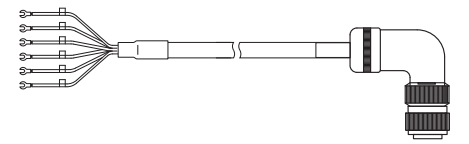
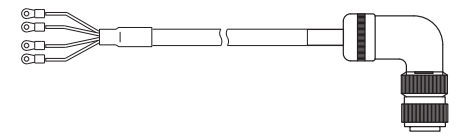
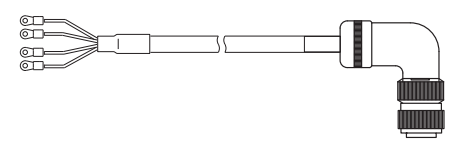
**Note:** For servomotors fitted with an absolute encoder you have to add the extension battery cable R88A-CRGD0R3C_ (see below) or connect a backup battery in the CN1 I/O connector.

### Absolute encoder battery cable (encoder extension cable only)

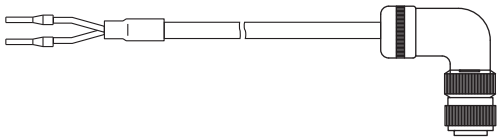
| Symbol | Appearance | Specifications | | | Order code |
|---|---|---|---|---|---|
| ④ |  | Absolute encoder battery cable | Battery not included | 0.3 m | R88A-CRGDOR3C-E |
| | | | Battery included | 0.3 m | R88A-CRGDOR3C-BS-E |
| |  | Absolute encoder backup battery | 2,000 mA.h 3.6V | – | R88A-BAT01G |

### Power cables

| Symbol | Appearance | Specifications | | | Order code |
|---|---|---|---|---|---|
| ⑤ |  | For 200 V servomotors<br>R88M-K(050/100/200/400/750)30(H/T)-_ _ S2<br>**Note:** for servomotors with brake R88M-K(050/100/200/400/750)30 (H/T)-BS2, the separate brake cable R88A-CAKA _ _ _ BR-E is needed | Power cable only (without brake) | 1.5 m | R88A-CAKA001-5SR-E |
| | | | | 3 m | R88A-CAKA003SR-E |
| | | | | 5 m | R88A-CAKA005SR-E |
| | | | | 10 m | R88A-CAKA010SR-E |
| | | | | 15 m | R88A-CAKA015SR-E |
| | | | | 20 m | R88A-CAKA020SR-E |
| |  | For 200 V servomotors<br>R88M-KH(200/400/750)30(H/T)-__S2 | without brake | 3 m | R88A-CAWA003S-DE |
| | | | | 5 m | R88A-CAWA005S-DE |
| | | | | 10 m | R88A-CAWA010S-DE |
| | | | | 15 m | R88A-CAWA015S-DE |
| | | | | 20 m | R88A-CAWA020S-DE |
| |  | | with brake | 3 m | R88A-CAWA003B-DE |
| | | | | 5 m | R88A-CAWA005B-DE |
| | | | | 10 m | R88A-CAWA010B-DE |
| | | | | 15 m | R88A-CAWA015B-DE |
| | | | | 20 m | R88A-CAWA020B-DE |

| Symbol | Appearance | Specifications | | | Order code |
|---|---|---|---|---|---|
| ⑤ |  | For 200 V servomotors<br>R88M-K(1K0/1K5)30(H/T)-_ _S2<br>R88M-K(1K0/1K5)20(H/T)-_ _S2<br>R88M-K90010(H/T)-_ _S2 | without brake | 1.5 m | R88A-CAGB001-5SR-E |
| | | | | 3 m | R88A-CAGB003SR-E |
| | | | | 5 m | R88A-CAGB005SR-E |
| | | | | 10 m | R88A-CAGB010SR-E |
| | | | | 15 m | R88A-CAGB015SR-E |
| | | | | 20 m | R88A-CAGB020SR-E |
| |  | | with brake | 1.5 m | R88A-CAGB001-5BR-E |
| | | | | 3 m | R88A-CAGB003BR-E |
| | | | | 5 m | R88A-CAGB005BR-E |
| | | | | 10 m | R88A-CAGB010BR-E |
| | | | | 15 m | R88A-CAGB015BR-E |
| | | | | 20 m | R88A-CAGB020BR-E |
| |  | For 400 V servomotors<br>R88M-K(750/1K0/1K5/2K)30(F/C)-_ _S2<br>R88M-K(400/600/1K0/1K5/2K0)20(F/C)-_ _S2<br>R88M-K90010(F/C)-_ _S2<br>R88M-KH(1K0/1K5)20(F/C)-_S1 | without brake | 1.5 m | R88A-CAGB001-5SR-E |
| | | | | 3 m | R88A-CAGB003SR-E |
| | | | | 5 m | R88A-CAGB05SR-E |
| | | | | 10 m | R88A-CAGB010SR-E |
| | | | | 15 m | R88A-CAGB015SR-E |
| | | | | 20 m | R88A-CAGB020SR-E |
| |  | | with brake | 1.5 m | R88A-CAKF001-5BR-E |
| | | | | 3 m | R88A-CAKF003BR-E |
| | | | | 5 m | R88A-CAKF005BR-E |
| | | | | 10 m | R88A-CAKF010BR-E |
| | | | | 15 m | R88A-CAKF015BR-E |
| | | | | 20 m | R88A-CAKF020BR-E |
| |  | For 400 V servomotors<br>R88M-KH2K020(F/C)-_S1 | without brake | 1.5 m | R88A-CAKC001-5SR-E |
| | | | | 3 m | R88A-CAKC003SR-E |
| | | | | 5 m | R88A-CAKC005SR-E |
| | | | | 10 m | R88A-CAKC010SR-E |
| | | | | 15 m | R88A-CAKC015SR-E |
| | | | | 20 m | R88A-CAKC020SR-E |
| |  | | with brake | 1.5 m | R88A-CAKF001-5BR-E |
| | | | | 3 m | R88A-CAKF003BR-E |
| | | | | 5 m | R88A-CAKF005BR-E |
| | | | | 10 m | R88A-CAKF010BR-E |
| | | | | 15 m | R88A-CAKF015BR-E |
| | | | | 20 m | R88A-CAKF020BR-E |
| |  | For 400 V servomotors<br>R88M-K(3K0/4K0/5K0)30(F/C)-_ _S2<br>R88M-K(3K0/4K0/5K0)20(F/C)-_ _S2<br>R88M-K(2K0/3K0)10(F/C)-_ _S2<br>R88M-K4K510C-_ _S2<br>R88M-KH(3K0/4K0/5K0)20(F/C)-_S1 | without brake | 1.5 m | R88A-CAGD001-5SR-E |
| | | | | 3 m | R88A-CAGD003SR-E |
| | | | | 5 m | R88A-CAGD005SR-E |
| | | | | 10 m | R88A-CAGD010SR-E |
| | | | | 15 m | R88A-CAGD015SR-E |
| | | | | 20 m | R88A-CAGD020SR-E |
| |  | | with brake | 1.5 m | R88A-CAGD001-5BR-E |
| | | | | 3 m | R88A-CAGD003BR-E |
| | | | | 5 m | R88A-CAGD005BR-E |
| | | | | 10 m | R88A-CAGD010BR-E |
| | | | | 15 m | R88A-CAGD015BR-E |
| | | | | 20 m | R88A-CAGD020BR-E |
| |  | For 400 V servomotors<br>R88M-K6K010C-_ _S2<br>R88M-K7K515C-_ _S2<br>R88M-KH7K515C-_S1<br>**Note:** for servomotors with brake R88M-K(6K010/7K515)C-BS2 and R88M-KH7K515C-BS1 the separate brake cable R88A-CAGE_ _ _BR-E is needed | Power cable only (without brake) | 1.5 m | R88A-CAKE001-5SR-E |
| | | | | 3 m | R88A-CAKE003SR-E |
| | | | | 5 m | R88A-CAKE005SR-E |
| | | | | 10 m | R88A-CAKE010SR-E |
| | | | | 15 m | R88A-CAKE015SR-E |
| | | | | 20 m | R88A-CAKE020SR-E |
| |  | For 400 V servomotors<br>R88M-K(11K0/15K0)15C-_ _S2<br>**Note:** Note: for servomotors with brake R88M-K(11K0/15K0)15C-BS2, the separate brake cable R88A-CAGE_ _ _BR-E is needed | Power cable only (without brake) | 1.5 m | R88A-CAKG001-5SR-E |
| | | | | 3 m | R88A-CAKG003SR-E |
| | | | | 5 m | R88A-CAKG005SR-E |
| | | | | 10 m | R88A-CAKG010SR-E |
| | | | | 15 m | R88A-CAKG015SR-E |
| | | | | 20 m | R88A-CAKG020SR-E |

### Brake cables (for 200 V 50 to 750 W servo motors and 400 V 6 to 15 kW servo motors)

| Symbol | Appearance | Specifications | | Order code |
|---|---|---|---|---|
| ⑥ |  | Brake cable only.<br>For 200 V servo motors with brake<br>R88M-K(050/100/200/400/750)30(H/T)-BS2 | 1.5 m | R88A-CAKA001-5BR-E |
| | | | 3 m | R88A-CAKA003BR-E |
| | | | 5 m | R88A-CAKA005BR-E |
| | | | 10 m | R88A-CAKA010BR-E |
| | | | 15 m | R88A-CAKA015BR-E |
| | | | 20 m | R88A-CAKA020BR-E |
| |  | Brake cable only.<br>For 400 V servo motors with brake<br>R88M-K6K010C-BS2<br>R88M-K(7K5/11K0/15K0)15C-BS2<br>R88M-KH7K515C-BS1 | 1.5 m | R88A-CAGE001-5BR-E |
| | | | 3 m | R88A-CAGE003BR-E |
| | | | 5 m | R88A-CAGE005BR-E |
| | | | 10 m | R88A-CAGE0010BR-E |
| | | | 15 m | R88A-CAGE015BR-E |
| | | | 20 m | R88A-CAGE020BR-E |

### Connectors for encoder, power and brake cables

| Specifications | | Applicable servo motor | Order code |
|---|---|---|---|
| Connectors for making encoder cables | Drive side (CN2) | All models | R88A-CNW01R |
| | Motor side | R88M-K(050/100/200/400/750)30(H/T)_ | R88A-CNK02R |
| | Motor side | R88M-KH(200/400/750)_ | SPOC-17H-FRON169 |
| | Motor side | R88M-K(1K0/1K5)30(H/T)_<br>R88M-K(750/1K0/1K5/2K0/3K0/4K0/5K0)30(F/C)_<br>R88M-K(400/600/1K0/1K5/2K0/3K0/4K0/5K0)20_<br>R88M-K(900/2K0/3K0)10_<br>R88M-K(4K5/6K0)10C-_<br>R88M-K(7K5/11K0/15K0)15C-_<br>R88M-KH(1K0/1K5/2K0/3K0/4K0/5K0/7K5)_ | R88A-CNK04R |
| Connectors for making power cables | Motor side | R88M-K(050/100/200/400/750)30(H/T)_ | R88A-CNK11A |
| | Motor side | R88M-KH(200/400/750)30(H/T)_ | SPOC-06K-FSDN169 |
| | Motor side | R88M-K(1K0/1K5)30(H/T)-S2<br>R88M-K(1K0/1K5)20(H/T)-S2<br>R88M-K90010(H/T)-S2<br>R88M-K(750/1K0/1K5/2K0)30(F/C)-S2<br>R88M-K(400/600/1K0/1K5/2K0)20(F/C)-S2<br>R88M-K90010(F/C)-S2<br>R88M-KH(1K0/1K5)20(F/C)-S1 | MS3108E20-4S |
| | Motor side | R88M-K(1K0/1K5)30(H/T)-BS2<br>R88M-K(1K0/1K5)20(H/T)-BS2<br>R88M-K90010(H/T)-BS2 | MS3108E20-18S |
| | Motor side | R88M-K(750/1K0/1K5/2K0/3K0/4K0/5K0)30(F/C)-BS2<br>R88M-K(400/600/1K0/1K5/2K0/3K0/4K0/5K0)20(F/C)-BS2<br>R88M-K(900/2K0/3K0)10(F/C)-BS2<br>R88M-K4K510C-BS2<br>R88M-KH(1K0/1K5/2K0/3K0/4K0/5K0)20(F/C)-BS1 | MS3108E24-11S |
| | Motor side | R88M-K(3K0/4K0/5K0)30(F/C)-S2<br>R88M-K(3K0/4K0/5K0)20(F/C)-S2<br>R88M-K(2K0/3K0)10(F/C)-S2<br>R88M-K4K510C-S2<br>R88M-KH(2K0/3K0/4K0/5K0)20(F/C)-S1 | MS3108E22-22S |
| | Motor side | R88M-K6K010C-_<br>R88M-K(7K5/11K0/15K0)15C-_<br>R88M-KH7K515C-_S1 | MS3108E32-17S |
| Connector for brake cable | Motor side | R88M-K(050/100/200/400/750)30(H/T)-BS2 | R88A-CNK11B |
| | Motor side | R88M-K6K010C-BS2<br>R88M-K(7K5/11K0/15K0)15C-BS2<br>R88M-KH7K515C-BS1 | MS3108E14S-2S |

**Note: 1.** All cables listed are flexible and shielded (except the R88A-CAKA____-BR-E which is only a flexible cable).
**2.** All connectors and cables listed have IP67 class (except R88A-CNW01R connector and R88A-CRGD0R3C cable).

## Specifications

### Standard servo motors 3,000 r/min, 230 V

| Voltage | | 230 V | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Servo motor model R88M-K_ | 20-bit incremental encoder | 05030H-_ | 10030H-_ | 20030H-_ | 40030H-_ | 75030H-_ | 1K030H-_ | 1K530H-_ |
| | 17-bit absolute encoder | 05030T-_ | 10030T-_ | 20030T-_ | 40030T-_ | 75030T-_ | 1K030T-_ | 1K530T-_ |
| Rated output | W | 50 | 100 | 200 | 400 | 750 | 1,000 | 1,500 |
| Rated torque | N·m | 0.16 | 0.32 | 0.64 | 1.3 | 2.4 | 3.18 | 4.77 |
| Instantaneous peak torque | N·m | 0.48 | 0.95 | 1.91 | 3.8 | 7.1 | 9.55 | 14.3 |
| Rated current | A (rms) | 1.1 | 1.1 | 1.5 | 2.4 | 4.1 | 6.6 | 8.2 |
| Instantaneous max. current | A (rms) | 4.7 | 4.7 | 6.5 | 10.2 | 17.4 | 28 | 35 |
| Rated speed | $min^{-1}$ | 3,000 | | | | | | |
| Max. speed | $min^{-1}$ | 6,000 | | | | | 5,000 | |
| Torque constant | N·m/A | 0.11±10% | 0.21±10% | 0.31±10% | 0.39±10% | 0.42±10% | 0.37 | 0.45 |
| Rotor moment of inertia (JM) | $kg·m^2 \times 10^{-4}$ (without brake) | 0.025 | 0.051 | 0.14 | 0.26 | 0.87 | 2.03 | 2.84 |
| | $kg·m^2 \times 10^{-4}$ (with brake) | 0.027 | 0.054 | 0.16 | 0.28 | 0.97 | 2.35 | 3.17 |
| Allowable load moment of inertia (JL) | Multiple of (JM) | 30*1 | | | | 20*1 | 15*1 | |

| Voltage | | 230 V | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Servo motor model R88M-K_ | 20-bit incremental encoder | 05030H-_ | 10030H-_ | 20030H-_ | 40030H-_ | 75030H-_ | 1K030H-_ | 1K530H-_ |
| | 17-bit absolute encoder | 05030T-_ | 10030T-_ | 20030T-_ | 40030T-_ | 75030T-_ | 1K030T-_ | 1K530T-_ |
| Rated power rate | kW/s (without brake) | 10.1 | 19.9 | 29.0 | 62.4 | 65.6 | 49.8 | 80.1 |
| | kW/s (with brake) | 9.4 | 18.8 | 25.4 | 58 | 58.8 | 43 | 71.8 |
| Allowable radial load | N | 68 | | 245 | | 490 | | |
| Allowable thrust load | N | 58 | | 98 | | 196 | | |
| Approx. mass | kg (without brake) | 0.32 | 0.47 | 0.82 | 1.2 | 2.3 | 3.5 | 4.4 |
| | kg (with brake) | 0.53 | 0.68 | 1.3 | 1.7 | 3.1 | 4.5 | 5.4 |
| Brake specifications: Rated voltage | | 24VDC±10% | | | | | | |
| Brake specifications: Holding brake moment of inertia J | $kg{\cdot}m^2 \times 10^{-4}$ | 0.002 | | 0.0018 | | 0.33 | | |
| Brake specifications: Power consumption (20°C) | W | 7 | | 9 | | 17 | 19 | |
| Brake specifications: Current consumption (20°C) | A | 0.3 | | 0.36 | | 0.70±10% | 0.81±10% | |
| Brake specifications: Static friction torque | N.m (minimum) | 0.29 | | 1.27 | | 2.5 | 7.8 | |
| Brake specifications: Rise time for holding torque | ms (max.) | 35 | | 50 | | | | |
| Brake specifications: Release time | ms (max) | 20 | | 15 | | | | |
| Basic specifications: Time Rating | | Continuous | | | | | | |
| Basic specifications: Insulation class | | Type B | | | | | Type F | |
| Basic specifications: Ambient operating/storage temperature | | 0 to 40°C/–20 to 65°C | | | | | | |
| Basic specifications: Ambient operating/storage humidity | | 20% to 80% (non-condensing) | | | | | 20% to 85% (non-condensing) | |
| Basic specifications: Vibration class | | V-15 | | | | | | |
| Basic specifications: Insulation resistance | | 20 MΩ min. at 500 VDC between the power terminals and FG terminal | | | | | | |
| Basic specifications: Enclosure | | Totally-enclosed, self-cooling, IP67 (excluding shaft opening) | | | | | | |
| Basic specifications: Vibration resistance | | Vibration acceleration 49 m/s2 | | | | | | |
| Basic specifications: Mounting | | Flange-mounted | | | | | | |

*1 Applicable load inertia: The operable load inertia ratio (load inertia/rotor inertia) depends on the mechanical configuration and its rigidity. For a machine with high rigidity, operation is possible even with high load inertia. Select an appropriate motor and confirm that operation is possible.

## Standard servo motors 3,000 r/min, 400 V

| Voltage | | 400 V | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Servo motor model R88M-K_ | 20-bit incremental encoder | 75030F-_ | 1K030F-_ | 1K530F-_ | 2K030F-_ | 3K030F-_ | 4K030F-_ | 5K030F-_ |
| | 17-bit absolute encoder | 75030C-_ | 1K030C-_ | 1K530C-_ | 2K030C-_ | 3K030C-_ | 4K030C-_ | 5K030C-_ |
| Rated output | W | 750 | 1,000 | 1,500 | 2,000 | 3,000 | 4,000 | 5,000 |
| Rated torque | N·m | 2.39 | 3.18 | 4.77 | 6.37 | 9.55 | 12.7 | 15.9 |
| Instantaneous peak torque | N·m | 7.16 | 9.55 | 14.3 | 19.1 | 28.6 | 38.2 | 47.7 |
| Rated current | A (rms) | 2.4 | 3.3 | 4.2 | 5.7 | 9.2 | 9.9 | 12 |
| Instantaneous max. current | A (rms) | 10 | 14 | 18 | 24 | 39 | 42 | 51 |
| Rated speed | $min^{-1}$ | 3,000 | | | | | | |
| Max. speed | $min^{-1}$ | 5,000 | | | | | 4,500 | |
| Torque constant | N·m/A | 0.78 | 0.75 | 0.89 | 0.87 | 0.81 | 0.98 | |
| Rotor moment of inertia (JM) | $kg{\cdot}m^2 \times 10^{-4}$ (without brake) | 1.61 | 2.03 | 2.84 | 3.68 | 6.5 | 12.9 | 17.4 |
| | $kg{\cdot}m^2 \times 10^{-4}$ (with brake) | 1.93 | 2.35 | 3.17 | 4.01 | 7.85 | 14.2 | 18.6 |
| Allowable load moment of inertia (JL) | Multiple of (JM) | 20*1 | 15*1 | | | | | |
| Rated power rate | kW/s (without brake) | 35.5 | 49.8 | 80.1 | 110 | 140 | 126 | 146 |
| | kW/s (with brake) | 29.6 | 43 | 71.8 | 101 | 116 | 114 | 136 |
| Allowable radial load | N | 490 | | | | | 784 | |
| Allowable thrust load | N | 196 | | | | | 343 | |
| Approx. mass | kg (without brake) | 3.1 | 3.5 | 4.4 | 5.3 | 8.3 | 11 | 14 |
| | kg (with brake) | 4.1 | 4.5 | 5.4 | 6.3 | 9.4 | 12.6 | 16 |
| Brake specifications: Rated voltage | | 24VDC±10% | | | | | | |
| Brake specifications: Holding brake moment of inertia J | $kg{\cdot}m^2 \times 10^{-4}$ | 0.33 | | | | | | 1.35 |
| Brake specifications: Power consumption (20°C) | W | 17 | 19 | | | | 22 | |
| Brake specifications: Current consumption (20°C) | A | 0.70±10% | 0.81±10% | | | | 0.90±10% | |
| Brake specifications: Static friction torque | N.m (minimum) | 2.5 | 7.8 | | | 11.8 | 16.1 | |
| Brake specifications: Rise time for holding torque | ms (max.) | 50 | | | | | 110 | |
| Brake specifications: Release time | ms (max) | 15 | | | | | 50 | |
| Basic specifications: Time Rating | | Continuous | | | | | | |
| Basic specifications: Insulation class | | Type F | | | | | | |
| Basic specifications: Ambient operating/storage temperature | | 0 to 40°C/–20 to 65°C | | | | | | |
| Basic specifications: Ambient operating/storage humidity | | 20% to 85% (non-condensing) | | | | | | |
| Basic specifications: Vibration class | | V-15 | | | | | | |
| Basic specifications: Insulation resistance | | 20 MΩ min. at 500 VDC between the power terminals and FG terminal | | | | | | |
| Basic specifications: Enclosure | | Totally-enclosed, self-cooling, IP67(excluding shaft opening) | | | | | | |
| Basic specifications: Vibration resistance | | Vibration acceleration 49 $m/s^2$ | | | | | | |
| Basic specifications: Mounting | | Flange-mounted | | | | | | |

*1 Applicable load inertia: The operable load inertia ratio (load inertia/rotor inertia) depends on the mechanical configuration and its rigidity. For a machine with high rigidity, operation is possible even with high load inertia. Select an appropriate motor and confirm that operation is possible.

## Standard servo motors 2,000 r/min, 230 V/400 V

| Voltage | | | 230 V | | 400 V | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Servo motor model R88M-K_ | | 20-bit incremental encoder | 1K020H-_ | 1K520H-_ | 40020F-_ | 60020F-_ | 1K020F-_ | 1K520F-_ | 2K020F-_ | 3K020F-_ | 4K020F-_ | 5K020F-_ |
| | | 17-bit absolute encoder | 1K020T-_ | 1K520T-_ | 40020C-_ | 60020C-_ | 1K020C-_ | 1K520C-_ | 2K020C-_ | 3K020C-_ | 4K020C-_ | 5K020C-_ |
| Rated output | | W | 1,000 | 1,500 | 400 | 600 | 1,000 | 1,500 | 2,000 | 3,000 | 4,000 | 5,000 |
| Rated torque | | N·m | 4.77 | 7.16 | 1.91 | 2.86 | 4.77 | 7.16 | 9.55 | 14.3 | 19.1 | 23.9 |
| Instantaneous peak torque | | N·m | 14.3 | 21.5 | 5.73 | 8.59 | 14.3 | 21.5 | 28.7 | 43 | 57.3 | 71.6 |
| Rated current | | A (rms) | 5.7 | 9.4 | 1.2 | 1.5 | 2.8 | 4.7 | 5.9 | 8.7 | 10.6 | 13 |
| Instantaneous max. current | | A (rms) | 24 | 40 | 4.9 | 6.5 | 12 | 20 | 25 | 37 | 45 | 55 |
| Rated speed | | $min^{-1}$ | 2,000 | | | | | | | | | |
| Max. speed | | $min^{-1}$ | 3,000 | | | | | | | | | |
| Torque constant | | N·m/A | 0.63 | 0.58 | 1.27 | 1.38 | 1.27 | 1.16 | 1.27 | 1.18 | 1.40 | 1.46 |
| Rotor moment of inertia (JM) | | $kg·m^2 \times 10^{-4}$ (without brake) | 4.60 | 6.70 | 1.61 | 2.03 | 4.60 | 6.70 | 8.72 | 12.9 | 37.6 | 48 |
| | | $kg·m^2 \times 10^{-4}$ (with brake) | 5.90 | 7.99 | 1.90 | 2.35 | 5.90 | 7.99 | 10 | 14.2 | 38.6 | 48.8 |
| Max. load moment of inertia (JL) | | Multiple of (JM) | 10*1 | | | | | | | | | |
| Rated power rate | | kW/s (without brake) | 49.5 | 76.5 | 22.7 | 40.3 | 49.5 | 76.5 | 105 | 159 | 97.1 | 119 |
| | | kW/s (with brake) | 38.6 | 64.2 | 19.2 | 34.8 | 38.6 | 64.2 | 91.2 | 144 | 94.5 | 117 |
| Allowable radial load | | N | 490 | | | | | | | 784 | | |
| Allowable thrust load | | N | 196 | | | | | | | 343 | | |
| Approx. mass | | kg (without brake) | 5.2 | 6.7 | 3.1 | 3.5 | 5.2 | 6.7 | 8 | 11 | 15.5 | 18.6 |
| | | kg (with brake) | 6.7 | 8.2 | 4.1 | 4.5 | 6.7 | 8.2 | 9.5 | 12.6 | 18.7 | 21.8 |
| Brake specifications | Rated voltage | | 24VDC ±10% | | | | | | | | | |
| | Holding brake moment inertia | (J) $kg·m^2 \times 10^{-4}$ | 1.35 | | | | | | | | 4.7 | |
| | Power consumption (20°C) | W | 14 | 19 | 17 | | 14 | 19 | | 22 | 31 | |
| | Current consumption (20°C) | A | 0.59±10% | 0.79±10% | 0.70 ±10% | | 0.59±10% | 0.79 ±10% | | 0.90±10% | 1.3±10% | 1.3 ±-10% |
| | Static friction torque | N.m (minimum) | 4.9 | 13.7 | 2.5 | | 4.9 | 13.7 | | 16.2 | 24.5 | |
| | Rise time for holding torque | ms (max.) | 80 | 100 | 50 | | 80 | 100 | | 110 | 80 | |
| | Release time | ms (max) | 70 | 50 | 15 | | 70 | 50 | | | 25 | |
| Basic specifications | Time Rating | | Continuous | | | | | | | | | |
| | Insulation class | | TypeF | | | | | | | | | |
| | Ambient operating/storage temperature | | 0 to 40 °C/–20 to 85°C | | | | | | | | | |
| | Ambient operating/storage humidity | | 20% to 85% (non-condensing) | | | | | | | | | |
| | Vibration class | | V-15 | | | | | | | | | |
| | Insulation resistance | | 20 MΩ min. at 500 VDC between the power terminals and FG terminal | | | | | | | | | |
| | Enclosure | | Totally-enclosed, self-cooling, IP67 (excluding shaft opening) | | | | | | | | | |
| | Vibration resistance | | Vibration acceleration 49 $m/s^2$ | | | | | | | | | |
| | Mounting | | Flange-mounted | | | | | | | | | |

*1 Applicable load inertia: The operable load inertia ratio (load inertia/rotor inertia) depends on the mechanical configuration and its rigidity. For a machine with high rigidity, operation is possible even with high load inertia. Select an appropriate motor and confirm that operation is possible.

## Standard servo motors 1,500 r/min, 400 V

| Applied voltage | | | 400 V | | |
|---|---|---|---|---|---|
| Servo motor model R88M-K_ | | 17-bit absolute encoder | 7K515C-_ | 11K015C-_ | 15K015C-_ |
| Rated output | | W | 7,500 | 11,000 | 15,000 |
| Rated torque | | N·m | 47.8 | 70.0 | 95.5 |
| Instantaneous peak torque | | N·m | 119.0 | 175.0 | 224.0 |
| Rated current | | A (rms) | 22.0 | 27.1 | 33.1 |
| Instantaneous max. current | | A (rms) | 83 | 101 | 118 |
| Rated speed | | $min^{-1}$ | 1,500 | | |
| Max. speed | | $min^{-1}$ | 3,000 | 2,000 | |
| Torque constant | | N·m/A | 1.54 | 1.84 | 2.10 |
| Rotor moment of inertia (JM) | | $kg·m^2 \times 10^{-4}$ (without brake) | 101 | 212 | 302 |
| | | $kg·m^2 \times 10^{-4}$ (with brake) | 107 | 220 | 311 |
| Allowable load moment of inertia (JL) | | Multiple of (JM) | 10*1 | | |
| Rated power rate | | kW/s (without brake) | 226 | 231 | 302 |
| | | kW/s (with brake) | 213 | 223 | 293 |
| Allowable radial load | | N | 1,176 | 2,254 | |
| Allowable thrust load | | N | 490 | 686 | |
| Approx. mass | | kg (without brake) | 36.4 | 52.7 | 70.2 |
| | | kg (with brake) | 40.4 | 58.9 | 76.3 |
| Brake specifications | Rated voltage | | 24VDC±10% | | |
| | Holding brake moment of inertia J | $kg·m^2 \times 10^{-4}$ | 4.7 | 7.1 | |
| | Power consumption (20°C) | W | 34 | 26 | |
| | Current consumption (20°C) | A | 1.4±10% | 1.08±10% | |
| | Static friction torque | N.m (minimum) | 58.8 | 100 | |
| | Rise time for holding torque | ms (max.) | 150 | 300 | |
| | Release time | ms (max) | 50 | 140 | |

| Applied voltage | | 400 V | | |
|---|---|---|---|---|
| Servo motor model R88M-K_ | 17-bit absolute encoder | 7K515C-_ | 11K015C-_ | 15K015C-_ |
| Basic specifications | Time Rating | Continuous | | |
| | Insulation class | Type F | | |
| | Ambient operating/storage temperature | 0 to 40 °C/–20 to 65°C | | |
| | Ambient operating/storage humidity | 20% to 85% RH (non-condensing) | | |
| | Vibration class | V-15 | | |
| | Insulation resistance | 20 MΩ min. at 500 VDC between the power terminals and FG terminal | | |
| | Enclosure | Totally-enclosed, self-cooling, IP67 (excluding shaft opening) | | |
| | Vibration resistance | Vibration acceleration 49 m/s2 | | |
| | Mounting | Flange-mounted | | |

*1 Applicable load inertia: The operable load inertia ratio (load inertia/rotor inertia) depends on the mechanical configuration and its rigidity. For a machine with high rigidity, operation is possible even with high load inertia. Select an appropriate motor and confirm that operation is possible.

## Standard servo motors 1000 r/min, 230 V/400 V

| Applied voltage | | 230 V | 400 V | | | | |
|---|---|---|---|---|---|---|---|
| Servo motor model R88M-K_ | 20-bit incremental encoder | 90010H-_ | 90010F-_ | 2K010F-_ | 3K010F-_ | | |
| | 17-bit absolute encoder | 90010T-_ | 90010C-_ | 2K010C-_ | 3K010C-_ | 4K510C-_ | 6K010C-_ |
| Rated output | W | 900 | 900 | 2,000 | 3,000 | 4,500 | 6,000 |
| Rated torque | N·m | 8.59 | | 19.1 | 28.7 | 43.0 | 57.3 |
| Instantaneous peak torque | N·m | 19.3 | | 47.7 | 71.7 | 107.0 | 143.0 |
| Rated current | A (rms) | 7.6 | 3.8 | 8.5 | 11.3 | 14.8 | 19.4 |
| Instantaneous max. current | A (rms) | 24 | 12 | 30 | 40 | 55 | 74 |
| Rated speed | $min^{-1}$ | 1,000 | | | | | |
| Max. speed | $min^{-1}$ | 2,000 | | | | | |
| Torque constant | N·m/A | 0.86 | 1.72 | 1.76 | 1.92 | 2.05 | 2.08 |
| Rotor moment of inertia (JM) | $kg·m^2 \times 10^{-4}$ (without brake) | 6.70 | | 30.3 | 48.4 | 79.1 | 101 |
| | $kg·m^2 \times 10^{-4}$ (with brake) | 7.99 | | 31.4 | 49.2 | 84.4 | 107 |
| Allowable load moment of inertia (JL) | Multiple of (JM) | 10*1 | | | | | |
| Rated power rate | kW/s (without brake) | 110 | | 120 | 170 | 233 | 325 |
| | kW/s (with brake) | 92.4 | | 116 | 167 | 219 | 307 |
| Allowable radial load | N | 686 | | 1,176 | 1,470 | | 1,764 |
| Allowable thrust load | N | 196 | | 490 | | | 588 |
| Approx. mass | kg (without brake) | 6.7 | | 14 | 20 | 29.4 | 36.4 |
| | kg (with brake) | 8.2 | | 17.5 | 23.5 | 33.3 | 40.4 |
| Brake specifications | Rated voltage | 24VDC±10% | | | | | |
| | Holding brake moment of inertia J | $kg·m^2 \times 10^{-4}$ | 1.35 | | 4.7 | | |
| | Power consumption (20°C) | W | 19 | | 31 | 34 | |
| | Current consumption (20°C) | A | 0.79±10% | | 1.3±10% | 1.4±10% | |
| | Static friction torque | N.m (minimum) | 13.7 | | 24.5 | 58.8 | |
| | Rise time for holding torque | ms (max.) | 100 | | 80 | 150 | |
| | Release time | ms (max) | 50 | | 25 | 50 | |
| Basic specifications | Time Rating | Continuous | | | | | |
| | Insulation class | Type F | | | | | |
| | Ambient operating/storage temperature | 0 to 40 °C/–20 to 65°C | | | | | |
| | Ambient operating/storage humidity | 20% to 85% RH (non-condensing) | | | | | |
| | Vibration class | V-15 | | | | | |
| | Insulation resistance | 20 MΩ min. at 500 VDC between the power terminals and FG terminal | | | | | |
| | Enclosure | Totally-enclosed, self-cooling, IP67 (excluding shaft opening) | | | | | |
| | Vibration resistance | Vibration acceleration 49 m/s2 | | | | | |
| | Mounting | Flange-mounted | | | | | |

*1 Applicable load inertia: The operable load inertia ratio (load inertia/rotor inertia) depends on the mechanical configuration and its rigidity. For a machine with high rigidity, operation is possible even with high load inertia. Select an appropriate motor and confirm that operation is possible.

## High inertia servo motors 3,000 r/min, 230 V

| Voltage | | 230 V | | |
|---|---|---|---|---|
| Servo motor model R88M-KH_ | 20-bit incremental encoder | 20030H-_ | 40030H-_ | 75030H-_ |
| | 17-bit absolute encoder | 20030T-_ | 40030T-_ | 75030T-_ |
| Rated output | W | 200 | 400 | 750 |
| Rated torque | N·m | 0.64 | 1.3 | 2.4 |
| Instantaneous peak torque | N·m | 1.91 | 3.8 | 7.1 |
| Rated current | A (rms) | 1.6 | 2.6 | 4.0 |
| Instantaneous max. current | A (rms) | 6.9 | 11.0 | 17.0 |
| Rated speed | $min^{-1}$ | 3,000 | | |
| Max. speed | $min^{-1}$ | 5,000 | | 4,500 |
| Torque constant | N·m/A | 0.29±10% | 0.36±10% | 0.45±10% |
| Rotor moment of inertia (JM) | $kg·m^2 \times 10^{-4}$ (without brake) | 0.42 | 0.67 | 1.51 |
| | $kg·m^2 \times 10^{-4}$ (with brake) | 0.45 | 0.70 | 1.61 |

| Voltage | | | 230 V | | |
|---|---|---|---|---|---|
| Servo motor model R88M-KH_ | 20-bit incremental encoder | | 20030H-_ | 40030H-_ | 75030H-_ |
| | 17-bit absolute encoder | | 20030T-_ | 40030T-_ | 75030T-_ |
| Allowable load moment of inertia (JL) | Multiple of (JM) | | 30*1 | | 20*1 |
| Rated power rate | kW/s (without brake) | | 9.58 | 24.1 | 37.7 |
| | kW/s (with brake) | | 9.06 | 23.3 | 35.3 |
| Allowable radial load | N | | 245 | | 392 |
| Allowable thrust load | N | | 98 | | 147 |
| Approx. mass | kg (without brake) | | 0.96 | 1.4 | 2.5 |
| | kg (with brake) | | 1.4 | 1.8 | 3.3 |
| Brake specifications | Rated voltage | | 24 VDC±5% | | |
| | Holding brake moment of inertia J | $kg \cdot m^2 \times 10^{-4}$ | 0.018 | | 0.075 |
| | Power consumption (at 20°C) | W | 9 | | 10 |
| | Current consumption (at 20°C) | A | 0.36 | | 0.42 |
| | Static friction torque | N.m (minimum) | 1.27 | | 2.45 |
| | Rise time for holding torque | ms (max.) | 50 | | 70 |
| | Release time | ms (max) | 15 | | 20 |
| Basic specifications | Time Rating | | Continuous | | |
| | Insulation class | | Type B | | |
| | Ambient operating/storage temperature | | 0 to 40°C/–20 to 65°C | | |
| | Ambient operating/storage humidity | | 20% to 85% RH (non-condensing) | | |
| | Vibration class | | V-15 | | |
| | Insulation resistance | | 20 MΩ min. at 500 VDC between the power terminals and FG terminal | | |
| | Enclosure | | Totally-enclosed, self-cooling, IP65 (excluding shaft opening and lead wire ends) | | |
| | Vibration resistance | | Vibration acceleration 49 $m/s^2$ | | |
| | Mounting | | Flange-mounted | | |

*1 Applicable load inertia: The operable load inertia ratio (load inertia/rotor inertia) depends on the mechanical configuration and its rigidity. For a machine with high rigidity, operation is possible even with high load inertia. Select an appropriate motor and confirm that operation is possible.

## High inertia servo motors 2,000 and 1,500 r/min, 400 V

| R/min, voltage | | | 2,000r/min, 400 V | | | | | | 1,500r/min, 400 V |
|---|---|---|---|---|---|---|---|---|---|
| Servo motor model R88M-KH_ | 20-bit incremental encoder | | 1K020F-_ | 1K520F-_ | 2K020F-_ | 3K020F-_ | 4K020F-_ | 5K020F-_ | |
| | 17-bit absolute encoder | | 1K020C-_ | 1K520C-_ | 2K020C-_ | 3K020C-_ | 4K020C-_ | 5K020C-_ | 7K515C-_ |
| Rated output | W | | 1,000 | 1,500 | 2,000 | 3,000 | 4,000 | 5,000 | 7,500 |
| Rated torque | N·m | | 4.77 | 7.16 | 9.55 | 14.3 | 19.1 | 23.9 | 47.8 |
| Instantaneous peak torque | N·m | | 14.3 | 21.5 | 28.6 | 43.0 | 57.3 | 71.6 | 119 |
| Rated current | A (rms) | | 2.9 | 4.7 | 5.5 | 8.0 | 10.5 | 13.0 | 22.0 |
| Instantaneous max. current | A (rms) | | 12 | 20 | 24 | 34 | 45 | 55 | 83 |
| Rated speed | $min^{-1}$ | | 2,000 | | | | | | 1500 |
| Max. speed | $min^{-1}$ | | 3,000 | | | | | | 3000 |
| Torque constant | N·m/A | | 1.27 | 1.16 | 1.31 | 1.34 | 1.38 | 1.39 | 1.54 |
| Rotor moment of inertia (JM) | $kg \cdot m^2 \times 10^{-4}$ (without brake) | | 24.7 | 37.1 | 57.8 | 90.2 | 112 | 162 | 273 |
| | $kg \cdot m^2 \times 10^{-4}$ (with brake) | | 26.0 | 38.4 | 62.9 | 95.3 | 117 | 167 | 279 |
| Max. load moment of inertia (JL) | Multiple of (JM) | | 5*1 | | | | | | |
| Rated power rate | kW/s (without brake) | | 9.2 | 13.8 | 15.8 | 22.7 | 32.5 | 35.1 | 86.7 |
| | kW/s (with brake) | | 8.8 | 13.4 | 14.5 | 21.5 | 31.1 | 34.1 | 85.1 |
| Allowable radial load | N | | 490 | | 784 | | | | 1,176 |
| Allowable thrust load | N | | 196 | | 343 | | | | 490 |
| Approx. mass | kg (without brake) | | 6.7 | 8.6 | 12.2 | 16.0 | 18.6 | 23.0 | 42.3 |
| | kg (with brake) | | 8.1 | 10.1 | 15.5 | 19.2 | 21.8 | 26.2 | 46.2 |
| Brake specifications | Rated voltage | | 24 VDC±10% | | | | | | |
| | Holding brake moment inertia | (J) $kg \cdot m^2 \times 10^{-4}$ | 1.35 | | 4.7 | | | | |
| | Power consumption (20°C) | W | 14 | 19 | 31 | | | | 34 |
| | Current consumption (20°C) | A | 0.59±10% | 0.79±10% | 1.30±10% | | | | 1.40±10% |
| | Static friction torque | N.m (minimum) | 4.9 | 13.7 | 24.5 | | | | 58.8 |
| | Rise time for holding torque | ms (max.) | 80 | 100 | 80 | | | | 150 |
| | Release time | ms (max) | 70 | 50 | 25 | | | | 50 |
| Basic specifications | Time Rating | | Continuous | | | | | | |
| | Insulation class | | Type F | | | | | | |
| | Ambient operating/storage temperature | | 0 to 40°C/–20 to 65°C | | | | | | |
| | Ambient operating/storage humidity | | 20% to 85% RH (non-condensing) | | | | | | |
| | Vibration class | | V-15 | | | | | | |
| | Insulation resistance | | 20 MW min. at 500 VDC between the power terminals and FG terminal | | | | | | |
| | Enclosure | | Totally-enclosed, self-cooling, IP67 (excluding shaft opening) | | | | | | |
| | Vibration resistance | | Vibration acceleration 49 $m/s^2$ | | | | | | |
| | Mounting | | Flange-mounted | | | | | | |

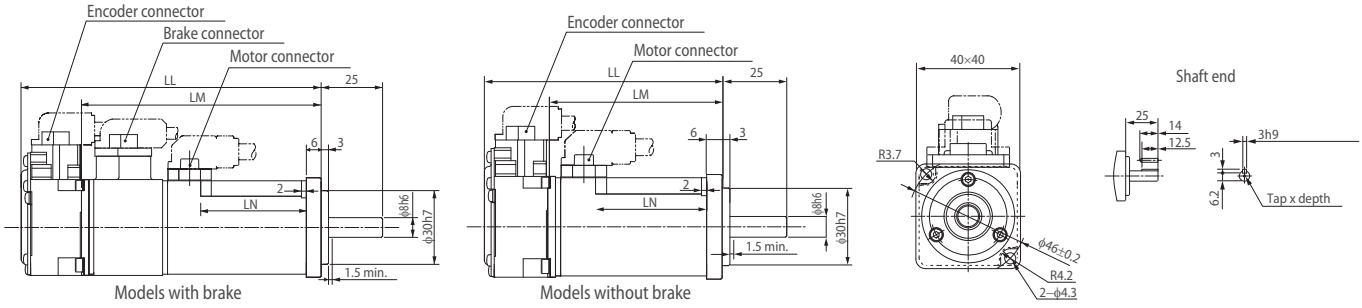
*1 Applicable load inertia: The operable load inertia ratio (load inertia/rotor inertia) depends on the mechanical configuration and its rigidity. For a machine with high rigidity, operation is possible even with high load inertia. Select an appropriate motor and confirm that operation is possible.

## Dimensions

### Standard servo motors

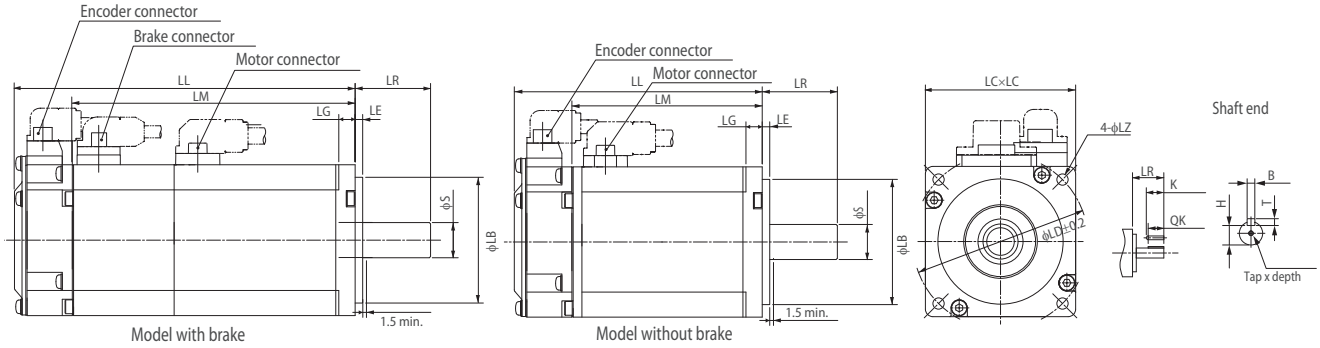
**Type 3,000 r/min motors (230 V, 50 to 100 W)**

| Dimensions (mm) | Without brake | | With brake | | LN | Shaft end dimensions | Approx. mass (kg) | |
|---|---|---|---|---|---|---|---|---|
| Model | LL | LM | LL | LM | | Tap × Depth | Without brake | With brake |
| R88M-K05030(H/T)-_S2 | 72 | 48 | 102 | 78 | 23 | M3 × 6L | 0.32 | 0.53 |
| R88M-K10030(H/T)-_S2 | 92 | 68 | 122 | 98 | 43 | | 0.47 | 0.68 |



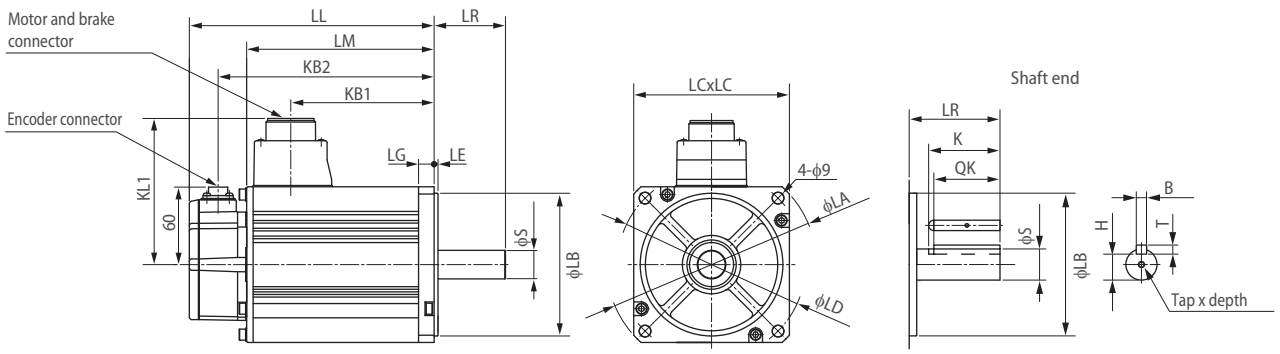

**Type 3,000 r/min motors (230 V, 200 to 750 W)**

| Dimensions (mm) | Without brake | | With brake | | LR | Flange surface | | | | | | Shaft end dimensions | | | | | | | Approx. mass (kg) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Model | LL | LM | LL | LM | | LB | LC | LD | LE | LG | LZ | S | K | QK | H | B | T | Tap × Depth | Without brake | With brake |
| R88M-K20030(H/T)-_S2 | 79.5 | 56.5 | 116 | 93 | 30 | $50^{h7}$ | 60 | 70 | 3 | 6.5 | 4.5 | $11^{h6}$ | 20 | 18 | 8.5 | $4^{h9}$ | 4 | M4 × 8L | 0.82 | 1.3 |
| R88M-K40030(H/T)-_S2 | 99 | 76 | 135.5 | 112.5 | | | | | | | | $14^{h6}$ | 25 | 22.5 | 11 | $5^{h9}$ | 5 | M5 × 10L | 1.2 | 1.7 |
| R88M-K75030(H/T)-_S2 | 112.2 | 86.2 | 148.2 | 122.2 | 35 | $70^{h7}$ | 80 | 90 | | 8 | 6 | $19^{h6}$ | | 22 | 15.5 | $6^{h9}$ | 6 | | 2.3 | 3.1 |



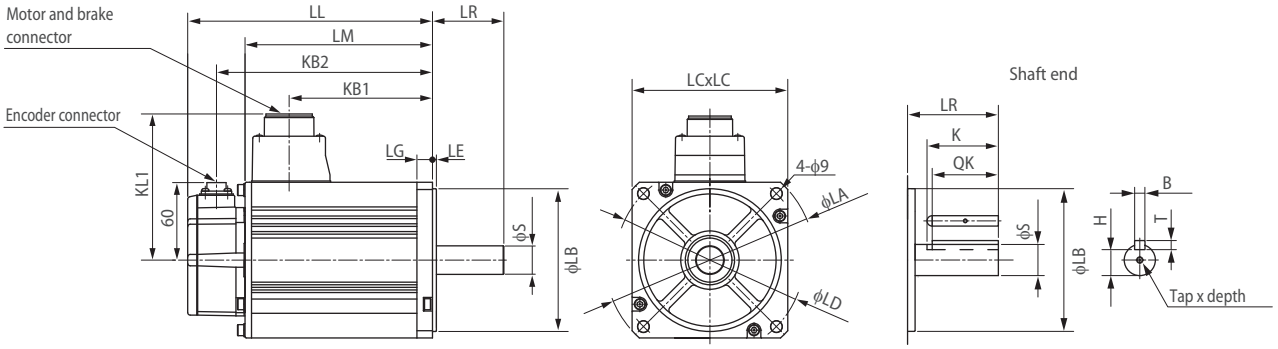

**Type 3,000 r/min motors (230 V, 1 to 1.5 kW/ 400V, 750 W to 5 kW)**

| Dimensions (mm) | | Without brake | | | | | With brake | | | | | LR | Flange surface | | | | | | Shaft end dimensions | | | | | | | Approx. mass (kg) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Voltage | Model R88M-K_ | LL | LM | KB1 | KB2 | KL1 | LL | LM | KB1 | KB2 | KL1 | | LA | LB | LC | LD | LE | LG | S | Tap × Depth | K | QK | H | B | T | Without brake | With brake |
| 230 | 1K030(H/T)-_S2 | 141 | 97 | 66 | 119 | 101 | 168 | 124 | 66 | 146 | 101 | 55 | 135 | $95^{h7}$ | 100 | 115 | 3 | 10 | $19^{h6}$ | M5 × 12L | 45 | 42 | 15.5 | $6^{h9}$ | 6 | 3.5 | 4.5 |
| | 1K530(H/T)-_S2 | 159.5 | 115.5 | 84.5 | 137.5 | | 186.5 | 142.5 | 84.5 | 164.5 | | | | | | | | | | | | | | | | 4.4 | 5.4 |
| 400 | 75030(F/C)-_S2 | 131.5 | 87.5 | 56.5 | 109.5 | | 158.5 | 114.5 | 53.5 | 136.5 | 103 | | | | | | | | | | | | | | | 3.1 | 4.1 |
| | 1K030(F/C)-_S2 | 141 | 97 | 66 | 119 | | 168 | 124 | 63 | 146 | | | | | | | | | | | | | | | | 3.5 | 4.5 |
| | 1K530(F/C)-_S2 | 159.5 | 115.5 | 84.5 | 137.5 | | 186.5 | 142.5 | 81.5 | 164.5 | | | | | | | | | | | | | | | | 4.4 | 5.4 |
| | 2K030(F/C)-_S2 | 178.5 | 134.5 | 103.5 | 156.5 | | 205.5 | 161.5 | 100.5 | 183.5 | | | | | | | | | | | | | | | | 5.3 | 6.3 |
| | 3K030(F/C)-_S2 | 190 | 146 | 112 | 168 | 113 | 215 | 171 | 112 | 193 | 113 | | 162 | $110^{h7}$ | 120 | 145 | | 12 | $22^{h6}$ | | | 41 | 18 | $8^{h9}$ | 7 | 8.3 | 9.4 |
| | 4K030(F/C)-_S2 | 208 | 164 | 127 | 186 | 118 | 233 | 189 | 127 | 211 | 118 | 65 | 165 | | 130 | | 6 | | $24^{h6}$ | M8 × 20L | 55 | 51 | 20 | | | 11 | 12.6 |
| | 5K030(F/C)-_S2 | 243 | 199 | 162 | 221 | | 268 | 224 | 162 | 246 | | | | | | | | | | | | | | | | 14 | 16 |



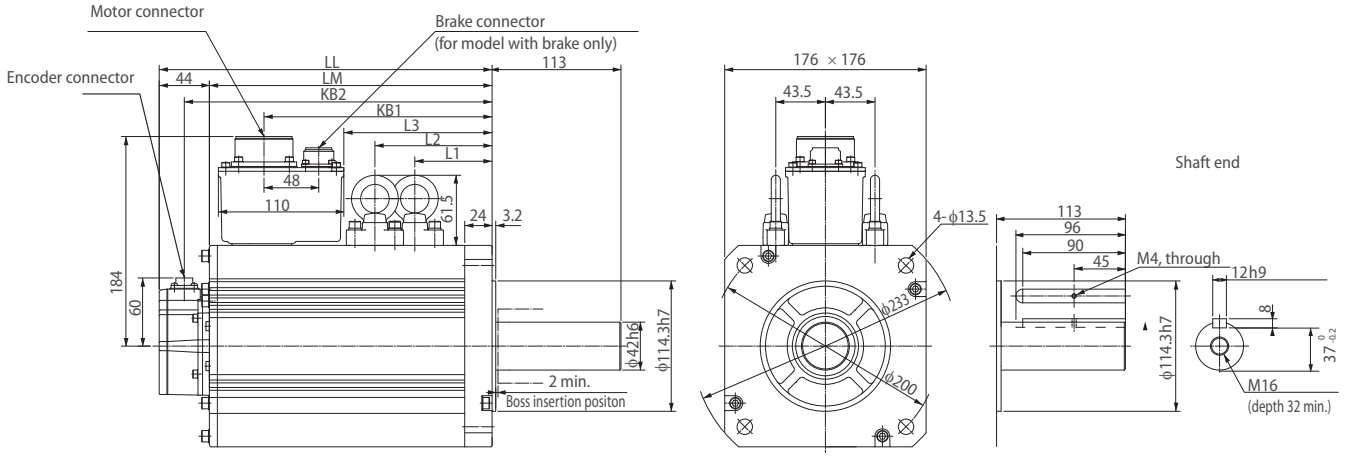
### Type 2,000 r/min motors (230 V, 1 to 1.5 kW/400 V, 400 W to 5 kW)

| Dimensions (mm) | | Without brake | | | | | With brake | | | | | LR | Flange surface | | | | | | | Shaft end dimensions | | | | | | | Approx. mass (kg) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Voltage | Model R88M-K_ | LL | LM | KB1 | KB2 | KL1 | LL | LM | KB1 | KB2 | KL1 | | LA | LB | LC | LD | LE | LG | LZ | S | Tap × Depth | K | QK | H | B | T | Without brake | With brake |
| 230 | 1K020(H/T)-_S2 | 138 | 94 | 60 | 116 | 116 | 163 | 119 | 60 | 141 | 116 | 55 | 165 | $110^{h7}$ | 130 | 145 | 6 | 12 | 9 | $22^{h6}$ | M5 × 12L | 45 | 41 | 18 | $8^{h9}$ | 7 | 5.2 | 6.7 |
| | 1K520(H/T)-_S2 | 155.5 | 111.5 | 77.5 | 133.5 | | 180.5 | 136.5 | 77.5 | 158.5 | | | | | | | | | | | | | | | | | 6.7 | 8.2 |
| 400 | 40020(F/C)-_S2 | 131.5 | 87.5 | 56.5 | 109.5 | 101 | 158.5 | 114.5 | 53.5 | 136.5 | 103 | | 135 | $95^{h7}$ | 100 | 115 | 3 | 10 | | $19^{h6}$ | | | 42 | 15.5 | $6^{h9}$ | 6 | 3.1 | 4.1 |
| | 60020(F/C)-_S2 | 141 | 97 | 66 | 119 | | 168 | 124 | 63 | 146 | | | | | | | | | | | | | | | | | 3.5 | 4.5 |
| | 1K020(F/C)-_S2 | 138 | 94 | 60 | 116 | 116 | 163 | 119 | 57 | 141 | 118 | | 165 | $110^{h7}$ | 130 | 145 | 6 | 12 | | $22^{h6}$ | | | 41 | 18 | $8^{h9}$ | 7 | 5.2 | 6.7 |
| | 1K520(F/C)-_S2 | 155.5 | 111.5 | 77.5 | 133.5 | | 180.5 | 136.5 | 74.5 | 158.5 | | | | | | | | | | | | | | | | | 6.7 | 8.2 |
| | 2K020(F/C)-_S2 | 173 | 129 | 95 | 151 | | 198 | 154 | 92 | 176 | | | | | | | | | | | | | | | | | 8 | 9.5 |
| | 3K020(F/C)-_S2 | 208 | 164 | 127 | 186 | 118 | 233 | 189 | 127 | 211 | | 65 | | | | | | | | $24^{h6}$ | M8 × 20L | 55 | 51 | 20 | | | 11 | 12.6 |
| | 4K020(F/C)-_S2 | 177 | 133 | 96 | 155 | 140 | 202 | 158 | 96 | 180 | 140 | 70 | 233 | $114.3^{h7}$ | 176 | 200 | 3.2 | 18 | 13.5 | $35^{h6}$ | M12 × 25L | | 50 | 30 | $10^{h9}$ | 8 | 15.5 | 18.7 |
| | 5K020(F/C)-_S2 | 196 | 152 | 115 | 174 | | 221 | 177 | 115 | 199 | | | | | | | | | | | | | | | | | 18.6 | 21.8 |



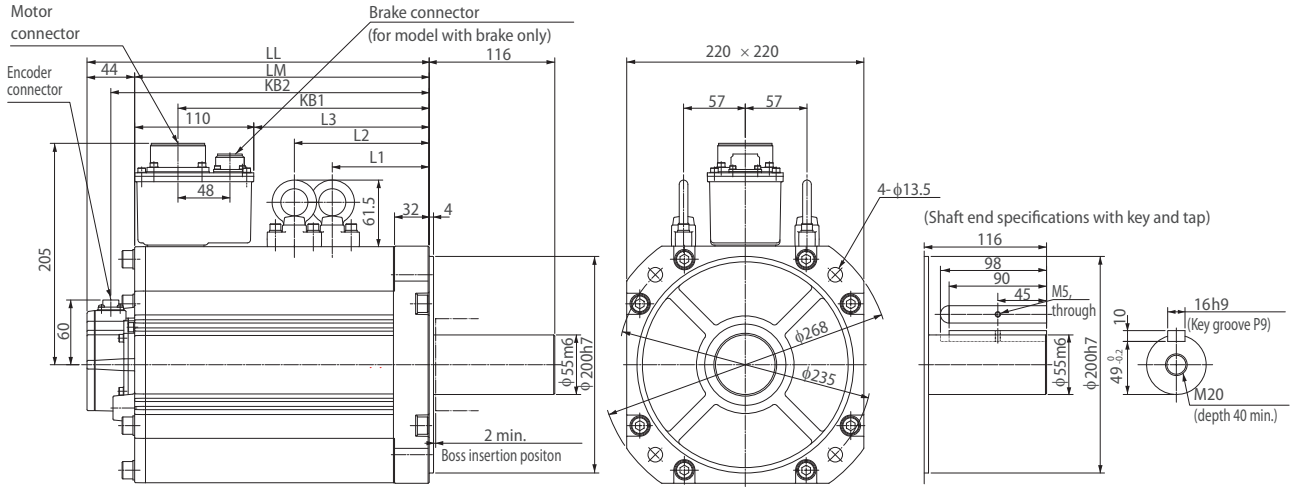

### Type 1,500 r/min motors (400 V, 7.5 kW)

| Dimensions (mm) | | Without brake | | | | | | | With brake | | | | | | | Approx. mass (kg) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Voltage | Model R88M-K_ | LL | LM | KB1 | KB2 | L1 | L2 | L3 | LL | LM | KB1 | KB2 | L1 | L2 | L3 | Whithout brake | With brake |
| 400 | 7K515C-_S2 | 312 | 268 | 219 | 290 | 117.5 | 117.5 | 149 | 337 | 293 | 253 | 315 | 117.5 | 152.5 | 183 | 36.4 | 40.4 |



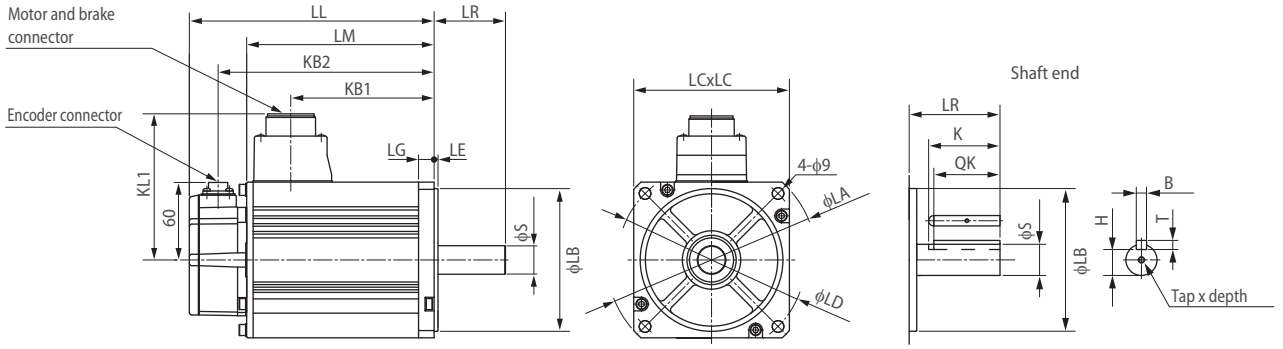
### Type 1,500 r/min motors (400 V, 11 to 15 kW)

| Dimensions (mm) | | Without brake | | | | | | | With brake | | | | | | | Approx. mass (kg) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Voltage | Model R88M-K_ | LL | LM | KB1 | KB2 | L1 | L2 | L3 | LL | LM | KB1 | KB2 | L1 | L2 | L3 | Whithout brake | With brake |
| 400 | 11K015C-_S2 | 316 | 272 | 232 | 294 | 124.5 | 124.5 | 162 | 364 | 320 | 266 | 342 | 124.5 | 159.5 | 196 | 52.7 | 58.9 |
| | 15K015C-_S2 | 384 | 340 | 300 | 362 | 158.5 | 158.5 | 230 | 432 | 388 | 334 | 410 | 158.5 | 193.5 | 264 | 70.2 | 76.3 |



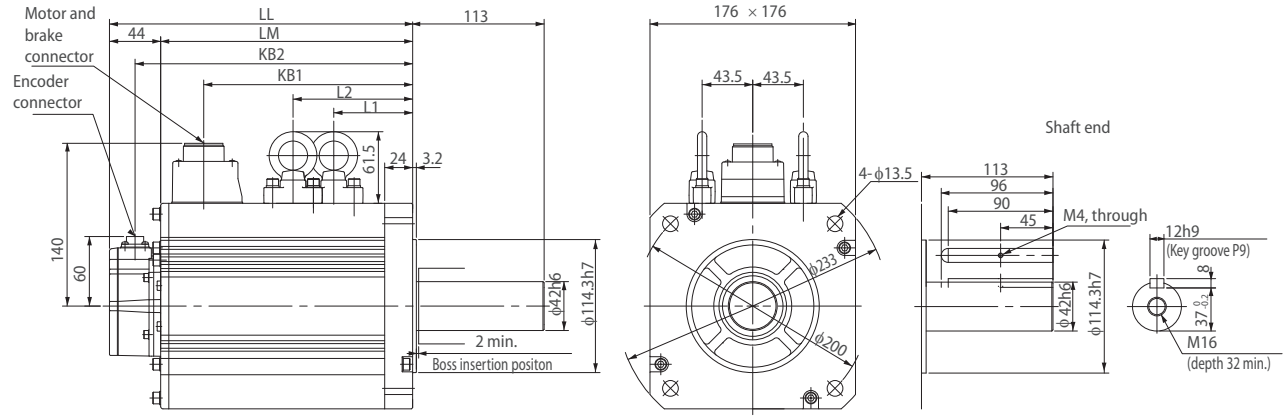

### Type 1,000 r/min motors (230 V, 900 W/400 V, 900 W to 3 kW)

| Dimensions (mm) | | Without brake | | | | | With brake | | | | | LR | Flange surface | | | | | | | Shaft end dimensions | | | | | | | Approx. mass (kg) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Voltage | Model R88M-K_ | LL | LM | KB1 | KB2 | KL1 | LL | LM | KB1 | KB2 | KL1 | | LA | LB | LC | LD | LE | LG | LZ | S | Tap × Depth | K | QK | H | B | T | Without brake | With brake |
| 230 | 90010(H/T)-_S2 | 155.5 | 111.5 | 77.5 | 133.5 | 116 | 180.5 | 136.5 | 77.5 | 158.5 | 116 | 70 | 165 | $110^{h7}$ | 130 | 145 | 6 | 12 | 9 | $22^{h6}$ | M5 × 12L | 45 | 41 | 18 | $8^{h9}$ | 7 | 6.7 | 8.2 |
| 400 | 90010(F/C)-_S2 | | | | | | | | 74.5 | | 118 | | | | | | | | | | M5 × 10L | | | | | | | |
| | 2K010(F/C)-_S2 | 163.5 | 119.5 | 82.5 | 141.5 | 140 | 188.5 | 144.5 | 82.5 | 166.5 | 140 | 80 | 233 | $114.3^{h7}$ | 176 | 200 | 3.2 | 18 | 13.5 | $35^{h6}$ | M12 × 25L | 55 | 50 | 30 | $10^{h9}$ | 8 | 14 | 17.5 |
| | 3K010(F/C)-_S2 | 209.5 | 165.5 | 128.5 | 187.5 | | 234.5 | 190.5 | 128.5 | 212.5 | | | | | | | | | | | | | | | | | 20 | 23.5 |



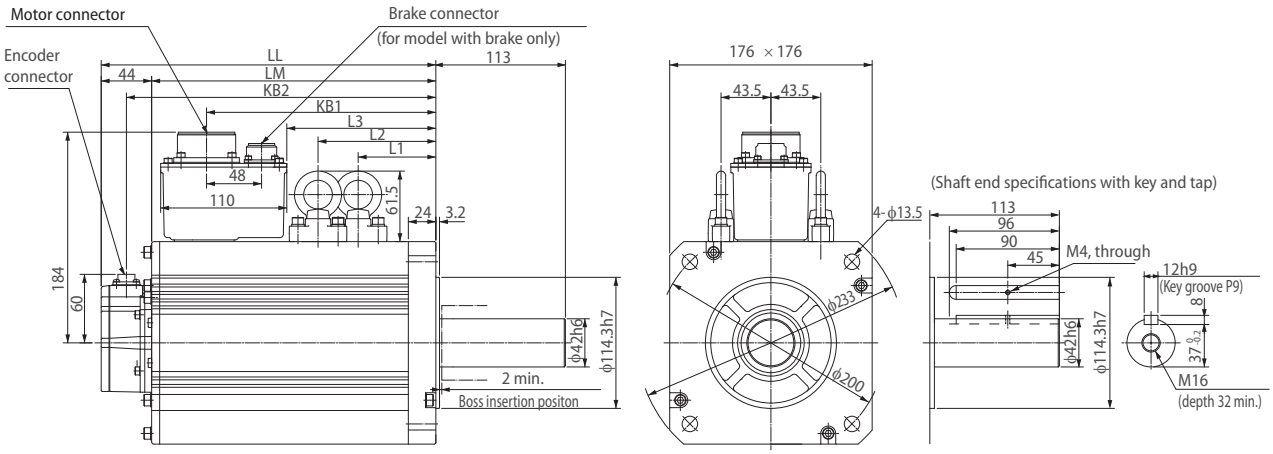

### Type 1,000 r/min motors (400 V, 4.5 kW)

| Dimensions (mm) | | Without brake | | | | | | With brake | | | | | | Approx. mass (kg) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Voltage | Model R88M-K_ | LL | LM | KB1 | KB2 | L1 | L2 | LL | LM | KB1 | KB2 | L1 | L2 | Whithout brake | With brake |
| 400 | 4K510C-_S2 | 266 | 222 | 185 | 244 | 98 | 98 | 291 | 247 | 185 | 269 | 98 | 133 | 29.4 | 33.3 |



### Type 1,000 r/min motors (400 V, 6 kW)

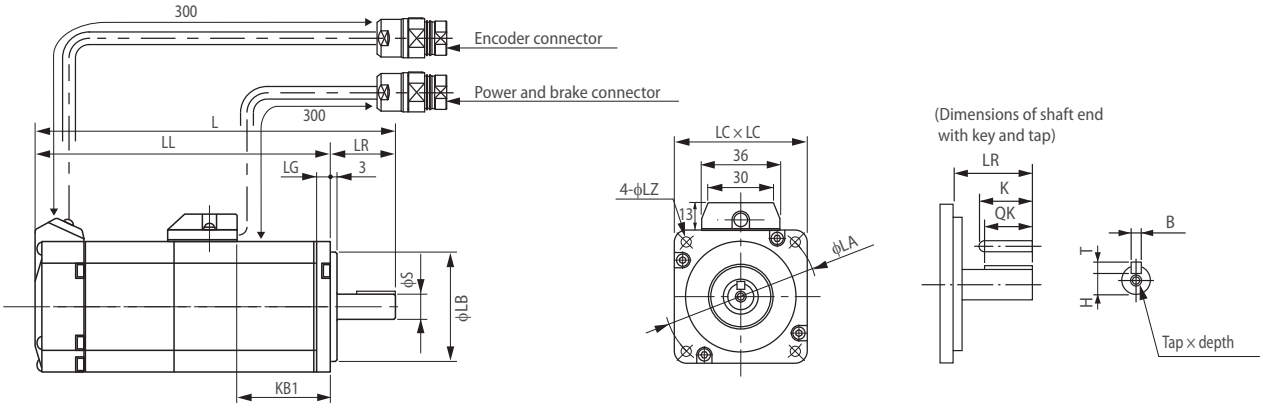
| Dimensions (mm) | | Without brake | | | | | | | With brake | | | | | | | Approx. mass (kg) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Voltage | Model R88M-K_ | LL | LM | KB1 | KB2 | L1 | L2 | L3 | LL | LM | KB1 | KB2 | L1 | L2 | L3 | Whithout brake | With brake |
| 400 | 6K010C-_S2 | 312 | 268 | 219 | 290 | 117.5 | 117.5 | 149 | 337 | 293 | 253 | 315 | 117.5 | 152.5 | 183 | 36.4 | 40.4 |




## High inertia servo motors

### Type 3,000 r/min motors (230 V, 200 to 750 W)

| Dimensions (mm) | | Without brake | | With brake | | KB1 | LR | Flange surface | | | | | Shaft end dimensions | | | | | | | Approx. mass (kg) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Voltage | Model R88M-KH□ | L | LL | L | LL | | | LA | LB | LC | LG | LZ | S | Tap × Depth | K | QK | H | B | T | Without brake | With brake |
| 230 | 20030(H/T)-_S2-D | 129 | 99 | 165.5 | 135.5 | 42 | 30 | 70 | $50^{h7}$ | 60 | 6.5 | 4.5 | $11^{h6}$ | M4 × 8L | 20 | 18 | 8.5 | $4^{h9}$ | 4 | 0.96 | 1.4 |
| | 40030(H/T)-_S2-D | 148.5 | 118.5 | 185 | 155 | 61.5 | | | | | | | $14^{h6}$ | M5 × 10L | 25 | 22.5 | 11 | $5^{h9}$ | 5 | 1.4 | 1.8 |
| | 75030(H/T)-_S2-D | 162.2 | 127.2 | 199.2 | 164.2 | 67.2 | 35 | 90 | $70^{h7}$ | 80 | 8 | 6 | $19^{h6}$ | M5 × 10L | 25 | 22 | 15.5 | $6^{h9}$ | 6 | 2.5 | 3.3 |




Encoder connector wiring

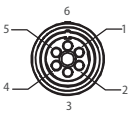
Cable length 300±30
Connector optional
Made by Hypertac
SRUC-17G-MRWN040 (MALE)

| Encoder connector | |
|---|---|
| Pin No. | Signal |
| 1 | BAT – (0 V) |
| 2 | BAT + |
| 3 | S + |
| 4 | S – |
| 5 to 7 | Free |
| 8 | E5V (power supply) |
| 9 | E0V (power supply) |
| 10 to 17 | Free |
| Connector case | FG (Ground) |

* Note: Pins 1 and 2 used only for motors with ABS encoder.

Mating connector:
Plug type: SPOC-17H-FRON169 (FEMALE)

Power and brake connector wiring




Cable length 300±30
Connector optional
Made by Hypertac
SRUC-06J-MSCN236 (MALE)

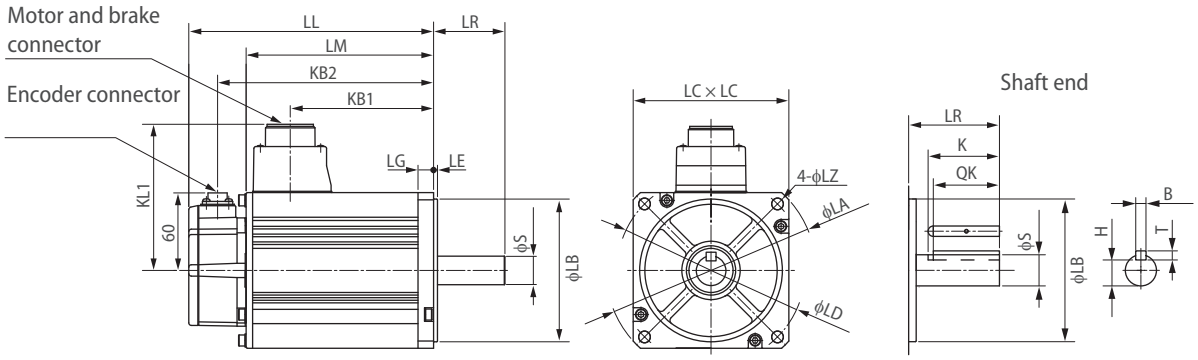
| Power and brake connector | |
|---|---|
| Pin No. | Output |
| 1 | Phase U |
| 2 | Phase V |
| 3 | Phase W |
| 4 | *Brake terminal |
| 5 | *Brake terminal |
| 6 | FG (ground) |

* Note: Pins 4 and 5 used only for motors with brake.

Mating connector:
Plug type: SPOC-06K-FSDN169 (FEMALE)

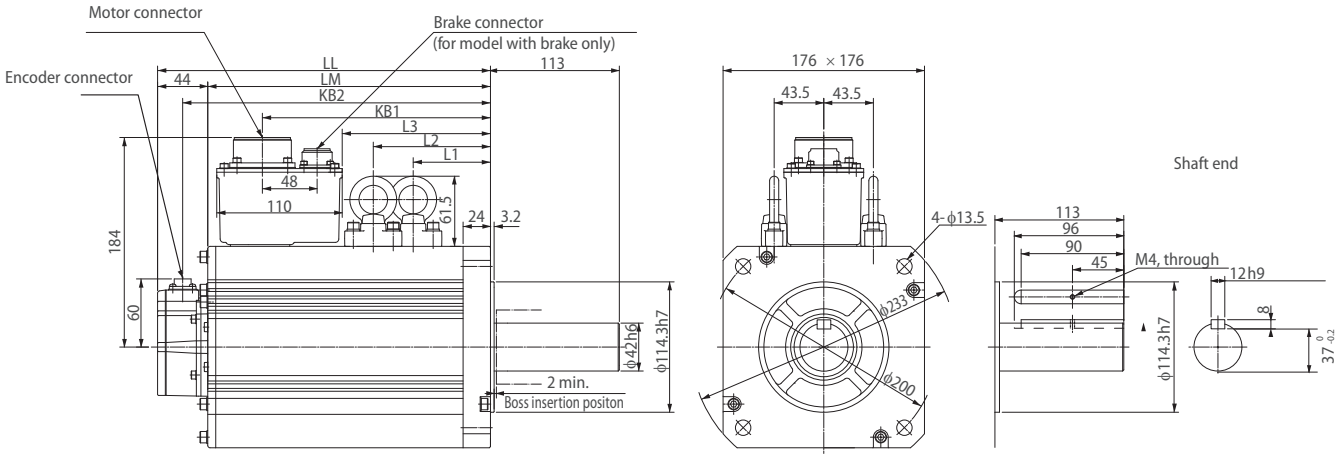
**Type 2,000 r/min motors (400 V, 1 kW to 5 kW)**

| Dimensions (mm) | | Without brake | | | | | With brake | | | | | LR | Flange surface | | | | | | | Shaft End Dimensions | | | | | | Approx. mass (kg) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Voltage | Model R88M-KH□ | LL | LM | KB1 | KB2 | KL1 | LL | LM | KB1 | KB2 | KL1 | | LA | LB | LC | LD | LE | LG | LZ | S | K | QK | H | B | T | Without brake | With brake |
| 400 | 1K020(F/C)-_S1 | 173 | 129 | 95 | 151 | 116 | 201 | 157 | 92 | 179 | 118 | 70 | 165 | $110^{h7}$ | 130 | 145 | 6 | 12 | 9 | $22^{h6}$ | 45 | 41 | 18 | $8^{h9}$ | 7 | 6.7 | 8.1 |
| | 1K520(F/C)-_S1 | 190.5 | 146.5 | 112.5 | 168.5 | | 218.5 | 174.5 | 109.5 | 196.5 | | | | | | | | | | | | | | | | 8.6 | 10.1 |
| | 2K020(F/C)-_S1 | 177 | 133 | 96 | 155 | 140 | 206 | 162 | 96 | 184 | 140 | 80 | 233 | $114.3^{h7}$ | 176 | 200 | 3.2 | 18 | 13.5 | $35^{h6}$ | 55 | 50 | 30 | $10^{h9}$ | 8 | 12.2 | 15.5 |
| | 3K020(F/C)-_S1 | 196 | 152 | 115 | 174 | | 225 | 181 | 115 | 203 | | | | | | | | | | | | | | | | 16.0 | 19.2 |
| | 4K020(F/C)-_S1 | 209.5 | 165.5 | 128.5 | 187.5 | | 238.5 | 194.5 | 128.5 | 216.5 | | | | | | | | | | | | | | | | 18.6 | 21.8 |
| | 5K020(F/C)-_S1 | 238.5 | 194.5 | 157.5 | 216.5 | | 267.5 | 223.5 | 157.5 | 245.5 | | | | | | | | | | | | | | | | 23.0 | 26.2 |




**Type 1,500 r/min motors (400 V, 7.5 kW)**

| Dimensions (mm) | | Without brake | | | | | | | With brake | | | | | | | Approx. mass (kg) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Voltage | Model R88M-KH_ | LL | LM | KB1 | KB2 | L1 | L2 | L3 | LL | LM | KB1 | KB2 | L1 | L2 | L3 | Whithout brake | With brake |
| 400 | 7K515C-_S1 | 357 | 313 | 264 | 335 | 146.5 | 146.5 | 194 | 382 | 338 | 298 | 360 | 146.5 | 181.5 | 228 | 42.3 | 46.2 |



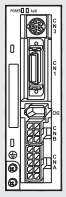
## Compact in size, big in features

A wide range of compact servo motors to meet all application needs. When used with a SmartStep 2 drive, the G-Series servo motors offer the simplicity and cost-effectiveness of a stepper with the added advantages of a servo system.

- Peak torque 300% of continuous torque during 3 seconds or more depending on model
- Servo motors supported by SmartStep2, G-Series and Accurax G5 servo drives
- Cylindrical and Flat servo motors types are available
- Encoder accuracy of 10,000 step/rev as standard and 17-bit INC/ABS encoder as optional
- IP65 as standard and shaft oil seal available
- Motors with brake as option

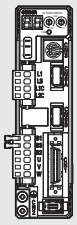


## Ordering information

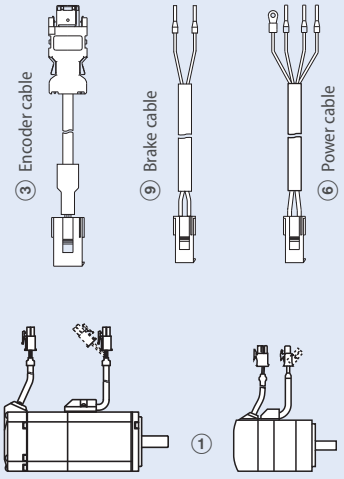


**SmartStep 2**
Servo drive controlled by pulses (100 to 750 W)

Drive options
②

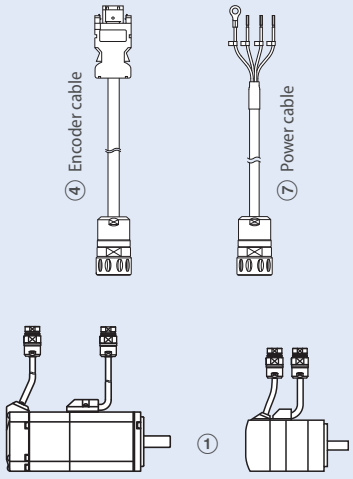


**G-Series servo drive**
ML2 and analog/pulse models (100 to 1500 W)



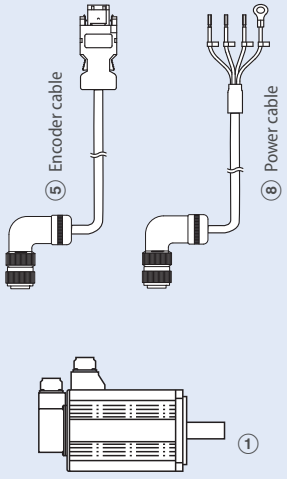

**Servo motor with standard connector**
3,000 rpm (50 to 750 W)

**Flat type servo motor with standard connector**
3,000 rpm (100 to 400 W)




**Servo motor with circular connector**
3,000 rpm (50 to 750 W)

**Flat type servo motor with circular connector**
3,000 rpm (100 to 400 W)




3,000 rpm (1,000 to 1,500 W)
2,000 rpm (1,000 to 1,500 W)
1,000 rpm (900 W)

**Note:** The symbols ①②③④⑤⑥ ... show the recommended sequence to select the servo motor and cables

### Servo drive

② Refer to G-Series and SmartStep2 servo drive section for detailed drive specifications and selection of drive accessories.

### Servo motor

① Select motor from cylindrical and flat types using motor tables in next pages.

### Cylindrical servo motors 3,000/2,000/1,000 r/min (230 V, 50 to 1.5 kW)

| Symbol | Specifications | | | | | ② Compatible servo drives | | Servo motor with standard connector | Servo motor with circular connector |
|---|---|---|---|---|---|---|---|---|---|
| | Encoder and design | Speed | Design | Rated torque | Capacity | SmartStep 2 | G-Series | Order code | |
| ①  (50 to 750 W) | Incremental encoder (10,000 pulses) Straight shaft with key and tap | 3,000 min$^{-1}$ | Without brake | 0.16 Nm | 50 W | R7D-BP01H | R88D-G_01H_ | R88M-G05030H-S2 | R88M-G05030H-S2-D |
| | | | | 0.32 Nm | 100 W | R7D-BP01H | R88D-G_01H_ | R88M-G10030H-S2 | R88M-G10030H-S2-D |
| | | | | 0.64 Nm | 200 W | R7D-BP02HH | R88D-G_02H_ | R88M-G20030H-S2 | R88M-G20030H-S2-D |
| | | | | 1.3 Nm | 400 W | R7D-BP04H | R88D-G_04H_ | R88M-G40030H-S2 | R88M-G40030H-S2-D |
| | | | | 2.4 Nm | 750 W | R88D-GP08H | R88D-G_08H_ | R88M-G75030H-S2 | R88M-G75030H-S2-D |
| | | | With brake | 0.16 Nm | 50 W | R7D-BP01H | R88D-G_01H_ | R88M-G05030H-BS2 | R88M-G05030H-BS2-D |
| | | | | 0.32 Nm | 100 W | R7D-BP01H | R88D-G_01H_ | R88M-G10030H-BS2 | R88M-G10030H-BS2-D |
| | | | | 0.64 Nm | 200 W | R7D-BP02HH | R88D-G_02H_ | R88M-G20030H-BS2 | R88M-G20030H-BS2-D |
| | | | | 1.3 Nm | 400 W | R7D-BP04H | R88D-G_04H_ | R88M-G40030H-BS2 | R88M-G40030H-BS2-D |
| | | | | 2.4 Nm | 750 W | R88D-GP08H | R88D-G_08H_ | R88M-G75030H-BS2 | R88M-G75030H-BS2-D |
|  (900 to 1,500 W) | Absolute/ incremental encoder (17 bits) Straight shaft with key and tap | 3,000 min$^{-1}$ | Without brake | 0.16 Nm | 50 W | – | R88D-G_01H_ | R88M-G05030T-S2 | R88M-G05030T-S2-D |
| | | | | 0.32 Nm | 100 W | – | R88D-G_01H_ | R88M-G10030T-S2 | R88M-G10030T-S2-D |
| | | | | 0.64 Nm | 200 W | – | R88D-G_02H_ | R88M-G20030T-S2 | R88M-G20030T-S2-D |
| | | | | 1.3 Nm | 400 W | – | R88D-G_04H_ | R88M-G40030T-S2 | R88M-G40030T-S2-D |
| | | | | 2.4 Nm | 750 W | – | R88D-G_08H_ | R88M-G75030T-S2 | R88M-G75030T-S2-D |
| | | | | 3.18 Nm | 1 kW | – | R88D-G_15H_ | R88M-G1K030T-S2 | – |
| | | | | 4.77 Nm | 1.5 kW | – | R88D-G_15H_ | R88M-G1K530T-S2 | – |
| | | | With brake | 0.16 Nm | 50 W | – | R88D-G_01H_ | R88M-G05030T-BS2 | R88M-G05030T-BS2-D |
| | | | | 0.32 Nm | 100 W | – | R88D-G_01H_ | R88M-G10030T-BS2 | R88M-G10030T-BS2-D |
| | | | | 0.64 Nm | 200 W | – | R88D-G_02H_ | R88M-G20030T-BS2 | R88M-G20030T-BS2-D |
| | | | | 1.3 Nm | 400 W | – | R88D-G_04H_ | R88M-G40030T-BS2 | R88M-G40030T-BS2-D |
| | | | | 2.4 Nm | 750 W | – | R88D-G_08H_ | R88M-G75030T-BS2 | R88M-G75030T-BS2-D |
| | | | | 3.18 Nm | 1 kW | – | R88D-G_15H_ | R88M-G1K030T-BS2 | – |
| | | | | 4.77 Nm | 1.5 kW | – | R88D-G_15H_ | R88M-G1K530T-BS2 | – |
| | | 2,000 min$^{-1}$ | Without brake | 4.8 Nm | 1 kW | – | R88D-G_10H_ | R88M-G1K020T-S2 | – |
| | | | | 7.15 Nm | 1.5 kW | – | R88D-G_15H_ | R88M-G1K520T-S2 | – |
| | | | With brake | 4.8 N m | 1 kW | – | R88D-G_10H_ | R88M-G1K020T-BS2 | – |
| | | | | 7.15 Nm | 1.5 kW | – | R88D-G_15H_ | R88M-G1K520T-BS2 | – |
| | | 1,000 min$^{-1}$ | Without brake | 8.62 Nm | 900 W | – | R88D-G_15H_ | R88M-G90010T-S2 | – |
| | | | With brake | 8.62 Nm | 900 W | – | R88D-G_15H_ | R88M-G90010T-BS2 | – |

### Flat type servo motors 3,000 r/min (230 V, 100 to 400 W)

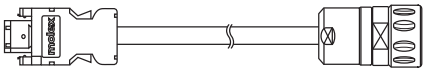
| Symbol | Specifications | | | | ② Compatible servo drives | | Servo motor with standard connector | Servo motor with circular connector |
|---|---|---|---|---|---|---|---|---|
| | Encoder and design | | Rated torque | Capacity | SmartStep 2 | G-Series | Order code | |
| ①  | Incremental encoder (10,000 pulses) Straight shaft with key and tap | Without brake | 0.32 Nm | 100 W | R7D-BP01H | R88D-G_01H_ | R88M-GP10030H-S2 | R88M-GP10030H-S2-D |
| | | | 0.64 Nm | 200 W | R7D-BP02HH | R88D-G_02H_ | R88M-GP20030H-S2 | R88M-GP20030H-S2-D |
| | | | 1.3 Nm | 400 W | R7D-BP04H | R88D-G_04H_ | R88M-GP40030H-S2 | R88M-GP40030H-S2-D |
| | | With brake | 0.32 Nm | 100 W | R7D-BP01H | R88D-G_01H_ | R88M-GP10030H-BS2 | R88M-GP10030H-BS2-D |
| | | | 0.64 Nm | 200 W | R7D-BP02HH | R88D-G_02H_ | R88M-GP20030H-BS2 | R88M-GP20030H-BS2-D |
| | | | 1.3 Nm | 400 W | R7D-BP04H | R88D-G_04H_ | R88M-GP40030H-BS2 | R88M-GP40030H-BS2-D |
| | Absolute/ incremental encoder (17 bits) Straight shaft with key and tap | Without brake | 0.32 Nm | 100 W | – | R88D-G_01H_ | R88M-GP10030T-S2 | R88M-GP10030T-S2-D |
| | | | 0.64 Nm | 200 W | – | R88D-G_02H_ | R88M-GP20030T-S2 | R88M-GP20030T-S2-D |
| | | | 1.3 Nm | 400 W | – | R88D-G_04H_ | R88M-GP40030T-S2 | R88M-GP40030T-S2-D |
| | | With brake | 0.32 Nm | 100 W | – | R88D-G_01H_ | R88M-GP10030T-BS2 | R88M-GP10030T-BS2-D |
| | | | 0.64 Nm | 200 W | – | R88D-G_02H_ | R88M-GP20030T-BS2 | R88M-GP20030T-BS2-D |
| | | | 1.3 Nm | 400 W | – | R88D-G_04H_ | R88M-GP40030T-BS2 | R88M-GP40030T-BS2-D |

## Encoder cables

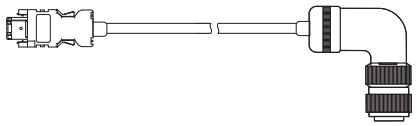
### For 50 to 750 W servo motors with standard connectors

| Symbol | Appearance | Specifications | | Length | Order code |
|---|---|---|---|---|---|
| ③ |  | Encoder cable (50 to 750 W)<br>R88M-G(50/100/200/400/750)30<br>R88M-GP(100/200/400)30 | Absolute encoder<br>T-_ | 1.5 m | R88A-CRGA001-5CR-E |
| | | | | 3 m | R88A-CRGA003CR-E |
| | | | | 5 m | R88A-CRGA005CR-E |
| | | | | 10 m | R88A-CRGA010CR-E |
| | | | | 15 m | R88A-CRGA015CR-E |
| | | | | 20 m | R88A-CRGA020CR-E |
| |  | | Incremental encoder<br>H-_ | 1.5 m | R88A-CRGB001-5CR-E |
| | | | | 3 m | R88A-CRGB003CR-E |
| | | | | 5 m | R88A-CRGB005CR-E |
| | | | | 10 m | R88A-CRGB010CR-E |
| | | | | 15 m | R88A-CRGB015CR-E |
| | | | | 20 m | R88A-CRGB020CR-E |

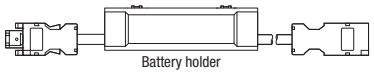
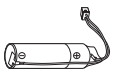
### For 50 to 750 W servo motors with circular connector

| Symbol | Appearance | Specifications | Length | Order code |
|---|---|---|---|---|
| ④ |  | Encoder cable (50 to 750 W)<br>R88M-G(50/100/200/400/750)30_-___-D<br>R88M-GP(100/200/400)30_-___-D | 3 m | R88A-CRWA003C-DE |
| | | | 5 m | R88A-CRWA005C-DE |
| | | | 10 m | R88A-CRWA010C-DE |
| | | | 15 m | R88A-CRWA015C-DE |
| | | | 20 m | R88A-CRWA020C-DE |

### For 900 to 1,500 W servo motors

| Symbol | Appearance | Specifications | Length | Order code |
|---|---|---|---|---|
| ⑤ |  | Encoder cable (900-1500 W)<br>R88M-G(1K0/1K5)30T-_<br>R88M-G(1K0/1K5)20T-_<br>R88M-G90010T-_ | 1.5 m | R88A-CRGC001-5NR-E |
| | | | 3 m | R88A-CRGC003NR-E |
| | | | 5 m | R88A-CRGC005NR-E |
| | | | 10 m | R88A-CRGC010NR-E |
| | | | 15 m | R88A-CRGC015NR-E |
| | | | 20 m | R88A-CRGC020NR-E |

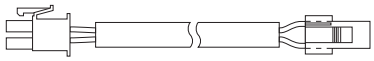
### Battery cable for G-series servo drive models with absolute encoder

| Symbol | Appearance | Specifications | | | Order code |
|---|---|---|---|---|---|
| ④ |  | Absolute encoder battery cable | Battery not included | 0.3 m | R88A-CRGDOR3C-E |
| | | | Battery included | 0.3 m | R88A-CRGDOR3C-BS-E |
| |  | Absolute encoder backup battery 2,000 mA.h 3.6 V | | – | R88A-BAT01G |

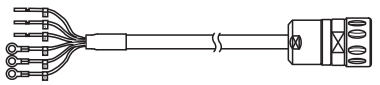
**Note:** The absolute encoder battery cable is only an extension and must be used with an absolute encoder cable.

## Power cables

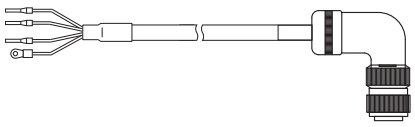
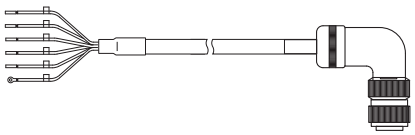
### For 50 to 750 W servo motors with standard connectors

| Symbol | Appearance | Specifications | Applicable servo drive | Length | Order code |
|---|---|---|---|---|---|
| ⑥ |  | For servomotors from 50 to 400 W<br>R88M-G(050/100/200/400)30_<br>R88M-GP(100/200/400)30_<br><br>For servomotors with brake, a separate cable (R88A-CAGA_BR-E) is needed | SmartStep 2 | 1.5 m | R7A-CAB001-5SR-E |
| | | | | 3 m | R7A-CAB003SR-E |
| | | | | 5 m | R7A-CAB005SR-E |
| | | | | 10 m | R7A-CAB010SR-E |
| | | | | 15 m | R7A-CAB015SR-E |
| | | | | 20 m | R7A-CAB020SR-E |
| |  | For servomotors from 50 to 750W<br>R88M-G(050/100/200/400/750)30_<br>R88M-GP(100/200/400)30_<br><br>For servomotors with brake, a separate cable (R88A-CAGA_BR-E) is needed | SmartStep 2 (only 750 W) and G-Series | 1.5 m | R88A-CAGA001-5SR-E |
| | | | | 3 m | R88A-CAGA003SR-E |
| | | | | 5 m | R88A-CAGA005SR-E |
| | | | | 10 m | R88A-CAGA010SR-E |
| | | | | 15 m | R88A-CAGA015SR-E |
| | | | | 20 m | R88A-CAGA020SR-E |

### For 50 to 750 W servo motors with circular connectors

| Symbol | Appearance | Specifications | | Applicable servo drive | Length | Order code |
|---|---|---|---|---|---|---|
| ⑦ |  | For servomotors from 50 to 400 W<br>R88M-G(050/100/200/400)30_<br>R88M-GP(100/200/400)30_ | Without brake<br>-S2-D | SmartStep 2 | 1.5 m | R7A-CAB001-5SR-DE |
| | | | | | 3 m | R7A-CAB003SR-DE |
| | | | | | 5 m | R7A-CAB005SR-DE |
| | | | | | 10 m | R7A-CAB010SR-DE |
| | | | | | 15 m | R7A-CAB015SR-DE |
| | | | | | 20 m | R7A-CAB020SR-DE |
| |  | | With brake<br>-BS2-D | | 1.5 m | R7A-CAB001-5BR-DE |
| | | | | | 3 m | R7A-CAB003BR-DE |
| | | | | | 5 m | R7A-CAB005BR-DE |
| | | | | | 10 m | R7A-CAB010BR-DE |
| | | | | | 15 m | R7A-CAB015BR-DE |
| | | | | | 20 m | R7A-CAB020BR-DE |
| |  | For servomotors from 50 to 750 W<br>R88M-G(050/100/200/400/750)30_<br>R88M-GP(100/200/400)30_ | Without brake<br>-S2-D | SmartStep 2 (only 750 W) and G-Series | 3 m | R88A-CAWA003S-DE |
| | | | | | 5 m | R88A-CAWA005S-DE |
| | | | | | 10 m | R88A-CAWA010S-DE |
| | | | | | 15 m | R88A-CAWA015S-DE |
| | | | | | 20 m | R88A-CAWA020S-DE |
| |  | | With brake<br>-BS2-D | | 3 m | R88A-CAWA003B-DE |
| | | | | | 5 m | R88A-CAWA005B-DE |
| | | | | | 10 m | R88A-CAWA010B-DE |
| | | | | | 15 m | R88A-CAWA015B-DE |
| | | | | | 20 m | R88A-CAWA020B-DE |

### For 900 to 1,500 W servo motors

| Symbol | Appearance | Specifications | | Applicable servo drive | Length | Order code |
|---|---|---|---|---|---|---|
| ⑧ |  | For servomotors from 900 to 1.5 kW<br>R88M-G(1K0/1K5)30T_<br>R88M-G(1K0/1K5)20T_<br>R88M-G90010T_ | Without brake<br>-S2 | G-Series | 1.5 m | R88A-CAGB001-5SR-E |
| | | | | | 3 m | R88A-CAGB003SR-E |
| | | | | | 5 m | R88A-CAGB005SR-E |
| | | | | | 10 m | R88A-CAGB010SR-E |
| | | | | | 15 m | R88A-CAGB015SR-E |
| | | | | | 20 m | R88A-CAGB020SR-E |
| |  | | With brake<br>-BS2 | | 1.5 m | R88A-CAGB001-5BR-E |
| | | | | | 3 m | R88A-CAGB003BR-E |
| | | | | | 5 m | R88A-CAGB005BR-E |
| | | | | | 10 m | R88A-CAGB010BR-E |
| | | | | | 15 m | R88A-CAGB015BR-E |
| | | | | | 20 m | R88A-CAGB020BR-E |

### Brake cable with standard connector

| Symbol | Appearance | Specifications | Length | Order code |
|---|---|---|---|---|
| ⑥ |  | Brake cable only.<br>For servomotors from 50 to 750W with brake<br><br>R88M-G(050/100/200/400/750)30_-BS2,<br>R88M-GP(100/200/400)30_-BS2 | 1.5 m | R88A-CAGA001-5BR-E |
| | | | 3 m | R88A-CAGA003BR-E |
| | | | 5 m | R88A-CAGA005BR-E |
| | | | 10 m | R88A-CAGA010BR-E |
| | | | 15 m | R88A-CAGA015BR-E |
| | | | 20 m | R88A-CAGA020BR-E |

### Connectors for power, encoder and brake cables

| Specifications | | | Applicable servomotor | Order code |
|---|---|---|---|---|
| Connectors for power cable | Drive side (CNB) | - | R88M-G(050/100/200/400)30H_<br>R88M-GP(100/200/400)30H_ | R7A-CNB01A |
| | Motor side | Standard connector | R88M-G(050/100/200/400/750)30_<br>R88M-GP(100/200/400)30_ | R88A-CNG01A |
| | | | R88M-G(1K0/1K5)30_-S2<br>R88M-G(1K0/1K5)20_-S2<br>R88M-G90010_-S2 | MS3108E20-4S |
| | | | R88M-G(1K0/1K5)30_-BS2<br>R88M-G(1K0/1K5)20_-BS2<br>R88M-G90010_-BS2 | MS3108E20-18S |
| | | Circular connector (Hypertac) | R88M-G(50/100/200/400/750)30_-___-D<br>R88M-GP(100/200/300)_-___-D | SPOC-06K-FSDN169 |
| Connectors for encoder cable | Drive side (CN2) | – | All models | R88A-CNW01R |
| | Motor side | Standard connector | R88M-G(050/100/200/400/750)30T-_<br>R88M-GP(100/200/400)30T-_ | R88A-CNG01R |
| | | | R88M-G(050/100/200/400/750)30H-_<br>R88M-GP(100/200/400)30H-_ | R88A-CNG02R |
| | | | R88M-G(1K0/1K5)30T-_<br>R88M-G(1K0/1K5)20T-_<br>R88M-G90010T-_ | MS3108E20-29S |
| | | Circular connector (Hypertac) | R88M-G(50/100/200/400/750)30_-___-D<br>R88M-GP(100/200/300)_-___-D | SPOC-17H-FRON169 |
| Connector for brake cable | Motor side | Standard connector | R88M-G(050/100/200/400/750)30_-BS2<br>R88M-GP(100/200/400)30_-BS2 | R88A-CNG01B |

### Connectors included with the motor

| Specifications | | Applicable servomotor | Order code |
|---|---|---|---|
| Power and brake connector (MALE) | Circular connector (Hypertac) | R88M-G(50/100/200/400/750)30_-___-D<br>R88M-GP(100/200/300)_-___-D | SRUC-06J-MSCN236 |
| Encoder connector (MALE) | | R88M-G(50/100/200/400/750)30_-___-D<br>R88M-GP(100/200/300)_-___-D | SRUC-17G-MRWN087 |

**Note: 1.** All cables listed are flexible and shielded (except the R88A-CAGA___BR-E which is only a flexible cable).
**2.** The R88A-CRGC___NR-E, R88A-CAGB___SR-E, R88A-CAGB___BR-E, R88A-CRWA___C-DE, R88A-CAWA___S-DE and R88A-CAWA___B-DE cables have IP67 class (including connector).

## Specifications

### Cylindrical servo motors 3,000/2,000/1,000 r/min

| Applied voltage | | | 230 V | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Servo motor model R88M-_ | | | G05030_ | G10030_ | G20030_ | G40030_ | G75030_ | G1K030T | G1K530T | G1K020T | G1K520T | G90010T |
| Rated output | | W | 50 | 100 | 200 | 400 | 750 | 1,000 | 1,500 | 1,000 | 1,500 | 900 |
| Rated torque | | N·m | 0.16 | 0.32 | 0.64 | 1.3 | 2.4 | 3.18 | 4.77 | 4.8 | 7.15 | 8.62 |
| Instantaneous peak torque | | N·m | 0.45 | 0.90 | 1.78 | 3.67 | 7.05 | 9.1 | 12.8 | 13.5 | 19.6 | 18.4 |
| Rated current | | A (rms) | 1.1 | | 1.6 | 2.6 | 4 | 7.2 | 9.4 | 5.6 | 9.4 | 7.6 |
| Instantaneous max. current | | A (rms) | 3.4 | | 4.9 | 7.9 | 12.1 | 21.4 | 28.5 | 17.1 | 28.5 | 17.1 |
| Rated speed | | $min^{-1}$ | 3,000 | | | | | | | 2,000 | | 1,000 |
| Max. speed | | $min^{-1}$ | 5,000 | | | | 4,500 | 5,000 | | 3,000 | | 2,000 |
| Torque constant | | N·m/A (rms) | 0.14 | 0.19 | 0.41 | 0.51 | 0.64 | 0.44 | 0.51 | 0.88 | 0.76 | 1.13 |
| Rotor moment of inertia (JM) | | $kg·m^2x10^{-4}$ | 0.025 | 0.051 | 0.14 | 0.26 | 0.87 | 1.69 | 2.59 | 6.17 | 11.2 | |
| Allowable load moment of inertia (JL) | | Multiple of (JM) | 30 | | | | 20 | 15 | | 10 | | |
| Rated power rate | | kW/s | 10.4 | 20.1 | 30.3 | 62.5 | 66 | 60 | 88 | 37.3 | 45.8 | 66.3 |
| Applicable Encoder | | | Incremental encoder (10,000 pulses) | | | | | – | | | | |
| | | | Incremental /Absolute encoder(17 bits) | | | | | | | | | |
| Allowable radial load | | N | 68 | | 245 | | 392 | | 490 | | | 686 |
| Allowable thrust load | | N | 58 | | 98 | | 147 | | 196 | | | |
| Approx. mass | | kg (without brake) | 0.3 | 0.5 | 0.8 | 1.2 | 2.3 | 4.5 | 5.1 | 6.8 | 8.5 | |
| | | kg (with brake) | 0.5 | 0.7 | 1.3 | 1.7 | 3.1 | 5.1 | 6.5 | 8.7 | 10.1 | 10 |
| Brake specifications | Rated voltage | | 24 VDC±5% | | | | | 24 VDC±10% | | | | |
| | Holding brake moment of inertia J | $kg·m^2x10^{-4}$ | 0.002 | | 0.018 | | 0.075 | 0.25 | 0.33 | 1.35 | | |
| | Power consumption (at 20°C) | W | 7 | | 9 | | 10 | 18 | 19 | 14 | 19 | |
| | Current consumption (at 20°C) | A | 0.3 | | 0.36 | | 0.42 | 0.74 | 0.81 | 0.59 | 0.79 | |
| | Static friction torque | N.m (minimum) | 0.29 | | 1.27 | | 2.45 | 4.9 | 7.8 | 4.9 | 13.7 | |
| | Rise time for holding torque | ms (max.) | 35 | | 50 | | 70 | 50 | | 80 | 100 | |
| | Release time | ms (max) | 20 | | 15 | | 20 | 15 | | 70 | 50 | |

| Applied voltage | | 230 V | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Servo motor model R88M-_ | | G05030_ | G10030_ | G20030_ | G40030_ | G75030_ | G1K030T | G1K530T | G1K020T | G1K520T | G90010T |
| Basic specifications | Rating | Continuous | | | | | | | | | |
| | Insulation grade | Type B | | | | | Type F | | | | |
| | Ambient operating/storage temperature | 0 to 40°C/–20 to 65°C | | | | | 0 to 40°C/–20 to 80°C | | | | |
| | Ambient operating/storage humidity | 85% RH max. (non-condensing) | | | | | | | | | |
| | Vibration class | V-15 | | | | | | | | | |
| | Insulation resistance | 20 MΩ min. at 500 VDC between the power terminals and FG terminal | | | | | | | | | |
| | Enclosure | Totally-enclosed, self-cooling, IP65 (excluding shaft opening and lead wire ends) | | | | | | | | | |
| | Vibration resistance | Vibration acceleration 49 m/s$^2$ | | | | | Vibration acceleration 24.5 m/s$^2$ | | | | |
| | Mounting | Flange-mounted | | | | | | | | | |

## Flat servo motors 3,000 r/min

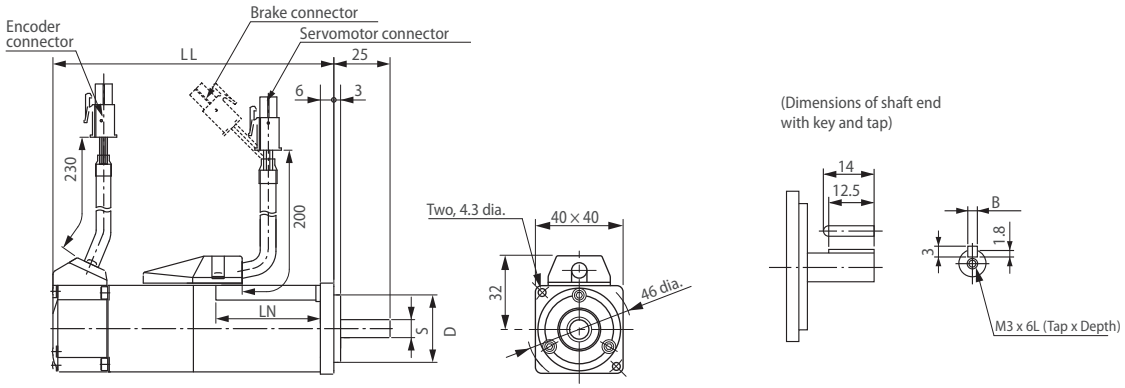
| Applied voltage | | | 230 V | | |
|---|---|---|---|---|---|
| Servo motor model R88M-_ | | | GP10030_ | GP20030_ | GP40030_ |
| Rated output | | W | 100 | 200 | 400 |
| Rated torque | | N·m | 0.32 | 0.64 | 1.3 |
| Instantaneous peak torque | | N·m | 0.86 | 1.8 | 3.65 |
| Rated current | | A (rms) | 1 | 1.6 | 2.5 |
| Instantaneous max. current | | A (rms) | 3.1 | 4.9 | 7.5 |
| Rated speed | | min$^{-1}$ | 3,000 | | |
| Max. speed | | min$^{-1}$ | 5,000 | | |
| Torque constant | | N·m/A (rms) | 0.34 | 0.42 | 0.54 |
| Rotor moment of inertia (JM) | | kg·m$^2$x10$^{-4}$ | 0.1 | 0.35 | 0.64 |
| Allowable load moment of inertia (JL) | | Multiple of (JM) | 20 | | |
| Rated power rate | | kW/s | 10.2 | 11.5 | 25.5 |
| Applicable encoder | | | Incremental (10,000 pulses) | | |
| | | | Incremental/Absolute encoder (17 bits) | | |
| Allowable radial load | | N | 68 | 245 | |
| Allowable thrust load | | N | 58 | 98 | |
| Approx. mass | | kg (without brake) | 0.7 | 1.3 | 1.8 |
| | | kg (with brake) | 0.9 | 2 | 2.5 |
| Brake specifications | Rated voltage | | 24 VDC±10% | | |
| | Holding brake moment of inertia J | kg·m$^2$x10$^{-4}$ | 0.03 | 0.09 | |
| | Power consumption (at 20°C) | W | 7 | 10 | |
| | Current consumption (at 20°C) | A | 0.29 | 0.41 | |
| | Static friction torque | N.m (minimum) | 0.29 | 1.27 | |
| | Rise time for holding torque | ms (max.) | 50 | 60 | |
| | Release time | ms (max) | 15 | | |
| Basic specifications | Rating | | Continuous | | |
| | Insulation grade | | Type B | | |
| | Ambient operating/storage temperature | | 0 to 40°C/–20 to 80°C | | |
| | Ambient operating/storage humidity | | 85% RH max. (non-condensing) | | |
| | Vibration class | | V-15 | | |
| | Insulation resistance | | 20 MΩ min. at 500 VDC between the power terminals and FG terminal | | |
| | Enclosure | | Totally-enclosed, self-cooling, IP65 (excluding shaft opening and lead wire ends) | | |
| | Vibration resistance | | Vibration acceleration 49 m/s$^2$ | | |
| | Mounting | | Flange-mounted | | |

## Dimensions

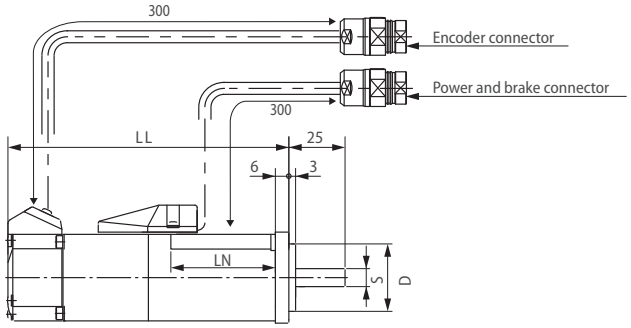
### Cylindrical type 3,000 r/min (230 V, 50 to 100 W)

| Dimensions (mm) | Without brake | With brake | LN | Flange surface | Shaft end | | Aprox. mass (kg) | |
|---|---|---|---|---|---|---|---|---|
| Model | LL | LL | | D | S | B | Without brake | With brake |
| R88M-G05030_-_S2-_ | 72 | 102 | 26.5 | $30^{h7}$ | $8^{h6}$ | $3^{h9}$ | 0.3 | 0.5 |
| R88M-G10030_-_S2-_ | 92 | 122 | 46.5 | | | | 0.5 | 0.7 |

### Servo motor with standard connector




### Servo motor with circular connector




Encoder connector wiring

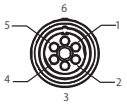
Cable length 300±30
Connector optional
Made by Hypertac
SRUC-17G-MRWN087 (MALE)

| Encoder connector | |
|---|---|
| Pin No. | Signal |
| 1 | BAT - (0 V) |
| 2 | BAT + |
| 3 | S + |
| 4 | S - |
| 5 to 7 | Free |
| 8 | E5V (power supply) |
| 9 | E0V (power supply) |
| 10 to 17 | Free |
| Connector case | FG (Ground) |

*Note: Pins 1 and 2 used only for motors with ABS encoder.

Mating connector:
Plug type: SPOC-17H-FRON169 (FEMALE)

Power and brake connector wiring




Cable length 300±30
Connector optional
Made by Hypertac
SRUC-06J-MSCN236 (MALE)

| Power and brake connector | |
|---|---|
| Pin No. | Output |
| 1 | Phase U |
| 2 | Phase V |
| 3 | Phase W |
| 4 | *Brake terminal |
| 5 | *Brake terminal |
| 6 | FG (ground) |

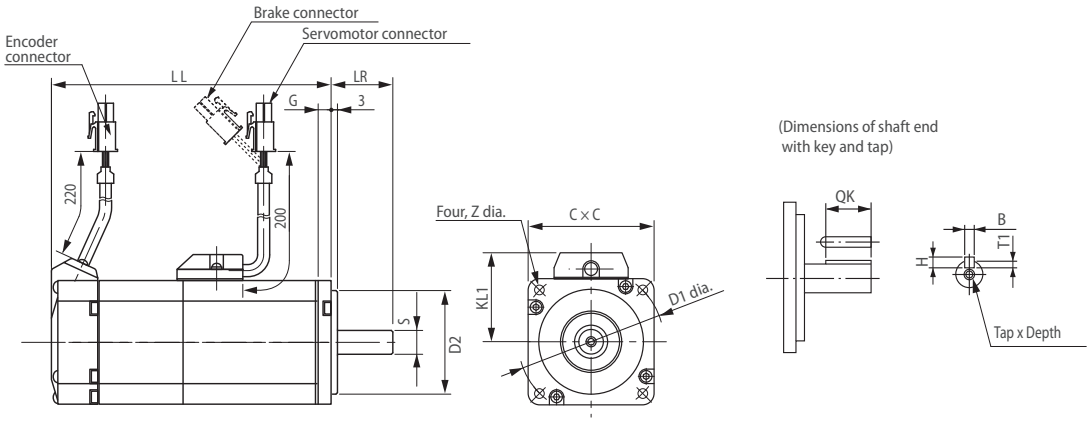
*Note: Pins 4 and 5 used only for motors with brake.

Mating connector:
Plug type: SPOC-06K-FSDN169 (FEMALE)

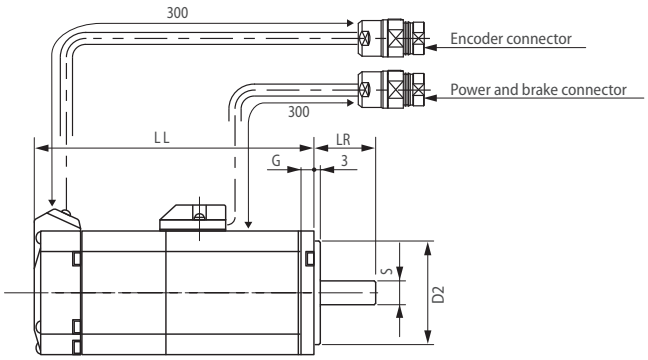
## Cylindrical type 3,000 r/min (230 V, 200 to 750 W)

| Dimensions (mm) | Without brake | With brake | LR | KL1 | Flange surface | | | | | Shaft end | | | | | | Aprox. mass (kg) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Model | LL | LL | | | D1 | D2 | C | G | Z | S | QK | B | H | T1 | Tap × depth | Without brake | With brake |
| R88M-G20030_-_S2-_ | 79.5 | 116 | 30 | 43 | 70 | $50^{h7}$ | 60 | 6.5 | 4.5 | $11^{h6}$ | 18 | $4^{h9}$ | 4 | 2.5 | M4 × 8L | 0.8 | 1.3 |
| R88M-G40030_-_S2-_ | 99 | 135.5 | | | | | | | | $14^{h6}$ | 22.5 | $5^{h9}$ | 5 | 3 | M5 × 10L | 1.2 | 1.7 |
| R88M-G75030_-_S2-_ | 112.2 | 149.2 | 35 | 53 | 90 | $70^{h7}$ | 80 | 8 | 6 | $19^{h6}$ | 22 | $6^{h9}$ | 6 | 3.5 | | 2.3 | 3.1 |

### Servo motor with standard connector




### Servo motor with circular connector




Encoder connector wiring

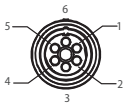
Cable length 300±30
Connector optional
Made by Hypertac
SRUC-17G-MRWN087 (MALE)

| Encoder connector | |
|---|---|
| Pin No. | Signal |
| 1 | BAT - (0 V) |
| 2 | BAT + |
| 3 | S + |
| 4 | S - |
| 5 to 7 | Free |
| 8 | E5V (power supply) |
| 9 | E0V (power supply) |
| 10 to 17 | Free |
| Connector case | FG (Ground) |

*Note: Pins 1 and 2 used only for motors with ABS encoder.

Mating connector:
Plug type: SPOC-17H-FRON169 (FEMALE)

Power and brake connector wiring




Cable length 300±30
Connector optional
Made by Hypertac
SRUC-06J-MSCN236 (MALE)

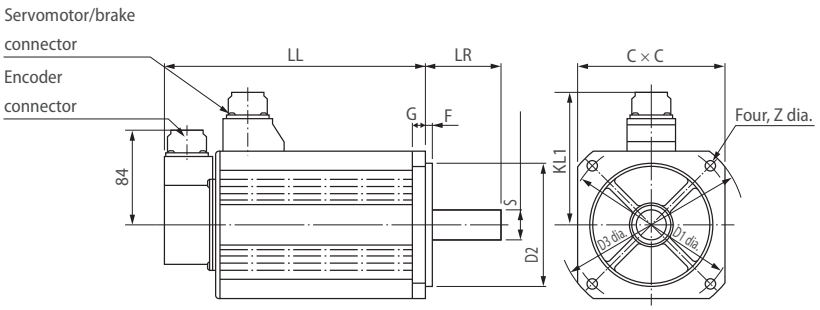
| Power and brake connector | |
|---|---|
| Pin No. | Output |
| 1 | Phase U |
| 2 | Phase V |
| 3 | Phase W |
| 4 | *Brake terminal |
| 5 | *Brake terminal |
| 6 | FG (ground) |

*Note: Pins 4 and 5 used only for motors with brake.

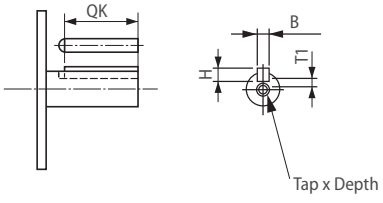
Mating connector:
Plug type: SPOC-06K-FSDN169 (FEMALE)

## Cylindrical type 3,000, 2,000 and 1,000 r/min (230 V, 900 kW to 1.5 kW)

| Dimensions (mm) | Without brake | With brake | LR | KL1 | Flange surface | | | | | | | Shaft end | | | | | | Approx. mass (kg) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Model | LL | LL | | | D1 | D2 | D3 | C | G | F | Z | S | QK | B | H | T1 | Tap × depth | Without brake | With brake |
| R88M-G1K030T-_S2 | 175 | 200 | 55 | 98 | 100 | $80^{h7}$ | 120 | 90 | 7 | 3 | 6.6 | $19^{h6}$ | 42 | $6^{h9}$ | 6 | 3.5 | M5 × 12L | 4.5 | 5.1 |
| R88M-G1K530T-_S2 | 180 | 205 | | 103 | 115 | $95^{h7}$ | 135 | 100 | 10 | | 9 | | | | | | | 5.1 | 6.5 |
| R88M-G1K020T-_S2 | 150 | 175 | | 118 | 145 | $110^{h7}$ | 165 | 130 | 12 | 6 | | $22^{h6}$ | 41 | $8^{h9}$ | 7 | 4 | | 6.8 | 8.7 |
| R88M-G1K520T-_S2 | 175 | 200 | | | | | | | | | | | | | | | | 8.5 | 10.1 |
| R88M-G90010T-_S2 | 175 | 200 | 70 | | | | | | | | | | | | | | | | 10 |



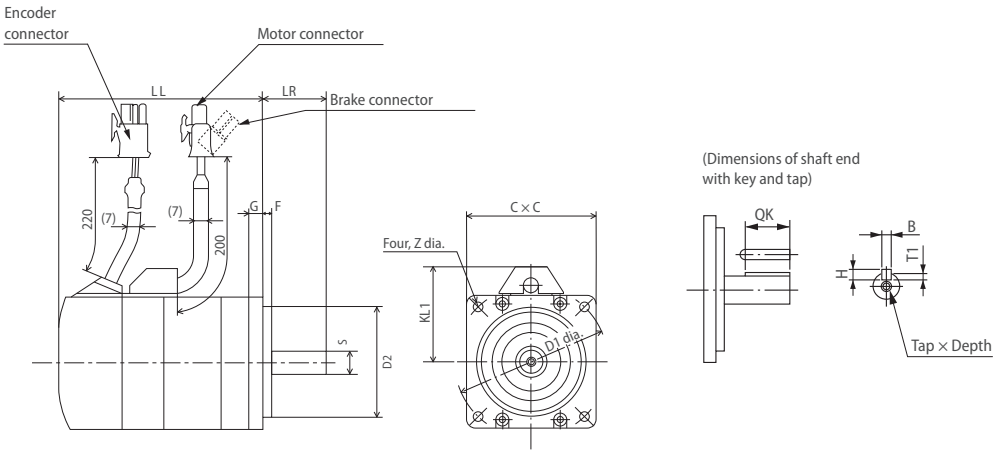

(Dimensions of shaft end with key and tap)



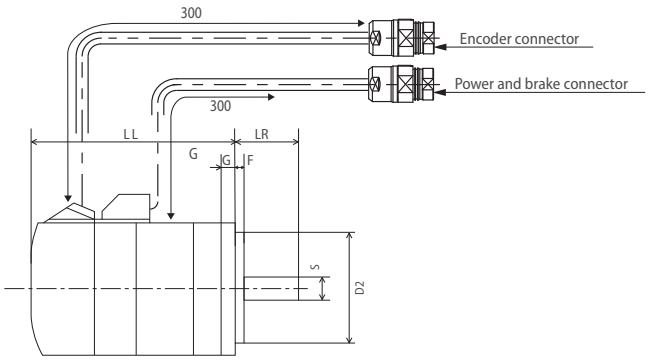
## Flat type 3;000 r/min (230 V, 100 W to 400 W)

| Dimensions (mm) | Without brake | With brake | LR | KL1 | Flange surface | | | | | | Shaft end | | | | | | Aprox. mass (kg) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Model | LL | LL | | | D1 | D2 | C | F | G | Z | S | QK | B | H | T1 | Tap × depth | Without brake | With brake |
| R88M-GP10030H-_S2-_ | 60.5 | 84.5 | 25 | 43 | 70 | $50^{h7}$ | 60 | 3 | 7 | 4.5 | $8^{h6}$ | 12.5 | $3^{h9}$ | 3 | 1.8 | M3 × 6L | 0.7 | 0.9 |
| R88M-GP10030T-_S2-_ | 87.5 | 111.5 | | | | | | | | | | | | | | | | |
| R88M-GP20030H-_S2-_ | 67.5 | 100 | 30 | 53 | 90 | $70^{h7}$ | 80 | 5 | 8 | 5.5 | $11^{h6}$ | 18 | $4^{h9}$ | 4 | 2.5 | M4 × 8L | 1.3 | 2 |
| R88M-GP20030T-_S2-_ | 94.5 | 127 | | | | | | | | | | | | | | | | |
| R88M-GP40030H-_S2-_ | 82.5 | 115 | | | | | | | | | $14^{h6}$ | 22.5 | $5^{h9}$ | 5 | 3.0 | M5 × 10L | 1.8 | 2.5 |
| R88M-GP40030T-_S2-_ | 109.5 | 142 | | | | | | | | | | | | | | | | |

### Servo motor with standard connector




### Servo motor with circular connector




Encoder connector wiring

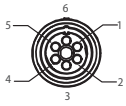
Cable length 300±30
Connector optional
Made by Hypertac
SRUC-17G-MRWN087 (MALE)

| Encoder connector | |
|---|---|
| Pin No. | Signal |
| 1 | BAT - (0 V) |
| 2 | BAT + |
| 3 | S + |
| 4 | S - |
| 5 to 7 | Free |
| 8 | E5V (power supply) |
| 9 | E0V (power supply) |
| 10 to 17 | Free |
| Connector case | FG (Ground) |

*Note: Pins 1 and 2 used only for motors with ABS encoder.

Mating connector:
Plug type: SPOC-17H-FRON169 (FEMALE)

Power and brake connector wiring




Cable length 300±30
Connector optional
Made by Hypertac
SRUC-06J-MSCN236 (MALE)

| Power and brake connector | |
|---|---|
| Pin No. | Output |
| 1 | Phase U |
| 2 | Phase V |
| 3 | Phase W |
| 4 | *Brake terminal |
| 5 | *Brake terminal |
| 6 | FG (ground) |

*Note: Pins 4 and 5 used only for motors with brake.

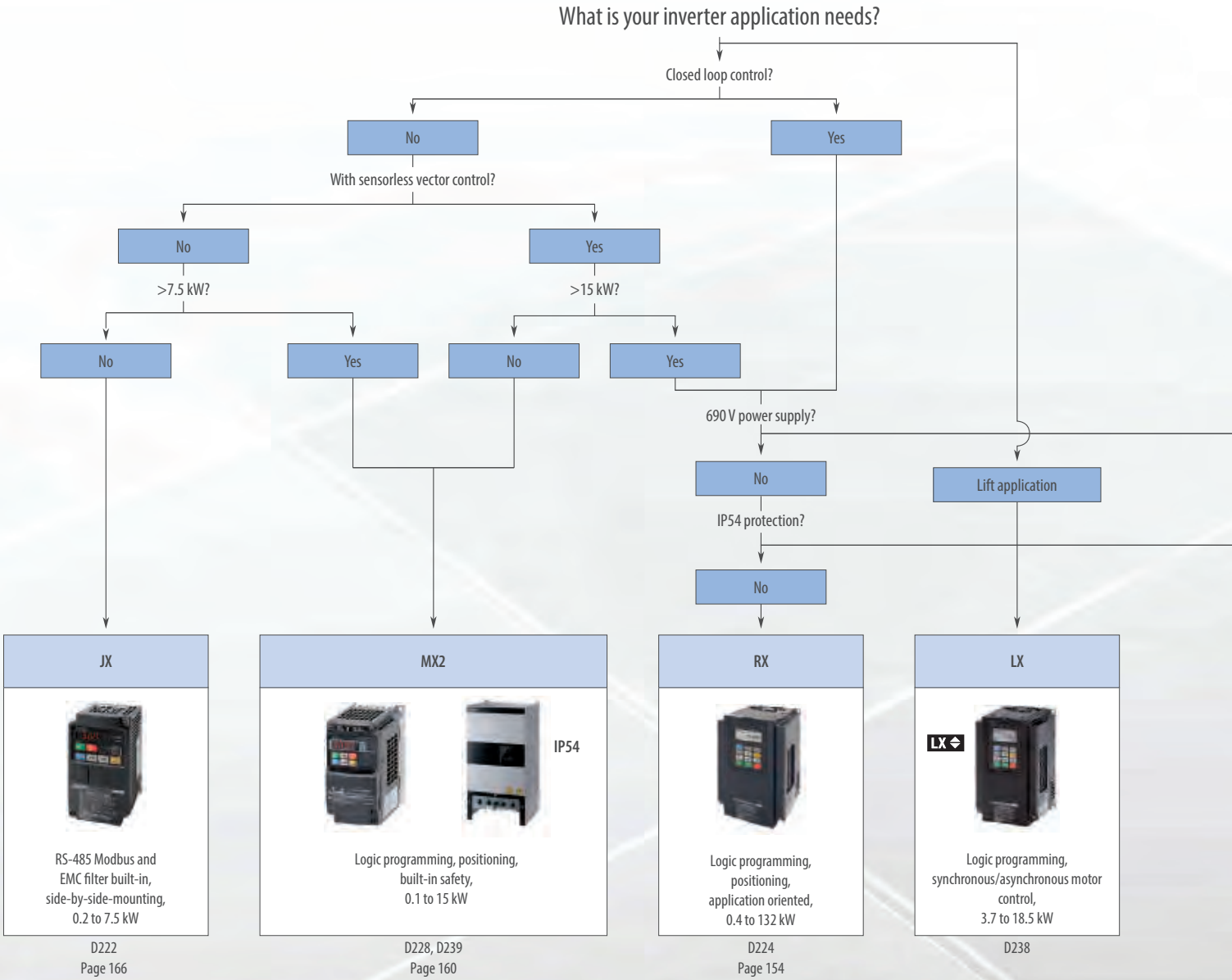
Mating connector:
Plug type: SPOC-06K-FSDN169 (FEMALE)

# BORN TO DRIVE MACHINES

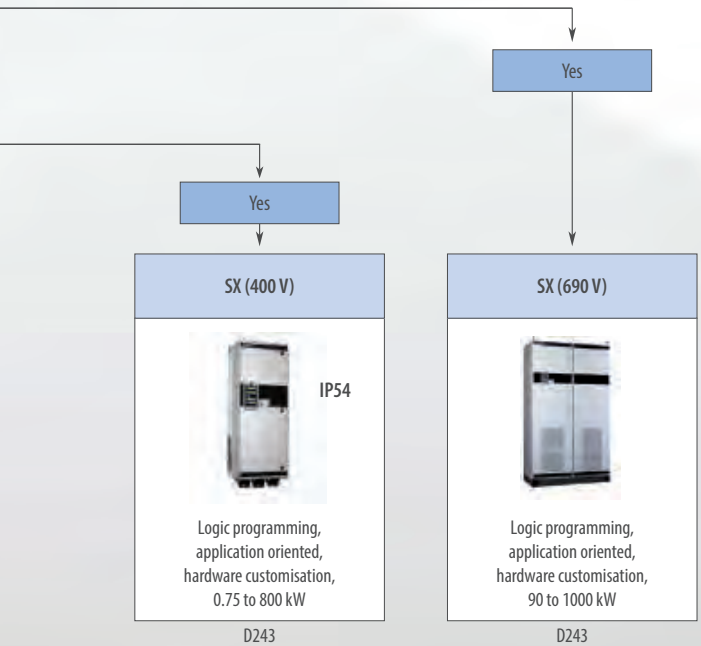
## Harmonised motor and machine control

Specifically created for your application, the MX2 was developed to harmonise advanced motor and machine control. Thanks to its advanced design and algorithms the MX2 provides smooth control down to zero speed, plus precise operation for fast cyclic operations and torque control capability in open loop.

The MX2 also gives you comprehensive functionality for machine control such as positioning, speed synchronisation and logic programming. The MX2 is fully integrated within the Omron smart automation platform.
The MX2 is the child of a true leader in machine automation.




200V
3PHASE
0.4kW
OMRON
RUN PWR
5000
RUN
STOP
RESET
WARNING – Risk of electric shock.


Yes
Yes
SX (400 V)
IP54
Logic programming,
application oriented,
hardware customisation,
0.75 to 800 kW
D243
SX (690 V)
Logic programming,
application oriented,
hardware customisation,
90 to 1000 kW
D243

| Model | RX | LX |
|---|---|---|
| |  | LX  |
| | **Customised to your machine** | **Lift applications** |
| 400 V three-phase | 0.4 kW to 132 kW | 3.7 kW to 18.5 kW |
| 200 V three-phase | 0.4 kW to 55 kW | – |
| Application | High performance, built-in know-how functionality | Lift control with asynchronous and synchronous motors |
| Control method | Open and closed loop for vector and V/F control | Open and closed loop vector control and V/F control |
| Torque features | 200% at 0.0 Hz (CLV)<br>150% at 0.3 Hz (OLV) | 150% at 0.0 Hz (CLV)<br>200% at 0.3 Hz (OLV) |
| Connectivity | Modbus, DeviceNet, PROFIBUS, MECHATROLINK-II, EtherCAT, CompoNet | Modbus |
| Logic programming | Standard firmware | Standard firmware |
| Page/Quick Link | 154 | D238 |

| Model | MX2 | JX |
|---|---|---|
| |   IP54 |  |
| | **Born to drive machines** | **Compact and complete** |
| 400 V three-phase | 0.4 kW to 15 kW | 0.4 kW to 7.5 kW |
| 200 V three-phase | 0.1 kW to 15 kW | 0.2 kW to 7.5 kW |
| 200 V single-phase | 0.1 kW to 2.2 kW | 0.2 kW to 2.2 kW |
| Application | Harmonized motor and machine control | General purpose built-in communications |
| Control method | Open loop speed and torque control for vector and speed for V/F control | V/F control |
| Torque features | 200% at 0.5 Hz | 150% at 3 Hz |
| Connectivity | Modbus, DeviceNet, PROFIBUS, MECHATROLINK-II, EtherCAT, CompoNet, EtherNet IP | Modbus |
| Logic programming | Standard firmware | N/A |
| Customisation options | IP54 enclosure | N/A |
| Page/Quick Link | 160 | 166 |

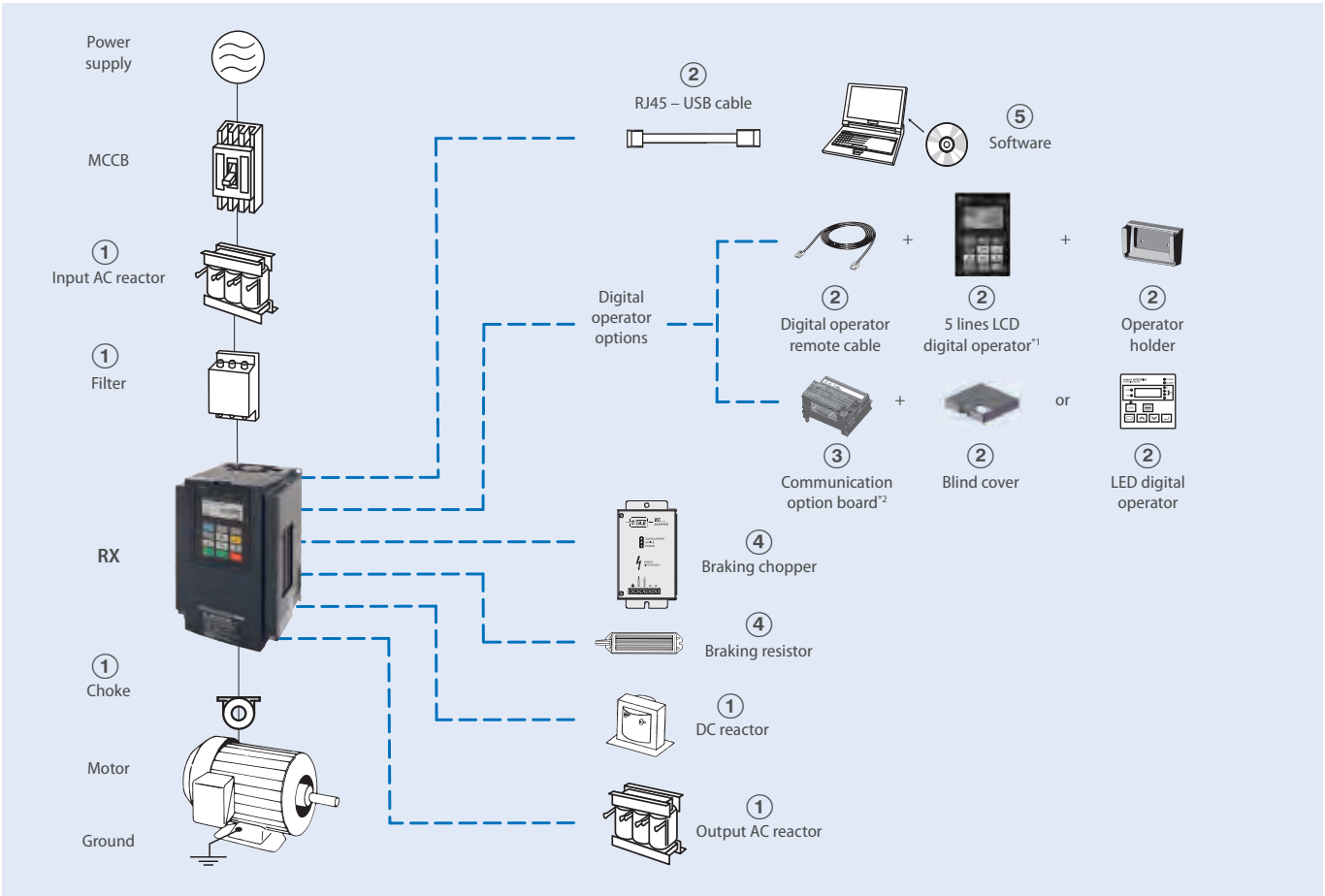
| Model | SX (400 V) | SX (690 V) |
|---|---|---|
| |  IP54 |  |
| | **High performance vector control** | |
| 400 V three-phase | 0.75 kW to 800 kW | – |
| 690 V three-phase | – | 90 kW to 1,000 kW |
| Application | High power flux vector and variable torque applications | High power flux vector and variable torque applications |
| Control method | Flux vector and V/F control | Flux vector and V/F control |
| Torque features | 120% at 0,0 Hz (CLV)<br>120% at 0,5 Hz (OLV) | 120% at 0,0 Hz (CLV)<br>120% at 0,5 Hz (OLV) |
| Connectivity | Modbus, DeviceNet, PROFIBUS, EtherCAT, Modbus TCP, CAN | Modbus, DeviceNet, PROFIBUS, EtherCAT, Modbus TCP, CAN |
| Logic programming | Standard firmware | Standard firmware |
| Customisation options | Hardware customisation (main switch, liquid cooling, 12-pulse rectifier, …) | Hardware customisation (main switch, liquid cooling, 12-pulse rectifier, …) |
| Page/Quick Link | D243 | D243 |

## Customised to your machine

Omron realises that you need quality and reliability, plus the ability to easily and quickly customise your inverter to the application in hand. And with the RX, you have the perfect tool for the job. Naturally it combines the same high level of quality and performance for which Omron is renowned. It also has abundant application functionality on board and you can customise it yourself to match your precise requirements.

- Ratings up to 132 kW
- Full torque at 0 Hz in closed loop
- Sensor-less and vector closed-loop control
- Built-in EMC filter
- Built-in logic programmability
- Built-in application oriented functionality
- Fieldbus communications: Modbus, DeviceNet, PROFIBUS, MECHATROLINK-II, EtherCAT and CompoNet

## Ordering information




*1 The 5 lines LCD digital operator is provided with the inverter from factory.
*2 When a communication option board is mounted, there are two options: mount a blind cover or a LED digital operator.

### 3G3RX

| Specifications | | | | | Order code | Specifications | | | | | Order code |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Voltage class | Constant torque | | Variable torque | | Standard | Voltage class | Constant torque | | Variable torque | | Standard |
| | Max. motor kW | Rated current A | Max. motor KW | Rated current A | | | Max. motor kW | Rated current A | Max. motor KW | Rated current A | |
| Three-phase 200 V | 0.4 | 3.0 | 0.75 | 3.7 | 3G3RX-A2004-E1F | Three-phase 400 V | 0.4 | 1.5 | 0.75 | 1.9 | 3G3RX-A4004-E1F |
| | 0.75 | 5.0 | 1.5 | 6.3 | 3G3RX-A2007-E1F | | 0.75 | 2.5 | 1.5 | 3.1 | 3G3RX-A4007-E1F |
| | 1.5 | 7.5 | 2.2 | 9.4 | 3G3RX-A2015-E1F | | 1.5 | 3.8 | 2.2 | 4.8 | 3G3RX-A4015-E1F |
| | 2.2 | 10.5 | 4.0 | 12 | 3G3RX-A2022-E1F | | 2.2 | 5.3 | 4.0 | 6.7 | 3G3RX-A4022-E1F |
| | 4.0 | 16.5 | 5.5 | 19.6 | 3G3RX-A2037-E1F | | 4.0 | 9.0 | 5.5 | 11.1 | 3G3RX-A4040-E1F |
| | 5.5 | 24 | 7.5 | 30 | 3G3RX-A2055-E1F | | 5.5 | 14 | 7.5 | 16 | 3G3RX-A4055-E1F |
| | 7.5 | 32 | 11 | 44 | 3G3RX-A2075-E1F | | 7.5 | 19 | 11 | 22 | 3G3RX-A4075-E1F |
| | 11 | 46 | 15 | 58 | 3G3RX-A2110-E1F | | 11 | 25 | 15 | 29 | 3G3RX-A4110-E1F |
| | 15 | 64 | 18.5 | 73 | 3G3RX-A2150-E1F | | 15 | 32 | 18.5 | 37 | 3G3RX-A4150-E1F |
| | 18.5 | 76 | 22 | 85 | 3G3RX-A2185-E1F | | 18.5 | 38 | 22 | 43 | 3G3RX-A4185-E1F |
| | 22 | 95 | 30 | 113 | 3G3RX-A2220-E1F | | 22 | 48 | 30 | 57 | 3G3RX-A4220-E1F |
| | 30 | 121 | 37 | 140 | 3G3RX-A2300-E1F | | 30 | 58 | 37 | 70 | 3G3RX-A4300-E1F |
| | 37 | 145 | 45 | 169 | 3G3RX-A2370-E1F | | 37 | 75 | 45 | 85 | 3G3RX-A4370-E1F |
| | 45 | 182 | 55 | 210 | 3G3RX-A2450-E1F | | 45 | 91 | 55 | 105 | 3G3RX-A4450-E1F |
| | 55 | 220 | 75 | 270 | 3G3RX-A2550-E1F | | 55 | 112 | 75 | 135 | 3G3RX-A4550-E1F |
| | – | | | | | | 75 | 149 | 90 | 160 | 3G3RX-B4750-E1F |
| | | | | | | | 90 | 176 | 110 | 195 | 3G3RX-B4900-E1F |
| | | | | | | | 110 | 217 | 132 | 230 | 3G3RX-B411K-E1F |
| | | | | | | | 132 | 260 | 160 | 290 | 3G3RX-B413K-E1F |

### ① Rasmi line filter

| 200 V | | | | | 400 V | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Model 3G3R_X-_ | Leakage Nom./Max. | Rated current A | Weight (kg) | Order code | Model 3G3RX-_ | Leakage Nom./Max. | Rated current A | Weight (kg) | Order code |
| A2004/A2007/A2015/ A2022/A2037 | 0.7/40 mA | 18 | 2.0 | AX-FIR2018-RE | A4004/A4007/A4015/ A4022/A4040 | 0.3/40 mA | 10 | 1.9 | AX-FIR3010-RE |
| A2055/A2075/A2110 | 0.7/40 mA | 53 | 2.5 | AX-FIR2053-RE | A4055/A4075/A4110 | 0.3/40 mA | 30 | 2.2 | AX-FIR3030-RE |
| A2150/A2185/A2220 | 1.2/70 mA | 110 | 8.0 | AX-FIR2110-RE | A4150/A4185/A4220 | 0.8/70 mA | 53 | 4.5 | AX-FIR3053-RE |
| A2300 | 1.2/70 mA | 145 | 8.6 | AX-FIR2145-RE | A4300 | 3/160 mA | 64 | 7.0 | AX-FIR3064-RE |
| A2370/A2450 | 6/300 mA | 250 | 13.0 | AX-FIR3250-RE | A4370 | 2/130 mA | 100 | 8.0 | AX-FIR3100-RE |
| A2550 | 6/300 mA | 320 | 13.2 | AX-FIR3320-RE | A4450/A4550 | 2/130 mA | 130 | 8.6 | AX-FIR3130-RE |
| - | | | | | A4750/A4900 | 10/500 mA | 250 | 13.0 | AX-FIR3250-RE |
| | | | | | A411K/A413K | 10/500 mA | 320 | 13.2 | AX-FIR3320-RE |

### ① Input AC reactors

| 3-phase 200 VAC | | 3-phase 400 VAC | |
|---|---|---|---|
| Inverter model 3G3RX-_ | Order code | Inverter model 3G3RX-_ | Order code |
| A2004/A2007/A2015 | AX-RAI02800100-DE | A4004/A4007/A4015 | AX-RAI07700050-DE |
| A2022/A2037 | AX-RAI00880200-DE | A4022/A4040 | AX-RAI03500100-DE |
| A2055/A2075 | AX-RAI00350335-DE | A4055/A4075 | AX-RAI01300170-DE |
| A2110/A2150 | AX-RAI00180670-DE | A4110/A4150 | AX-RAI00740335-DE |
| A2185/A2220 | AX-RAI00091000-DE | A4185/A4220 | AX-RAI00360500-DE |
| A2300/A2370 | AX-RAI00071550-DE | A4300/A4370 | AX-RAI00290780-DE |
| A2450/A2550 | AX-RAI00042300-DE | A4450/A4550 | AX-RAI00191150-DE |
| | | A4750/A4900 | AX-RAI00111850-DE |
| | | A411K/A413K | AX.RAI00072700-DE |

### ① DC reactors

| 3-phase 200 VAC | | 3-phase 400 VAC | |
|---|---|---|---|
| Inverter model 3G3RX-_ | Order code | Inverter model 3G3RX-_ | Order code |
| A2004 | AX-RC10700032-DE | A4004 | AX-RC43000020-DE |
| A2007 | AX-RC06750061-DE | A4007 | AX-RC27000030-DE |
| A2015 | AX-RC03510093-DE | A4015 | AX-RC14000047-DE |
| A2022 | AX-RC02510138-DE | A4022 | AX-RC10100069-DE |
| A2037 | AX-RC01600223-DE | A4040 | AX-RC06400116-DE |
| A2055 | AX-RC01110309-DE | A4055 | AX-RC04410167-DE |
| A2075 | AX-RC00840437-DE | A4075 | AX-RC03350219-DE |
| A2110 | AX-RC00590614-DE | A4110 | AX-RC02330307-DE |
| A2150 | AX-RC00440859-DE | A4150 | AX-RC01750430-DE |
| A2185/A2220 | AX-RC00301275-DE | A4185/A4220 | AX-RC01200644-DE |
| A2300 | AX-RC00231662-DE | A4300 | AX-RC00920797-DE |
| A2370 | AX-RC00192015-DE | A4370 | AX-RC00741042-DE |
| A2450 | AX-RC00162500-DE | A4450 | AX-RC00611236-DE |
| A2550 | AX-RC00133057-DE | A4550 | AX-RC00501529-DE |

| 3-phase 200 VAC | | 3-phase 400 VAC | |
|---|---|---|---|
| Inverter model 3G3RX-_ | Order code | Inverter model 3G3RX-_ | Order code |
| | | A4750 | AX-RC00372094-DE |
| | | A4900 | AX-RC00312446-DE |
| | | A411K | AX-RC00252981-DE |
| | | A413K | AX-RC00213613-DE |

## ① Chokes

| Diameter | Description | Order code |
|---|---|---|
| 21 | For 2.2 kW motors or below | AX-FER2102-RE |
| 25 | For 15 kW motors or below | AX-FER2515-RE |
| 50 | For 45 kW motors or below | AX-FER5045-RE |
| 60 | For 55 kW motors or above | AX-FER6055-RE |

## ① Output AC Reactor

| 200 V | | 400 V | |
|---|---|---|---|
| Model 3G3RX-_ | Order code | Model 3G3RX-_ | Order code |
| A2004 | AX-RAO11500026-DE | A4004/A4007/A4015 | AX-RAO16300038-DE |
| A2007 | AX-RAO07600042-DE | | |
| A2015 | AX-RAO04100075-DE | | |
| A2022 | AX-RAO03000105-DE | A4022 | AX-RAO11800053-DE |
| A2037 | AX-RAO01830160-DE | A4040 | AX-RAO07300080-DE |
| A2055 | AX-RAO01150220-DE | A4055 | AX-RAO04600110-DE |
| A2075 | AX-RAO00950320-DE | A4075 | AX-RAO03600160-DE |
| A2110 | AX-RAO00630430-DE | A4110 | AX-RAO02500220-DE |
| A2150 | AX-RAO00490640-DE | A4150 | AX-RAO02000320-DE |
| A2185 | AX-RAO00390800-DE | A4185 | AX-RAO01650400-DE |
| A2220 | AX-RAO00330950-DE | A4220 | AX-RAO01300480-DE |
| A2300 | AX-RAO00251210-DE | A4300 | AX-RAO01030580-DE |
| A2370 | AX-RAO00191450-DE | A4370 | AX-RAO00800750-DE |
| A2450 | AX-RAO00161820-DE | A4450 | AX-RAO00680900-DE |
| A2550 | AX-RAO00132200-DE | A4550 | AX-RAO00531100-DE |
| | | A4750 | AX-RAO00401490-DE |
| | | A4900 | AX-RAO00331760-DE |
| | | A411K | AX-RAO00262170-DE |
| | | A413K | AX-RAO00212600-DE |

**Note:** This table corresponds with HD rating. When ND is used, please choose the reactor for the next size inverter.

## ② Accessories

| Types | Appearance | Description | Order code |
|---|---|---|---|
| Remote digital operator |  | 5 line LCD digital operator with copy function*1 | 3G3AX-OP05 |
| | | Operator holder (for inside cabinet mounting) | 3G3AX-OP05-H-E |
| |  | LED remote digital operator | 3G3AX-OP01 |
| | | Mounting kit | 4X-KITmini |
| LED digital operator |  | To be used in combination with communication option boards | 3G3AX-OP03 |
| Blind cover |  | | 3G3AX-OP05-B-E |
| Cables |  | 3 m remote digital operator cable | 3G3AX-CAJOP300-EE |
| | – | RJ45 to USB connection cable | USB-CONVERTERCABLE |
| | | | 3G3AX-PCACN2 |

*1 This digital operator is provided with the RX inverter from factory.

## ③ Option boards

| Types | Description | Functions | Order code |
|---|---|---|---|
| Encoder feedback | PG speed controller option card | Phase A,B and Z pulse (differential pulse) inputs (RS-422)<br>Pulse train position command input (RS-422)<br>Pulse monitor output (RS-422)<br>PG frequency range: 100 kHz max | 3G3AX-PG |
| Communication option board | DeviceNet option card | Used for running or stopping the inverter, setting or referencing parameters, and monitoring output frequency, output current ... through communications with the host controller | 3G3AX-RX-DRT |
| | Profibus option card | | 3G3AX-RX-PRT |
| | Ethercat option card | | 3G3AX-RX-ECT |
| | CompoNet option card | | 3G3AX-RX-CRT |
| | Mechatrolink-II option card | | 3G3AX-RX-MRT |
| I/O option | Extra input/output option card | 8 digital inputs, 8 digital outputs, 4 analog inputs, 1 analog output | 3G3AX-EIO21-ROE |

### ④ Braking unit, braking resistor unit

| Inverter | | | | | Braking resistor unit | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Voltage | Max. motor kW | Inverter 3G3RX_ | Braking unit AX-BCR_ | Connectable min. resistance Ω | Inverter mounted type (3% ED, 10 sec max.) | | Braking torque % | External resistor 10% ED 10 sec max. for built-in 5 sec max. for braking unit | | Braking torque % |
| | | 3-phase | | | Order code | Resist Ω | | Order code | Resist Ω | |
| 200 V (single-/ three-phase) | 0.55 | 2004 | Built-in | 50 | AX-REM00K1200-IE | 200 | 180 | AX-REM00K1200-IE | 200 | 180 |
| | 1.1 | 2007 | | | | | 100 | AX-REM00K2070-IE | 70 | 200 |
| | 1.5 | 2015 | | 35 | AX-REM00K2070-IE | 70 | 140 | AX-REM00K4075-IE | 75 | 130 |
| | 2.2 | 2022 | | | | | 90 | AX-REM00K4035-IE | 35 | 180 |
| | 4.0 | 2037 | | | AX-REM00K4075-IE | 75 | 50 | AX-REM00K6035-IE | 35 | 100 |
| | 5.5 | 2055 | | 16 | AX-REM00K4035-IE | 35 | 75 | AX-REM00K9020-IE | 20 | 150 |
| | 7.5 | 2075 | | 10 | | | 55 | AX-REM01K9017-IE | 17 | 110 |
| | 11.0 | 2110 | | | AX-REM00K6035-IE | 35 | 40 | AX-REM02K1017-IE | 17 | 75 |
| | 15.0 | 2150 | | 7.5 | AX-REM00K9017-IE | 17 | 55 | AX-REM03K5010-IE | 10 | 95 |
| | 18.5 | 2185 | | | AX-REM03K5010-IE | 10 | 75 | AX-REM19K0008-IE | 8 | 95 |
| | 22.0 | 2220 | | 5 | | | 65 | | | 80 |
| | 30.0 | 2300 | 2035090-TE | 4 | – | | | AX-REM19K0006-IE | 6 | 80 |
| | 37.0 | 2370 | | | | | | | 6 | 60 |
| | 45.0 | 2450 | 2070130-TE | 2.8 | | | | 2 x AX-REM19K0006-IE | 3 | 105 |
| | 55.0 | 2550 | | | | | | | 3 | 85 |
| 400 V (three-phase) | 0.55 | 4004 | Built-in | 100 | AX-REM00K1400-IE | 400 | 200 | AX-REM00K1400-IE | 400 | 200 |
| | 1.1 | 4007 | | | | | 200 | | | 200 |
| | 1.5 | 4015 | | | AX-REM00K1200-IE | 200 | 190 | AX-REM00K2200-IE | 200 | 190 |
| | 2.2 | 4022 | | | AX-REM00K2200-IE | 200 | 130 | AX-REM00K5120-IE | 120 | 200 |
| | 4.0 | 4040 | | 70 | AX-REM00K2120-IE | 120 | 120 | AX-REM00K6100-IE | 100 | 140 |
| | 5.5 | 4055 | | | AX-REM00K4075-IE | 75 | 140 | AX-REM00K9070-IE | 70 | 150 |
| | 7.5 | 4075 | | 35 | | | 100 | AX-REM01K9070-IE | 70 | 110 |
| | 11.0 | 4110 | | | AX-REM00K6100-IE | 100 | 50 | AX-REM02K1070-IE | 70 | 75 |
| | 15.0 | 4150 | | 24 | AX-REM00K9070-IE | 70 | 55 | AX-REM03K5035-IE | 35 | 110 |
| | 18.5 | 4185 | | | AX-REM03K5035-IE | 35 | 90 | AX-REM19K0030-IE | 30 | 100 |
| | 22.0 | 4220 | | 20 | | | 75 | | | 85 |
| | 30.0 | 4300 | 4015045-TE | 16 | – | | | AX-REM19K0020-IE | 20 | 95 |
| | 37.0 | 4370 | 4017068-TE | 11 | | | | AX-REM38K0012-IE | 15 | 125 |
| | 45.0 | 4450 | | | | | | | | 100 |
| | 55.0 | 4550 | 4035090-TE | 8.5 | | | | 2 x AX-REM19K0020-IE | 10 | 100 |
| | 75.0 | 4750 | | | | | | 3 x AX-REM19K0030-IE | 10 | 75 |
| | 90.0 | 4900 | 4070130-TE | 5.5 | | | | 2 x AX-REM38K0012-IE | 6 | 105 |
| | 110.0 | 411K | 4090240-TE | 3.2 | | | | 3 x AX-REM38K0012-IE | 4 | 125 |
| | 132.0 | 413K | | | | | | | | 105 |

### ⑤ Computer software

| Description | Installation | Order code |
|---|---|---|
| Computer software | Configuration and monitoring software tool | CX-Drive |
| Computer software | Configuration and monitoring software tool | CX-One |
| Computer software | Software tool for energy saving calculation | €Saver |

## Specifications

### 200 V class

| Three-phase: 3G3RX-_ | | | | A2004 | A2007 | A2015 | A2022 | A2037 | A2055 | A2075 | A2110 | A2150 | A2185 | A2220 | A2300 | A2370 | A2450 | A2550 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Max. applicable motor 4P kW[*1] | | | at CT | 0.4 | 0.75 | 1.5 | 2.2 | 3.7 | 5.5 | 7.5 | 11 | 15 | 18.5 | 22 | 30 | 37 | 45 | 55 |
| | | | at VT | 0.75 | 1.5 | 2.2 | 3.7 | 5.5 | 7.5 | 11 | 15 | 18.5 | 22 | 30 | 37 | 45 | 55 | 75 |
| Output characteristics | Inverter capacity kVA | 200 V | at CT | 1.0 | 1.7 | 2.5 | 3.6 | 5.7 | 8.3 | 11.0 | 15.9 | 22.1 | 26.3 | 32.9 | 41.9 | 50.2 | 63.0 | 76.2 |
| | | | at VT | 1.3 | 2.1 | 3.2 | 4.1 | 6.7 | 10.4 | 15.2 | 20.0 | 26.3 | 29.4 | 39.1 | 49.5 | 59.2 | 72.7 | 93.5 |
| | | 240 V | at CT | 1.2 | 2.0 | 3.1 | 4.3 | 6.8 | 9.9 | 13.3 | 19.1 | 26.6 | 31.5 | 39.4 | 50.2 | 60.2 | 75.6 | 91.4 |
| | | | at VT | 1,5 | 2.6 | 3.9 | 5.0 | 8.1 | 12.4 | 18.2 | 24.1 | 31.5 | 35.3 | 46.9 | 59.4 | 71.0 | 87.2 | 112.2 |
| | Rated output current (A) | | at CT | 3.0 | 5.0 | 7.5 | 10.5 | 16.5 | 24 | 32 | 46 | 64 | 76 | 95 | 121 | 145 | 182 | 220 |
| | | | at VT | 3.7 | 6.3 | 9.4 | 12 | 19.6 | 30 | 44 | 58 | 73 | 85 | 113 | 140 | 169 | 210 | 270 |
| | Max. output voltage | | | Proportional to input voltage: 0 to 240 V | | | | | | | | | | | | | | |
| | Max. output frequency | | | 400 Hz | | | | | | | | | | | | | | |
| Power supply | Rated input voltage and frequency | | | 3-phase 200 to 240 V 50/60 Hz | | | | | | | | | | | | | | |
| | Allowable voltage fluctuation | | | –15% to 10% | | | | | | | | | | | | | | |
| | Allowable frequency fluctuation | | | 5% | | | | | | | | | | | | | | |
| Braking | Regenerative braking | | | Internal BRD circuit (external discharge resistor) | | | | | | | | | | | External regenerative braking unit | | | |
| | Minimum connectable resistance | | | 50 | 50 | 35 | 35 | 35 | 16 | 10 | 10 | 7.5 | 7.5 | 5 | | | | |
| Protective structure | | | | IP20 | | | | | | | | | | | | | | |
| Cooling method | | | | Forced air cooling | | | | | | | | | | | | | | |

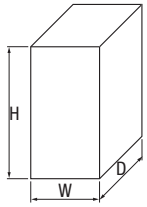
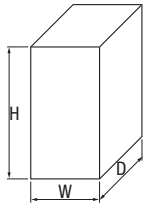
[*1] Based on a standard 3-phase standard motor.

### 400 V class

| Three-phase: 3G3RX-_ | | | | A4004 | A4007 | A4015 | A4022 | A4040 | A4055 | A4075 | A4110 | A4150 | A4185 | A4220 | A4300 | A4370 | A4450 | A4550 | B4750 | B4900 | B411K | B413K |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Max. applicable motor 4P kW[*1] | | | at CT | 0.4 | 0.75 | 1.5 | 2.2 | 4.0 | 5.5 | 7.5 | 11 | 15 | 18.5 | 22 | 30 | 37 | 45 | 55 | 75 | 90 | 110 | 132 |
| | | | at VT | 0.75 | 1.5 | 2.2 | 4.0 | 5.5 | 7.5 | 11 | 15 | 18.5 | 22 | 30 | 37 | 45 | 55 | 75 | 90 | 110 | 132 | 160 |
| Output characteristics | Inverter capacity kVA | 400 V | at CT | 1.0 | 1.7 | 2.5 | 3.6 | 6.2 | 9.7 | 13.1 | 17.3 | 22.1 | 26.3 | 33.2 | 40.1 | 51.9 | 63.0 | 77.6 | 103.2 | 121.9 | 150.3 | 180.1 |
| | | | at VT | 1.3 | 2.1 | 3.3 | 4.6 | 7.7 | 11.0 | 15.2 | 20.9 | 25.6 | 30.4 | 39.4 | 48.4 | 58.8 | 72.7 | 93.5 | 110.8 | 135 | 159.3 | 200.9 |
| | | 480 V | at CT | 1.2 | 2.0 | 3.1 | 4.3 | 7.4 | 11.6 | 15.8 | 20.7 | 26.6 | 31.5 | 39.9 | 48.2 | 62.3 | 75.6 | 93.1 | 123.8 | 146.3 | 180.4 | 216.1 |
| | | | at VT | 1.5 | 2.5 | 4.0 | 5.5 | 9.2 | 13.3 | 18.2 | 24.1 | 30.7 | 36.5 | 47.3 | 58.1 | 70.6 | 87.2 | 112.2 | 133 | 162.1 | 191.2 | 241.1 |
| | Rated output current (A) | | at CT | 1.5 | 2.5 | 3.8 | 5.3 | 9.0 | 14 | 19 | 25 | 32 | 38 | 48 | 58 | 75 | 91 | 112 | 149 | 176 | 217 | 260 |
| | | | at VT | 1.9 | 3.1 | 4.8 | 6.7 | 11.1 | 16 | 22 | 29 | 37 | 43 | 57 | 70 | 85 | 105 | 135 | 160 | 195 | 230 | 290 |
| | Max. output voltage | | | Proportional to input voltage: 0 to 480 V | | | | | | | | | | | | | | | | | | |
| | Max. output frequency | | | 400 Hz | | | | | | | | | | | | | | | | | | |
| Power supply | Rated input voltage and frequency | | | 3-phase 380 to 480 V 50/60 Hz | | | | | | | | | | | | | | | | | | |
| | Allowable voltage fluctuation | | | –15% to 10% | | | | | | | | | | | | | | | | | | |
| | Allowable frequency fluctuation | | | 5% | | | | | | | | | | | | | | | | | | |
| Braking | Regenerative braking | | | Internal BRD circuit (external discharge resistor) | | | | | | | | | | | External regenerative braking unit | | | | | | | |
| | Minimum connectable resistance | | | 100 | 100 | 100 | 100 | 70 | 70 | 35 | 35 | 24 | 24 | 20 | | | | | | | | |
| Protective structure | | | | IP20 | | | | | | | | | | | | | | | IP00 | | | |
| Cooling method | | | | Forced air cooling | | | | | | | | | | | | | | | | | | |

[*1] Based on a standard 3-phase standard motor.

## Dimensions

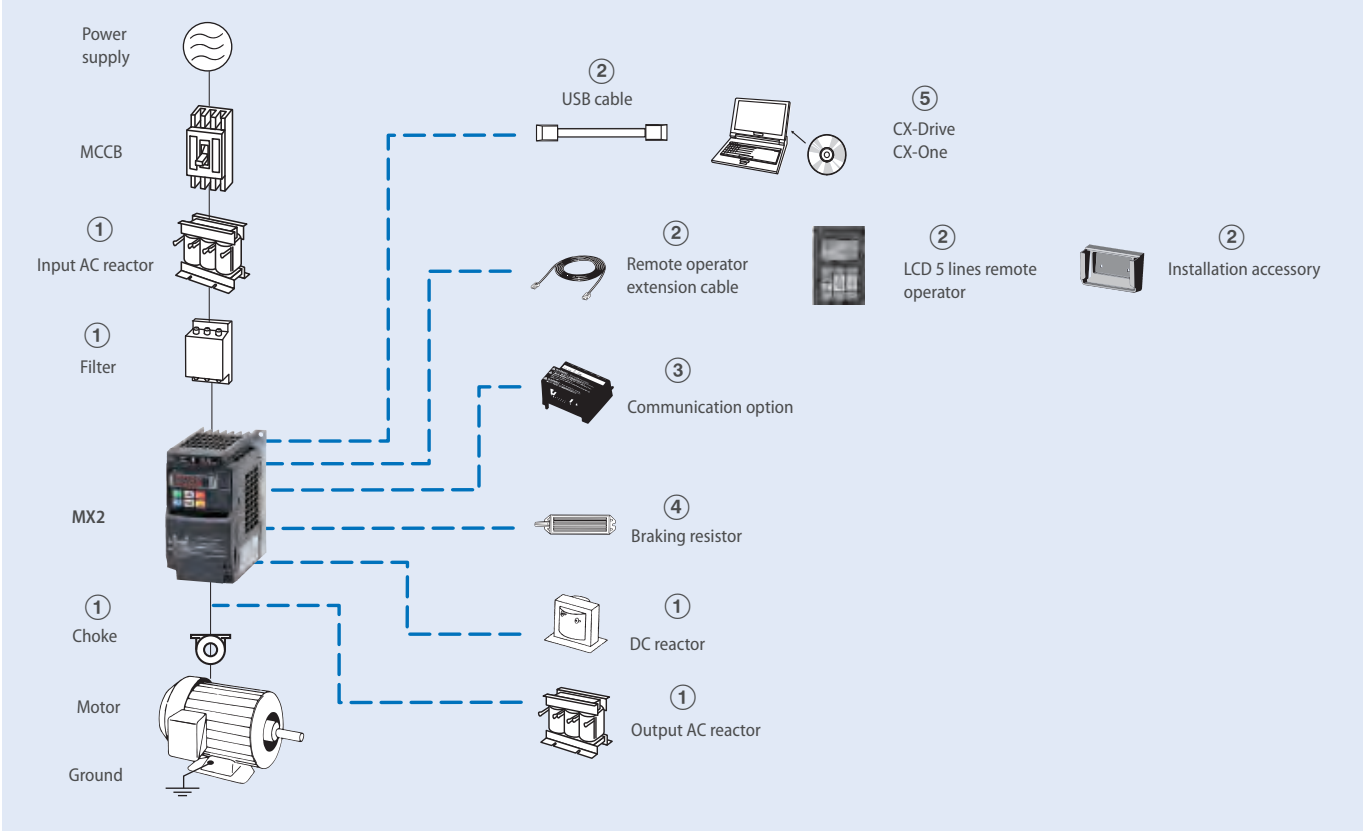
| Voltage class | Inverter model | Dimensions in mm | | | | |
|---|---|---|---|---|---|---|
| | | H | W | D | Weight (kg) | |
| Three-phase 200 V | 3G3RX-A2004 | 255 | 150 | 140 | 3.5 |   |
| | 3G3RX-A2007 | | | | | |
| | 3G3RX-A2015 | | | | | |
| | 3G3RX-A2022 | | | | | |
| | 3G3RX-A2037 | | | | | |
| | 3G3RX-A2055 | 260 | 210 | 170 | 6 | |
| | 3G3RX-A2075 | | | | | |
| | 3G3RX-A2110 | | | | | |
| | 3G3RX-A2150 | 390 | 250 | 190 | 14 | |
| | 3G3RX-A2185 | | | | | |
| | 3G3RX-A2220 | | | | | |
| | 3G3RX-A2300 | 540 | 310 | 195 | 20 | |
| | 3G3RX-A2370 | 550 | 390 | 250 | 30 | |
| | 3G3RX-A2450 | | | | | |
| | 3G3RX-A2550 | 700 | 480 | 250 | 43 | |
| Three-phase 400 V | 3G3RX-A4004 | 255 | 150 | 140 | 3.5 |   |
| | 3G3RX-A4007 | | | | | |
| | 3G3RX-A4015 | | | | | |
| | 3G3RX-A4022 | | | | | |
| | 3G3RX-A4040 | | | | | |
| | 3G3RX-A4055 | 260 | 210 | 170 | 6 | |
| | 3G3RX-A4075 | | | | | |
| | 3G3RX-A4110 | | | | | |
| | 3G3RX-A4150 | 390 | 250 | 190 | 14 | |
| | 3G3RX-A4185 | | | | | |
| | 3G3RX-A4220 | | | | | |
| | 3G3RX-A4300 | 540 | 310 | 195 | 22 | |
| | 3G3RX-A4370 | 550 | 390 | 250 | 30 | |
| | 3G3RX-A4450 | | | | | |
| | 3G3RX-A4550 | | | | | |
| | 3G3RX-B4750 | 700 | 390 | 270 | 60 | |
| | 3G3RX-B4900 | | | | | |
| | 3G3RX-B411K | 740 | 480 | 270 | 80 | |
| | 3G3RX-B413K | | | | | |

## Born to drive machines

MX2 has been developed to harmonise advanced motor and machine control. Thanks to its advanced design algorithms the MX2 provides smooth control down to zero speed, plus precise operation for fast cyclic operations and torque control capability in open loop. The MX2 also gives you comprehensive functionality for machine control such as positioning, speed synchronisation and logic programming.

- Current vector control
- Double rating VT 120%/1 min and CT 150%/1 min
- IM & PM motor control
- Torque control in open loop vector
- Positioning functionality
- Built-in application functionality (i.e. Brake control)
- Fieldbus comms: Modbus, DeviceNet, Profibus, MECHATROLINK-II, EtherCAT, CompoNet and EtherNet/IP

## Ordering information




**3G3MX2**

| Specifications | | | | | Order code | | |
|---|---|---|---|---|---|---|---|
| Voltage class | Constant torque | | Variable torque | | Standard (IP20) | Finless | IP54 |
| | Max motor kW | Rated current A | Max motor kW | Rated current A | | | |
| Single-phase 200 V | 0.1 | 1.0 | 0.2 | 1.2 | 3G3MX2-AB001-E | 3G3MX2-AB001-P-E | 3G3MX2-DB001-E/EC |
| | 0.2 | 1.6 | 0.4 | 1.9 | 3G3MX2-AB002-E | 3G3MX2-AB002-P-E | 3G3MX2-DB002-E/EC |
| | 0.4 | 3.0 | 0.55 | 3.5 | 3G3MX2-AB004-E | 3G3MX2-AB004-P-E | 3G3MX2-DB004-E/EC |
| | 0.75 | 5.0 | 1.1 | 6.0 | 3G3MX2-AB007-E | 3G3MX2-AB007-P-E | 3G3MX2-DB007-EC |
| | 1.5 | 8.0 | 2.2 | 9.6 | 3G3MX2-AB015-E | 3G3MX2-AB015-P-E | 3G3MX2-DB015-EC |
| | 2.2 | 11.0 | 3.0 | 12.0 | 3G3MX2-AB022-E | 3G3MX2-AB022-P-E | 3G3MX2-DB022-EC |
| Three-phase 200 V | 0.1 | 1.0 | 0.2 | 1.2 | 3G3MX2-A2001-E | 3G3MX2-A2001-P-E | 3G3MX2-D2001-E/EC |
| | 0.2 | 1.6 | 0.4 | 1.9 | 3G3MX2-A2002-E | 3G3MX2-A2002-P-E | 3G3MX2-D2002-E/EC |
| | 0.4 | 3.0 | 0.55 | 3.5 | 3G3MX2-A2004-E | 3G3MX2-A2004-P-E | 3G3MX2-D2004-E/EC |
| | 0.75 | 5.0 | 1.1 | 6.0 | 3G3MX2-A2007-E | 3G3MX2-A2007-P-E | 3G3MX2-D2007-E/EC |
| | 1.5 | 8.0 | 2.2 | 9.6 | 3G3MX2-A2015-E | 3G3MX2-A2015-P-E | 3G3MX2-D2015-EC |
| | 2.2 | 11.0 | 3.0 | 12.0 | 3G3MX2-A2022-E | 3G3MX2-A2022-P-E | 3G3MX2-D2022-EC |
| | 3.7 | 17.5 | 5.5 | 19.6 | 3G3MX2-A2037-E | 3G3MX2-A2037-P-E | 3G3MX2-D2037-EC |
| | 5.5 | 25.0 | 7.5 | 30.0 | 3G3MX2-A2055-E | – | 3G3MX2-D2055-EC |
| | 7.5 | 33.0 | 11 | 40.0 | 3G3MX2-A2075-E | – | 3G3MX2-D2075-EC |
| | 11 | 47.0 | 15 | 56.0 | 3G3MX2-A2110-E | – | 3G3MX2-D2110-EC |
| | 15 | 60.0 | 18.5 | 69.0 | 3G3MX2-A2150-E | – | 3G3MX2-D2150-EC |

| Specifications | | | | | Order code | | |
|---|---|---|---|---|---|---|---|
| Voltage class | Constant torque | | Variable torque | | Standard (IP20) | Finless | IP54 |
| | Max motor kW | Rated current A | Max motor kW | Rated current A | | | |
| Three-phase 400 V | 0.4 | 1.8 | 0.75 | 2.1 | 3G3MX2-A4004-E | 3G3MX2-A4004-P-E | 3G3MX2-D4004-EC |
| | 0.75 | 3.4 | 1.5 | 4.1 | 3G3MX2-A4007-E | 3G3MX2-A4007-P-E | 3G3MX2-D4007-EC |
| | 1.5 | 4.8 | 2.2 | 5.4 | 3G3MX2-A4015-E | 3G3MX2-A4015-P-E | 3G3MX2-D4015-EC |
| | 2.2 | 5.5 | 3.0 | 6.9 | 3G3MX2-A4022-E | 3G3MX2-A4022-P-E | 3G3MX2-D4022-EC |
| | 3.0 | 7.2 | 4.0 | 8.8 | 3G3MX2-A4030-E | 3G3MX2-A4030-P-E | 3G3MX2-D4030-EC |
| | 4.0 | 9.2 | 5.5 | 11.1 | 3G3MX2-A4040-E | 3G3MX2-A4040-P-E | 3G3MX2-D4040-EC |
| | 5.5 | 14.8 | 7.5 | 17.5 | 3G3MX2-A4055-E | – | 3G3MX2-D4055-EC |
| | 7.5 | 18.0 | 11 | 23.0 | 3G3MX2-A4075-E | – | 3G3MX2-D4075-EC |
| | 11 | 24.0 | 15 | 31.0 | 3G3MX2-A4110-E | – | 3G3MX2-D4110-EC |
| | 15 | 31.0 | 18.5 | 38.0 | 3G3MX2-A4150-E | – | 3G3MX2-D4150-EC |

### ① Line filters

| Inverter | | Standard line filter | | | | Low leakage line filter | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Rasmi | | Schaffner | | Rasmi | | Schaffner | |
| Voltage | Model 3G3MX2-_ | Order code AX-FIM | Current (A) | Order code AX-FIM | Current (A) | Order code AX-FIM | Current (A) | Order code AX-FIM | Current (A) |
| 1Phase 200 VAC | AB001 / AB002 / AB004 | 1010-RE | 10 | 1010-SE-V1 | 8 | 1010-RE-LL | 10 | 1010-SE-LL | 10 |
| | AB007 | 1014-RE | 14 | 1014-SE-V1 | 14 | 1014-RE-LL | 14 | 1014-SE-LL | 14 |
| | AB015 / AB022 | 1024-RE | 24 | 1024-SE-V1 | 27 | 1024-RE-LL | 24 | 1024-SE-LL | 24 |
| 3Phase 200 VAC | A2001 / A2002 / A2004 / A2007 | 2010-RE | 10 | 2010-SE-V1 | 7.8 | 2010-RE-LL | 10 | – | – |
| | A2015 / A2022 | 2020-RE | 20 | 2020-SE-V1 | 16 | 2020-RE-LL | 20 | 2020-SE-LL | 20 |
| | A2037 | 2030-RE | 30 | 2030-SE-V1 | 25 | 2030-RE-LL | 30 | 2030-SE-LL | 30 |
| | A2055 / A2075 | 2060-RE | 60 | 2060-SE-V1 | 50 | 2060-RE-LL | 60 | 2060-SE-LL | 50 |
| | A2110 | 2080-RE | 80 | 2080-SE-V1 | 70 | 2080-RE-LL | 80 | – | – |
| | A2150 | 2100-RE | 100 | 2100-SE-V1 | 75 | 2100-RE-LL | 100 | – | – |
| 3Phase 400 VAC | A4004 / A4007 | 3005-RE | 5 | 3005-SE-V1 | 6 | 3005-RE-LL | 5 | 3005-SE-LL | 5 |
| | A4015 / A4022 / A4030 | 3010-RE | 10 | 3010-SE-V1 | 12 | 3010-RE-LL | 10 | 3010-SE-LL | 10 |
| | A4040 | 3014-RE | 14 | 3014-SE-V1 | 15 | 3014-RE-LL | 14 | 3014-SE-LL | 15 |
| | A4055 / A4075 | 3030-RE | 30 | 3030-SE-V1 | 29 | 3030-RE-LL | 30 | 3030-SE-LL | 30 |
| | A4110 / A4150 | 3050-RE | 50 | 3050-SE-V1 | 48 | 3050-RE-LL | 50 | 3050-SE-LL | 50 |

### ① Input AC reactors

| Inverter | | AC Reactor |
|---|---|---|
| Voltage | Model 3G3MX2-_ | Order code |
| 1-Phase 200 VAC | AB002/AB004 | AX-RAI02000070-DE |
| | AB007 | AX-RAI01700140-DE |
| | AB015 | AX-RAI01200200-DE |
| | AB022 | AX-RAI00630240-DE |
| 3-Phase 200 VAC | A2002/A2004/A2007 | AX-RAI02800080-DE |
| | A2015/A2022/A2037 | AX-RAI00880200-DE |
| | A2055/A2075 | AX-RAI00350335-DE |
| | A2110/A2150 | AX-RAI00180670-DE |

| Inverter | | AC Reactor |
|---|---|---|
| Voltage | Model 3G3MX2-_ | Order code |
| 3-Phase 400 VAC | A4004/A4007/A4015 | AX-RAI07700050-DE |
| | A4022/A4030/A4040 | AX-RAI03500100-DE |
| | A4055/A4075 | AX-RAI01300170-DE |
| | A4110/A4150 | AX-RAI00740335-DE |

### ① DC reactors

| 200 V single-phase | | 200 V three-phase | | 400 V three-phase | |
|---|---|---|---|---|---|
| Inverter | Order code | Inverter | Order code | Inverter | Order code |
| 3G3MX2-AB001 | AX-RC10700032-DE | 3G3MX2-A2001 | AX-RC21400016-DE | 3G3MX2-A4004 | AX-RC43000020-DE |
| 3G3MX2-AB002 | | 3G3MX2-A2002 | | 3G3MX2-A4007 | AX-RC27000030-DE |
| 3G3MX2-AB004 | AX-RC06750061-DE | 3G3MX2-A2004 | AX-RC10700032-DE | 3G3MX2-A4015 | AX-RC14000047-DE |
| 3G3MX2-AB007 | AX-RC03510093-DE | 3G3MX2-A2007 | AX-RC06750061-DE | 3G3MX2-A4022 | AX-RC10100069-DE |
| 3G3MX2-AB015 | AX-RC02510138-DE | 3G3MX2-A2015 | AX-RC03510093-DE | 3G3MX2-A4030 | AX-RC08250093-DE |
| 3G3MX2-AB022 | AX-RC01600223-DE | 3G3MX2-A2022 | AX-RC02510138-DE | 3G3MX2-A4040 | AX-RC06400116-DE |
| – | | 3G3MX2-A2037 | AX-RC01600223-DE | 3G3MX2-A4055 | AX-RC04410167-DE |
| | | 3G3MX2-A2055 | AX-RC01110309-DE | 3G3MX2-A4075 | AX-RC03350219-DE |
| | | 3G3MX2-A2075 | AX-RC00840437-DE | 3G3MX2-A4011 | AX-RC02330307-DE |
| | | 3G3MX2-A2011 | AX-RC00590614-DE | 3G3MX2-A4015 | AX-RC01750430-DE |
| | | 3G3MX2-A2015 | AX-RC00440859-DE | – | |

### ① Chokes

| Diameter | Description | Order code |
|---|---|---|
| 21 | For 2.2 KW motors or below | AX-FER2102-RE |
| 25 | For 15 KW motors or below | AX-FER2515-RE |
| 50 | For 45 KW motors or below | AX-FER5045-RE |

### ① Output AC reactor

| Inverter | | AC Reactor |
|---|---|---|
| Voltage | Model 3G3MX2-_ | Order code |
| 200 VAC | AB001/AB002/AB004/A2001/A2002/A2004 | AX-RAO11500026-DE |
| | AB007/A2007 | AX-RAO07600042-DE |
| | AB015/A2015 | AX-RAO04100075-DE |
| | AB022/A2022 | AX-RAO03000105-DE |
| | A2037 | AX-RAO01830160-DE |
| | A2055 | AX-RAO01150220-DE |
| | A2075 | AX-RAO00950320-DE |
| | A2110 | AX-RAO00630430-DE |
| | A2150 | AX-RAO00490640-DE |

| Inverter | | AC Reactor |
|---|---|---|
| Voltage | Model 3G3MX2-_ | Order code |
| 400 VAC | A4004/A4007/A4015 | AX-RAO16300038-DE |
| | A4022 | AX-RAO11800053-DE |
| | A4030/A4040 | AX-RAO07300080-DE |
| | A4055 | AX-RAO04600110-DE |
| | A4075 | AX-RAO03600160-DE |
| | A4110 | AX-RAO02500220-DE |
| | A4150 | AX-RAO02000320-DE |

### ② Accessories

| Types | Description | Functions | Order code |
|---|---|---|---|
| Digital operator | LCD remote operator | 5 Line LCD remote operator with copy function, cable length max. 3m. | AX-OP05-E |
| | Remote operator cable | 3 meters cable for connecting remote operator | 3G3AX-CAJOP300-EE |
| | LED remote operator | LED remote operator, cable length max. 3m | 3G3AX-OP01 |
| | Mounting kit for LED operator | Mounting kit for LED operator on panel | 4X-KITMINI |
| | Operator holder | Holder to put the AX-OP05-E inside of the cabinet | 3G3AX-OP05-H-E |
| Accessories | PC configuration cable | Mini USB to USB connector cable | AX-CUSBM002-E |

### ③ Communication option boards

| Description | Functions | Order code |
|---|---|---|
| Profibus option card | Used for running or stopping the inverter, setting or referencing parameters, and monitoring output frequency, output current, or similar items through communications with the host controller. | 3G3AX-MX2-PRT |
| DeviceNet option card | | 3G3AX-MX2-DRT |
| EtherCAT option card | | 3G3AX-MX2-ECT |
| CompoNet option card | | 3G3AX-MX2-CRT |
| MECHATROLINK-II option card | | 3G3AX-MX2-MRT |
| EtherNet/IP option card | | 3G3AX-MX2-EIP |
| Extra input/output option board | 1 analog voltage input, 1 analog current input, 1 analog voltage output, 8 discrete logic inputs, 4 discrete logic outputs | 3G3AX-MX2-EIO15-E |

### ④ Braking unit, braking resistor unit

| Inverter | | | | | Braking resistor unit | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Voltage | Max. motor kW | Inverter 3G3MX2_ | | Connectable min. resistance Ω | Inverter mounted type (3 %ED, 10 sec max) | | Braking torque % | Inverter mounted type (10%ED, 10 sec max) | | Braking torque % |
| | | 1-phase | 3-phase | | Order code | Resist Ω | | Order code | Resist Ω | |
| 200 V (Single-/Three-phase) | 0.12 | B001 | 2001 | 100 | AX-REM00K1400-IE | 400 | 200 | AX-REM00K1400-IE | 400 | 200 |
| | 0.25 | B002 | 2002 | | | | 180 | | | 180 |
| | 0.55 | B004 | 2004 | | AX-REM00K1200-IE | 200 | 180 | AX-REM00K1200-IE | 200 | 180 |
| | 1.1 | B007 | 2007 | 50 | | | 100 | AX-REM00K2070-IE | 70 | 200 |
| | 1.5 | B015 | 2015 | | AX-REM00K2070-IE | 70 | 140 | AX-REM00K4075-IE | 75 | 130 |
| | 2.2 | B022 | 2022 | 35 | | | 90 | AX-REM00K4035-IE | 35 | 180 |
| | 4.0 | – | 2040 | | AX-REM00K4075-IE | 75 | 50 | AX-REM00K6035-IE | 35 | 100 |
| | 5.5 | – | 2055 | 20 | AX-REM00K4035-IE | 35 | 75 | AX-REM00K9020-IE | 20 | 150 |
| | 7.5 | – | 2075 | 17 | | | 55 | AX-REM01K9017-IE | 17 | 110 |
| | 11 | – | 2110 | | AX-REM00K6035-IE | 35 | 40 | AX-REM02K1017-IE | 17 | 75 |
| | 15 | – | 2150 | 10 | AX-REM00K9017-IE | 17 | 55 | AX-REM03K5010-IE | 10 | 95 |
| 400 V (Three-phase) | 0.55 | – | 4004 | 180 | AX-REM00K1400-IE | 400 | 200 | AX-REM00K1400-IE | 400 | 200 |
| | 1.1 | – | 4007 | | | | 200 | | | 200 |
| | 1.5 | – | 4015 | | AX-REM00K1200-IE | 200 | 190 | AX-REM00K2200-IE | 200 | 190 |
| | 2.2 | – | 4022 | 100 | AX-REM00K2200-IE | 200 | 130 | AX-REM00K5120-IE | 120 | 200 |
| | 3.0 | – | 4030 | | AX-REM00K2120-IE | 120 | 160 | | | 160 |
| | 4.0 | – | 4040 | | | | 120 | AX-REM00K6100-IE | 100 | 140 |
| | 5.5 | – | 4055 | 70 | AX-REM00K4075-IE | 75 | 140 | AX-REM00K9070-IE | 70 | 150 |
| | 7.5 | – | 4075 | | | | 100 | AX-REM01K9070-IE | 70 | 110 |
| | 11 | – | 4110 | | AX-REM00K6100-IE | 100 | 50 | AX-REM02K1070-IE | 70 | 75 |
| | 15 | – | 4150 | 35 | AX-REM00K9070-IE | 70 | 55 | AX-REM03K5035-IE | 35 | 110 |

### ⑤ Computer software

| Description | Installation | Order code |
|---|---|---|
| Computer software | Configuration and monitoring software tool | CX-Drive |
| Computer software | Configuration and monitoring software tool | CX-One |
| Computer software | Software tool for Energy Saving calculation | €Saver |

## Specifications

### 200 V class

| Single-phase: 3G3MX2-_ | | | B001 | B002 | B004 | B007[*1] | B015 | B022 | – | – | – | – | – |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Three-phase: 3G3MX2-_ | | | 2001 | 2002 | 2004 | 2007 | 2015 | 2022 | 2037 | 2055 | 2075 | 2110 | 2150 |
| Motor kW[*2] | For VT setting | | 0.2 | 0.4 | 0.55 | 1.1 | 2.2 | 3.0 | 5.5 | 7.5 | 11 | 15 | 18.5 |
| | For CT setting | | 0.1 | 0.2 | 0.4 | 0.75 | 1.5 | 2.2 | 3.7 | 5.5 | 7.5 | 11 | 15 |
| Output characteristics | Inverter capacity kVA | 200 VT | 0.4 | 0.6 | 1.2 | 2.0 | 3.3 | 4.1 | 6.7 | 10.3 | 13.8 | 19.3 | 23.9 |
| | | 200 CT | 0.2 | 0.5 | 1.0 | 1.7 | 2.7 | 3.8 | 6.0 | 8.6 | 11.4 | 16.2 | 20.7 |
| | | 240 VT | 0.4 | 0.7 | 1.4 | 2.4 | 3.9 | 4.9 | 8.1 | 12.4 | 16.6 | 23.2 | 28.6 |
| | | 240 CT | 0.3 | 0.6 | 1.2 | 2.0 | 3.3 | 4.5 | 7.2 | 10.3 | 13.7 | 19.5 | 24.9 |
| | Rated output current (A) at VT | | 1.2 | 1.9 | 3.5 | 6.0 | 9.6 | 12.0 | 19.6 | 30.0 | 40.0 | 56.0 | 69.0 |
| | Rated output current (A) at CT | | 1.0 | 1.6 | 3.0 | 5.0 | 8.0 | 11.0 | 17.5 | 25.0 | 33.0 | 47.0 | 60.0 |
| | Max. output voltage | | Proportional to input voltage: 0 … 240 V | | | | | | | | | | |
| | Max. output frequency | | 400 Hz | | | | | | | | | | |
| Power supply | Rated input voltage and frequency | | Single-phase 200… 240 V 50/60 Hz<br>3-phase 200… 240 V 50/60 Hz | | | | | | | | | | |
| | Allowable voltage fluctuation | | –15% … +10% | | | | | | | | | | |
| | Allowable frequency fluctuation | | 5% | | | | | | | | | | |
| Braking torque | At short-time deceleration | | 100%: <50Hz | | | | 70%: <50Hz | Approx 20% | – | | | | |
| | At capacitor feedback | | 50%: <60Hz | | | | 50%: <60Hz | | | | | | |
| Cooling method | | | Self cooling[*3] | | | | Forced-air-cooling | | | | | | |

[*1] Three phase model use forced-air-cooling but single phase model is self cooling.
[*2] Based on a standard 3-Phase standard motor.
[*3] Forced air cooling for IP54 models

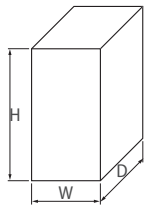
### 400 V class

| Three-phase: 3G3MX2-_ | | | 4004 | 4007 | 4015 | 4022 | 4030 | 4040 | 4055 | 4075 | 4110 | 4150 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Motor kW[*1] | For VT setting | | 0.75 | 1.5 | 2.2 | 3.0 | 4.0 | 5.5 | 7.5 | 11 | 15 | 18.5 |
| | For CT setting | | 0.4 | 0.75 | 1.5 | 2.2 | 3.0 | 4.0 | 5.5 | 7.5 | 11 | 15 |
| Output characteristics | Inverter capacity kVA | 380 VT | 1.3 | 2.6 | 3.5 | 4.5 | 5.7 | 7.3 | 11.5 | 15.1 | 20.4 | 25.0 |
| | | 380 CT | 1.1 | 2.2 | 3.1 | 3.6 | 4.7 | 6.0 | 9.7 | 11.8 | 15.7 | 20.4 |
| | | 480 VT | 1.7 | 3.4 | 4.4 | 5.7 | 7.3 | 9.2 | 14.5 | 19.1 | 25.7 | 31.5 |
| | | 480 CT | 1.4 | 2.8 | 3.9 | 4.5 | 5.9 | 7.6 | 12.3 | 14.9 | 19.9 | 25.7 |
| | Rated output current (A) at VT | | 2.1 | 4.1 | 5.4 | 6.9 | 8.8 | 11.1 | 17.5 | 23.0 | 31.0 | 38.0 |
| | Rated output current (A) at CT | | 1.8 | 3.4 | 4.8 | 5.5 | 7.2 | 9.2 | 14.8 | 18.0 | 24.0 | 31.0 |
| | Max. output voltage | | Proportional to input voltage: 0 … 480 V | | | | | | | | | |
| | Max. output frequency | | 400 Hz | | | | | | | | | |
| Power supply | Rated input voltage and frequency | | 3-phase 380 … 480 V 50/60 Hz | | | | | | | | | |
| | Allowable voltage fluctuation | | –15% … +10% | | | | | | | | | |
| | Allowable frequency fluctuation | | 5% | | | | | | | | | |
| Braking torque | At short-time deceleration[*2]<br>At capacitor feedback | | 100%: <50Hz<br>50%: <60Hz | | | | 70%: <50Hz<br>50%: <60Hz | – | | | | |
| Cooling method | | | Self cooling[*2] | | Forced-air-cooling | | | | | | | |

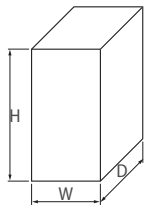
[*1] Based on a standard 3-Phase standard motor.
[*2] Forced air cooling for IP54 models

## Dimensions

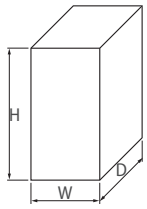
### Standard models (IP20)

| Voltage class | Inverter model | Dimensions in mm | | | Weight (kg) | |
|---|---|---|---|---|---|---|
| | | H | W | D | | |
| Single-phase 200 V | 3G3MX2-AB001-E | 128 | 68 | 109 | 1.0 |   |
| | 3G3MX2-AB002-E | | | | 1.0 | |
| | 3G3MX2-AB004-E | | | 122.5 | 1.1 | |
| | 3G3MX2-AB007-E | 128 | 108 | 170.5 | 1.4 | |
| | 3G3MX2-AB015-E | | | | 1.8 | |
| | 3G3MX2-AB022-E | | | | 1.8 | |
| Three-phase 200 V | 3G3MX2-A2001-E | 128 | 68 | 109 | 1.0 | |
| | 3G3MX2-A2002-E | | | | 1.0 | |
| | 3G3MX2-A2004-E | | | 122.5 | 1.1 | |
| | 3G3MX2-A2007-E | | | 145.5 | 1.2 | |
| | 3G3MX2-A2015-E | 128 | 108 | 170.5 | 1.6 | |
| | 3G3MX2-A2022-E | | | | 1.8 | |
| | 3G3MX2-A2037-E | 128 | 140 | 170.5 | 2.0 | |
| | 3G3MX2-A2055-E | 260 | 140 | 155 | 3.0 | |
| | 3G3MX2-A2075-E | | | | 3.4 | |
| | 3G3MX2-A2110-E | 296 | 180 | 175 | 5.1 | |
| | 3G3MX2-A2150-E | 350 | 220 | 175 | 7.4 | |
| Three-phase 400 V | 3G3MX2-A4004-E | 128 | 108 | 143.5 | 1.5 | |
| | 3G3MX2-A4007-E | | | 170.5 | 1.6 | |
| | 3G3MX2-A4015-E | | | | 1.8 | |
| | 3G3MX2-A4022-E | | | | 1.9 | |
| | 3G3MX2-A4030-E | | | | 1.9 | |
| | 3G3MX2-A4040-E | 128 | 140 | 170.5 | 2.1 | |
| | 3G3MX2-A4055-E | 260 | | 155 | 3.5 | |
| | 3G3MX2-A4075-E | | | | 3.5 | |
| | 3G3MX2-A4110-E | 296 | 180 | 175 | 4.7 | |
| | 3G3MX2-A4150-E | | | | 5.2 | |

### Finless models

| Voltage class | Inverter model | Dimensions in mm | | | Weight (kg) | |
|---|---|---|---|---|---|---|
| | | H | W | D | | |
| Single-phase 200 V | 3G3MX2-AB001-P-E | 128 | 68 | 103 | 1.1 |   |
| | 3G3MX2-AB002-P-E | | | | | |
| | 3G3MX2-AB004-P-E | | | | | |
| | 3G3MX2-AB007-P-E | 128 | 108 | 123 | 1.8 | |
| | 3G3MX2-AB015-P-E | | | | | |
| | 3G3MX2-AB022-P-E | | | | | |
| Three-phase 200 V | 3G3MX2-A2001-P-E | 128 | 68 | 103 | 1.1 | |
| | 3G3MX2-A2002-P-E | | | | | |
| | 3G3MX2-A2004-P-E | | | | | |
| | 3G3MX2-A2007-P-E | | | | | |
| | 3G3MX2-A2015-P-E | 128 | 108 | 123 | 1.8 | |
| | 3G3MX2-A2022-P-E | | | | | |
| | 3G3MX2-A2037-P-E | 128 | 140 | 123 | 2.1 | |
| Three-phase 400 V | 3G3MX2-A4004-P-E | 128 | 108 | 123 | 1.8 | |
| | 3G3MX2-A4007-P-E | | | | | |
| | 3G3MX2-A4015-P-E | | | | | |
| | 3G3MX2-A4022-P-E | | | | | |
| | 3G3MX2-A4030-P-E | | | | | |
| | 3G3MX2-A4040-P-E | 128 | 140 | 123 | 2.1 | |

**IP54 models**

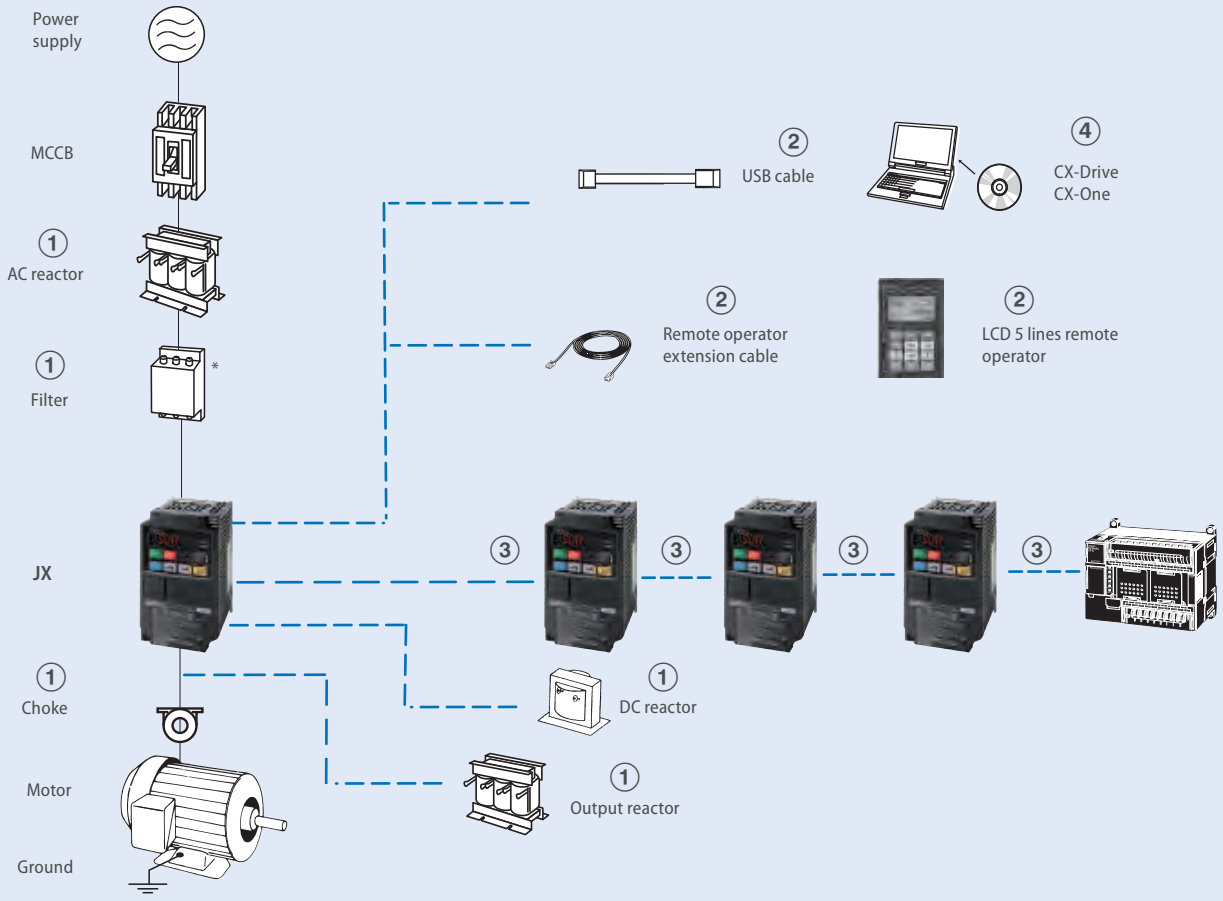
| Voltage class | Inverter model | Dimensions in mm | | | Weight (kg) | |
|---|---|---|---|---|---|---|
| | | H | W | D | | |
| Single-phase 200 V | 3G3MX2-DB001-E | 464.74 | 179.5 | 292.7 | 8.0 |   |
| | 3G3MX2-DB001-EC | 482.8 | 309.5 | 317.7 | 11.8 | |
| | 3G3MX2-DB002-E | 464.74 | 179.5 | 292.7 | 8.0 | |
| | 3G3MX2-DB002-EC | 482.8 | 309.5 | 317.7 | 11.8 | |
| | 3G3MX2-DB004-E | 464.74 | 179.5 | 292.7 | 8.4 | |
| | 3G3MX2-DB004-EC | 482.8 | 309.5 | 317.7 | 12.1 | |
| | 3G3MX2-DB007-EC | | | | 12.4 | |
| | 3G3MX2-DB015-EC | | | | 16.0 | |
| | 3G3MX2-DB022-EC | | | | 16.0 | |
| Three-phase 200 V | 3G3MX2-D2001-E | 464.74 | 179.5 | 292.7 | 8.0 | |
| | 3G3MX2-D2001-EC | 482.8 | 309.5 | 317.7 | 11.8 | |
| | 3G3MX2-D2002-E | 464.74 | 179.5 | 292.7 | 8.0 | |
| | 3G3MX2-D2002-EC | 482.8 | 309.5 | 317.7 | 11.8 | |
| | 3G3MX2-D2004-E | 464.74 | 179.5 | 292.7 | 8.1 | |
| | 3G3MX2-D2004-EC | 482.8 | 309.5 | 317.7 | 11.9 | |
| | 3G3MX2-D2007-E | 464.74 | 179.5 | 292.7 | 8.2 | |
| | 3G3MX2-D2007-EC | 482.8 | 309.5 | 317.7 | 12.0 | |
| | 3G3MX2-D2015-EC | | | | 15.4 | |
| | 3G3MX2-D2022-EC | | | | 15.6 | |
| | 3G3MX2-D2037-EC | | | | 16.2 | |
| | 3G3MX2-D2055-EC | 627.04 | 325 | 299.5 | 18.8 | |
| | 3G3MX2-D2075-EC | | | | 19.2 | |
| | 3G3MX2-D2110-EC | 710.35 | 379 | 329.7 | 25.3 | |
| | 3G3MX2-D2150-EC | | | | 28.0 | |
| Three-phase 400 V | 3G3MX2-D4004-EC | 482.8 | 309.5 | 317.7 | 12.0 | |
| | 3G3MX2-D4007-EC | | | | 12.5 | |
| | 3G3MX2-D4015-EC | | | | 12.4 | |
| | 3G3MX2-D4022-EC | | | | 12.5 | |
| | 3G3MX2-D4030-EC | | | | 12.5 | |
| | 3G3MX2-D4040-EC | | | | 13.1 | |
| | 3G3MX2-D4055-EC | 627.04 | 325 | 299.5 | 18.7 | |
| | 3G3MX2-D4075-EC | | | | 18.7 | |
| | 3G3MX2-D4110-EC | 710.35 | 379 | 329.7 | 23.8 | |
| | 3G3MX2-D4150-EC | | | | 24.3 | |

## Compact and complete

With the RFI filter built-in, and the communications integrated as standard, the JX provides a compact and complete solution to a whole range of simple applications, such as conveyor control. The RS485 Modbus is built into the RJ45 port of the inverter front, making it very easy to add inverters into the network without any extra option boards. Therefore, saving costs and space.

- V/f controlled inverter
- Side by side mounting
- EMC filter built-in
- RS485 Modbus built-in
- Overload detection function (150% during 60 s)
- PID
- Micro-surge voltage suppression
- Automatic energy saving

## Ordering information




* Only needed for 3 phase 200 V or to comply C1 on 3 phase 400 V models

### 3G3JX

| Specifications | | | Order code |
|---|---|---|---|
| Voltage class | Max. applicable motor output kW | Rated output current (A) | Standard |
| Single-phase 200 V | 0.2 | 1.4 | 3G3JX-AB002-EF |
| | 0.4 | 2.6 | 3G3JX-AB004-EF |
| | 0.75 | 4 | 3G3JX-AB007-EF |
| | 1.5 | 7.1 | 3G3JX-AB015-EF |
| | 2.2 | 10 | 3G3JX-AB022-EF |
| Three-phase 200 V | 0.2 | 1.4 | 3G3JX-A2002-E |
| | 0.4 | 2.6 | 3G3JX-A2004-E |
| | 0.75 | 4 | 3G3JX-A2007-E |
| | 1.5 | 7.1 | 3G3JX-A2015-E |
| | 2.2 | 10 | 3G3JX-A2022-E |
| | 3.7 | 15.9 | 3G3JX-A2037-E |
| | 5.5 | 24 | 3G3JX-A2055-E |
| | 7.5 | 32 | 3G3JX-A2075-E |
| Three-phase 400 V | 0.4 | 1.5 | 3G3JX-A4004-EF |
| | 0.75 | 2.5 | 3G3JX-A4007-EF |
| | 1.5 | 3.8 | 3G3JX-A4015-EF |
| | 2.2 | 5.5 | 3G3JX-A4022-EF |
| | 4.0 | 8.6 | 3G3JX-A4040-EF |
| | 5.5 | 13 | 3G3JXA4055-EF |
| | 7.5 | 16 | 3G3JXA4075-EF |

### ① Line filters

| Inverter | | Line filter Rasmi | | |
|---|---|---|---|---|
| Voltage | Model 3G3JX-_ | Rated current (A) | Weight (kg) | Order code |
| 1-Phase 200 VAC | AB002/AB004 | 6 | 0.5 | AX-FIJ1006-RE |
| | AB007 | 10 | 0.6 | AX-FIJ1010-RE |
| | AB015/AB022 | 26 | 0.8 | AX-FIJ1026-RE |
| 3-Phase 200 VAC | A2002/A2004/A2007 | 6 | 1.0 | AX-FIJ2006-RE |
| | A2015/A2022/A2037 | 20 | 1.3 | AX-FIJ2020-RE |
| | A2055/A2075 | 40 | 2.3 | AX-FIJ2040-RE |
| 3-Phase 400 VAC | A4004/A4007 /A4015 | 5 | 0.9 | AX-FIJ3005-RE |
| | A4022 /A4040 | 11 | 1.1 | AX-FIJ3011-RE |
| | A4055/A4075 | 20 | 1.7 | AX-FIJ3020-RE |

### ① Input AC Reactors

| Inverter | | AC Reactor |
|---|---|---|
| Voltage | Model 3G3JX-_ | Order code |
| 3-Phase 200 VAC | A2002/A2004/A2007 | AX-RAI02800080-DE |
| | A2015/A2022/A2037 | AX-RAI00880175-DE |
| | A2055/A2075 | AX-RAI00350335-DE |
| 1-Phase 200 VAC | AB002/AB004 | Under development |
| | AB007 | |
| | AB015/AB022 | |
| 3-Phase 400 VAC | A4004/A4007/A4015 | AX-RAI07700042-DE |
| | A4022/A4040 | AX-RAI03500090-DE |
| | A4055/A4075 | AX-RAI01300170-DE |

### ① DC Reactors

| 200 V single-phase | | 200 V three-phase | | 400 V three-phase | |
|---|---|---|---|---|---|
| Inverter | Order code | Inverter | Order code | Inverter | Order code |
| 3G3JX-AB002 | AX-RC10700032-DE | 3G3JX-A2002 | AX-RC21400016-DE | – | |
| 3G3JX-AB004 | AX-RC06750061-DE | 3G3JX-A2004 | AX-RC10700032-DE | 3G3JX-A4004 | AX-RC43000020-DE |
| 3G3JX-AB007 | AX-RC03510093-DE | 3G3JX-A2007 | AX-RC06750061-DE | 3G3JX-A4007 | AX-RC27000030-DE |
| 3G3JX-AB015 | AX-RC02510138-DE | 3G3JX-A2015 | AX-RC03510093-DE | 3G3JX-A4015 | AX-RC14000047-DE |
| 3G3JX-AB022 | AX-RC01600223-DE | 3G3JX-A2022 | AX-RC02510138-DE | 3G3JX-A4022 | AX-RC10100069-DE |
| – | | 3G3JX-A2037 | AX-RC01600223-DE | 3G3JX-A4040 | AX-RC06400116-DE |
| | | 3G3JX-A2055 | AX-RC01110309-DE | 3G3JX-A4055 | AX-RC04410167-DE |
| | | 3G3JX-A2075 | AX-RC00840437-DE | 3G3JX-A4075 | AX-RC03350219-DE |

### ① Chokes

| Diameter | Description | Order code |
|---|---|---|
| 21 | For 2.2 KW motors or below | AX-FER2102-RE |
| 25 | For 7.5 KW motors or below | AX-FER2515-RE |

### ① Output AC Reactors

| Inverter | | AC Reactor |
|---|---|---|
| Voltage | Model 3G3JX-□ | Order code |
| 200 VAC | A2001/A2002/A2004 AB001/AB002/AB004 | AX-RAO11500026-DE |
| | A2007/AB007 | AX-RAO07600042-DE |
| | A2015/AB015 | AX-RAO04100075-DE |
| | A2022/AB022 | AX-RAO03000105-DE |
| | A2037 | AX-RAO01830160-DE |
| | A2055 | AX-RAO01150220-DE |
| | A2075 | AX-RAO00950320-DE |
| 400 VAC | A4004/A4007/A4015 | AX-RAO16300038-DE |
| | A4022 | AX-RAO11800053-DE |
| | A4040 | AX-RAO07300080-DE |
| | A4055 | AX-RAO04600110-DE |
| | A4075 | AX-RAO03600160-DE |

### ② Accessories

| Types | Description | Functions | Order code |
|---|---|---|---|
| Digital operator | LCD remote operator | 5 Line LCD remote operator with copy function, cable length max. 3 m.*1 | AX-OP05-E |
| | Remote operator cable | 3 meters cable for connecting remote operator | 3G3AX-CAJOP300-EE |
| | LED remote operator | LED remote operator, cable length max. 3 m | 3G3AX-OP01 |
| | Mounting kit for LED operator | Mounting kit for LED operator on panel | 4X-KITMINI |
| Accessories | USB converter / USB cable | RJ45 to USB connection cable | 3G3AX-PCACN2 |
| | | | USB-convertercable |
| | RJ45 T-Branch cable | T cable for RS-422 connection | 3G3AX-CTB020-EE |
| | RJ45 Terminator resistor | Terminator resistor for RS-422 connection | 3G3AX-CTR150-EE |

*1 Please note, for 3G3JX inverters models, the operator will only display 2 lines of text.

### ④ Computer software

| Description | Installation | Order code |
|---|---|---|
| Computer software | Configuration and monitoring software tool | CX-Drive |
| Computer software | Configuration and monitoring software tool | CX-One |
| Computer software | Software tool for Energy Saving calculation | €Saver |

## Specifications

### 200 V class

| Single-phase: 3G3JX_ | | | AB002 | AB004 | AB007 | AB015 | AB022 | - | - | - |
|---|---|---|---|---|---|---|---|---|---|---|
| Three-phase: 3G3JX_ | | | A2002 | A2004 | A2007 | A2015 | A2022 | A2037 | A2055 | A2075 |
| Motor kW*1 | Applicable motor capacity | | 0.2 | 0.4 | 0.75 | 1.5 | 2.2 | 3.7 | 5.5 | 7.5 |
| Output characteristics | Inverter capacity kVA | 200 V | 0.4 | 0.9 | 1.3 | 2.4 | 3.4 | 5.5 | 8.3 | 11.0 |
| | | 240 V | 0.5 | 1.0 | 1.6 | 2.9 | 4.1 | 6.6 | 9.9 | 13.3 |
| | Rated output current (A) | | 1.4 | 2.6 | 4.0 | 7.1 | 10.0 | 15.9 | 24.0 | 32.0 |
| | Max. output voltage | | Proportional to input voltage: 0 to 240 V | | | | | | | |
| | Max. output frequency | | 400 Hz | | | | | | | |
| Power supply | Rated input voltageand frequency | | Single-phase 200 to 240 V 50/60 Hz<br>Three-phase 200 to 240 V 50/60 Hz | | | | | | | |
| | Rated input current (A) Three-phase 200 V | | 1.8 | 3.4 | 5.2 | 9.3 | 13.0 | 20.0 | 30.0 | 40.0 |
| | Rated input current (A) Single-phase 200 V | | 3.1 | 5.8 | 9.0 | 16.0 | 22.5 | – | – | – |
| | Allowable voltage fluctuation | | –15% to 10% | | | | | | | |
| | Allowable frequency fluctuation | | 5% | | | | | | | |
| Built-in filter | | | EMC filter (C1 single phase) | | | | | | | |
| Braking torque | At short-time deceleration | | Approx. 50% | | | 50% for 3-phase 20% to 40% for 1-phase | Approx 20% to 40% | | Approx 20% | |
| | At capacitor feedback | | | | | | | | | |
| Cooling method | | | Self cooling | | | Forced-air-cooling | | | | |

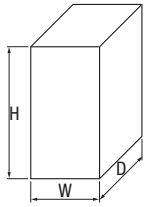
*1 Based on a standard 3-Phase standard motor.

### 400 V class

| Three-phase: 3G3JX_ | | | A4004 | A4007 | A4015 | A4022 | A4040 | A4055 | A4075 |
|---|---|---|---|---|---|---|---|---|---|
| Motor kW*1 | Applicable motor capacity | | 0.4 | 0.75 | 1.5 | 2.2 | 4.0 | 5.5 | 7.5 |
| Output characteristics | Inverter capacity kVA | 380 V | 0.9 | 1.6 | 2.5 | 3.6 | 5.6 | 8.5 | 10.5 |
| | | 480 V | 1.2 | 2.0 | 3.1 | 4.5 | 7.1 | 10.8 | 13.3 |
| | Rated output current (A) | | 1.5 | 2.5 | 3.8 | 5.5 | 8.6 | 13.0 | 16.0 |
| | Max. output voltage | | Proportional to input voltage: 0 to 480 V | | | | | | |
| | Max. output frequency | | 400 Hz | | | | | | |
| Power supply | Rated input voltageand frequency | | 3-phase 380 to 480 V 50/60 Hz | | | | | | |
| | Rated input current (A) | | 2.0 | 3.3 | 5.0 | 7.0 | 11.0 | 16.5 | 20.0 |
| | Allowable voltage fluctuation | | –15% to 10% | | | | | | |
| | Allowable frequency fluctuation | | 5% | | | | | | |
| Built-in filter | | | EMC filter C2 class | | | | | | |
| Braking torque | At short-time deceleration<br>At capacitor feedback | | Approx. 50% | | Approx. 20% to 40% | | | Approx. 20% | |
| Cooling method | | | Self cooling | | Forced-air-cooling | | | | |

*1 Based on a standard 3-Phase standard motor.

## Dimensions

| Voltage class | Max. applicable motor output kW | Inverter model | Dimensions in mm | | | | |
|---|---|---|---|---|---|---|---|
| | | | H | W | D | Weight (kg) | |
| Single-phase 200 V | 0.2 | 3G3JX-AB002 | 155 | 80 | 95.5 | 0.8 |   |
| | 0.4 | 3G3JX-AB004 | | | 109.5 | 0.9 | |
| | 0.75 | 3G3JX-AB007 | 189 | 110 | 130.5 | 1.5 | |
| | 1.5 | 3G3JX-AB015 | | | 157.5 | 2.3 | |
| | 2.2 | 3G3JX-AB022 | | | | 2.4 | |
| Three-phase 200 V | 0.2 | 3G3JX-A2002 | 155 | 80 | 95.5 | 0.8 | |
| | 0.4 | 3G3JX-A2004 | | | 109.5 | 0.9 | |
| | 0.75 | 3G3JX-A2007 | | | 132.5 | 1.1 | |
| | 1.5 | 3G3JX-A2015 | 189 | 110 | 157.5 | 2.2 | |
| | 2.2 | 3G3JX-A2022 | | | | 2.4 | |
| | 3.7 | 3G3JX-A2037 | | | | | |
| | 5.5 | 3G3JX-A2055 | 250 | 180 | 167.5 | 4.2 | |
| | 7.5 | 3G3JX-A2075 | | | | | |
| Three-phase 400 V | 0.4 | 3G3JX-A4004 | 189 | 110 | 130.5 | 1.5 | |
| | 0.75 | 3G3JX-A4007 | | | 157.5 | 2.3 | |
| | 1.5 | 3G3JX-A4015 | | | | 2.4 | |
| | 2.2 | 3G3JX-A4022 | | | | | |
| | 4.0 | 3G3JX-A4040 | | | | | |
| | 5.5 | 3G3JX-A4055 | 250 | 180 | 167.5 | 4.2 | |
| | 7.5 | 3G3JX-A4075 | | | | | |

# Sensing

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Content

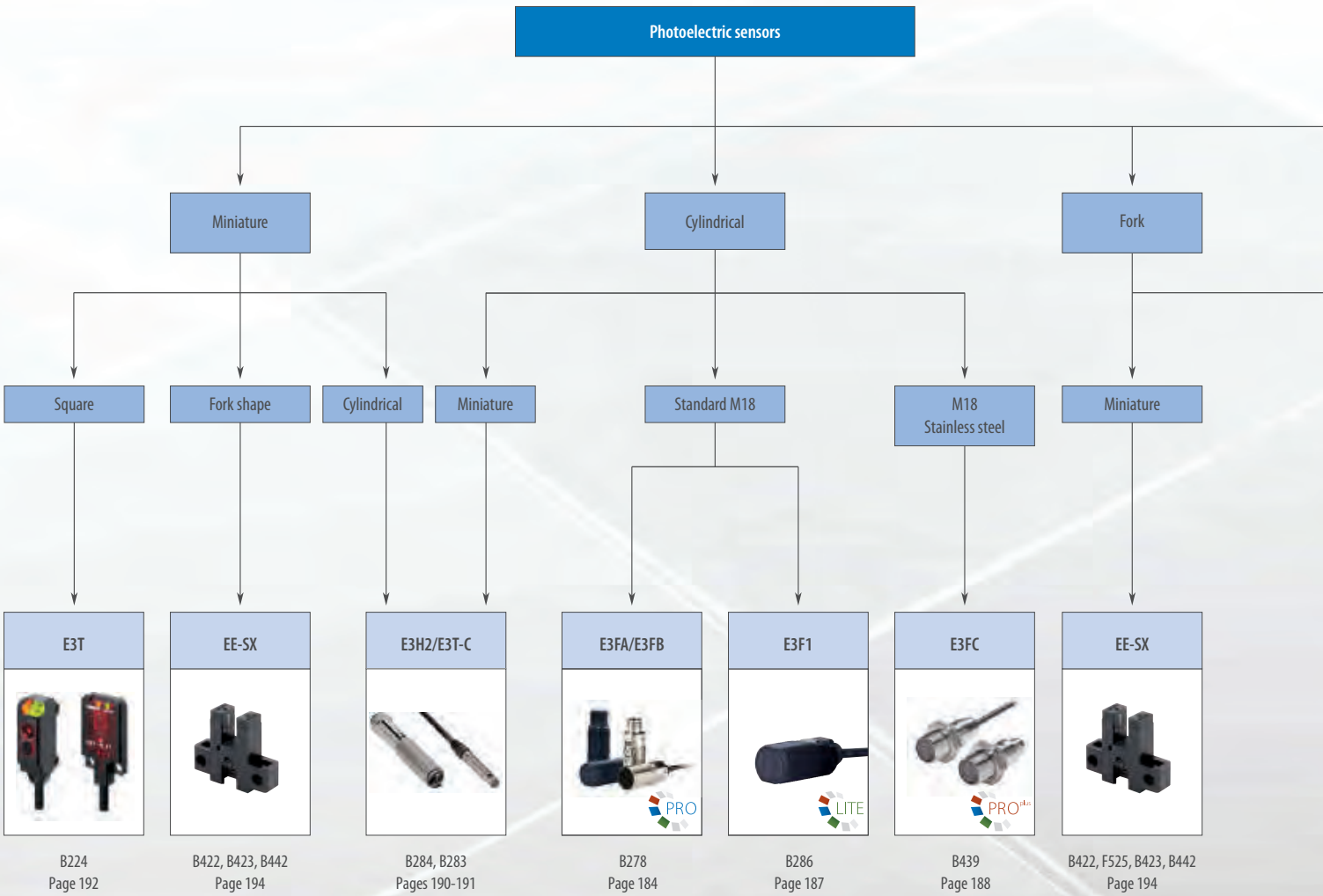
# Sensing

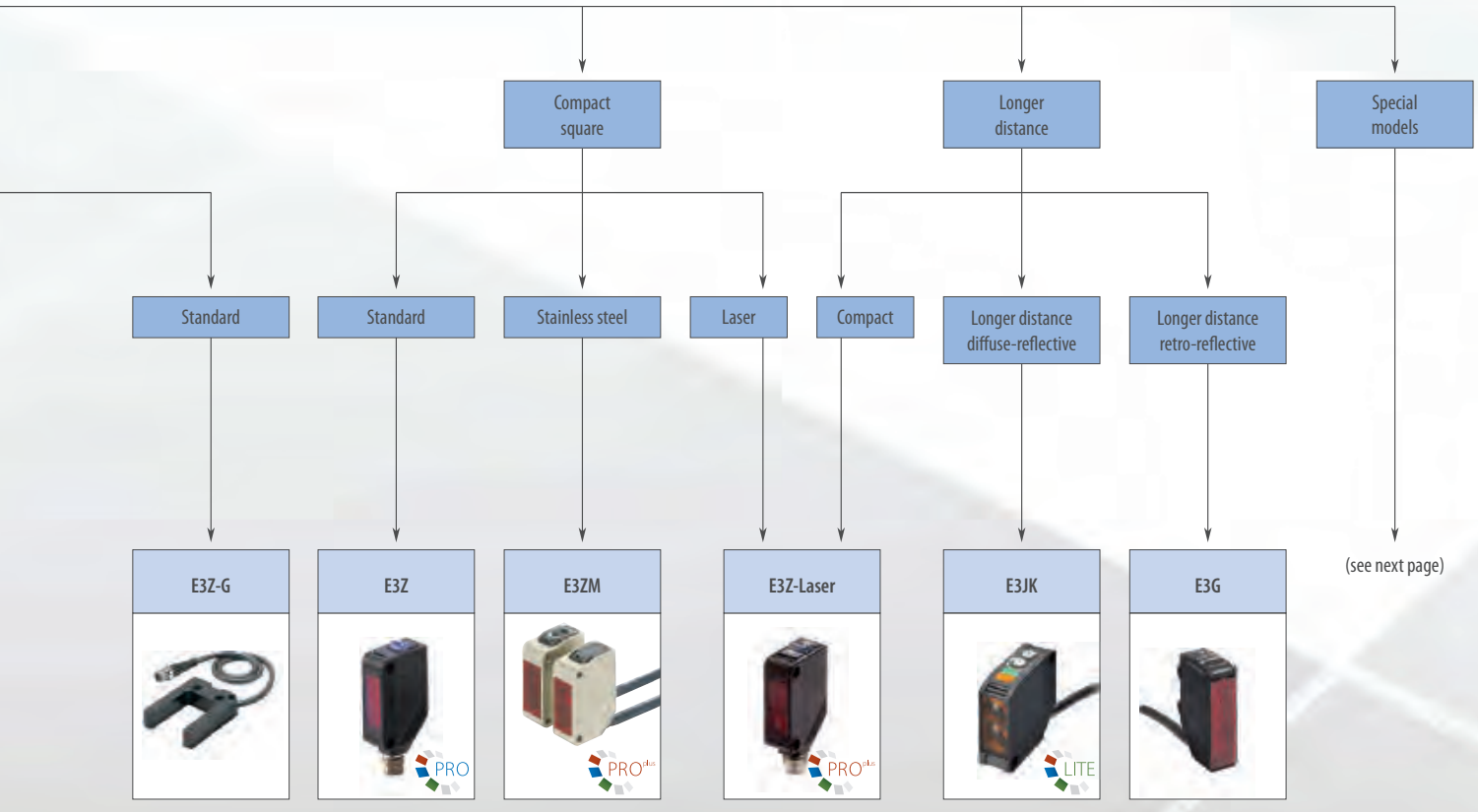
# FOR MACHINES BUILT TO LAST

## Reliability and accuracy confirmed by millions . . . every day

With more than one million units sold, OMRON Photoelectric sensors are among the world's most popular and successful photoelectric sensors.
Manufactured to exceptionally high engineering standards, you can take the performance reliability for granted.

- Optimal sensing performance tuned to your application
- Various housing designs fitting your application concept
- Proven performance and unmatched reliability






B268
Page 196

B222
Page 176

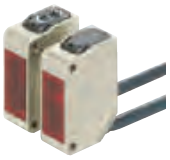
B223
Page 178

B265
Page 180

B227
Page 182

B228

# Selection table

| Type | Compact square | | | Longer distance | |
|---|---|---|---|---|---|
| |  |  |  |  |  |
| **Model** | **E3Z** | **E3ZM** | **E3Z Laser** | **E3S-CL** | **E3JK** |
| **361°** | PRO | PRO$^{plus}$ | PRO$^{plus}$ | n.a. | LITE |
| **Housing** | PBT | Stainless steel | PBT | Zinc diecast | ABS |
| **Through-beam** | 15 m, 30 m | 15 m | 60 m | – | 40 m |
| **Retro-reflective with M.S.R.** | 5 m | 4 m | 15 m | – | 7 m |
| **Diffuse-reflective (energetic)** | 1 m | 1 m | – | – | 2.5 m |
| **Diffuse-reflective (background suppression)** | 200 mm | 200 mm | 300 mm | 500 mm | – |
| **Page/Quick Link** | 176 | 178 | 180 | 181 | 182 |

| Type | Cylindrical | | | |
|---|---|---|---|---|
| |  |  |  |  |
| **Model** | **E3FA/E3FB** | **E3F1** | **E3FC** | **E3H2** |
| **361°** | PRO | LITE | PRO$^{plus}$ | n.a. |
| **Housing** | M18 PBT, metal | ABS | M18 stainless steel | M12 metal,<br>M8 stainless steel |
| **Through-beam** | 20 m | 15 m | 20 m | 4 m, 2 m |
| **Retro-reflective with M.S.R.** | 4 m | 3 m | 4 m | 2 m |
| **Diffuse-reflective (energetic)** | 1 m | 300 mm | 1 m | 300 mm |
| **Diffuse-reflective (background suppression)** | 200 mm | – | 200 mm | – |
| **Page/Quick Link** | 184 | 187 | 188 | 190 |

| Type | Miniature | | | Fork |
|---|---|---|---|---|
| |  |  |  |  |
| **Model** | **E3T-C** | **E3T** | **EE-SX47/67** | **E3Z-G** |
| **361°** | n.a. | n.a. | n.a. | n.a. |
| **Housing** | M5, M6 stainless steel | PBT | PBT | PBT |
| **Through-beam** | 1 m | 1 m, 2 m | 5 mm (slot width) | 25 mm |
| **Retro-reflective with M.S.R.** | – | 200 mm | – | – |
| **Diffuse-reflective (energetic)** | 50 mm | 30 mm | – | – |
| **Diffuse-reflective (background suppression)** | – | 30 mm | – | – |
| **Page/Quick Link** | 191 | 192 | 194 | 196 |

| Type | Oil resistant | Mark detection | Transparent detection | | | |
|---|---|---|---|---|---|---|
| |  |  |  |  |  |  |
| **Model** | **E3ZM-C** | **E3ZM-V** | **E3ZM-B** | **E3Z-B** | **E3F_-B/-V** | **E3S-DB** |
| **361°** | PRO$^{plus}$ | PRO$^{plus}$ | PRO$^{plus}$ | PRO$^{plus}$ | PRO$^{plus}$ | PRO$^{plus}$ |
| **Key features** | Oil and lubricant resistant stainless steel housing | White LED for optimal contrast recognition | Optimised optical system for all transparent objects | Optical system for standard transparent objects | Optimised optical system for all transparent objects | Enhanced performance for all transparent objects, SmartTeach, Narrow spot |
| **Housing** | Stainless steel | Stainless steel | Stainless steel | PBT | M18 PBT/metal | PBT/ABS |
| **Through-beam** | 20 m | – | – | – | – | – |
| **Retro-reflective with M.S.R.** | 4 m | | 500 mm | 500 mm, 2 m | 2 m | 4.5 m |
| **Diffuse-reflective** | 1 m | 12mm±2mm | – | – | – | – |
| **Diffuse-reflective (background suppression)** | 200 mm | – | – | – | 50 mm | – |
| **Page/Quick Link** | 197 | 217 | 199 | 200 | 201 | 202 |

| Type | High precision positioning | Structured object detection | Multi voltage power supply |
|---|---|---|---|
| |  |  |  |
| **Model** | **E3NC Laser Sensors** | **E3S-LS3** | **E3JK, E3JM, E3G-_M** |
| **361°** | n.a. | n.a. | n.a. |
| **Key features** | 0.1 mm Laser spot, line beam, CMOS BGS, EtherCAT connectivity | Wide beam | AC/DC power supply and relay output |
| **Housing** | PBT | PBT | ABS, ABS, PBT |
| **Through-beam** | – | – | 40 m, 10 m, – |
| **Retro-reflective with M.S.R.** | 8 m | – | 9 m, 4 m, 10 m |
| **Diffuse-reflective** | 1.2 m | 60 mm | 2.5 m, 700 mm, 2 m |
| **Diffuse-reflective (background suppression)** | 250 mm | – | –, –, 1.2 m |
| **Page/Quick Link** | 203 | 207 | 182/208/209 |

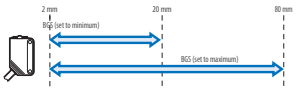
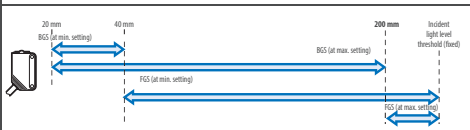
PRO

## General purpose sensor in compact plastic housing

The compact housing size and the high-power LED provide an excellent performance-size ratio and the high optical precision and long sensor lifetime make the sensor the first choice for standard and challenging applications.

- Minimal optical axis deviation for easy alignment
- IP67 and IP69K for highest water resistance
- Intensive shielding for highest noise immunity (EMC)
- Multiple molding housing for high mechanical resistance

## Ordering information

| Sensor type | | Sensing distance | Connection method | | | | Order code *1 | |
|---|---|---|---|---|---|---|---|---|
| | | | ○ | ○ | 2 m | | NPN output | PNP output |
| Through-beam | | 30 m (Infrared light) | – | – | 2 m | For ordering pigtail versions replace '2M' of cable types with: - M1J: M12 with 30 cm cable - M3J: M8 4-pin with 30 cm cable - M5J: M8 3-pin with 30 cm cable | E3Z-T62 2M | E3Z-T82 2M |
| | | | ■ | – | – | | E3Z-T67 | E3Z-T87 |
| | | 10 m (Red light) | – | – | 2 m | | E3Z-T61A 2M | E3Z-T81A 2M |
| | | | ■ | – | – | | E3Z-T66A | E3Z-T86A |
| Retro-reflective with M.S.R. | | 0.1 to 4 m *2 (Red light) | – | – | 2 m | | E3Z-R61 2M | E3Z-R81 2M |
| | | | ■ | – | – | | E3Z-R66 | E3Z-R86 |
| Retro-reflective without M.S.R. | | 0.1 to 5 m *2 (Infrared light) | – | – | 2 m | | E3Z-R61-4 2M | E3Z-R81-4 2M |
| | | | ■ | – | – | | E3Z-R66-4 | E3Z-R86-4 |
| Diffuse-reflective | | 1 m (adjustable) (Infrared light) | – | – | 2 m | | E3Z-D62 2M | E3Z-D82 2M |
| | | | ■ | – | – | | E3Z-D67 | E3Z-D87 |
| Diffuse-reflective wide beam | | 100 mm (adjustable) (Infrared light) | – | – | 2 m | | E3Z-D61 2M | E3Z-D81 2M |
| | | | ■ | – | – | | E3Z-D66 | E3Z-D86 |
| Distance settable (background suppression) | Small spot (Red light) |  | – | – | 2 m | | E3Z-LS63 2M | E3Z-LS83 2M |
| | | | ■ | – | – | | E3Z-LS68 | E3Z-LS88 |
| | Standard (Red light) |  | – | – | 2 m | | E3Z-LS61 2M *3 | E3Z-LS81 2M *3 |
| | | | ■ | – | – | | E3Z-LS66 *3 | E3Z-LS86 *3 |

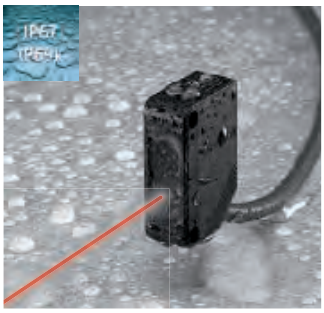
*1 Light-ON/Dark-ON switch selectable
*2 Measured with E39-R1S
*3 For infrared LED models contact your Omron representative

## Specifications

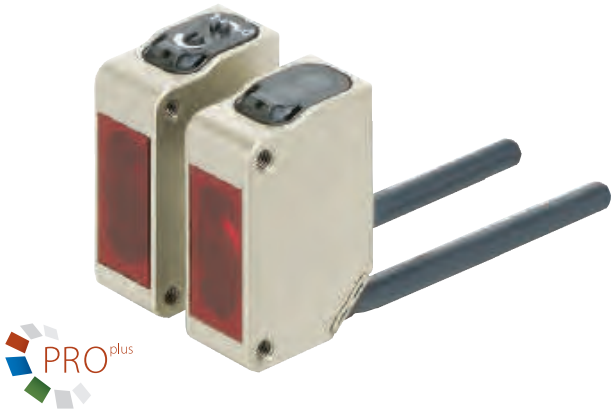
| Item | | Through-beam | | Retro-reflective with M.S.R | Retro-reflective without M.S.R | Diffuse-reflective | Diffuse-reflective (wide beam) | Distance-settable (background suppression) | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Red LED | Infrared LED | | | Standard | Small spot |
| | NPN | E3Z-T62/T67 | E3Z-T61A/T66A | E3Z-R61/R66 | E3Z-R6_-4 | E3Z-D62/D67 | E3Z-D61/D66 | E3Z-LS61/66 | E3Z-LS63/68 |
| | PNP | E3Z-T82/T87 | E3Z-T81A/T86A | E3Z-R81/R86 | E3Z-R8_-4 | E3Z-D82/D87 | E3Z-D81/D86 | E3Z-LS81/86 | E3Z-LS83/88 |
| Directional angle | | Both emitter and receiver: 3° to 15° | | 2° to 10° | | – | | | |
| Black/white error | | – | | | | | | 10% of set distance max. | 5% of set distance max. |
| Light source (wave length) | | Infrared LED (870 nm) | RED LED (700 nm) | Red LED (680 nm) | Infrared LED (870 nm) | Infrared LED (860 nm) | | Red LED (680 nm) | Red LED (650 nm) |
| Power supply voltage | | 12 to 24 VD±10%, ripple (p-p): 10% max. | | | | | | | |
| Protective circuits | | Reverse polarity protection, short-circuit protection, output reverse polarity protection | Output short-circuit protection, power supply, reverse polarity protection | Reverse polarity protection, output short-circuit protection, mutual interference prevention, output reverse polarity protection | | | | Reverse polarity protection, output short-circuit protection, mutual interference prevention | |
| Response time | | 2 ms max. | 1 ms max. | | | | | | |
| Ambient temperature | Operating | –25 to 55°C | | | | | | | |
| | Storage | –40 to 70°C (with no icing or condensation) | | | | | | | |
| Degree of protection | | IEC 60529 IP67, IP69K after DIN 40050 part 9 | | | | | | | |
| Material | Case | PBT (polybutylene terephthalate) | | | | | | | |
| | Lens | Denatured polyacrylate resin | | Methacrylate resin | | Denatured polyacrylate resin | | | |

High ambient light immunity

High electromagnetic noise immunity




Robust and tight housing construction



## Photoelectric sensor in compact stainless steel housing

Compact housing size and high power LED for excellent performance-size ratio in a rugged, detergent-resistant stainless steel housing for demanding environments.

- High grade stainless steel housing (SUS316L)
- IP67 and IP69k for highest water resistance
- ECOLAB tested and certified detergent resistance

## Ordering information

| Sensor type | Sensing distance | Connection method | | | | Order code*1 | |
|---|---|---|---|---|---|---|---|
| | | | | | | NPN output | PNP output |
| Through-beam | 15 m | – | – | 2 m | *2 | E3ZM-T61 2M | E3ZM-T81 2M |
| | | ■ | – | – | | E3ZM-T66 | E3ZM-T86 |
| | 0.8 m with built-in slit | – | – | 2 m | | E3ZM-T63 2M | E3ZM-T83 2M |
| | | ■ | – | – | | E3ZM-T68 | E3ZM-T88 |
| Retro-reflective with M.S.R. | 0.1 to 4 m | – | – | 2 m | | E3ZM-R61 2M | E3ZM-R81 2M |
| | | ■ | – | – | | E3ZM-R66 | E3ZM-R86 |
| Diffuse-reflective | 1 m (adjustable) | – | – | 2 m | | E3ZM-D62 2M | E3ZM-D82 2M |
| | | ■ | – | – | | E3ZM-D67 | E3ZM-D87 |
| Diffuse-reflective (background suppression) | 10 to 100 mm (fixed) | – | – | 2 m | | E3ZM-LS61X 2M*3 | E3ZM-LS81X 2M*3 |
| | | ■ | – | – | | E3ZM-LS66X*3 | E3ZM-LS86X*3 |
| | 10 to 200 mm (fixed) | – | – | 2 m | | E3ZM-LS64X 2M*3 | E3ZM-LS84X 2M*3 |
| | | ■ | – | – | | E3ZM-LS69X*3 | E3ZM-LS89X*3 |

*1 Light-ON / Dark-ON switch selectable except for E3ZM-LS

*2 For ordering pigtail versions replace '2M' of the cable types with:
- S1J: for M12 stainless steel plug with 30 cm cable
- S3J: for M8 4-pin stainless steel plug with 30cm cable
- S5J: for M8 3-pin stainless steel plug with 30cm cable (except for background suppression types)
- M1J: for M12 brass plug with 30cm cable
- M3J: for M8 4-pin brass plug with 30cm cable
- M5J: for M8 3-pin brass plug with 30cm cable (except for background suppression types)

*3 E3ZM-LS_X are fixed LIGHT-ON models. For fixed DARK-ON models please order E3ZM-LS_Y and for L-ON/D-ON selectable by wire please order E3ZM-LS_H.

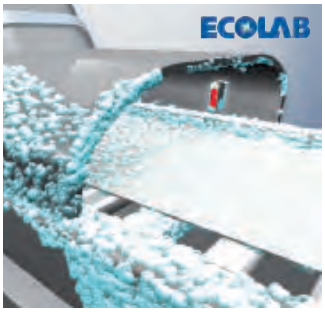
## Specifications

| Item | | Through-beam | | Retro-reflective with M.S.R. | Diffuse-reflective |
|---|---|---|---|---|---|
| | NPN | E3ZM-T61<br>E3ZM-T66 | E3ZM-T63<br>E3ZM-T68 | E3ZM-R61<br>E3ZM-R66 | E3ZM-D62<br>E3ZM-D67 |
| | PNP | E3ZM-T81<br>E3ZM-T86 | E3ZM-T83<br>E3ZM-T88 | E3ZM-R81<br>E3ZM-R86 | E3ZM-D82<br>E3ZM-D87 |
| Light source (wave length) | | Infrared LED (870 nm) | | Red LED (660 nm) | Infrared LED (860 nm) |
| Power supply voltage | | 10 to 30 VDC, ±10% ripple (p-p) | | | |
| Protective circuits | | Power supply reverse polarity protection, output short-circuit protection, output reverse polarity protection | | Power supply reverse polarity protection, output short-circuit protection, mutual interference prevention, output reverse polarity protection | |
| Response time | | 1 ms max. | | | |
| Ambient temperature | Operating | –25 to 55°C | | | |
| | Storage | –40 to 70°C (with no icing or condensation) | | | |
| Degree of protection | | IEC 60529 IP67, IP69K after DIN 40050 part 9 | | | |
| Material | Case | SUS316L | | | |
| | Lens | Methacrylic resin | | | |
| | Display | PES (polyether sulfone) | | | |
| | Sensitivity adjustment and operation switch | PEEK (polyether ether ketone) | | | |
| | Seals | Fluoro rubber | | | |

| Item | | | Diffuse-reflective with background suppression (fixed distance) | |
|---|---|---|---|---|
| | | NPN | E3ZM-LS61X<br>E3ZM-LS66X | E3ZM-LS64X<br>E3ZM-LS69X |
| | | PNP | E3ZM-LS81X<br>E3ZM-LS86X | E3ZM-LS84X<br>E3ZM-LS89X |
| Light source (adjustable) | | | Red LED (650 nm) | Red LED (660 nm) |
| Black/white error | | | 5% of sensing distance max. | 20% of sensing distance max. |
| Power supply voltage | | | 10 to 30 VDC, ±10% ripple (p-p): 10% max. | |
| Protective circuits | | | Power supply reverse polarity protection, output short-circuit protection, output reverse polarity protection, mutual interference protection | |
| Response time | | | 1 ms max. | |
| Ambient temperature range | | Operating | –25 to 55°C | |
| | | Storage | –40 to 70°C (with no icing or condensation) | |
| Degree of protection | | | IEC 60529 IP67, IP69K after DIN 40050 part 9 | |
| Material | Case | | SUS316L | |
| | Lens | | Methacrylic resin | |
| | Display | | PES (polyether sulfone) | |
| | Sensitivity adjustment and operation switch | | PEEK (polyether ether ketone) | |
| | Seals | | Fluoro rubber | |

Robust construction


Tight housing




Detergent resistant

Pre-wired models with stainless steel plug connectors for best combination of highest water ingress protection with fast connect & disconnect..

## LASER sensor in compact plastic housing

The E3Z LASER sensor in compact plastic housing features visible LASER light for precision positioning and detection applications.

- Visible LASER light for precision positioning and small object detection
- High power LD for long range precision
- Class 1 LASER
- Precise background suppression and low black/white error for accurate detection

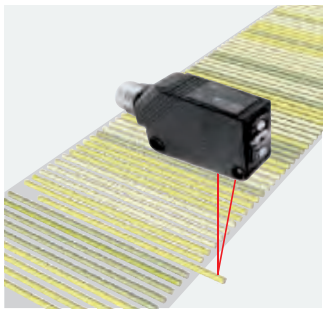
## Ordering information

| Sensor type | Sensing distance | Response time | Connection method | | | | Order code*1 | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | NPN output | PNP output |
| Through-beam | 60 m | 1 ms | – | – | 2 m | For ordering pigtail versions replace '2M' of cable types with: - M1J: M12 with 30 cm cable - M3J: M8 4-pin with 30 cm cable - M5J: M8 3-pin with 30 cm cable | E3Z-LT61 2M | E3Z-LT81 2M |
| | | | ■ | – | – | | E3Z-LT66 | E3Z-LT86 |
| Retro-reflective with M.S.R. | 0.3 to 15 m*2 | | – | – | 2 m | | E3Z-LR61 2M | E3Z-LR81 2M |
| | | | ■ | – | – | | E3Z-LR66 | E3Z-LR86 |
| Distance-settable (background suppression) | 20 to 300 mm | | – | – | 2 m | | E3Z-LL61 2M | E3Z-LL81 2M |
| | | | ■ | – | – | | E3Z-LL66 | E3Z-LL86 |
| | 25 to 300 mm | 0.5 ms | – | – | 2 m | | E3Z-LL63 2M | E3Z-LL83 2M |
| | | | ■ | – | – | | E3Z-LL68 | E3Z-LL88 |

*1 Light-ON/Dark-ON switch selectable
*2 Measured with E39-R1

## Specifications

| Item | | Through-beam | Retro-reflective with M.S.R. | Distance settable (background suppression) | |
|---|---|---|---|---|---|
| | | Standard model | | | High-speed model |
| | NPN output | E3Z-LT61/-LT66 | E3Z-LR61/-LR66 | E3Z-LL61/-LL66 | E3Z-LL63/-LL68 |
| | PNP output | E3Z-LT81/-LT86 | E3Z-LR81/-LR86 | E3Z-LL81/-LL86 | E3Z-LL83/-LL88 |
| Black/white error | | – | | 5% (at 160 mm) | 5% (at 100 mm) |
| Light source (wave length) | | Red LD (655 nm), JIS Class 1, IEC Class 1, FDA Class II | | | |
| Power supply voltage | | 12 to 24 VDC±10%, ripple (p-p): 10% max. | | | |
| Protective circuits | | Power supply reverse polarity, protection, short circuit protection, output reverse polarity protection | Power supply reverse polarity protection, short circuit protection, output reverse polarity protection, mutual interference prevention | | |
| Response time | | 1 ms max. | | | 0.5 ms max. |
| Ambient temperature | Operating | –10 to 55°C | | | |
| | Storage | –25 to 70°C (with no icing or condensation) | | | |
| Degree of protection | | IEC 60529 IP67, IP69K after DIN 40050 part 9 | | | |
| Material | Case | PBT (polybutylene terephthalate) | | | |
| | Lens | Modified polyacrylate resin | Methacrylate | Modified polyacrylate resin | |



Low black/white error for precise detection

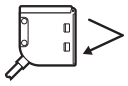
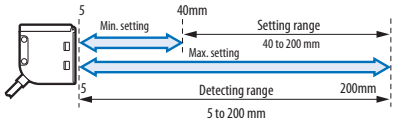
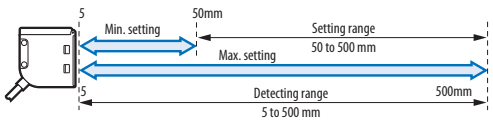
Visible laser light for precision positioning

Class 1 laser

## Distance-settable photoelectric sensor in metal housing

- Minimal black/white error for highest reliability detecting differently colored objects (E3S-CL1)
- Setting distance up to 500 mm with reliable background suppression

## Ordering information

| Sensortype | Sensing distance | Connection method | | | | Order code*1 |
|---|---|---|---|---|---|---|
| | |  |  |  |  | |
| Distance-settable (background suppression)  |   | – | – | ■ | – | E3S-CL1 2M |
| | | – | – | – | ■ M12 | E3S-CL1-M1J |
| |   | – | – | ■ | – | E3S-CL2 2M |
| | | – | – | – | ■ M12 | E3S-CL2-M1J |

*1 Light-ON/Dark-ON switch selectable. NPN/PNP switch selectable

## Specifications

| Item | | Distance-settable (background suppression) | |
|---|---|---|---|
| | | E3S-CL1 | E3S-CL2 |
| Light source (wave length) | | Red LED (700 nm) | Infrared LED (860 nm) |
| Black/white error*1 | | 2% max. | 10% max. |
| Power supply voltage | | 10 to 30 VDC [ripple (p-p) 10% included] | |
| Protective circuits | | Reverse polarity protection, output short-circuit protection, mutual interference prevention | |
| Response time | | 1 ms max. | 2 ms max. |
| Ambient temperature | Operating | –25 to 55°C (with no icing or condensation) | |
| | Storage | | |
| Degree of protection | | IEC 60529 IP67 | |
| Material | Case | Zinc diecast | |
| | Operation panel cover | Polyethyl sulfon | |
| | Lens | Acrylics | |

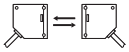
*1 Sensing distance difference between standard white paper (reflectivity 90%) and standard black paper (reflectivity 5%)

## All voltage photoelectric sensor with long sensing distance

The new generation of square sized E3JK family provides significantly enhanced sensing performance and ease of operation. The family features 24 to 240 VAC power models as well as models with PNP/NPN transistor output.

- High power and visible red LED for all models enabling easy alignment and long sensing distance
- Bright indicator LEDs that are visible even at a large distance
- Best price-value ratio

## Ordering information

| Sensor type | Sensing distance | Connection method | | | | Order code | | |
|---|---|---|---|---|---|---|---|---|
| | |  |  |  |  | Relay models (AC/DC) | NPN models | PNP models |
| Through-beam  | 40 m (adjustable) | – | – | 2 m | – | E3JK-TR11 2M | E3JK-TN11 2M | E3JK-TP11 2M |
| Retro-reflective without M.S.R.  | 9 m[*1] (adjustable) | | | | | E3JK-RR11 2M | E3JK-RN11 2M | E3JK-RP11 2M |
| Retro-reflective with M.S.R.  | 7 m[*1] (adjustable) | | | | | E3JK-RR12 2M | E3JK-RN12 2M | E3JK-RP12 2M |
| Diffuse-reflective  | 2.5 m (adjustable) | | | | | E3JK-DR11 2M | E3JK-DN11 2M | E3JK-DP11 2M |
| | 300 mm (adjustable) | | | | | E3JK-DR12 2M | E3JK-DN12 2M | E3JK-DP12 2M |

[*1] Measured with E39-R1S. Please order reflector separately.

### Accessories

| Appearance | Description | Order code |
|---|---|---|
|  | Mounting bracket[*1] (A mounting bracket is not provided with the sensor. Order a mounting bracket separately if required.) | E39-L40 |

[*1] When using a through-beam sensor, order one mounting bracket for the receiver and one for the emitter.

## Specifications

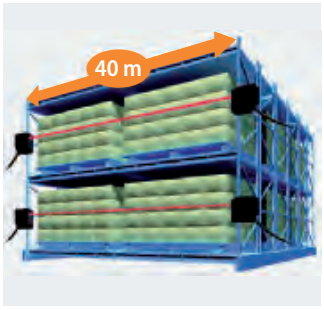
### AC models

| Item | | Through-beam | Retro-reflective without M.S.R. | Retro-reflective with M.S.R. | Diffuse-reflective | |
|---|---|---|---|---|---|---|
| | | E3JK-TR11 | E3JK-RR11 | E3JK-RR12 | E3JK-DR11 | E3JK-DR12 |
| Sensing distance | | 40 m | 9 m | 7 m | 2.5 m | 300 mm |
| Light source (wave length) | | Red LED (624 nm) | | | | |
| Power supply voltage | | 24 to 240 VDC±10% ripple (p-p): 10% max. 24 to 240 VAC±10% 50/60 Hz | | | | |
| Control output | | Relay output SPDT, 250 VAC, 3 A max. (cosϕ= 1), 5 VDC, 10 mA min., Light-ON/Dark-ON selectable | | | | |
| Response time | | 20 ms max. | | | | |
| Sensitivity adjustment | | One-turn adjuster | | | | |
| Ambient temperature | Operating | –25 to 55°C | | | | |
| | Storage | –30 to 70°C (with no icing or condensation) | | | | |
| Degree of protection | | IEC60529 IP64 | | | | |
| Material | Case | ABS | | | | |
| | Lens | Methacrylics (PMMA) | | | | |

## DC models

| Item | | Through-beam | Retro-reflective without M.S.R. | Retro-reflective with M.S.R. | Diffuse-reflective | |
|---|---|---|---|---|---|---|
| | NPN output | E3JK-TN11 | E3JK-RN11 | E3JK-RN12 | E3JK-DN11 | E3JK-DN12 |
| | PNP output | E3JK-TP11 | E3JK-RP11 | E3JK-RP12 | E3JK-DP11 | E3JK-DP12 |
| Sensing distance | | 40 m | 9 m | 7 m | 2.5 m | 300 mm |
| Light source (wave length) | | Red LED (624 nm) | | | | |
| Power supply voltage | | 10 to 30 VDC, including ripple (p-p): 10% | | | | |
| Control output | | Open collector output (NPN/PNP), Load current: 100 mA max., Light-ON/Dark-ON selectable | | | | |
| Response time | | 1 ms max. | | | | |
| Sensitivity adjustment | | One-turn adjuster | | | | |
| Ambient temperature | Operating | –25 to 55°C | | | | |
| | Storage | –30 to 70°C (with no icing or condensation) | | | | |
| Degree of protection | | IEC60529 IP64 | | | | |
| Material | Case | ABS | | | | |
| | Lens | Methacrylics (PMMA) | | | | |

AC power-supply fits for building installations like industrial doors, elevators or car parks




Long sensing distance up to 40 m

## High performance photoelectric sensor in compact M18 housing

E3FA/E3FB series represents a new generation of OMRON photoelectric sensors with large varieties of reliable and easy-to use photoelectric sensors. Featuring many standard and special functions this line is addressing many kinds of industries such as packaging, ceramics and material handling.

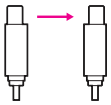
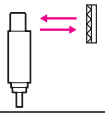
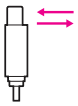
- Large variety of standard and special types
- High power and visible red LED enabling easy alignment and long sensing distance
- Compact and robust housing for easy integration into machines

## Ordering information

**Straight types**

| Sensor type | Sensing distance | Connection method | | | | Order code | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | E3FA (plastic housing) | | E3FB (metal housing) | |
| | | | | | | NPN output | PNP output | NPN output | PNP output |
| Through-beam (Red LED) | 20 m | – | – | 2 m | – | E3FA-TN11 2M | E3FA-TP11 2M | E3FB-TN11 2M | E3FB-TP11 2M |
| | | – | ■ | – | – | E3FA-TN21 | E3FA-TP21 | E3FB-TN21 | E3FB-TP21 |
| Through-beam (Infrared LED) | 15 m | – | – | 2 m | – | E3FA-TN12 2M | E3FA-TP12 2M | – | – |
| | | – | ■ | – | – | E3FA-TN22 | E3FA-TP22 | – | – |
| Retro-reflective with MSR*1 | 0.1 to 4 m (with E39-R1S) | – | – | 2 m | – | E3FA-RN11 2M | E3FA-RP11 2M | E3FB-RN11 2M | E3FB-RP11 2M |
| | | – | ■ | – | – | E3FA-RN21 | E3FA-RP21 | E3FB-RN21 | E3FB-RP21 |
| Coaxial Retro-reflective with MSR*1 | 0 to 500 mm (with E39-R1S) | – | – | 2 m | – | E3FA-RN12 2M | E3FA-RP12 2M | E3FB-RN12 2M | E3FB-RP12 2M |
| | | – | ■ | – | – | E3FA-RN22 | E3FA-RP22 | E3FB-RN22 | E3FB-RP22 |
| Diffuse-reflective (Red LED) | 100 mm | – | – | 2 m | – | E3FA-DN11 2M | E3FA-DP11 2M | E3FB-DN11 2M | E3FB-DP11 2M |
| | | – | ■ | – | – | E3FA-DN21 | E3FA-DP21 | E3FB-DN21 | E3FB-DP21 |
| | 300 mm | – | – | 2 m | – | E3FA-DN12 2M | E3FA-DP12 2M | E3FB-DN12 2M | E3FB-DP12 2M |
| | | – | ■ | – | – | E3FA-DN22 | E3FA-DP22 | E3FB-DN22 | E3FB-DP22 |
| | 1 m | – | – | 2 m | – | E3FA-DN13 2M | E3FA-DP13 2M | E3FB-DN13 2M | E3FB-DP13 2M |
| | | – | ■ | – | – | E3FA-DN23 | E3FA-DP23 | E3FB-DN23 | E3FB-DP23 |
| Diffuse-reflective (Infrared LED) | 100 mm | – | – | 2 m | – | E3FA-DN14 2M | E3FA-DP14 2M | – | – |
| | | – | ■ | – | – | E3FA-DN24 | E3FA-DP24 | – | – |
| | 300 mm | – | – | 2 m | – | E3FA-DN15 2M | E3FA-DP15 2M | – | – |
| | | – | ■ | – | – | E3FA-DN25 | E3FA-DP25 | – | – |
| | 1 m | – | – | 2 m | – | E3FA-DN16 2M | E3FA-DP16 2M | – | – |
| | | – | ■ | – | – | E3FA-DN26 | E3FA-DP26 | – | – |
| BGS (background suppression) | 100 mm | – | – | 2 m | – | E3FA-LN11 2M | E3FA-LP11 2M | E3FB-LN11 2M | E3FB-LP11 2M |
| | | – | ■ | – | – | E3FA-LN21 | E3FA-LP21 | E3FB-LN21 | E3FB-LP21 |
| | 200 mm | – | – | 2 m | – | E3FA-LN12 2M | E3FA-LP12 2M | E3FB-LN12 2M | E3FB-LP12 2M |
| | | – | ■ | – | – | E3FA-LN22 | E3FA-LP22 | E3FB-LN22 | E3FB-LP22 |

### Radial types

| Sensor type | Sensing distance | Connection method | | | | Order code | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | E3RA (plastic housing) | | E3RB (metal housing) | |
| | | | | | | NPN output | PNP output | NPN output | PNP output |
| Through-beam  | 15 m | – | – | 2 m | – | E3RA-TN11 2M | E3RA-TP11 2M | E3RB-TN11 2M | E3RB-TP11 2M |
| | | – | ■ | – | – | E3RA-TN21 | E3RA-TP21 | E3RB-TN21 | E3RB-TP21 |
| Retro-reflective with MSR*1.  | 0.1 to 3 m (with E39-R1S) | – | – | 2 m | – | E3RA-RN11 2M | E3RA-RP11 2M | E3RB-RN11 2M | E3RB-RP11 2M |
| | | – | ■ | – | – | E3RA-RN21 | E3RA-RP21 | E3RB-RN21 | E3RB-RP21 |
| Diffuse reflective  | 100 mm | – | – | 2 m | – | E3RA-DN11 2M | E3RA-DP11 2M | E3RB-DN11 2M | E3RB-DP11 2M |
| | | – | ■ | – | – | E3RA-DN21 | E3RA-DP21 | E3RB-DN21 | E3RB-DP21 |
| | 300 mm | – | – | 2 m | – | E3RA-DN12 2M | E3RA-DP12 2M | E3RB-DN12 2M | E3RB-DP12 2M |
| | | – | ■ | – | – | E3RA-DN22 | E3RA-DP22 | E3RB-DN22 | E3RB-DP22 |
| | 700 mm | – | – | 2 m | – | E3RA-DN13 2M | E3RA-DP13 2M | E3RB-DN13 2M | E3RB-DP13 2M |
| | | – | ■ | – | – | E3RA-DN23 | E3RA-DP23 | E3RB-DN23 | E3RB-DP23 |

*1 The Reflector is sold separately. Select the Reflector model most suited to the application.


Compact size and shape. Can be installed almost anywhere.

Visible LED light for easy alignment.

## Specifications

### Straight type

| Model / Item | Sensing method | | Through-beam (Red LED) | Through-beam (Infrared LED) | Retro-reflective | Coaxial Retro-reflective | Diffuse-reflective | | |
|---|---|---|---|---|---|---|---|---|---|
| | NPN output | Pre-wired | E3F_-TN11 2M | E3F_-TN12 2M | E3F_-RN11 2M | E3F_-RN12 2M | E3F_-DN11 2M | E3F_-DN12 2M | E3F_-DN13 2M |
| | | M12 Connector | E3F_-TN21 | E3F_-TN22 | E3F_-RN21 | E3F_-RN22 | E3F_-DN21 | E3F_-DN22 | E3F_-DN23 |
| | PNP output | Pre-wired | E3F_-TP11 2M | E3F_-TP12 2M | E3F_-RP11 2M | E3F_-RP12 2M | E3F_-DP11 2M | E3F_-DP12 2M | E3F_-DP13 2M |
| | | M12 Connector | E3F_-TP21 | E3F_-TP22 | E3F_-RP21 | E3F_-RP22 | E3F_-DP21 | E3F_-DP22 | E3F_-DP23 |
| Sensing distance | | | 20 m | 15 m | 0.1 to 4 m | 0 to 500 mm | 100 mm | 300 mm | 1 m |
| Light source (wavelength) | | | Red LED (624 nm) | Infrared LED (850 nm) | Red LED (624 nm) | | | | |
| Power supply voltage | | | 10 to 30 VDC (include voltage ripple of 10%(p-p) max.) | | | | | | |
| Operation mode | | | Light-ON/Dark-ON selectable by wiring | | | | | | |
| Sensitivity adjustment | | | One-turn adjuster | | | | | | |
| Protection circuits | | | Reversed power supply polarity protection, Output short-circuit protection and Reversed output polarity protection | | | | | | |
| Response time | | | 0.5 ms | | | | | | |
| Ambient temperature | | Operating | –25 to 55°C | | | | | | |
| | | Storage | –30 to 70°C (with no icing or condensation) | | | | | | |
| Degree of protection | | | IEC: IP67, DIN 40050-9: IP69K | | | | | | |
| Material | Case and Nut | | E3FA: ABS, E3FB: Nickel brass | | | | | | |
| | Lens and Display | | PMMA | | | | | | |
| | Adjuster | | POM | | | | | | |

| Model / Item | Sensing method | | Diffuse-reflective | | | BGS (Background suppression) | |
|---|---|---|---|---|---|---|---|
| | NPN output | Pre-wired | E3F_-DN14 2M | E3F_-DN15 2M | E3F_-DN16 2M | E3F_-LN11 2M | E3F_-LN12 2M |
| | | M12 Connector | E3F_-DN24 | E3F_-DN25 | E3F_-DN26 | E3F_-LN21 | E3F_-LN22 |
| | PNP output | Pre-wired | E3F_-DP14 2M | E3F_-DP15 2M | E3F_-DP16 2M | E3F_-LP11 2M | E3F_-LP12 2M |
| | | M12 Connector | E3F_-DP24 | E3F_-DP25 | E3F_-DP26 | E3F_-LP21 | E3F_-LP22 |
| Sensing distance | | | 100 mm | 300 mm | 1 m | 100 mm | 200 mm |
| Light source (wavelength) | | | Infrared LED (850 nm) | | | Red LED (624 nm) | |
| Power supply voltage | | | 10 to 30 VDC (include voltage ripple of 10%(p-p) max.) | | | | |
| Operation mode | | | Light-ON/Dark-ON selectable by wiring | | | | |
| Sensitivity adjustment | | | One-turn adjuster | | | Fixed | |
| Protection circuits | | | Reversed power supply polarity protection, Output short-circuit protection and Reversed output polarity protection | | | | |
| Response time | | | 0.5 ms | | | | |
| Ambient temperature | | Operating | –25 to 55°C | | | | |
| | | Storage | –30 to 70°C (with no icing or condensation) | | | | |
| Degree of protection | | | IEC: IP67, DIN 40050-9: IP69K | | | | |
| Material | Case and Nut | | E3FA: ABS, E3FB: Nickel brass | | | | |
| | Lens and Display | | PMMA | | | | |
| | Adjuster | | POM | | | | |

### Radial type

| Model / Item | Sensing method | | Through-beam | Retro-reflective | Diffuse-reflective | | |
|---|---|---|---|---|---|---|---|
| | NPN output | Pre-wired | E3R_-TN11 2M | E3R_-RN11 2M | E3R_-DN11 2M | E3R_-DN12 2M | E3R_-DN13 2M |
| | | M12 Connector | E3R_-TN21 | E3R_-RN21 | E3R_-DN21 | E3R_-DN22 | E3R_-DN23 |
| | PNP output | Pre-wired | E3R_-TP11 2M | E3R_-RP11 2M | E3R_-DP11 2M | E3R_-DP12 2M | E3R_-DP13 2M |
| | | M12 Connector | E3R_-TP21 | E3R_-RP21 | E3R_-DP21 | E3R_-DP22 | E3R_-DP23 |
| Sensing distance | | | 15 m | 0.1 to 3 m | 100 mm | 300 mm | 700 mm |
| Light source (wavelength) | | | Red LED (624 nm) | | | | |
| Power supply voltage | | | 10 to 30 VDC (include voltage ripple of 10%(p-p) max.) | | | | |
| Operation mode | | | Light-ON/Dark-ON selectable by wiring | | | | |
| Sensitivity adjustment | | | One-turn adjuster | | | | |
| Protection circuits | | | Reversed power supply polarity protection, Output short-circuit protection and Reversed output polarity protection | | | | |
| Response time | | | 0.5 ms | | | | |
| Ambient temperature | | Operating | –25 to 55°C | | | | |
| | | Storage | –30 to 70°C (with no icing or condensation) | | | | |
| Degree of protection | | | IEC: IP67, DIN 40050-9: IP69K | | | | |
| Material | Case and Nut | | E3FA: ABS, E3FB: Nickel brass | | | | |
| | Lens and Display | | PMMA | | | | |
| | Adjuster | | POM | | | | |

## Standard M18 Photosensor with best price-value ratio

OMRON E3F1 series represents an M18 size Photoelectric sensor with best value at competitive price. It features the same compact housing as E3FA and meets all requirements for standard industrial applications.

- Bright visible red LED enabling easy alignment
- Reliable operation in all industrial environments
- Compact and robust housing for easy integration into machines

LITE

## Ordering information

| Sensor type | Sensing distance | Connection method | | | | Order code | |
|---|---|---|---|---|---|---|---|
| | | | | | | NPN output | PNP output |
| Through-beam | 15 m | – | – | 2 m | – | E3F1-TN11 2M*1 | E3F1-TP11 2M*1 |
| | | – | ■ | – | – | E3F1-TN21*1 | E3F1-TP21*1 |
| Retro-reflective*2 | 0.1 to 3 m (with E39-R1S) | – | – | 2 m | – | E3F1-RN11 2M | E3F1-RP11 2M |
| | | – | ■ | – | – | E3F1-RN21 | E3F1-RP21 |
| Diffuse-reflective | 100 mm | – | – | 2 m | – | E3F1-DN11 2M | E3F1-DP11 2M |
| | | – | ■ | – | – | E3F1-DN21 | E3F1-DP21 |
| | 300 mm | – | – | 2 m | – | E3F1-DN12 2M | E3F1-DP12 2M |
| | | – | ■ | – | – | E3F1-DN22 | E3F1-DP22 |

*1 Includes the emitter and receiver.
*2 The Reflector is sold separately.

## Specifications

| Item | | | | | | |
|---|---|---|---|---|---|---|
| Model | Sensing method | | Through-beam | Retro-reflective | Diffuse-reflective | |
| | NPN output | Pre-wired | E3F1-TN11 2M | E3F1-RN11 2M | E3F1-DN11 2M | E3F1-DN12 2M |
| | | M12 Connector | E3F1-TN21 | E3F1-RN21 | E3F1-DN21 | E3F1-DN22 |
| | PNP output | Pre-wired | E3F1-TP11 2M | E3F1-RP11 2M | E3F1-DP11 2M | E3F1-DP12 2M |
| | | M12 Connector | E3F1-TP21 | E3F1-RP21 | E3F1-DP21 | E3F1-DP22 |
| Sensing distance | | | 15 m | 0.1 to 3 m | 100 mm | 300 mm |
| Light source (wavelength) | | | Red LED (624 nm) | | | |
| Power supply voltage | | | 10 to 30 VDC (include voltage ripple of 10%(p-p) max.) | | | |
| Operation mode | | | Light-ON/Dark-ON selectable by wiring | | | |
| Sensitivity adjustment | | | One-turn adjuster | | | |
| Protection circuits | | | Reversed power supply polarity protection, Output short-circuit protection and Reversed output polarity protection | | | |
| Response time | | | 0.5 ms | | | |
| Ambient temperature | | Operating | –25 to 55°C | | | |
| | | Storage | –30 to 70°C (with no icing or condensation) | | | |
| Degree of protection | | | IEC: IP66 | | | |
| Material | Case | | ABS | | | |
| | Lens and Display | | PMMA | | | |


Compact size and shape. Can be installed almost anywhere.

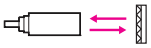
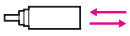
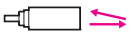
Visible LED light for easy alignment.

## M18 Photosensor in high-grade stainless steel housing

OMRON E3FC represents a compact M18 sensor with high housing protection for wash-down applications in Food & Beverage industry.

- High grade steel housing (SUS316L)
- Proven with various industrial detergents of Ecolab and Diversey
- Withstands heat shock conditions
- Epoxy resin at connector/cable end preventing water ingress
- Bright visible red LED enabling easy alignment

## Ordering information

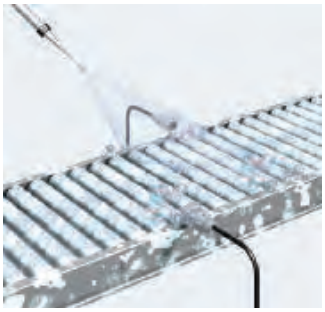
| Sensor type | Sensing distance | Connection method | | | | Order code | |
|---|---|---|---|---|---|---|---|
| | |  |  |  |  | NPN output | PNP output |
| Through-beam  | 20 m | – | – | 2 m | – | E3FC-TN11 2M | E3FC-TP11 2M |
| | | – | ■ | – | – | E3FC-TN21 | E3FC-TP21 |
| Retro-reflective with MSR*1  | 0.1 to 4 m (with E39-R1S) | – | – | 2 m | – | E3FC-RN11 2M | E3FC-RP11 2M |
| | | – | ■ | – | – | E3FC-RN21 | E3FC-RP21 |
| Diffuse-reflective*2  | 300 mm (adjustable, red LED) | – | – | 2 m | – | E3FC-DN12 2M | E3FC-DP12 2M |
| | | – | ■ | – | – | E3FC-DN22 | E3FC-DP22 |
| | 1 m (adjustable, red LED) | – | – | 2 m | – | E3FC-DN13 2M | E3FC-DP13 2M |
| | | – | ■ | – | – | E3FC-DN23 | E3FC-DP23 |
| | 300 mm (adjustable, IR LED) | – | – | 2 m | – | E3FC-DN15 2M | E3FC-DP15 2M |
| | | – | ■ | – | – | E3FC-DN25 | E3FC-DP25 |
| | 1 m (adjustable, IR LED) | – | – | 2 m | – | E3FC-DN16 2M | E3FC-DP16 2M |
| | | – | ■ | – | – | E3FC-DN26 | E3FC-DP26 |
| BGS*2 (Background suppression)  | 100 mm | – | – | 2 m | – | E3FC-LN11 2M | E3FC-LP11 2M |
| | | – | ■ | – | – | E3FC-LN21 | E3FC-LP21 |
| | 200 mm | – | – | 2 m | – | E3FC-LN12 2M | E3FC-LP12 2M |
| | | – | ■ | – | – | E3FC-LN22 | E3FC-LP22 |

*1 The Reflector is sold separately.
*2 Models with default L-On output logic for diffuse and BGS available. Please check with your OMRON representative.

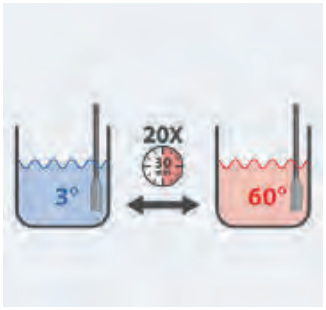
## Specifications

| Model | Sensing method | | Through-beam | Retro-reflective | Diffuse reflective | | | | BGS (Background suppression) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | NPN output | Pre-wired | E3FC-TN11 2M | E3FC-RN11 2M | E3FC-DN12 2M | E3FC-DN13 2M | E3FC-DN15 2M | E3FC-DN16 2M | E3FC-LN11 2M | E3FC-LN12 2M |
| | | M12 connector | E3FC-TN21 | E3FC-RN21 | E3FC-DN22 | E3FC-DN23 | E3FC-DN25 | E3FC-DN26 | E3FC-LN21 | E3FC-LN22 |
| | PNP output | Pre-wired | E3FC-TP11 2M | E3FC-RP11 2M | E3FC-DP12 2M | E3FC-DP13 2M | E3FC-DP15 2M | E3FC-DP16 2M | E3FC-LP11 2M | E3FC-LP12 2M |
| Item | | M12 connector | E3FC-TP21 | E3FC-RP21 | E3FC-DP22 | E3FC-DP23 | E3FC-DP25 | E3FC-DP26 | E3FC-LP21 | E3FC-LP22 |
| Sensing distance | | | 20 m | 0.1 to 4 m | 300 mm | 1 m | 300 mm | 1 m | 100 mm | 200 mm |
| Light source (wavelength) | | | red LED (624 nm) | | | | Infrared LED (850 nm) | | red LED (624 nm) | |
| Power supply voltage | | | 10 to 30 VDC (include voltage ripple of 10%(p-p) max.) | | | | | | | |
| Operation mode | | | Light-ON/Dark-ON selectable by wiring | | | | | | | |
| Indicator | | | Operation indicator (orange)<br>Stability indicator (green) | | | | | | | |
| Sensitivity adjustment | | | no adjuster | | One-turn adjuster | | | | no adjuster | |
| Protection circuits | | | Reversed power supply polarity protection, Output short-circuit protection and Reversed output polarity protection | | | | | | | |
| Response time | | | 0.5 ms | | | | | | | |
| Ambient temperature | | Operating | –25 to 55°C | | | | | | | |
| | | Storage | –30 to 70°C (with no icing or condensation) | | | | | | | |
| Degree of protection | | | IP67, IP68*1, IP69K | | | | | | | |
| Material | | Case | Stainless Steel (SUS 316L) | | | | | | | |
| | | Lens | PMMA | | | | | | | |
| | | Cable | PVC | | | | | | | |
| | | Adjuster | – | | POM | | | | – | |

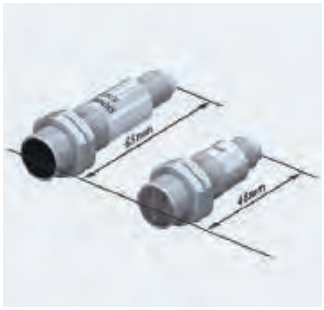
*1 IP68 test definition: Heat shock cycles in 3° and 60°C surface tensioned water (20 cycles with 30 min.)



Best fit for wash-down applications.




Proven in heat shock tests with surface tensioned water.



Compact size and shape. Can be installed almost anywhere.

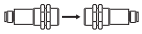
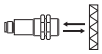
Visible LED light for easy alignment.

## Miniature photoelectric sensors in cylindrical M8 and M12 housing

- M8 or M12 sized cylindrical housings when mounting space is crucial
- Retro-reflective models with two teaching modes for standard and semi-transparent objects
- pre-wired and connector models

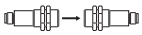
## Ordering information

### M12 cylindrical housing

| Sensor type | Sensing distance | Connection method | | | | Order code[*1] | |
|---|---|---|---|---|---|---|---|
| | |  |  |  |  | NPN output | PNP output |
| Through-beam  | 4 m (adjustable) | – | – | 2 m | – | E3H2-T4C4M 2M | E3H2-T4B4M 2M |
| | | – | ■ | – | – | E3H2-T4C4M-M1 | E3H2-T4B4M-M1 |
| Retro-reflective with M.S.R.  | 2 m (teachable[*2]) | – | – | 2 m | – | E3H2-R2C4M 2M[*3] | E3H2-R2B4M 2M[*3] |
| | | – | ■ | – | – | E3H2-R2C4M-M1[*3] | E3H2-R2B4M-M1[*3] |
| Diffuse-reflective  | 300 mm (teachable) | – | – | 2 m | – | E3H2-DS30C4M 2M | E3H2-DS30B4M 2M |
| | | – | ■ | – | – | E3H2-DS30C4M-M1 | E3H2-DS30B4M-M1 |
| | 100 mm (fixed) | – | – | 2 m | – | E3H2-DS10C4M 2M | E3H2-DS10B4M 2M |
| | | – | ■ | – | – | E3H2-DS10C4M-M1 | E3H2-DS10B4M-M1 |

[*1] Light-ON/Dark-ON selectable by wire
[*2] Models without teach-button are available. Contact your OMRON representative.
[*3] Without reflector; order reflector separately

### M8 cylindrical housing

| Sensor type | Sensing distance | Connection method | | | | Operation mode | Order code | |
|---|---|---|---|---|---|---|---|---|
| | |  |  |  |  | | NPN output | PNP output |
| Through-beam  | 2 m | – | – | 2 m | – | dark on | E3H2-T2C2S 2M | E3H2-T2B2S 2M |
| | | ■ | – | – | – | | E3H2-T2C2S-M5 | E3H2-T2B2S-M5 |
| | | – | – | 2 m | – | light on | E3H2-T2C1S 2M | E3H2-T2B1S 2M |
| | | ■ | – | – | – | | E3H2-T2C1S-M5 | E3H2-T2B1S-M5 |

## Specifications

| Item | | Through-beam | | Retro-reflective with M.S.R. | Diffuse-reflective | |
|---|---|---|---|---|---|---|
| | | E3H2-T4 | E3H2-T2 | E3H2-R | E3H2-DS30 | E3H2-DS10 |
| Light source (wave length) | | Infrared LED (880 nm) | | Red LED (660 nm) | Infrared LED (880 nm) | |
| Power supply voltage | | 10 to 30 VDC, 10% ripple | | | | |
| Protective circuits | | Power supply reverse polarity protection, output short circuit protection | | | | |
| Response time | | 2.5 ms max | 1 ms max. | 1.1 ms max | | |
| Sensitivity adjustment | | Potentiometer adjuster | – | Teach-in | | – |
| Ambient temperature | Operating | –25 to 55°C | –25 to 50°C | –25 to 55°C | | |
| Degree of protection | | EN 60529: IP67 | | | | |
| Material | Case | nickel-plated brass | stainless steel | nickel-plated brass | | |
| | Lens | plastic | | | | |

## Miniature photoelectric sensors in M5 and M6 sized housing

The E3T-C family of miniature photoelectric sensors is the ideal solution when mounting space is crucial.

- axial and radial M5 sized through-beam sensors
- axial M6 sized diffuse-reflective sensors
- pre-wired models in stainless steel housing

## Ordering information

### M5 cylindrical housing

| Sensor type | Sensing distance | Connection method | | | | Operation mode | Order code | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | NPN output | PNP output |
| Through-beam (axial) | 1 m | – | – | 2 m | – | dark on | E3T-CT12 2M | E3T-CT14 2M |
| Through-beam (radial) | 500 mm | – | – | 2 m | – | | E3T-CT22S 2M | E3T-CT24S 2M |

### M6 cylindrical housing

| Sensor type | Sensing distance | Connection method | | | | Operation mode | Order code | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | NPN output | PNP output |
| Diffuse-reflective | 50 mm (adjustable) | – | – | 2 m | – | light on | E3T-CD11 2M | E3T-CD13 2M |

## Specifications

| Item | | E3T-CT1_ | E3T-CT2_ | E3T-CD1_ |
|---|---|---|---|---|
| Light source (wave length) | | Red LED (630 nm) | Red LED (625 nm) | Infrared LED (870 nm) |
| Power supply voltage | | 12 to 24 VDC±10%, ripple (p-p) 10% max. | | |
| Protective circuits | | Power supply reverse polarity protection, Output short-circuit protection | | |
| Response time | | 0.5 ms max. | | |
| Ambient temperature | Operating | –25 to 55°C | | |
| | Storage | –30 to 70°C (with no icing or condensation) | | |
| Degree of protection | | IEC 60529 IP65 | | |
| Material | Case | SUS303 | | |
| | Display window | Polysulfone Epoxy | | |
| | Lens | Polysulfone | | |


## Photoelectric sensor in miniature plastic housing

Small sized photoelectric sensors in flat and side view shape for demanding mounting conditions.

- Small size with precision pinpoint LED where space is crucial
- 3.5 mm flat model with reliable background suppression and small black/white error
- Unique optical alignment technology ensuring minimal deviation of optical axis
- High EMC and ambient light immunity

## Ordering information

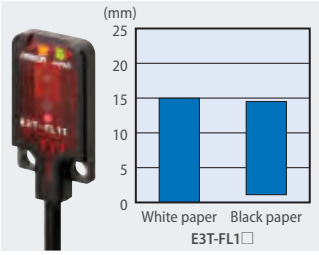
| Sensor type | Sensing distance | Connection method | | | | Operation mode | Mounting screw size | Order code[*1] | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | NPN output | PNP output |
| Through-beam | 2 m | – | – | 2 m | For ordering pigtail versions replace '2M' of cable types with:<br>- M1J: M12 with 30 cm cable<br>- M3J: M8 4-pin with 30 cm cable<br>- M5J: M8 3-pin with 30 cm cable | Light-ON | M2 | E3T-ST31 2M | E3T-ST33 2M |
| | | | | | | Dark-ON | M2 | E3T-ST32 2M | E3T-ST34 2M |
| | 1 m | | | | | Light-ON | M2 | E3T-ST11 2M | E3T-ST13 2M |
| | | | | | | | M3 | E3T-ST11M 2M | E3T-ST13M 2M |
| | | | | | | Dark-ON | M2 | E3T-ST12 2M | E3T-ST14 2M |
| | | | | | | | M3 | E3T-ST12M 2M | E3T-ST14M 2M |
| | 300 mm | | | | | Light-ON | M2 | E3T-ST21 2M | E3T-ST23 2M |
| | | | | | | | M3 | E3T-ST21M 2M | E3T-ST23M 2M |
| | | | | | | Dark-ON | M2 | E3T-ST22 2M | E3T-ST24 2M |
| | | | | | | | M3 | E3T-ST22M 2M | E3T-ST24M 2M |
| Through-beam | 500 mm | | | | | Light-ON | M2 | E3T-FT11 2M | E3T-FT13 2M |
| | | | | | | Dark-ON | M2 | E3T-FT12 2M | E3T-FT14 2M |
| | 300 mm | | | | | Light-ON | M2 | E3T-FT21 2M | E3T-FT23 2M |
| | | | | | | Dark-ON | M2 | E3T-FT22 2M | E3T-FT24 2M |
| Retro-reflective | 30 to 200 mm[*2] on reflectors/ 10 to 100 mm[*2] on reflective foils | | | | | Light-ON | M2 | E3T-SR41-C 2M[*3] | E3T-SR43-C 2M[*3] |
| | | | | | | Dark-ON | M2 | E3T-SR42-C 2M[*3] | E3T-SR44-C 2M[*3] |
| Diffuse-reflective | 5 to 30 mm | | | | | Light-ON | M2 | E3T-FD11 2M | E3T-FD13 2M |
| | | | | | | | M3 | E3T-FD11M 2M | E3T-FD13M 2M |
| | | | | | | Dark-ON | M2 | E3T-FD12 2M | E3T-FD14 2M |
| | | | | | | | M3 | E3T-FD12M 2M | E3T-FD14M 2M |
| Limited-reflective | 5 to 15 mm | | | | | Light-ON | M2 | E3T-SL11 2M | E3T-SL13 2M |
| | | | | | | | M3 | E3T-SL11M 2M | E3T-SL13M 2M |
| | | | | | | Dark-ON | M2 | E3T-SL12 2M | E3T-SL14 2M |
| | | | | | | | M3 | E3T-SL12M 2M | E3T-SL14M 2M |
| | 5 to 30 mm | | | | | Light-ON | M2 | E3T-SL21 2M | E3T-SL23 2M |
| | | | | | | | M3 | E3T-SL21M 2M | E3T-SL23M 2M |
| | | | | | | Dark-ON | M2 | E3T-SL22 2M | E3T-SL24 2M |
| | | | | | | | M3 | E3T-SL22M 2M | E3T-SL24M 2M |
| Diffuse-reflective (background suppression) | 1 to 15 mm | | | | | Light-ON | M2 | E3T-FL11 2M | E3T-FL13 2M |
| | | | | | | Dark-ON | M2 | E3T-FL12 2M | E3T-FL14 2M |
| | 1 to 30 mm | | | | | Light-ON | M2 | E3T-FL21 2M | E3T-FL23 2M |
| | | | | | | Dark-ON | M2 | E3T-FL22 2M | E3T-FL24 2M |

[*1] For pre-wired models with robotic cables add '-R' to the order code (example: E3T-FT21R 2M)
[*2] The distances are measured with reflector E39-R4 and reflective foil E39-R37-CA. For applications with shorter distances between the sensor and the reflector contact your OMRON representative.
[*3] Order reflector separately. Models with included reflectors are available.

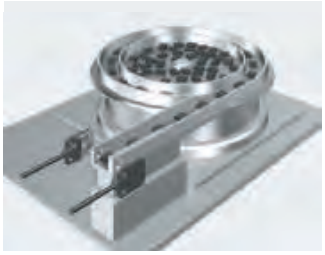
## Specifications

| Item | | Through-beam | | Retro-reflective |
|---|---|---|---|---|
| | | Side-view | Flat | Side-view |
| | | E3T-ST1<br>E3T-ST2<br>E3T-ST3 | E3T-FT1<br>E3T-FT2 | E3T-SR4 |
| Sensing distance | | E3T-ST3_: 2 m<br>E3T-ST1_: 1 m<br>E3T-ST2_: 300 mm | E3T-FT1_: 500 mm<br>E3T-FT2_: 300 mm | 30 to 200 mm (with E39-R4)<br>10 to 100 mm (with E39-R37-CA) |
| Light source (wave length) | | Red LED ("Pin-point" LED) λ = 650 nm | | |
| Power supply voltage | | 12 to 24 VDC±10%, ripple (p-p) 10% max. | | |
| Protective circuits | | Power supply and control output reverse polarity protection<br>Output short-circuit protection | | Power supply and control output reverse polarity protection<br>Output short-circuit protection, mutual interference prevention, surge suppressor |
| Response time | | 1 ms max. | | |
| Ambient temperature | Operating | –25 to 55°C (with no icing or condensation) | | |
| | Storage | –40 to 70°C (with no icing or condensation) | | |
| Degree of protection | | IEC60529 IP67 | | |
| Material | Case | PBT (polybutylene terephthalate) | | |
| | Display window | Denatured polyarylate | | |
| | Lens | Denatured polyarylate | | Methacrylic resin |

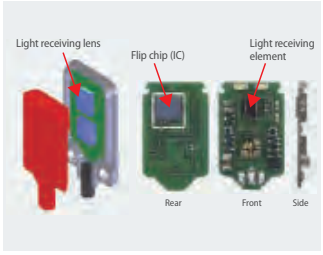
| Item | | Diffuse-reflective | Limited-reflective | | Diffuse-reflective (background suppression) | |
|---|---|---|---|---|---|---|
| | | Flat | Side-view | | Flat | |
| | | E3T-FD1 | E3T-SL1 | E3T-SL2 | E3T-FL1 | E3T-FL2 |
| Sensing distance | | 5 to 30 mm | 5 to 15 mm | 5 to 30 mm | 1 to 15 mm | 1 to 30 mm |
| Black/white error | | – | | | 15% max. | |
| Light source (wave length) | | Red LED ("Pin-point" LED) λ = 650 nm | | | | |
| Power supply voltage | | 12 to 24 VDC±10%, ripple (p-p) 10% max. | | | | |
| Protective circuits | | Power supply and control output reverse polarity protection<br>Output short-circuit protection, Mutual interference prevention | | | | |
| Response time | | 1 ms max. | | | | |
| Ambient temperature | Operating | –25 to 55°C | | | | |
| | Storage | –40 to 70°C (with no icing or condensation) | | | | |
| Degree of protection | | IEC60529 IP67 | | | | |
| Material | Case | PBT (polybutylene terephthalate) | | | | |
| | Display window | Denatured polyarylate | | | | |
| | Lens | Denatured polyarylate | | | | |




Minimal black / white error



The coaxial optics and the small focal lens of the retro-reflective models allow the detection of small (dia 2 mm) objects or through small holes (dia 2 mm).




The unique light receiving lens shape and the chip mounting technology, provide appropriate sensing distances for very precise and reliable detection even through smallest slits and gaps with e.g. 0.5 mm dia.

Models with mounting holes for M2 or M3 screws


## Photo microsensor in plastic fork shape housing

Standard photo microsensors with 50 to 100 mA direct switching capacity for best value-performance ratio to detect machine parts or end positions independent of material or magnetic fields.

- Response frequency up to 1 kHz
- Wide operating voltage range: 5 to 24 VDC

## Ordering information

### Connector models

| Sensor type | Sensing distance | Connection method | Operation Mode | Shape[*1] | Order code[*2] | |
|---|---|---|---|---|---|---|
| | | | | | NPN output | PNP output |
| Through-beam with slot | 5 mm (slot width) (Infrared light) | Connector (4 pin)[*3] | Dark-ON/Light-ON (selectable) | Standard  | EE-SX670 | EE-SX670P |
| | | | | L-shaped  | EE-SX671 | EE-SX671P |
| | | | | T-shaped, 7 mm  | EE-SX672 | EE-SX672P |
| | | | | Close-mounting  | EE-SX673 | EE-SX673P |
| | | | | Close-mounting  | EE-SX674 | EE-SX674P |
| | | | | T-shaped, 10 mm  | EE-SX675 | EE-SX675P |
| | | | | F-shaped  | EE-SX676 | EE-SX676P |
| | | | | R-shaped  | EE-SX677 | EESX-677P |

[*1] For shape dimensions refer to datasheet on www.industrial.omron.eu
[*2] For pre-wired models with 1 m cable add '-WR' to order reference (e.g. EE-SX670-WR)
[*3] Order connector separately from accessories

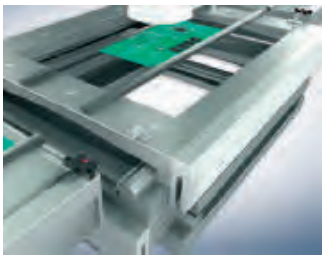
## Specifications

| Item | | Through-beam | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Standard | L-shaped | T-shaped, slot center: 7 mm | Close-mounting | | T-shaped, slot center: 10 mm | F-shaped | R-shaped |
| | NPN | EE-SX670 | EE-SX671 | EE-SX672 | EE-SX673 | EE-SX674 | EE-SX675 | EE-SX676 | EE-SX677 |
| | PNP | EE-SX670P | EE-SX671P | EE-SX672P | EE-SX673P | EE-SX674P | EE-SX675P | EE-SX676P | EE-SX677P |
| Sensing distance | | 5 mm (slot width) | | | | | | | |
| Power supply voltage | | 5 to 24 VDC ±10%, ripple (p-p): 10% max. | | | | | | | |
| Response frequency | | 1 kHz min. (3 kHz average) | | | | | | | |
| Ambient temperature | | Operating: –25 to 55°C, Storage: –30 to 80°C | | | | | | | |
| Degree of protection | | IEC60529 IP50 | | | | | | | |
| Material | Case | PBT (polybutylene terephthalate) | | | | | | | |
| | Lens | Polycarbonate | | | | | | | |

### Accessories (order separately)

| Type | Cable length | Material | Order code |
|---|---|---|---|
| Connector with Cable | 2 m | PVC | EE-1010 2M |
| Connector with Robot Cable | 2 m | PVC | EE-1010R 2M |

**Note:** For mechanical limit switches see page 304



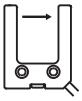
Easy to mount end position detection/limit sensors (contactless).

## Photoelectric sensor in 25 mm plastic fork shape housing

The forked shape optical through-beam sensors combine simple installation with reliable passage detection of object, machine parts or transportation elements like hanggliders.

- Fork shape for simple installation
- 1 or 2 axis models

## Ordering information

| Sensor type | Sensing distance | Number of optical axes | Connection method | | | | Order code*1 | |
|---|---|---|---|---|---|---|---|---|
| | | |  |  |  |  | NPN output | PNP output |
| Through-beam  | 25 mm (Infrared light) | 1 | – | – | 2 m | – | E3Z-G61 2M | E3Z-G81 2M |
| | | | – | – | – | ■ M8 4-pin | E3Z-G61-M3J | E3Z-G81-M3J |
| | | 2 | – | – | 2 m | – | E3Z-G62 2M | E3Z-G822M |
| | | | – | – | – | ■ M8 4-pin | E3Z-G62-M3J | E3Z-G82-M3J |

*1 Light-ON/Dark-ON switch selectable

## Specifications

| Item | | Through-beam |
|---|---|---|
| | | E3Z-G |
| Power supply voltage | | 12 to 24 VDC±10% max. ripple (p-p): 10% |
| Protective circuits | | Output short-circuit protection, and mutual interference prevention, power supply, reverse polarity protection |
| Response time | | 1 ms max. |
| Ambient temperature | Operating | –25 to 55°C |
| | Storage | –40 to 70°C (with no icing or condensation) |
| Degree of protection | | IEC60529 IP64 |
| Material | | ABS |

## Oil-resistant photoelectric sensor in compact stainless steel housing

The oil-resistant compact photoelectric sensor in a robust stainless steel housing features an enhanced functional reserve for reliable object detection in dirty and mechanically demanding environments such as automotive assembly lines.

- Oil-resistant stainless steel housing
- IP67 and IP69k for highest water resistance
- High visibility orange LED in through-beam model for easy alignment

## Ordering information

| Sensor type | Sensing distance | Connection method | | | | Order code*1 | |
|---|---|---|---|---|---|---|---|
| | | | | | | NPN output | PNP output |
| Through-beam | 15 m (Infrared light) | – | – | 2 m | – | E3ZM-CT61 2M | E3ZM-CT81 2M |
| | | – | – | – | ■*2 | E3ZM-CT61-M1TJ | E3ZM-CT81-M1TJ |
| | | ■ | – | – | – | E3ZM-CT66 | E3ZM-CT86 |
| | 20 m (Orange light) | – | – | 2 m | – | E3ZM-CT62B 2M | E3ZM-CT82B 2M |
| | | – | – | – | ■*2 | E3ZM-CT62B-M1TJ | E3ZM-CT82B-M1TJ |
| | | ■ | – | – | – | E3ZM-CT67B | E3ZM-CT87B |
| Retro-reflective with M.S.R. | 0.1 to 4m*3 | – | – | 2 m | – | E3ZM-CR61 2M | E3ZM-CR81 2M |
| | | – | – | – | ■*2 | E3ZM-CR61-M1TJ | E3ZM-CR81-M1TJ |
| | | ■ | – | – | – | E3ZM-CR66 | E3ZM-CR86 |
| Diffuse-reflective | 1 m (adjustable) | – | – | 2 m | – | E3ZM-CD62 2M | E3ZM-CD82 2M |
| | | – | – | – | ■*2 | E3ZM-CD62-M1TJ | E3ZM-CD82-M1TJ |
| | | ■ | – | – | – | E3ZM-CD67 | E3ZM-CD87 |
| Diffuse-reflective (background suppression) | 10 to 100 mm (fixed) | – | – | 2 m | – | E3ZM-CL61H 2M | E3ZM-CL81H 2M |
| | | – | – | – | ■*2 | E3ZM-CL61H-M1TJ | E3ZM-CL81H-M1TJ |
| | | ■ | – | – | – | E3ZM-CL66H | E3ZM-CL86H |
| | 10 to 200 mm (fixed) | – | – | 2 m | – | E3ZM-CL64H 2M | E3ZM-CL84H 2M |
| | | – | – | – | ■*2 | E3ZM-CL64H-M1TJ | E3ZM-CL84H-M1TJ |
| | | ■ | – | – | – | E3ZM-CL69H | E3ZM-CL89H |

*1 Light-ON/ Dark-ON switch selectable for E3ZM-CT, E3ZM-CR and E3ZM-CD. Light-ON/ Dark-ON selectable by wire for E3ZM-CL.
*2 uses OMRON's Twist & Click M12 connector XS5.
*3 Measured with E39-R1S.

## Specifications

| Item | | Through-beam | | Retro-reflective with M.S.R. | Diffuse-reflective |
|---|---|---|---|---|---|
| | NPN | E3ZM-CT61 (-M1TJ) E3ZM-CT66 | E3ZM-CT62B (-M1TJ) E3ZM-CT67B | E3ZM-CR61 (-M1TJ) E3ZM-CR66 | E3ZM-CD62 (-M1TJ) E3ZM-CD67 |
| | PNP | E3ZM-CT81 (-M1TJ) E3ZM-CT86 | E3ZM-CT82B (-M1TJ) E3ZM-CT87B | E3ZM-CR81 (-M1TJ) E3ZM-CR86 | E3ZM-CD82 (-M1TJ) E3ZM-CD87 |
| Light source (wave length) | | Infrared LED (870 nm) | Orange LED (615 nm) | Red LED (660 nm) | Infrared LED (860 nm) |
| Power supply voltage | | 10 to 30 VDC, including 10% ripple (p-p) | | | |
| Protective circuits | | Power supply reverse polarity protection, output short-circuit protection, output reverse polarity protection | | Power supply reverse polarity protection, output short-circuit protection, output reverse polarity protection, and mutual interference prevention | |
| Response time | | 1 ms max. | 2 ms max. | 1 ms max. | |
| Ambient temperature | Operating | –25 to 55°C | | | |
| | Storage | –40 to 70°C (with no icing or condensation) | | | |
| Degree of protection | | IEC 60529 IP67, IP69K after DIN 40050 part 9 | | | |
| Material | Case | SUS316L | | | |
| | Lens | PMMA (polymethylmethacrylate) | | | |
| | Display | PES (polyether sulfone) | | | |
| | Sensitivity adjustment and operation switch | PEEK (polyether ether ketone) | | | |
| | Seals | Fluoro rubber | | | |

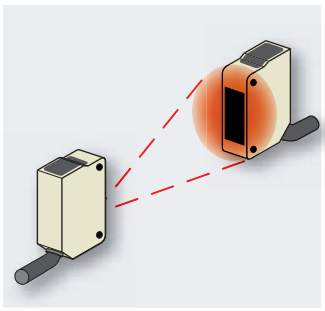
| Item | | Diffuse-reflective with background suppression (fixed distance) | |
|---|---|---|---|
| | NPN | E3ZM-CL61H (-M1TJ)<br>E3ZM-CL66H | E3ZM-CL64H (-M1TJ)<br>E3ZM-CL69H |
| | PNP | E3ZM-CL81H (-M1TJ)<br>E3ZM-CL86H | E3ZM-CL84H (-M1TJ)<br>E3ZM-CL89H |
| Light source (wave length) | | Red LED (650 nm) | Red LED (660 nm) |
| Power supply voltage | | 10 to 30 VDC, ±10% ripple (p-p): 10% max. | |
| Protective circuits | | Reversed power supply polarity protection, output short-circuit protection, reversed output polarity protection, mutual interference protection | |
| Response time | | 1 ms max. | |
| Ambient temperature | Operating | –25 to 55°C | |
| | Storage | –40 to 70°C (with no icing or condensation) | |
| Degree of protection | | IEC 60529 IP67, IP69K after DIN 40050 part 9 | |
| Material | Case | SUS316L | |
| | Cable | Oil-resistant vinyl cable | |
| | Lens | PMMA (polymethylmethacrylate) | |
| | Display | PES (polyethersulfone) | |
| | Seals | Fluoro rubber | |

## Oil Resistance

| Test oil type | Product name | Kinetic viscosity at 40°C ($mm^2/s$) | pH (dilution rate) |
|---|---|---|---|
| Lubricants | Velocity Oil No. 3 | 2.02 | – |
| Non-water-soluble cutting oils | Yushiron Oil No.2 AC | Less than 10 | – |
| Water-soluble cutting oils | Yushiroken EC50T3 | – | 10.1 (×30) |
| | Yushiroken EC50T5 | | 9.9 (×30) |
| | Yushiroken S46D | | 9.9 (×50) |
| | Yushiroken S50N | | 8.6 (×50) |
| | Yushiron Lubic HWC68 | | 9.1 (×30) |
| | Yushiroken Synthetic #770TG | | 9.9 (×20) |
| | Emulcut FA-900ST | | 9.7 (×30) |
| | Multicool CSF-9000 | | 9.7 (×20) |
| | Sugicut CS-68JS-1 | | 9.6 (×20) |
| | Toyocool 3A-666 | | 9.6 (×20) |
| | Gryton 1700 | | 9.1 (×10) |
| | Gryton 1700D | | 9.3 (×3) |

1. The Sensor was immersed in the above oils for 240 h at 55°C and then passed an insulation resistance test at 100 MΩ.
2. Use the kinetic viscosities and pHs in the above table as a guide when using the Sensor in environments containing oils not listed in the table. Additives in the oil may also affect performance. Always test applicability in advance.

Tested oil and lubricant resistance



Highly visible orange LED

## Transparent object detection sensor in compact stainless steel housing

The E3ZM-B family provides models for the general transparent material detection and specialized models providing highest stability for the detection of PET bottles.

- Stable PET detection using double refraction and AC$^3$ power control technology
- Detergent resistant compact SUS316L housing

## Ordering information

| Sensor type | | Sensing distance | Special reflector | Connection method | | | | Order code*1 | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | NPN output | PNP output |
| Retro-reflective with M.S.R. | Optimised for PET bottles and trays | 100 to 500 mm (teachable) | Order separately*2 | – | – | 2 m | – | E3ZM-B61 2M | E3ZM-B81 2M |
| | | | | ■ | – | – | – | E3ZM-B66 | E3ZM-B86 |
| | | | E39-RP1 included | – | – | 2 m | – | E3ZM-B61-C 2M | E3ZM-B81-C 2M |
| | | | | ■ | – | – | – | E3ZM-B66-C | E3ZM-B86-C |
| Retro-reflective with M.S.R. | For all transparent media (glass, PET, foils) | 100 to 500 mm (potentiometer adjustment)*3 | Order separately*4 | – | – | 2 m | – | E3ZM-B61T 2M | E3ZM-B81T 2M |
| | | | | ■ | – | – | – | E3ZM-B66T | E3ZM-B86T |

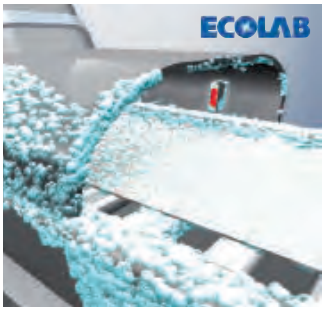
*1 PET optimised models are Light-ON/Dark-ON selectable by wire. E3ZM-B_T all transparent media types are Light-ON/ Dark-ON switch selectable
*2 For higher signal stability using circular polarisation functionality for PET bottles, order special reflector E39-RP1 separately
*3 Teachable all-transparent-media types are available. Contact your OMRON representative
*4 Order reflector separately

## Specifications

| Item | | PET optimised (teachable) | all-transparent-media (potentiometer adjustment) |
|---|---|---|---|
| | NPN | E3ZM-B61(-C)/-B66(-C) | E3ZM-B6_T |
| | PNP | E3ZM-B81(-C)/-B86(-C) | E3ZM-B8_T |
| Light source (wave length) | | Red LED (650 nm) | |
| Power supply voltage | | 10 to 30 VDC, ±10% ripple (p-p): 10% max. | |
| Protective circuits | | Reversed power supply polarity protection, output short-circuit protection, mutual interference prevention, and reversed output polarity protection | |
| Repsonse time | | 1 ms max. | |
| Ambient temperature | Operating | –40 to 60°C | –25 to 55°C |
| | Storage | –40 to 70°C (with no icing or condensation) | |
| Degree of protection | | IEC 60529 IP67, IP69K after DIN 40050 part 9 | |
| Material | Case | SUS316L | |
| | Lens | PMMA (polymethylmethacrylate) | |
| | Display | PES (polyether sulfone) | |
| | Seals | Fluoro rubber | |
| | Cable | PVC (polyvinyl chloride) | |

Utilisation of double reflection effect in PET for higher detection stability (PET optimised models)

Automatic LED power adjustment (AC$^3$) to compensate for soiling and temperature fluctuations (PET optimised models)




Detergent resistant

## Transparent object detection photoelectric sensor in compact plastic housing

The E3Z-B provides easy adjustment for the detection of a large variety of standard transparent objects.

- Detects a wide range of bottles from single bottles to sets of stocked bottles
- IP67/IP69K tested for highest water resistance

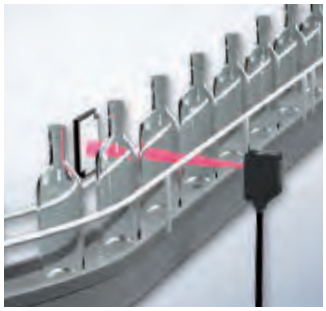
## Ordering information

| Sensor type | Sensing distance | Connection method | | | | Order code*1 | |
|---|---|---|---|---|---|---|---|
| | |  |  |  |  | NPN output | PNP output |
| Retro-reflective without M.S.R.  | 80 to 500 mm*2 (adjustable) | – | – | 2 m | – | E3Z-B61 2M | E3Z-B81 2M |
| | | ■ | – | – | – | E3Z-B66 | E3Z-B86 |
| | 0.5 to 2 m*2 (adjustable) | – | – | 2 m | – | E3Z-B62 2M | E3Z-B82 2M |
| | | ■ | – | – | – | E3Z-B67 | E3Z-B87 |

*1 Light-ON / Dark-ON switch selectable
*2 Measured with E39-R1S

## Specifications

| Item | | Retro-reflective without M.S.R. | |
|---|---|---|---|
| | NPN output | E3Z-B61/E3Z-B66 | E3Z-B62/E3Z-B67 |
| | PNP output | E3Z-B81/E3Z-B86 | E3Z-B82/E3Z-B87 |
| Light source (wave length) | | Red LED (680 nm) | |
| Power supply voltage | | 12 to 24 VDC±10%, ripple (p-p) : 10% max. | |
| Protective circuits | | Reverse polarity protection, output short-circuit protection, mutual interference prevention | |
| Response time | | 1 ms max. | |
| Ambient temperature | Operating | –25 to 55°C | |
| | Storage | –40 to 70°C (with no icing or condensation) | |
| Degree of protection | | IEC 60529 IP67, IP69K after DIN 40050 part 9 | |
| Material | Case | PBT (polybutylene terephthalate) | |
| | Lens | Methacrylate resin | |



Easy adjustment for the detection of a large variety of transparent objects

## Transparent object detection sensor in compact M18 housing

The E3F_-B/-V provide enhanced detection stability for the detection of transparent objects. It allows an easy and intuitive adjustment to individual requirements.

- Easy adjustment to individual requirements for all transparent materials
- P-opaquing technology enables reliable detection of PET bottles also in dusty environments
- Coaxial optics (E3F_-B__1) for stable, position-independent detection

PRO plus

## Ordering Information

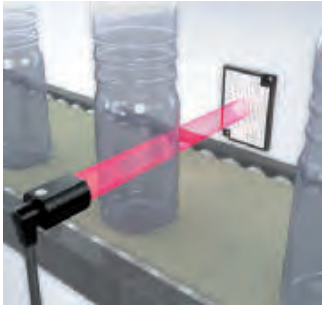
| Sensor type | Sensing distance | Connection method | | | | Order code | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | E3FA (plastic housing) | | E3FB (metal housing) | |
| | | | | | | NPN output | PNP output | NPN output | PNP output |
| Limited distance reflective | 10 to 50 mm | – | – | 2 m | – | E3FA-VN11 2M | E3FA-VP11 2M | E3FB-VN11 2M | E3FB-VP11 2M |
| | | – | ■ | – | – | E3FA-VN21 | E3FA-VP21 | E3FB-VN21 | E3FB-VP21 |
| Coaxial retro-reflective with P-opaquing function*1 | 0 to 500 mm (with E39-RP1) | – | – | 2 m | – | E3FA-BN11 2M | E3FA-BP11 2M | E3FB-BN11 2M | E3FB-BP11 2M |
| | | – | ■ | – | – | E3FA-BN21 | E3FA-BP21 | E3FB-BN21 | E3FB-BP21 |
| Retro-reflective with P-opaquing function*1 | 0.1 to 2m (with E39-RP1) | – | – | 2 m | – | E3FA-BN12 2M | E3FA-BP12 2M | E3FB-BN12 2M | E3FB-BP12 2M |
| | | – | ■ | – | – | E3FA-BN22 | E3FA-BN22 | E3FB-BN22 | E3FB-BN22 |

*1 The Reflector is sold separately. Select the Reflector model most suited to the application. For PET detection E39-RP1 is recommended for best detection stability.

## Ratings and Specifications

| Model | Sensing method | | Limited distance reflective | Retro-reflective with P-opaquing function | |
|---|---|---|---|---|---|
| | NPN output | Pre-wired | E3F_-VN11 2M | E3F_-BN11 2M | E3F_-BN12 2M |
| | | M12 Connector | E3F_-VN21 | E3F_-BN21 | E3F_-BN22 |
| | PNP output | Pre-wired | E3F_-VP11 2M | E3F_-BP11 2M | E3F_-BP12 2M |
| Item | | M12 Connector | E3F_-VP21 | E3F_-BP21 | E3F_-BP22 |
| Sensing distance | | | 10 to 50 mm | 0 to 500 mm (coaxial) | 0.1 to 2 m |
| Light source (wavelength) | | | Red LED (624 nm) | | |
| Power supply voltage | | | 10 to 30 VDC (include voltage ripple of 10%(p-p) max.) | | |
| Operation mode | | | Light-ON/Dark-ON selectable by wiring | | |
| Sensitivity adjustment | | | One-turn adjuster | | |
| Protection circuits | | | Reversed power supply polarity protection, Output short-circuit protection and Reversed output polarity protection | | |
| Response time | | | 0.5 ms | | |
| Ambient temperature | | Operating | –25 to 55°C | | |
| | | Storage | –30 to 70°C (with no icing or condensation) | | |
| Degree of protection | | | IEC: IP67, DIN 40050-9: IP69K | | |
| Material | Case and Nut | | E3FA: ABS, E3FB: Nickel brass | | |
| | Lens and Display | | PMMA | | |

Coaxial optics (E3F_-B) for detection through small holes



Reliable detection of PET bottles by unique p-opaquing technology

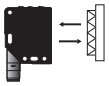
Limited-reflective types suitable for detecting transparant film to shiny, mirror film.

## Transparent object sensor

E3S-DB sensor provides most reliable detection of all kinds of transparent objects such as PET bottles, glass bottles or transparent trays.

- Most reliable detection of all transparent objects
- SmartTeach enabling fast set up and optimum threshold setting
- Narrow beam types detecting smallest object gaps (min. 3 mm)
- Proven for environments in Food & Beverage industry

## Ordering information

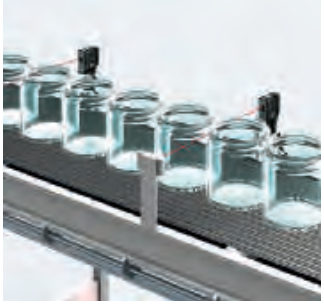
| Sensor type | | | Sensing distance recommended (max.) | Connection method | | | | Order code*1 | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | NPN output | PNP output |
| Retro-reflective with MSR function  | Smart teach | Standard | 3.5 m (4.5 m)*2 | – | – | ■ | – | E3S-DBN11 2M | E3S-DBP11 2M |
| | | | | – | ■ | – | – | E3S-DBN21 | E3S-DBP21 |
| | | | | – | – | – | ■ | E3S-DBN31 | E3S-DBP31 |
| | | Narrow beam*3 | 0.5 m (0.7 m)*4 | – | – | ■ | – | E3S-DBN12 2M | E3S-DBP12 2M |
| | | | | – | ■ | – | – | E3S-DBN22 | E3S-DBP22 |
| | | | | – | – | – | ■ | E3S-DBN32 | E3S-DBP32 |
| | Trimmer | Standard | 3.5 m (4.5 m)*2 | – | – | ■ | – | E3S-DBN11T 2M | E3S-DBP11T 2M |
| | | | | – | ■ | – | – | E3S-DBN21T | E3S-DBP21T |
| | | | | – | – | – | ■ | E3S-DBN31T | E3S-DBP31T |
| | | Narrow beam*3 | 0.5 m (0.7 m)*4 | – | – | ■ | – | E3S-DBN12T 2M | E3S-DBP12T 2M |
| | | | | – | ■ | – | – | E3S-DBN22T | E3S-DBP22T |
| | | | | – | – | – | ■ | E3S-DBN32T | E3S-DBP32T |

*1 Please order reflector separately.
*2 Rated with E39-R8
*3 For narrow beam type please use micro-triple reflector (e.g. E39-R21)
*4 Rated with E39-R21

## Specifications

| Item \ Model | Sensing method | Retro-reflective with MSR function | | | |
|---|---|---|---|---|---|
| | NPN output | E3S-DBN_1 | E3S-DBN_1T | E3S-DBN_2 | E3S-DBN_2T |
| | PNP output | E3S-DBP_1 | E3S-DBP_1T | E3S-DBP_2 | E3S-DBP_2T |
| Sensing distance, typ. max | | 0 to 4.5 m (with E39-R8) | | 0 to 700 mm (with E39-R21) | |
| Sensing distance, recommended | | 0 to 3.5 m (with E39-R8) | | 0 to 500 mm (with E39-R21) | |
| Light source (wavelength) | | Red LED (624 nm) | | | |
| Power supply voltage | | 10 to 30 VDC, including 10% ripple (p-p) | | | |
| Operating modes | | OUT1: L-ON/OUT2: D-ON (antivalent output) | | | |
| Protection circuits | | Reversed power supply polarity protection, Output short-circuit protection, Reversed output polarity protection, Missconnection protection, Mutual interference suppression | | | |
| Response time | | 0.5 ms | | | |
| Sensitivity adjustment | | SmartTeach | 11-turn trimmer | SmartTeach | 11-turn trimmer |
| Degree of protection | | IEC: IP67, DIN 40050-9: IP69K | | | |
| Connection method | | Pre-wired cable (standard length: 2 m) or M12 4-pin connector or Pigtail (0.3 m/M12 4-pin) | | | |
| Indicators | | Light indicator (orange), Stability indicator (green) | | | |

SmartTeach providing fast & easy setting of optimum thresholds



Narrow beam models for detecting gaps down to 3 mm

PC Tool enables detailed identification of object attenuation level and optimizing sensor set up

Auto-compensation-control for contamination keeps light level stable in harsh environments

## High precision laser sensor with separate amplifier

The separate amplifier laser sensors feature a comprehensive range of sensing heads with variable spot and advanced CMOS sensing heads for high precision positioning and demanding applications.

- High detection stability independent from color or surface structure
- Lens attachments for line beam applications
- Easy installation due to adjustable focus and smart tune functions
- Sensor heads with up to 1.2 m sensing distance covering a wide range of applications
- High speed network connectivity to EtherCat fieldbus

## Ordering information

### Sensor heads E3NC-L Sensor Series

| Sensor type | Sensing distance | Remarks | Order code |
|---|---|---|---|
| Diffuse-reflective  | 1,200 mm | Variable spot (diffuse reflective) | E3NC-LH02 2M |
| | 70±15 mm | Fixed spot (limited reflective) | E3NC-LH01 2M |
| Coaxial retro-reflective with M.S.R.  | 8 m*1 | Fixed spot | E3NC-LH03 2M |

*1 A Reflector is not included. Purchase a Reflector separately.

### Sensor heads E3NC-S CMOS Laser Sensor Series

| Sensor type | Sensing distance | Laser class | Order code |
|---|---|---|---|
| Diffuse-reflective (distance-settable)  | 35 to 100 mm | 1 | E3NC-SH100 2M |
| | 35 to 250 mm | 1 | E3NC-SH250 2M |
| | 35 to 250 mm | 2 | E3NC-SH250H 2M |

### Amplifier units E3NC-L Sensor Series

| Item | Order code | | | | | |
|---|---|---|---|---|---|---|
| | pre-wired | | with connector*1 | | M8 connector | |
| | NPN output | PNP output | NPN output | PNP output | NPN output | PNP output |
| 2 outputs + 1 input models | E3NC-LA21 2M | E3NC-LA51 2M | – | | – | |
| 1 output + 1 input models | – | | E3NC-LA7 | E3NC-LA9 | E3NC-LA24 | E3NC-LA54 |
| Networking model*2 | E3NC-LA0 | | | | | |

*1 Order connector (E3X-CN21_) separately from accessories
*2 For network connection please order networking unit E3NW

### Amplifier units E3NC-S CMOS Laser Sensor Series

| Item | Order code | | | | | |
|---|---|---|---|---|---|---|
| | pre-wired | | with connector*1 | | M8 connector | |
| | NPN output | PNP output | NPN output | PNP output | NPN output | PNP output |
| 2 outputs + 1 input models | E3NC-SA21 2M | E3NC-SA51 2M | – | | – | |
| 1 output + 1 input models | – | | E3NC-SA7 | E3NC-SA9 | E3NC-SA24 | E3NC-SA54 |
| Networking model*2 | E3NC-SA0 | | | | | |

*1 Order connector (E3X-CN21_) separately from accessories
*2 For network connection please order networking unit E3NW

## Amplifier connectors

| Shape | Type | Comment | Order code |
|---|---|---|---|
|  | Amplifier connector | 2 m PVC cable | E3X-CN21 |
|  | | 30 cm PVC cable with M12 plug connector (4 pin) | E3X-CN21-M1J 0.3M |
| | | 30 cm PVC cable with M8 plug connector (4 pin) | E3X-CN21-M3J-2 0.3M |

## Communication units

| Shape | Communications method | Applicable Amplifier Units | Order code |
|---|---|---|---|
|  | Sensor communication unit for EtherCAT | E3NX-FA0<br>E3NC-LA0<br>E3NC-SA0 | E3NW-ECT |
|  | Sensor dispersion (slave) unit | | E3NW-DS |

## Reflectors

| Appearance | Type | Size | Applicable sensor | Order code |
|---|---|---|---|---|
|  | Micro-triple reflector | 30 × 35 mm | E3NC-LH03 | E39-R21 |
|  | Micro-triple reflector | 55 × 40 mm | | E39-R22 |
|  | Micro-triple reflector self-adhesive | 25 × 25 mm | | E39-RS10 |
|  | Micro-triple reflector self-adhesive | 50 × 50 mm | | E39-RS11 |

## Lens Attachments for Sensor Heads

| Appearance | Comment | Applicable sensor | Order code |
|---|---|---|---|
|  | Lens attachement to a create line beam | E3NC-LH03 | E39-P51 |
|  | Lens attachement to a create line beam | E3NC-LH02 | E39-P52 |

### Mounting Brackets for Sensor Heads

| Appearance | Type | Applicable sensor | Order code |
|---|---|---|---|
|  | L-shape mounting bracket | E3NC-LH03 | E39-L190 |
|  | L-shape mounting bracket | E3NC-LH02 | E39-L185 |
|  | L-shape mounting bracket | E3NC-LH01 | E39-L186 |
|  | L-shape mounting bracket | E3NC-SH250<br>E3NC-SH250<br>E3NC-SH100 | E39-L187 |
|  | L-shape mounting bracket | | E39-L188 |

## Specifications

### Sensor heads E3NC-L Sensor Series

| Item | Coaxial Retro-reflective (M.S.R.) | Diffuse-reflective | |
|---|---|---|---|
| | E3NC-LH03 | E3NC-LH02 | E3NC-LH01 |
| Light source (emission wave length) | Red laser diode (660 nm), 315 µW max. (JIS Class 1, IEC/EN Class 1, and FDA Class 1) | | |
| Sensing distance | Giga-power mode (GIGA): 8 m<br>Standard mode (Stnd): 6 m<br>High-speed mode (HS): 3.5 m<br>Super-high-speed mode (SHS): 2 m | Giga-power mode (GIGA): 1,200 mm<br>Standard mode (Stnd): 750 mm<br>High-speed mode (HS): 250 mm<br>Super-high-speed mode (SHS): 200 mm | 70±15 mm |
| Beam size (typical) | 2 mm dia. (at 1 m) | 0.8 mm max. (at distances up to 300 mm) | 0.1 mm (at 70 mm) |
| Degree of protection | IP67 | IP65 | |

### Amplifier units E3NC-L Sensor Series

| Item | | 2 output/1 input models | 1 output/1 input models | Networking models |
|---|---|---|---|---|
| | NPN output | E3NC-LA21 | E3NC-LA7/E3NC-LA24 | E3NC-LA0 |
| | PNP output | E3NC-LA51 | E3NC-LA9/E3NC-LA54 | |
| Outputs | | 2 outputs | 1 output | –* |
| Inputs | | 1 input | | –* |
| Supply voltage | | 10 to 30 VDC±10%, ripple (p-p) 10% max. | | |
| Response time | Super-high-speed mode | 80 µs | | |
| | High-speed mode | 250 µs | | |
| | Standard mode | 1 ms | | |
| | Giga-power mode | 16 ms | | |
| Functions | Smart tuning | 2-point tuning, full auto tuning, position tuning, maximum sensitivity tuning, power tuning, or percentage tuning (–99% to 99%) | | |
| | Timer function | Select from timer disabled, OFF-delay, ON-delay, one-shot, or ON-delay + OFF-delay timer: 1 to 9,999 ms | | |
| | Eco mode | Select from OFF (digital displays lit) or ECO (digital displays not lit) | | |
| | Bank switching | Select from banks 1 to 4 | | |
| | Dynamic Power Control (DPC) | Provided (automatically controls light intensity and compensates incident level changes) | | |
| Ambient temperature range | Operating | –10 to 55°C | | |
| | Storage | –25 to 70°C (with no icing or condensation) | | |
| Digital display | | 7-segment displays (sub digital display: green, main digital display: white)<br>Display direction: switchable between normal and reversed | | |
| Degree of protection | | IP50 (IEC 60529) | | |

* Two sensor outputs are allocated in the programmable logic controller PLC I/O table. PLC operation via Communications Unit enables reading detected values and changing settings.

## Sensor heads E3NC-SH CMOS Laser Sensor series

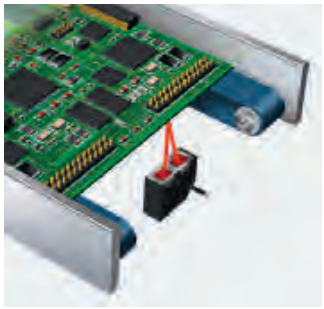
| Item | | Diffuse-reflective (distance-settable) | |
|---|---|---|---|
| | E3NC-SH250H | E3NC-SH250 | E3NC-SH100 |
| Light source (emission wave length) | Red laser diode (660 nm), 1 mW (average output: 220 µW), (JIS Class 2, IEC/EN Class 2, and FDA Class 2) | Red laser diode (660 nm), 100 µW max. (JIS Class 1, IEC/EN Class 1, and FDA Class 1) | |
| Measurement range | 35 to 250 mm (display value: 350 to 2,500) | | 35 to 100 mm (display value: 350 to 1,000) |
| Spot diameter | 1 mm (at 250 mm) | | 0.5 mm (at 100 mm) |
| Degree of protection | IEC60529 IP67 | | |

## Amplifier units E3NC-SH CMOS Laser Sensor series

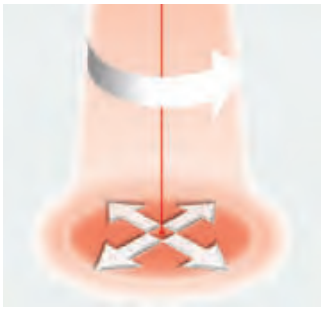
| Item | | 2 output/1 input models | 1 output/1 input models | Networking models |
|---|---|---|---|---|
| | NPN output | E3NC-SA21 | E3NC-SA7/E3NC-SA24 | E3NC-SA0 |
| | PNP output | E3NC-SA51 | E3NC-SA9/E3NC-SA54 | |
| Outputs | | 2 outputs | 1 output | –* |
| Inputs | | 1 input | | –* |
| Supply voltage | | 10 to 30 VDC±10%, ripple (p-p) 10% max. | | |
| Response time | Super-high-speed mode | 1.5 ms | | |
| | High-speed mode | 5 ms | | |
| | Standard mode | 10 ms | | |
| | Giga-power mode | 50 ms | | |
| Functions | Smart tuning | 2-point tuning, full auto tuning, 1-point tuning, tuning without workpiece, 2-point area tuning, 1-point area tuning, or area tuning without workpiece | | |
| | Timer function | Select from timer disabled, OFF-delay, ON-delay, one-shot, or ON-delay + OFF-delay timer: 1 to 9,999 ms | | |
| | Bank switching | Select from banks 1 to 4 | | |
| Ambient temperature range | Operating | –10 to 55°C | | |
| | Storage | –25 to 70°C (with no icing or condensation) | | |
| Digital display | | 7-segment displays (sub digital display: green, main digital display: white)<br>Display direction: switchable between normal and reversed. | | |
| Degree of protection | | IP50 (IEC 60529) | | |

* Two sensor outputs are allocated in the programmable logic controller PLC I/O table. PLC operation via Communications Unit enables reading detected values and changing settings.

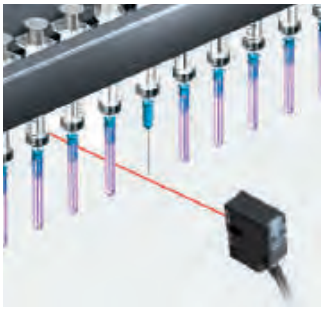
Integration into N-Smart platform



High precision positioning



Focal point adjustment



High precision detection over long range

## Photoelectric sensor for structured object detection in plastic housing

The special wide beam and limited-reflective optics of the E3S-LS3 ensures reliable detection of structured objects (with holes or different heights) and can be used for example to detect printed circuit boards (PCBs).

- Wide beam and limited-reflective optics for the reliable detection of structured, shiny and irregularly shaped objects

## Ordering information

| Sensor type | Sensing distance | Connection method | | | | Timer function | Output | Order code |
|---|---|---|---|---|---|---|---|---|
| | |  |  |  |  | | | Light ON |
| Limited-reflective  | 20 to 35 mm (Red light) | – | – | 2 m | – | No | NPN | E3S-LS3N 2M |
| | 10 to 60 mm (Red light) | | | | | | | E3S-LS3NW 2M |
| | 20 to 35 mm | – | – | 2 m | – | No | PNP | E3S-LS3P 2M |
| | | | | | | Yes | | E3S-LS3PT 2M |
| | | – | – | – | ■ M8 3-pin | No | | E3S-LS3P-M5J |
| | | | | | | Yes | | E3S-LS3PT-M5J |
| | | – | – | – | ■ M8 4-pin | No | | E3S-LS3P-M3J |
| | | | | | | Yes | | E3S-LS3PT-M3J |
| | 10 to 60 mm | – | – | 2 m | – | No | | E3S-LS3PW 2M |
| | | | | | | Yes | | E3S-LS3PWT 2M |
| | | – | – | – | ■ M8 3-pin | No | | E3S-LS3PW-M5J |
| | | | | | | Yes | | E3S-LS3PWT-M5J |
| | | – | – | – | ■ M8 4-pin | No | | E3S-LS3PW-M3J |
| | | | | | | Yes | | E3S-LS3PWT-M3J |

## Specifications

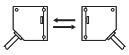
| Item | | Limited-reflective |
|---|---|---|
| | | E3S-LS3_ |
| Light source (wave length) | | Red LED (660 nm) |
| Power supply voltage | | 12 to 24 VDC±10%, ripple (p-p) 10% max. |
| Response time | | 1 ms max. |
| Timer function | | Available with E3S-LS3P(W)T models only. Time range: 0.1 to 1.0 s (adjustable) |
| Ambient temperature | Operating | –10 to 55°C (with no icing or condensation) |
| | Storage | –25 to 70°C (with no icing or condensation) |
| Degree of protection | | IEC60529 IP40 |
| Material | Case | ABS |
| | Lens | Acrylic |

## All voltage photoelectric sensor in plastic housing with timer function

The square sized E3JM family provides 12 to 240 VDC and 24 to 240 VAC power supply voltage, an enhanced sensing distance and a timer function.

- 12 to 240 VDC and 24 to 240 VAC supply voltage
- Relay or solid state relay output
- Models with timer function

## Ordering information

| Sensor type | Sensing distance | Connection method | Timer function | Order code*1 | | |
|---|---|---|---|---|---|---|
| | | | | Relay output | DC SSR output | |
| | | | | | minus common | plus common |
| Through-beam  | 10 m | Terminal block (with PG 13.5) | – | E3JM-10M4-G-N | E3JM-10S4-G-N | E3JM-10R4-G-N |
| | | | ON or OFF delay 0.1 s to 5 s (adjustable) | E3JM-10M4T-G-N | E3JM-10S4T-G-N | E3JM-10R4T-G-N |
| Retro-reflective with M.S.R.  | 4 m | | – | E3JM-R4M4-G | E3JM-R4S4-G | E3JM-R4R4-G |
| | | | ON or OFF delay 0.1 s to 5 s (adjustable) | E3JM-R4M4T-G | E3JM-R4S4T-G | E3JM-R4R4T-G |
| Diffuse-reflective  | 700 mm (adjustable) | | – | E3JM-DS70M4-G | E3JM-DS70S4-G | E3JM-DS70R4-G |
| | | | ON or OFF delay 0.1 s to 5 s (adjustable) | E3JM-DS70M4T-G | E3JM-DS70S4T-G | E3JM-DS70R4T-G |

*1 Light-ON / Dark-ON switch selectable

## Specifications

| Item | | Through-beam | | Retro-reflective with M.S.R. | | Diffuse-reflective | |
|---|---|---|---|---|---|---|---|
| | | E3JM-10 | E3JM-10_T | E3JM-R | E3JM-R_T | E3JM-D | E3JM-D_T |
| Light source (wave length) | | Infrared LED (950 nm) | | Red LED (660 nm) | | Infrared LED (950 nm) | |
| Power supply voltage | | 12 to 240 VDC±10% ripple (p-p) : 10% max. 24 to 240 VAC±10% 50/60 Hz | | | | | |
| Control output | Relay output | 250 VAC, 3 A max.; 5 VDC, 10 mA min. | | | | | |
| | DC SSR output | 48 VDC, 100 mA max.; residual voltage 2V | | | | | |
| Response time | Relay output | 30 ms max. | | | | | |
| | DC SSR output | 5 ms max. | | | | | |
| Timer function | ON/OFF delay | – | 0.1 s to 5 s | – | 0.1 s to 5 s | – | 0.1 s to 5 s |
| Ambient temperature | Operating | –25 to 55°C | | | | | |
| | Storage | –30 to 70°C (with no icing or condensation) | | | | | |
| Degree of protection | | IEC60529 IP66 | | | | | |
| Material | Case | ABS | | | | | |
| | Lens | Methacrylate resin | | | | | |

## Long distance all voltage photoelectric sensor in plastic housing

The E3G-M series offers the long sensing distance of the E3G family for all voltage (AC and DC) installations.

- 12 to 240 VDC and 24 to 240 VAC power supply
- Terminal block connection

## Ordering information

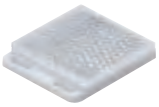
| Sensor type | Sensing distance | Connection method | Timer function | Order code *1 |
|---|---|---|---|---|
| | | | | Relay output |
| Retro-reflective with M.S.R.  | 0.5 to 10 m *2 (Red light) | Terminal block (with PG 13.5 conduit) | – | E3G-MR19-G |
| | | | ON or OFF delay 0 to 5 s (adjustable) | E3G-MR19T-G |
| Distance-settable (background suppression)  | 0.2 to 2 m (0.2 to 1.2 m distance settable) | | – | E3G-ML79-G |
| | | | ON or OFF delay 0 to 5 s (adjustable) | E3G-ML79T-G |

*1 Light-ON/Dark-ON switch selectable
*2 Measured with E39-R2

## Specifications

| Item | | Retro-reflective with M.S.R. | | Distance-settable (background suppression) | |
|---|---|---|---|---|---|
| | | E3G-MR19-G | E3G-MR19T-G | E3G-ML79-G | E3G-ML79T-G |
| Light source (wave length) | | Red LED (700 nm) | | Infrared LED (860 nm) | |
| Power supply voltage | | 12 to 240 VDC±10% ripple (p-p): 10% max.<br>24 to 240 VAC±10% 50/60 Hz | | | |
| Response time | | 30 ms | | | |
| Timer function | | – | ON delay/OFF delay<br>0 to 5 s<br>(Adjuster variable system) | – | ON delay/OFF delay<br>0 to 5 s<br>(Adjuster variable system) |
| Ambient temperature | Operating | –25 to 55°C | | | |
| | Storage | –30 to 70°C (with no icing or condensation) | | | |
| Degree of protection | | IEC 60529 IP67 (with protective cover attached) | | | |
| Material | Case | PBT (polybutylene terephthalate) | | | |
| | Lens | Acrylics (PMMA) | | | |

## Reflectors for retro-reflective photoelectric sensors

| Shape | Type | Housing material | Features | Size in mm | Applicable Sensor | Order code |
|---|---|---|---|---|---|---|
|  | **General purpose reflectors** | • ABS base<br>• Acrylic surface | Surface screw mounting (diagonal holes) | 40 × 60 × 7.5 | • Retro-reflective photoelectric sensors with and without M.S.R | E39-R1S |
|  | | | Surface screw mounting (holes on one side only) | 35.4 × 42.3 × 8 | | E39-R9 |
|  | | | | 51.4 × 60.3 × 8.5 | | E39-R42 |
|  | **Small size** | | Side screw mounting or surface selfadhesive | 41.8 × 22.5 × 11 | | E39-R3 |
|  | | | Surface screw mounting | 23 × 13.7 × 4.9 | | E39-R4 |
|  | **Large size** | | | 100 × 100 × 9 | | E39-R8 |
|  | | | | 84.5 × 84.5 × 8.7 | | E39-R40 |
|  | **High precision** | | Microtripel for improved performance with fine beam sensors | 52 × 40 × 4.8 | Recommended for fine beam coaxial models (E3NC-LH03, E3S-DB, E3T-SR4) | E39-R6 |
|  | | | | 30 × 45 | | E39-R12 |
|  | | | | 14 × 23 × 1 | | E39-R37-CA |
|  | | | | 12 × 24 | | E39-R13 |
|  | **Simple mounting** | | Round shape with centered mounting hole for simple screw mounting | Diameter: 84<br>Depth: 7.4 | Photoelectric sensors with and without M.S.R. | E39-R7 |

**Note:** the ambient operating temperature is -25°C to 55°C unless otherwise specified

| Shape | Type | Housing material | Features | Size in mm | Applicable Sensor | Order code |
|---|---|---|---|---|---|---|
|  | Enhanced detergent resistance | • PVC | • Surface screw mounting<br>• IP69k after DIN 40050 part 9 | 40 × 60 × 7.5 | Recommended for harsh environment sensors | E39-R50 |
|  | | | | 20 × 60 × 6 | | E39-R51 |
|  | Highest detergent resistance | • SUS316L<br>• Borosilicat | • Surface screw mounting | 43 × 30 × 5 | | E39-R16 |
|  | Heat resistant | • Borosilicat | • Surface screw mounting<br>• 450°C heat resistance<br>• Suitable for vacuum environment | 95 × 51 × 8 | | E39-R47 |
|  | Non-fogging reflector | • ABS<br>• Acrylic surface | Anti-fogging coating | 40 × 60 × 7.5 | | E39-R1K |
|  | Special polarizing | • ABS base<br>• PMMA surface | Special polarizing filter to PET | 44 × 80 × 8.5 | E3ZM-B, E3FA-B, E3FB-B, E3S-DB | E39-RP1 |
|  | General purpose tape reflectors | • Acrylic | • Self adhesive<br>• Pre cut | 35 × 10 × 0.6 | Photoelectric sensors with and without M.S.R. | E39-RS1 |
| | | | | | Optimised for E3T-SR4 | E39-RS1-CA |
|  | | | | 40 × 35 × 0.6 | | E39-RS2 |
| | | | | | Optimised for E3T-SR4 | E39-RS2-CA |
|  | | | | 80 × 70 × 0.6 | | E39-RS3 |
| | | | | | Optimised for E3T-SR4 | E39-RS3-CA |
|  | | | • Self adhesive<br>• Cut-to-length, roll material | 25 mm × 5 m | | E39-RS25 5 m |
| | | | | 25 mm × 22.8 m | | E39-RS25 22.8 m |
|  | | | | 50 mm × 5 m | | E39-RS50 5 m |
| | | | | 50 mm × 22.8 m | | E39-RS50 22.8 m |
|  | High precision tape reflectors | | • Self adhesive<br>• Pre cut | 195 × 22 | Recommended for fine beam and laser sensors (E3NC-LH03, E3Z-LR, E3S-DB_2) | E39-RS4 |
|  | | | | 108 × 46 | | E39-RS5 |

**Note:** Note: the ambient operating temperature is –25°C to 55°C unless otherwise specified

## Mounting brackets

| Shape | Type | Material | Features | Order code |
|---|---|---|---|---|
|  | M8 nuts | brass | 100 pcs | ASMM0800 |
|  | | stainless steel | | ASMM0801 |
|  | M12 nuts | brass | | ASMM1200 |
|  | M18 nuts | | | ASMM1800 |
| | | stainless steel | | ASMM1802 |
|  | | plastic | 1 pc | ASMK1802 (8 mm thickness) |
|  | | | 100 pcs | ASMK1801 (4 mm thickness) |
| | M30 nuts | brass | 100 pcs | ASMM3000 |
|  | M8 Washer | brass | 1,000 pcs | ASZA0800 |
|  | M12 Washer | | | ASZA1200 |
| | | stainless steel | 500pcs | ASZA1201 |
|  | M18 Washer | brass | 100 pcs | ASZA1801 |
|  | | stainless steel | 200 pcs | ASZA1802 |
| | M30 Washer | brass | 100 pcs | ASZA3001 |

## Mounting brackets

| Shape | Type | Order code |
|---|---|---|
|  | Quick access – snap fix for cylindrical sensors; sizes M8, M12, M18, M30 | Y92E-BC08<br>Y92E-BC12<br>Y92E-BC18<br>Y92E-BC30 |
|  | Surface mounting for M18 cylindrical sensors (dia 18mm) | E39-L183 |
|  | Standard-surface mounting (for pre-wired or pigtail models) | E39-L104*1 |
|  | Standard-backwall mounting | E39-L44*1 |
|  | Protection-wall mounting (for pre-wired or pigtail models) | E39-L142*1 |
|  | Protection-surface mounting | E39-L98*1 |
|  | Telescope mounting | E39-L93FH |
|  | 3D rotation mounting | E39-EL4 |

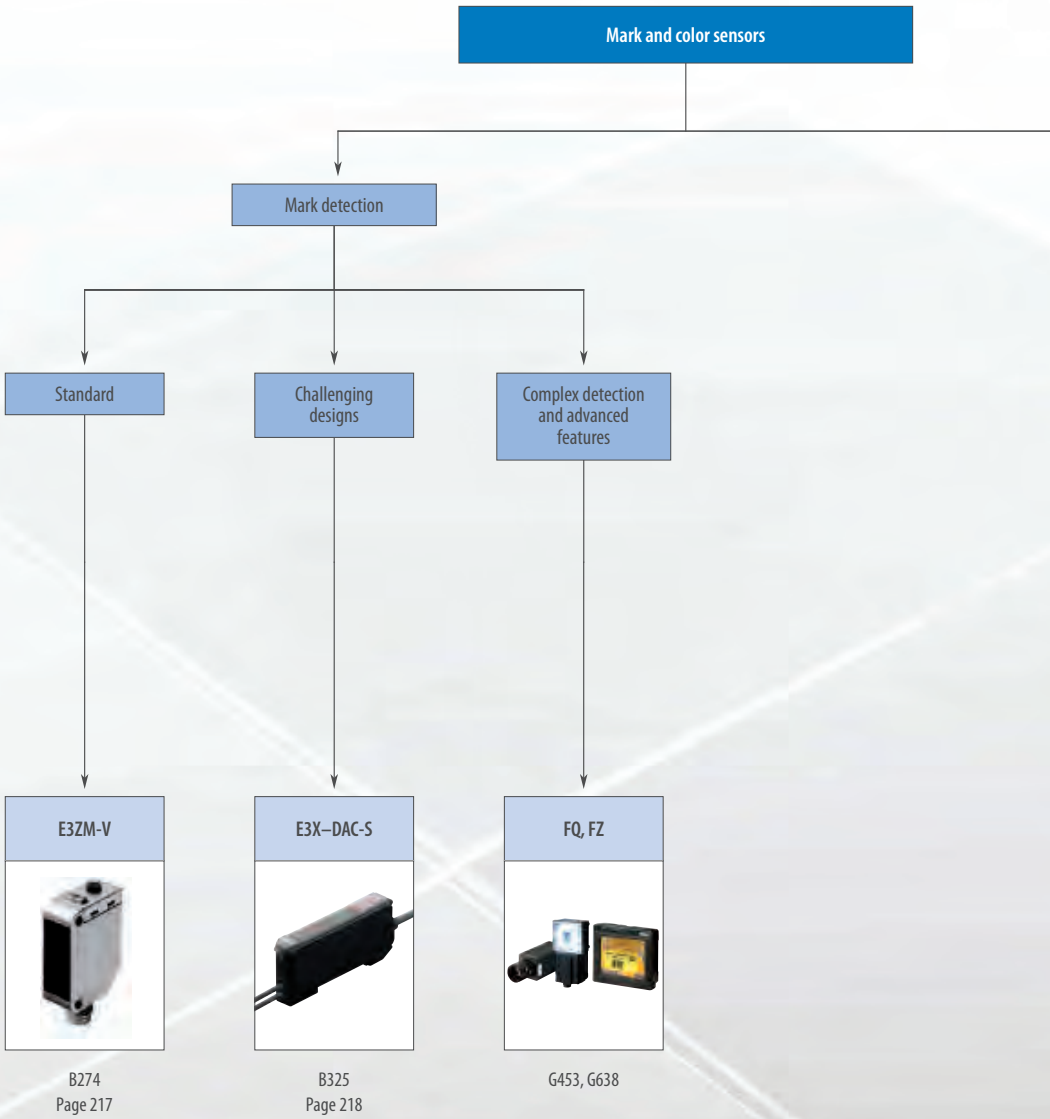
*1 The order references are examples for the E3Z sensor family. Refer to the sensor accessory datasheet E26E for the complete list of mounting brackets.

# FAST ADAPTION TO CHANGING PACKAGINGS

## Choose the performance you need

Packaging machines have to adapt quickly to a large variety of different packaging designs with minimal change-over time and no quality loss. For sensors detecting registration marks or colors this requires flexibility and simplicity in handling while keeping the precision and operational stability. At OMRON we closely work together with leading packaging machine makers to evaluate the requirements for sensors from commonly used packaging material as well as most critical designs or materials. Our portfolio is set up to balance the performance and budget requirements in these situations ... simply choose the performance you need.

- Reliable mark detection even in changing environmental conditions during machine operation
- Fast and easy setup up after packaging material exchange
- Performance levels fitting the machine value concept




OMRON
OK
Popcorn 30 packs
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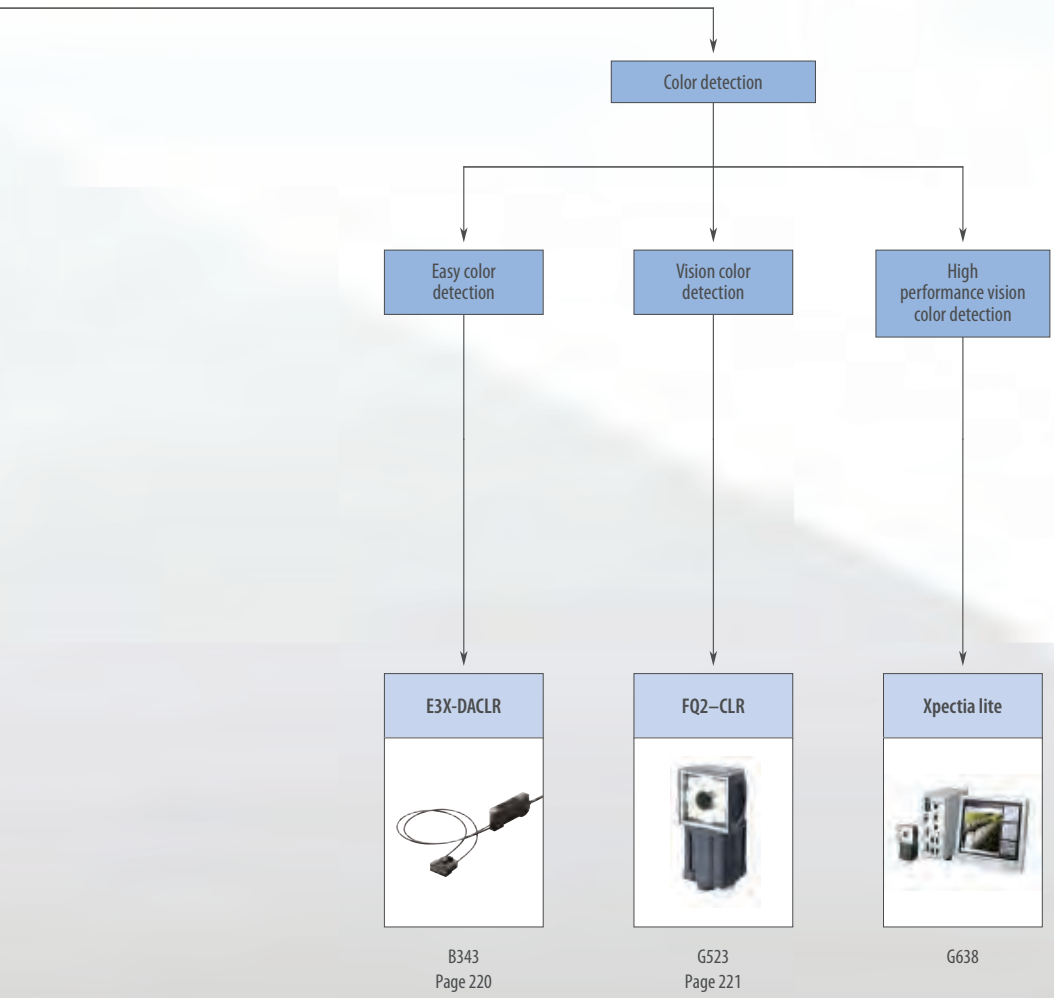

Color detection
Easy color detection
Vision color detection
High performance vision color detection
E3X-DACLR
FQ2-CLR
Xpectia lite
B343
Page 220
G523
Page 221
G638

| Type | | Standard print mark detection | Challenging designs | Complex detection and advanced features |
|---|---|---|---|---|
| | |  |  |  |
| Model | | E3ZM-V | E3X-DAC-S | FQ, FZ |
| Key feature | | White LED, stainless steel housing | White LED, RGB ratio comparison and extended functionality | High performance vision inspection functionality |
| Detection distance | | 12±2 mm | 5–50 mm | See QUALITY CONTROL AND INSPECTION GUIDE |
| Response time | | 50 µs | 60 µs | |
| Page/Quick Link | | 217 | 218 | |

| Type | | Easy color detection | Vision color detection | High performace vision color detection |
|---|---|---|---|---|
| | |  |  |  |
| Model | | E3X-DACLR | FQ2-CLR | Xpectia lite |
| Key feature | | Easy one-button teach operation | | |
| No of simultaneous color inspections | | 1 to 4 | 1 to 32 | 1 to 128 |
| Output | Color detected – digital out | ■ | ■ | ■ |
| | RGB value out (via ethernet) | – | ■ | ■ |
| | HSI value out (via ethernet) | – | – | ■ |
| Tolerance adjustment | Auto tolerance | ■ | – | – |
| | Teachable | ■ | ■ | ■ |
| | Manually adjustable | – | ■ | ■ |
| | Advanced | – | – | ■ |
| Page/Quick Link | | 220 | 221 | See QUALITY CONTROL AND INSPECTION GUIDE |

## Registration mark sensor in compact stainless steel housing

The registration mark detection sensor in a compact stainless steel housing provides reliable detection of all common registration marks in food packaging applications.

- White LED for stable detection of differently colored or black print marks
- SUS 316L stainless steel housing
- Easy-to-use teach-in button or remote teach
- Fast response time of 50 µs

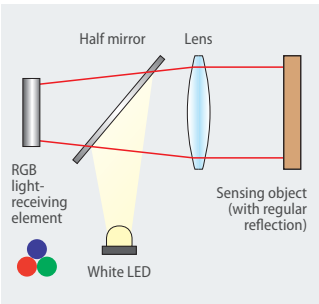
## Ordering information

| Sensor type | Sensing distance | Connection method | | | | Order code*1 | |
|---|---|---|---|---|---|---|---|
| | |  |  |  |  | NPN output | PNP output |
| Mark sensor  | 12±2 mm | – | – | 2 m | – | E3ZM-V61 2M | E3ZM-V81 2M |
| | | ■ | – | – | – | E3ZM-V66 | E3ZM-V86 |

*1 The output configuration (ON or OFF when mark is detected) is teachable. Common operation is output is ON when mark is detected.

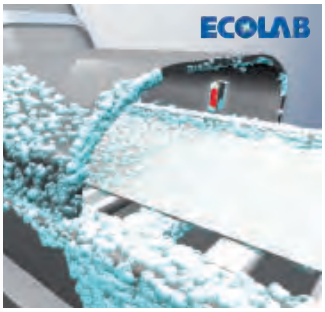
## Specifications

| Item | | NPN | E3ZM-V6_ |
|---|---|---|---|
| | | PNP | E3ZM-V8_ |
| Light source (wave length) | | | White LED (450 to 700 nm) |
| Power supply voltage | | | 10 to 30 VDC±10%, ripple (p-p) 10% max. |
| Protective circuits | | | Reversed power supply polarity protection, output short-circuit protection, Reversed output polarity protection, and mutual interference prevention |
| Ambient temperature | | Operating | –25 to 55°C |
| | | Storage | –40 to 70°C (with no icing or condensation) |
| Response time | | | 50 µs |
| Degree of protection | | | IEC: IP67, DIN 40050-9: IP69K |
| Material | Case | | SUS316L |
| | Lens | | PMMA (polymethylmethacrylate) |
| | Display | | PES (polyether sulfone) |
| | Sensitivity adjustment and operation switch | | PEEK (polyether ether ketone) |
| | Seals | | Fluoro rubber |




Coaxial optical system with white LED

Remote teaching




Detergent resistant

Reliable detection of standard or semi-transparent marks at normal or high speed

## E3X-DAC-S high functionality mark detection sensor

The E3X-DAC-S provides reliable mark detection for standard as well as challenging applications. The separate sensing head setup allows the easy adaption to the mounting requirements even when space is crucial. The remote amplifier provides easy teaching for standard applications but also on demand full control over the detection performance for most challenging applications.

## Ordering information

### Pre-wired

| Item | Functions | Order code (for pre-wired types with 2 m cable length) | |
|---|---|---|---|
| | | NPN output | PNP output |
| Standard models | Timer, response speed change | E3X-DAC11-S | E3X-DAC41-S |
| Advanced models | Same as standard models + simultaneous determination (2 colors) AND/OR output, remote setting | E3X-DAC21-S | E3X-DAC51-S |

### Connector versions

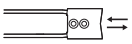
| Item | Functions | Order code | |
|---|---|---|---|
| | | NPN output | PNP output |
| Standard models (fiber amplifier connector)*1 | Timer, response speed change | E3X-DAC6-S | E3X-DAC8-S |

*1 Order connector separately

## Specifications

| Item | | Standard models E3X-DAC1, E3X-DAC4 E3X-DAC6, E3X-DAC8 | Advanced models E3X-DAC2, E3X-DAC5 |
|---|---|---|---|
| Light source (wave length) | | White LED (420 to 700 nm) | |
| Number of registered marks | | 1 | 2 (simultaneous determination) |
| Power supply voltage | | 12 to 24 VDC±10%, ripple (p-p) 10% max. | |
| Protective circuits | | Power supply reverse polarity protection, output short circuit protection, output reverse polarity protection, mutual interference prevention | |
| Ambient temperature | Operating | –25 to 55°C | |
| | Storage | –30 to 70°C (with no icing or condensation) | |
| Response time | Super-high-speed mode | Operation or reset: 60 µs | Operation or reset: 120 µs |
| | Standard mode | Operation or reset: 1 ms | Operation or reset: 2 ms |
| Sensitivity setting | | Teaching (one-point teaching or teaching with/without workpiece) or manual adjustment | |
| Functions | Detection mode | Automode (automatic selection of C-mode or I-mode)<br>C-mode (RGB ratio)<br>I-mode (light intensity)<br>Mark mode (Intensity and ratio of RGB values) | |
| | Operating mode | ON for match (ON for same color as registered color) or ON for mismatch (ON for different color from registered color) | |
| | Timer function | Timer type: OFF delay, ON delay, or one-short<br>Timer time: 1 ms to 5 s (variable) | |
| | Control outputs | – | Output for each channel, AND output, and OR output |
| | Remote control | – | One-point teaching, teaching with/without workpiece, zero reset, and light emission OFF |
| Degree of protection | | IEC60529 IP50 (with protective cover attached) | |

### Recommended fiber heads

| Sensor type | Size | Recommended operating distance (mm) | Comment | Order code |
|---|---|---|---|---|
|  | M6 | 5 | Standard mark detection | E32-CC200 2M |
|  | 29x25.5x11.2 mm | 40 to 50 | Long distance – plastic | E32-L15 2M |
| | 23x20x9 mm | 25 to 30 | Long distance – metal | E32-A09 2M |
|  | M3 | 10 | High precision mark detection (dia 1mm spot) | E32-EC31 2M + E39-EF51 |

### Fiber amplifier connectors

| Shape | Type | Comment | Order code |
|---|---|---|---|
|  | Fiber amplifier connector | 2 m PVC cable | E3X-CN21 |
|  | | 30 cm PVC cable with M12 plug connector (4 pin) | E3X-CN21-M1J 0.3M |
| | | 30 cm PVC cable with M8 plug connector (4 pin) | E3X-CN21-M3J-2 0.3M |


Easy to operate detection of challenging or colored registration marks.


Detection of challenging registration marks e.g. with texts or graphics.

## Easy-Teach Color Detection Sensor

The E3X-DACLR provides reliable and easy to set up one-touch color verification. Up to four colors can be identified. The separate amplifier allows mounting in easily accessible areas for operators while the small sensor head can be mounted in locations even when space is limited.

- Easy to set up one-touch color verification for 1 to 4 colors
- Model for remote teaching
- Small sensor head for easy mounting even when space is tight
- White LED and multi detection modes for reliable operation even for challenging applications

## Ordering information

| Type | Output | Tolerance adjustment | Connection method | Order code PNP[*1] |
|---|---|---|---|---|
| Single color detection | Digital color detected out | – Object teaching (good sample) with auto-tolerance<br>– 2-point teaching (good and bad sample) | M8 4-pin pigtail (with 30 cm PVC cable)[*2] | E3X-DACLRX1P-M3J 0.3M |
| 1 to 4 color detection | Digital color detected out (with bank switching) | | 2 m PVC cable | E3X-DACLRX4P 2M |

[*1] NPN models are available. Contact your Omron representative.
[*2] Models with 2 m PVC cable or M12 pigtail connector are available. Contact your Omron representative.

## Specifications (amplifier and sensing head)

| Item | | Single color detection | 1 to 4 color detection |
|---|---|---|---|
| Sensing distance | | 40 to 50 mm (E32-L15 sensing head) | |
| Light source (wave length) | | White LED (420 to 700 nm) | |
| Number of registered marks | | 1 | 1 to 4 (2 banks switchable by external input with 2 colors each) |
| Power supply voltage | | 12 to 24 VDC±10%, ripple (p-p) 10% max. | |
| Protective circuits | | Power supply reverse polarity protection, output short circuit protection, output reverse polarity protection, mutual interference prevention | |
| Ambient temperature | Operating | –25 to 55°C (amplifier)<br>–40 to 70°C (sensing head) | |
| | Storage | –30 to 70°C (amplifier); (without icing or condensation)<br>–40 to 70°C (sensing head) | |
| Response time | Super-high-speed mode | Operation or reset: 60 µs | Operation or reset: 120 µs |
| | Standard mode | Operation or reset: 1 ms | Operation or reset: 2 ms |
| Functions | Operating mode | ON for match (ON for same color as registered color) or ON for mismatch (ON for different color from registered color) | |
| | Timer function | Timer type: OFF delay, ON delay, or one-short<br>Timer time: 1 ms to 5 s (variable) | |
| | Remote control | – | One-point teaching, teaching with/without workpiece, zero reset, and light emission OFF |
| Degree of protection | | IEC60529 IP50 (with protective cover attached) | |

## Vision Color Sensor with teachable inspection area and RGB value processing

The vision color sensor FQ2-CLR provides real color identification functionality in combination with the flexibility and functionality of a vision sensor. The teachable inspection area provides an easy and flexible set up. The color processing and evaluation can be carried out by the FQ2-CLR directly or the RGB values are available via Ethernet to other devices.

- Teachable inspection area
- Models with single color detection or up to 32 color and image processing tasks
- RGB values via Ethernet

## Ordering information

| Type | Output | Tolerance adjustment | Connection method | Order code PNP[*1] |
|---|---|---|---|---|
| Single color | Digital color detected out and/or RGB value out (via ethernet) | –Object teaching (good sample) with auto-tolerance<br>–2-point teaching (good and bad sample) | 3 m PVC cable<br>or<br>3 m Ethernet cable[*2] | FQ2-CLR-V1P 3M[*3] |
| 1 to 32 color and image processing tasks | | | | FQ2-CLR-V32P 3M |

[*1] NPN models are available. Contact your Omron representative.
[*2] I/O and Ethernet cables are included. Other cable lengths can be provided on request. Contact your Omron representative.
[*3] Programming device 'Touch Finder FQ2-D31' is not included. Order separately incl. AC power supply and battery or use PC Tool to program FQ2-CLR.

### Programming device

| Type | | | Order code |
|---|---|---|---|
|  | Touch Finder (included in FQ2-CLR-V32P)[*1] | | FQ2-D31 |
| | | AC power supply (plug type c) for FQ2-D31 | FQ-AC4 |
| | | Rechargeable battery for FQ2-D31 | FQ-BAT1 |

[*1] The FQ2-CLR can be programmed either with the Touch Finder or via a PC using the FQ2 PC Tool. After programming the FQ2-CLR, the programming device can be disconnected. Only one programming device is required for programming multiple FQ2-CLR. Contact your OMRON representative for FQ2-CLR-V32P version without included Touch Finder.

## Specifications

| Item | | FQ2-CLR-V□ |
|---|---|---|
| Field of view | | 13 x 8.2 to 53 x 33 mm |
| Installation distance | | 56 to 215 mm |
| Ambient temperature | Operating | 0 to 50°C |
| | Storage | –25 to 65°C (without icing or condensation) |
| Degree of protection | | IEC 60529 IP67 |

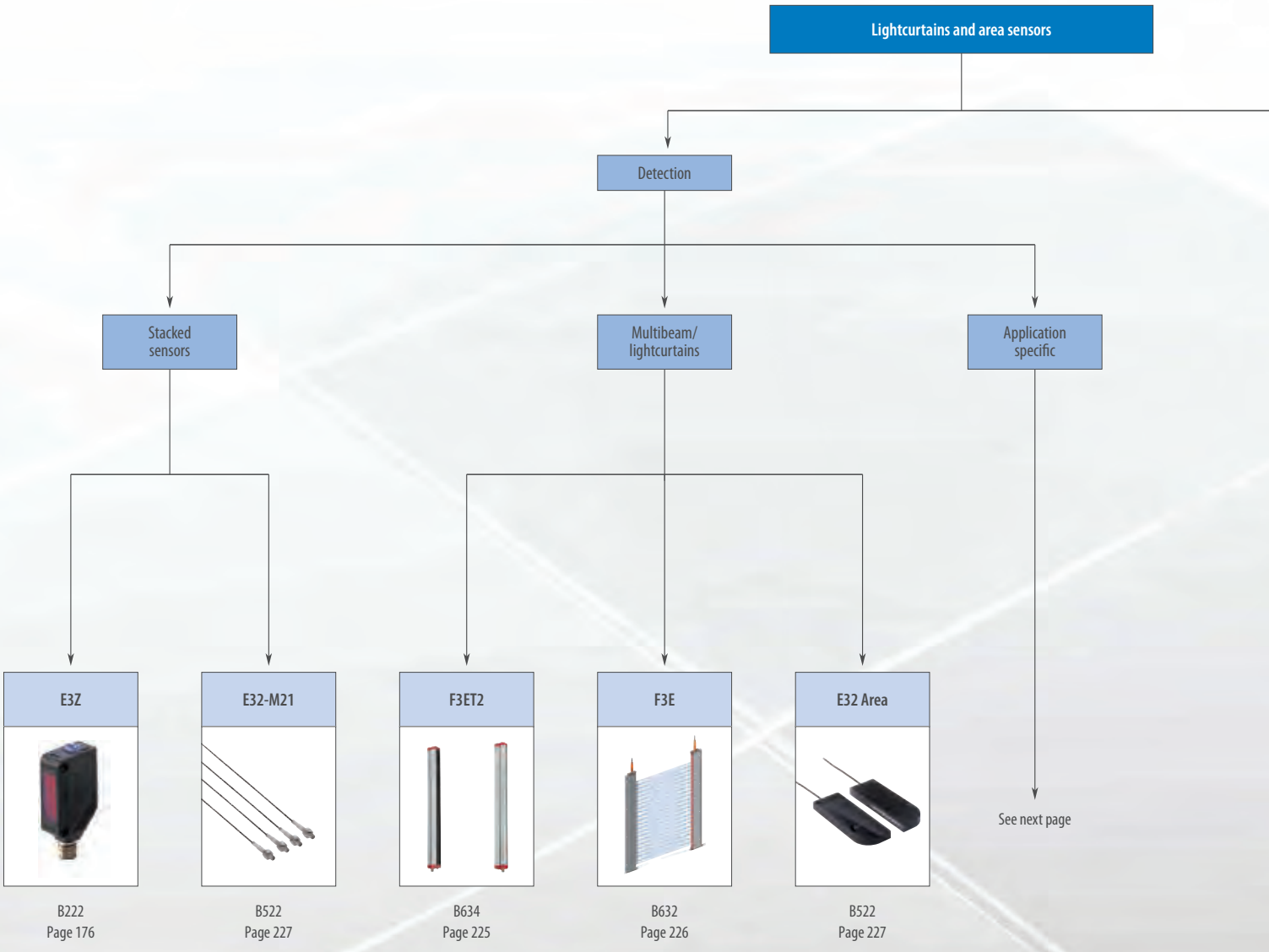
# PRESENCE, HEIGHT OR PROFILE ...

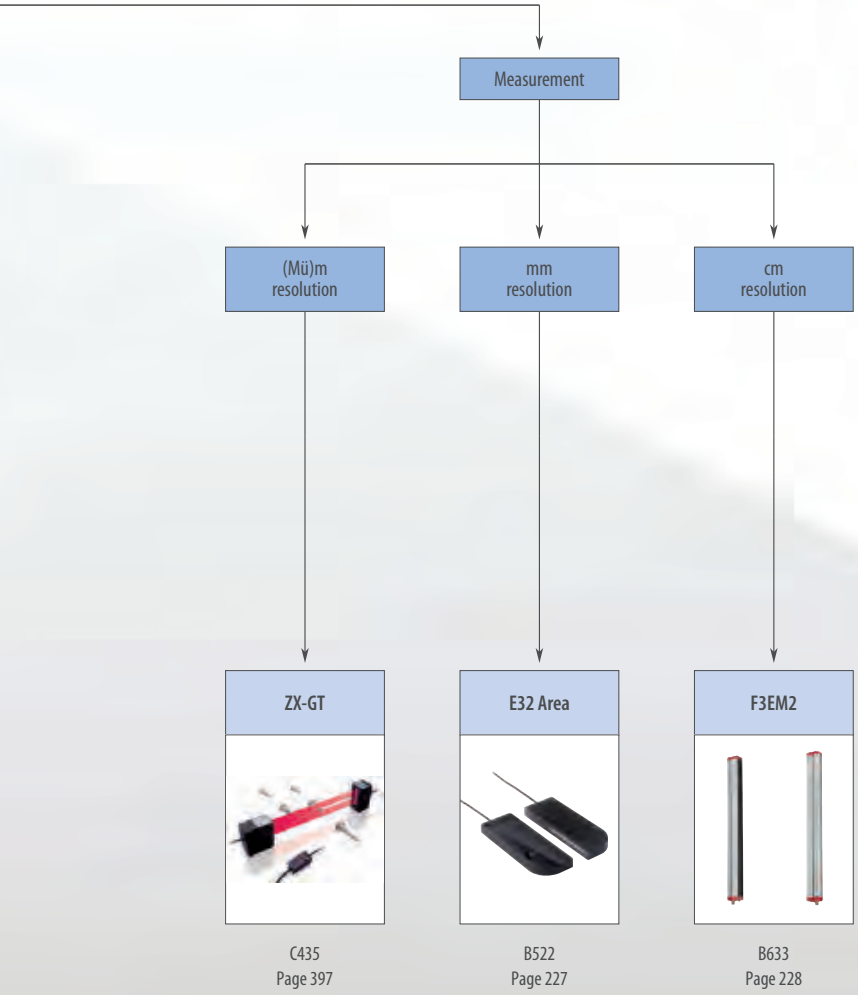
## ... choose the accuracy you need

Objects with varying positions or heights or objects with holes can create multiple signals or stay undetected when using single beam sensors. These objects (e.g. parcels, bikes or natural products like ham or fish) are then wrongly classified as multiple smaller items or are not detected correctly.

Detecting these objects over their whole length or acquiring the more detailed object profile can be realized using multiple sensors or light curtains.

Omron offers a wide range of models with varying max detection heights, different resolutions and with digital, analog or serial outputs to provide the best performance match fitting your application.

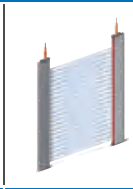
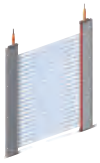





C435
Page 397

B522
Page 227

B633
Page 228

| Type | Stacked sensors | | Multibeam sensors/lightcurtains | | | Application specific lightcurtains | |
|---|---|---|---|---|---|---|---|
| |  |  |  |  |  |  |  |
| **Model** | **E3Z** | **E32-M21** | **F3ET2** | **F3E** | **E32 area** | **Safety lightcurtains** | **F3E Elevator lightcurtains** |
| **Key features** | Mutual interference prevention | 4 × M3 heads combined in one fiber | Models with 5 and 18 mm pitch | Thin aluminum housing | Teachable sensitivity | Type 2, type 4 or application specific | Fulfills EN81-70 |
| **Max. sensing distance** | 60 m | 1.3 m | 15 m | 5 m | 4 m | 50 m | 5 m |
| **Max. detection height** | n. a. | 4 m | 2.1 m | 1.8 m | 70 mm | 2.4 m | 1.8 m |
| **Page/Quick Link** | 176 | 227 | 225 | 226 | 227 | 462 | 226 |

| Type | Measuring lightcurtains | | |
|---|---|---|---|
| |  |  |  |
| **Model** | **F3EM2** | **E32 area** | **ZX-GT** |
| **Key features** | cm accuracy | mm accuracy | µm accuracy |
| **Max. sensing distance** | 15 m | 4 m | 0.5 m |
| **Max. measurement height** | 2.1 m | 70 mm | 28 mm |
| **Page/Quick Link** | 228 | 227 | 397 |

## Lightcurtain in robust aluminum housing

The F3ET2 lightcurtains provide a reliable area monitoring in a robust housing. The optical synchronisation between emitter and receiver allow a fast and simple installation without special requirements.

- Optical synchronisation for reliable operation without additional wiring
- Robust aluminum housing
- NPN/PNP and Light ON/Dark ON selectable

## Ordering information

| Sensor type | Detection area (mm) | Pitch | Sensing distance | Channels | Connection method | | | | Output | Order code *1 |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | |  |  |  |  | | |
| Through-beam  | 150 | 5 mm | 3 m | 30 | – | 5 pin | – | – | PNP/NPN | F3ET2-005-150 |
| | | 18 mm | 15 m | 8 | – | | – | – | | F3ET2-018-150 |
| | 300 | 5 mm | 3 m | 60 | – | | – | – | | F3ET2-005-300 |
| | | 18 mm | 15 m | 16 | – | | – | – | | F3ET2-018-300 |
| | 450 | 5 mm | 3 m | 90 | – | | – | – | | F3ET2-005-450 |
| | | 18 mm | 15 m | 24 | – | | – | – | | F3ET2-018-450 |
| | 600 | 5 mm | 3 m | 120 | – | | – | – | | F3ET2-005-600 |
| | | 18 mm | 15 m | 32 | – | | – | – | | F3ET2-018-600 |
| | 900 | 5 mm | 3 m | 180 | – | | – | – | | F3ET2-005-900 |
| | | 18 mm | 15 m | 48 | – | | – | – | | F3ET2-018-900 |
| | 1200 | 5 mm | 3 m | 240 | – | | – | – | | F3ET2-005-1200 |
| | | 18 mm | 15 m | 64 | – | | – | – | | F3ET2-018-1200 |
| | 1500 | 5 mm | 3 m | 300 | – | | – | – | | F3ET2-005-1500 |
| | | 18 mm | 15 m | 80 | – | | – | – | | F3ET2-018-1500 |
| | 1800 | 5 mm | 3 m | 360 | – | | – | – | | F3ET2-005-1800 |
| | | 18 mm | 15 m | 96 | – | | – | – | | F3ET2-018-1800 |
| | 2100 | 18 mm | 15 m | 112 | – | | – | – | | F3ET2-018-2100 |

*1 Light-ON/Dark-ON selectable

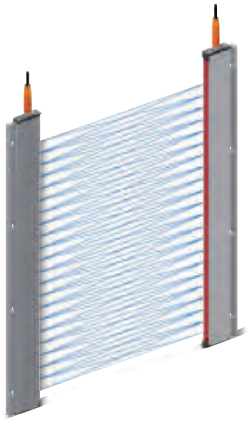
### Connector cables

| Type | Features | Material | | Order code | |
|---|---|---|---|---|---|
| | | Nut | Cable | Straight | Angled |
| M12 | 5 wires | CuZn | PVC 2 m | XS2F-M12PVC5S2M-EU | XS2F-M12PVC5A2M-EU |
| | | | PUR 2 m | XS2F-M12PUR5S2M-EU | XS2F-M12PUR5A2M-EU |
| | | | PVC 5 m | XS2F-M12PVC5S5M-EU | XS2F-M12PVC5A5M-EU |
| | | | PUR 5 m | XS2F-M12PUR5S5M-EU | XS2F-M12PUR5A5M-EU |

## Specifications

| Item | | Through-beam | |
|---|---|---|---|
| | | F3ET2-005_ | F3ET2-018_ |
| Sensing distance | | 0 to 3 m | 0 to 15 m |
| Vertical detection area | | 0 to $Max_M$ mm; $Max_M$: 150, 300, 450, 600, 900, 1200, 1500, 1800*1 | 0 to $Max_M$ mm; $Max_M$: 150, 300, 450, 600, 900, 1200, 1500, 1800, 2100 |
| Minimum detectable object size | | 10 mm | 30 mm |
| Pitch | | 5 mm | 18 mm |
| Response time | | 4 ms + 80 µs × number of beams | |
| Light source (wave length) | | Infrared LED (880 nm) | |
| Power supply voltage | | 24 VDC±20% | |
| Operating temperature | | –10 to 55°C | |
| Degree of protection | | IEC 60529 IP65 | |
| Material | Case | Aluminum | |

*1 Models with different detection ranges are available in 150 mm intervals. Please contact your OMRON representative.



## Lightcurtain in thin aluminum housing

The crossing of the multiple sensor beams provides a reliable area monitoring in a thin, easy to install housing. The thin housing makes the light curtain ideal for the installation where space is crucial.

- Thin 9 mm shape for easy design-in in elevator constructions
- High ambient light immunity
- Robust aluminum housing
- Fulfills requirements of EN81-70 (1800 mm models) for mounting in elevators

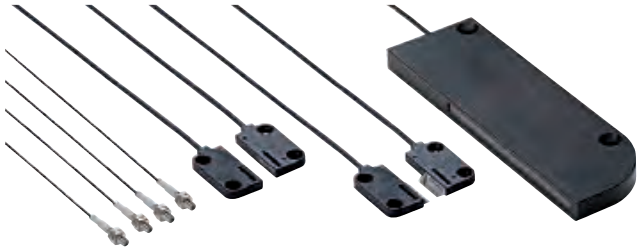
## Ordering information

| Sensor type | Detection area | Pitch | Sensing distance | Channels | Number of optical axis | Connection method | | | | Order code*1 Potential free output |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| Through-beam  | 200 mm | 40 mm | 5 m | 6 | 16 | – | – | 5 m | – | F3E-06-T1 5M |
| | | | | | | ■ | – | – | – | F3E-06-T6 |
| | 1320 mm | 120 mm | | 12 | 34 | – | – | 5 m | – | F3E-12-T1 5M |
| | | | | | | ■ | – | – | – | F3E-12-T6 |
| | 1800 mm | 120 mm | | 16 | 46 | – | – | 5 m | – | F3E-16-T1 5M |
| | | | | | | ■ | – | – | – | F3E-16-T6 |
| | | 40 mm | | 46 | 136 | – | – | 5 m | – | F3E-46-T1 5M |
| | | | | | | ■ | – | – | – | F3E-46-T6 |

*1 Light-ON/Dark-ON settable. Common operation is Dark-ON

## Specifications

| Item | | Through-beam | | | |
|---|---|---|---|---|---|
| | | F3E-06-T_ | F3E-12-T_ | F3E-16-T_ | F3E-46-T_ |
| Number of LEDs | | 6 | 12 | 16 | 46 |
| Number of optical axes | | 16 | 34 | 46 | 136 |
| Pitch | | 40 mm | 120 mm | 120 mm | 40 mm |
| Vertical detection range | | 20 to 200 mm | 20 to 1320 mm | 20 to 1820 mm | |
| Response time | | max. 110 ms (signal interruption) | | | |
| Light source (wave length) | | Infrared LED (880 nm) | | | |
| Power supply voltage | | 10 to 30 VDC | | | |
| Ambient temperature | Operation | –20 to 60°C | | | |
| | Storage | –40 to 70°C | | | |
| EMC conformity/standards | | 73/23/EWG; 89/336/EWG; 95/16/EG; EN81-1; EN81-2; EN12015; EN12016; EN61000-6-x | | | |
| Degree of protection | | IEC 60529 IP54 | | | |
| Dimensions | | 400 × 40.7 × 9 mm | 1590 × 40.7 × 9 mm | 2070 × 40.7 × 9 mm | 2000 × 40.7 × 9 mm |
| Material | Case | Aluminum | | | |

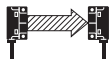
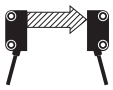
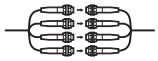


## Area monitoring fiber sensor heads

When mounting space is crucial or the objects are very small, the area monitoring fibers provide a reliable object detection even when the object position varies within the monitored range.
In combination with the window monitoring function or the serial transmission of the received light level values of the fiber amplifiers, simple height comparison or measuring applications can be realized.

- Area monitoring up to 70 mm height
- Multi-beam sensor with 4 separate heads for flexible detection points
- Standard or high flex fibers

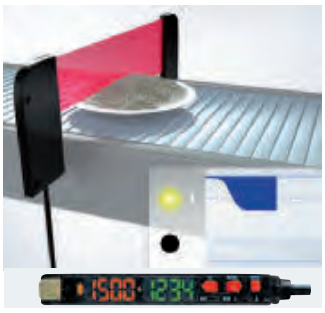
## Ordering information

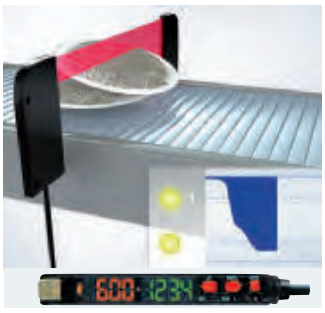
| Sensor type | Sensing height (in mm) | Sensing distance (in mm)*1 | | | | Order code | |
|---|---|---|---|---|---|---|---|
| | | Standard fiber | | High-flex fiber | | Standard fiber | High-flex fiber |
| | | E3X-HD | E3NX-FA | E3X-HD | E3NX-FA | | |
|  | 10 | 4000 | 4000 | – | – | E32-T16 | – |
|  *2 | 11 | 2200 | 3300 | 1700 | 2550 | E32-T16P | E32-T16PR 2M |
|  | 30 | 3600 | 4000 | 2600 | 3900 | E32-T16W 2M | E32-T16WR 2M |
| | 50 | – | – | 3000 | 4000 | – | E32-ET16WR-2 2M |
| | 70 | – | – | 3500 | 4000 | – | E32-ET16WR-1 2M |
|  | 11 | 2000 | 3000 | 1500 | 2200 | E32-T16J 2M | E32-T16JR 2M |
|  | 4 × seperate M3 heads | 1300 | 1900 | – | – | E32-M21 | – |
|  | 11 | – | – | 300 | 450 | – | E32-D36P1 2M |

*1 Sensing distance measured with Standard mode
*2 Sensing area aligned to top of housing.

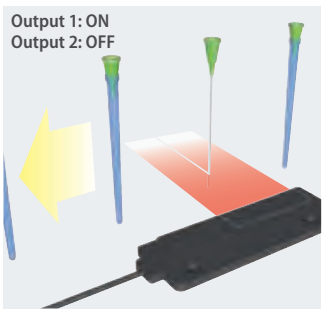
## Specifications

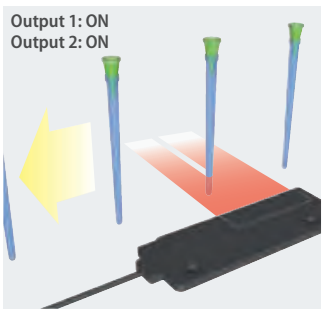
| Item | | Standard | | | High-flex | | |
|---|---|---|---|---|---|---|---|
| | | E32-T16 | E32-M21 | E32-T16J<br>E32-T16P<br>E32-T16W | E32-D36P1 | E32-ET16WR-1<br>E32-ET16WR-2 | E32-T16JR<br>E32-T16PR<br>E32-T16WR |
| Permissible bending radius | | R25 | | R10 | R4 | R1 | |
| Cut to length | | Yes | | | | | |
| Ambient temperature | | –40°C to 70°C | | | | | |
| Material | Head | ABS | Stainless steel | ABS | Brass-nickel plated | Aluminium | ABS |
| | Fiber | PMMA | | | | | |
| | Sheath | Polyethylene coating | | PVC coating | Polyethylene coating | | PVC coating |
| Degree of protection | | IEC 60529 IP67 | | IEC 60529 IP50 | | IEC 60529 IP54 | IEC 60529 IP50 |





The two outputs of the E3NX-FA can be used to detect two different light levels



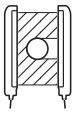

In combination with the twin output function of the E3NX-FA amplifier, the diffuse reflective area monitoring fibers can detect very small objects (e.g. needles) and a second state (e.g cover present). The area beam compensates for position variations at high speed.

## Measuring lightcurtain in robust aluminum housing

The F3EM2 provides easy to install and set up height and profile measurement. The analog output provides a simple overall height detection and the serial output models provide single beam evaluation for profile measurements.

- Robust aluminum housing
- Analog output for simple height detections
- Serial output with single beam evaluation for profile measurement
- Various output modes to adapt output data to the given application

## Ordering information

| Sensor type | Measurement range (mm) | Pitch*1 | Sensing distance | Channels | Connection method | | | | Order code | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | |  |  |  |  | RS-232-C serial/ analog output models*2 | Analog output models |
| Through-beam (measuring)  | 150 | 5 mm | 3 m | 30 | – | M12 8-pin/ M12 5-pin | – | – | F3EM2-005-150 | F3EM2-005-150-AV |
| | | 18 mm | 15 m | 8 | – | | – | – | F3EM2-018-150 | F3EM2-018-150-AV |
| | 300 | 5 mm | 3 m | 60 | – | | – | – | F3EM2-005-300 | F3EM2-005-300-AV |
| | | 18 mm | 15 m | 16 | – | | – | – | F3EM2-018-300 | F3EM2-018-300-AV |
| | 450 | 5 mm | 3 m | 90 | – | | – | – | F3EM2-005-450 | F3EM2-005-450-AV |
| | | 18 mm | 15 m | 24 | – | | – | – | F3EM2-018-450 | F3EM2-018-450-AV |
| | 600 | 5 mm | 3 m | 120 | – | | – | – | F3EM2-005-600 | F3EM2-005-600-AV |
| | | 18 mm | 15 m | 32 | – | | – | – | F3EM2-018-600 | F3EM2-018-600-AV |
| | 900 | 5 mm | 3 m | 180 | – | | – | – | F3EM2-005-900 | F3EM2-005-900-AV |
| | | 18 mm | 15 m | 48 | – | | – | – | F3EM2-018-900 | F3EM2-018-900-AV |
| | 1200 | 5 mm | 3 m | 240 | – | | – | – | F3EM2-005-1200 | F3EM2-005-1200-AV |
| | | 18 mm | 15 m | 64 | – | | – | – | F3EM2-018-1200 | F3EM2-018-1200-AV |
| | 1500 | 5 mm | 3 m | 300 | – | | – | – | F3EM2-005-1500 | F3EM2-005-1500-AV |
| | | 18 mm | 15 m | 80 | – | | – | – | F3EM2-018-1500 | F3EM2-018-1500-AV |
| | 1800 | 5 mm | 3 m | 360 | – | | – | – | F3EM2-005-1800 | F3EM2-005-1800-AV |
| | | 18 mm | 15 m | 96 | – | | – | – | F3EM2-018-1800 | F3EM2-018-1800-AV |
| | 2100 | 18 mm | 15 m | 112 | – | | – | – | F3EM2-018-2100 | F3EM2-018-2100-AV |

*1 Models with 7.5 mm pitch are available. Contact your OMRON representative.
*2 Models with RS-485 serial output are available. Contact your OMRON representative.

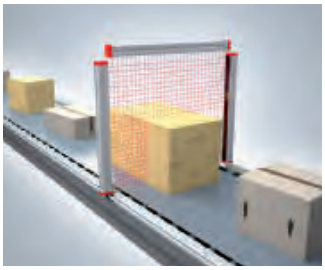
### Connector cables

| Type | Features | Material | | Order code | |
|---|---|---|---|---|---|
| | | Nut | Cable | Straight | Angled |
| M12 | 8 wires | CuZN | PUR 2 m | Y92E-M12PURSH8S2M-L | |
| | | | PUR 5 m | Y92E-M12PURSH8S5M-L | |
| | 5 wires | CuZn | PVC 2 m | XS2F-M12PVC5S2M-EU | XS2F-M12PVC5A2M-EU |
| | | | PUR 2 m | XS2F-M12PUR5S2M-EU | XS2F-M12PUR5A2M-EU |
| | | | PVC 5 m | XS2F-M12PVC5S5M-EU | XS2F-M12PVC5A5M-EU |
| | | | PUR 5 m | XS2F-M12PUR5S5M-EU | XS2F-M12PUR5A5M-EU |

## Specifications

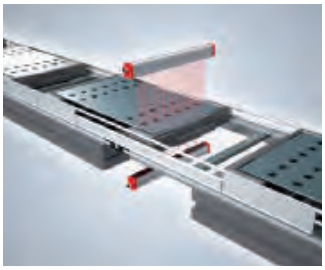
| Item | | Through-beam | |
|---|---|---|---|
| | | F3EM2-005_ | F3EM2-018_ |
| Sensing distance | | 0 to 3 m | 0 to 15 m |
| Vertical measurement range | | 0 to $Max_M$ mm; $Max_M$: 150, 300, 450, 600, 900, 1200, 1500, 1800*1 | 0 to $Max_M$ mm; $Max_M$: 150, 300, 450, 600, 900, 1200, 1500, 1800*1 |
| Minimum detectable object size | | 10 mm | 30 mm |
| Pitch | | 5 mm | 18 mm |
| Response time | | 4 ms + 80 µs × number of beams (+ transmitting time for serial operation) | |
| Light source (wave length) | | Infrared LED (880 nm) | |
| Power supply voltage | | 24 VDC±20% | |
| Ambient temperature | | –10 to 55°C | |
| Degree of protection | | IEC 60529 IP65 | |
| Material | Case | Aluminum | |

*1 Models with different measurement ranges are available in 150 mm intervals. Please contact your OMRON representative.

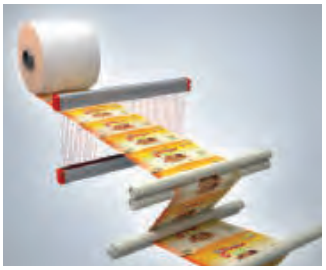


Volume measurement

Profile scan



Hole detection



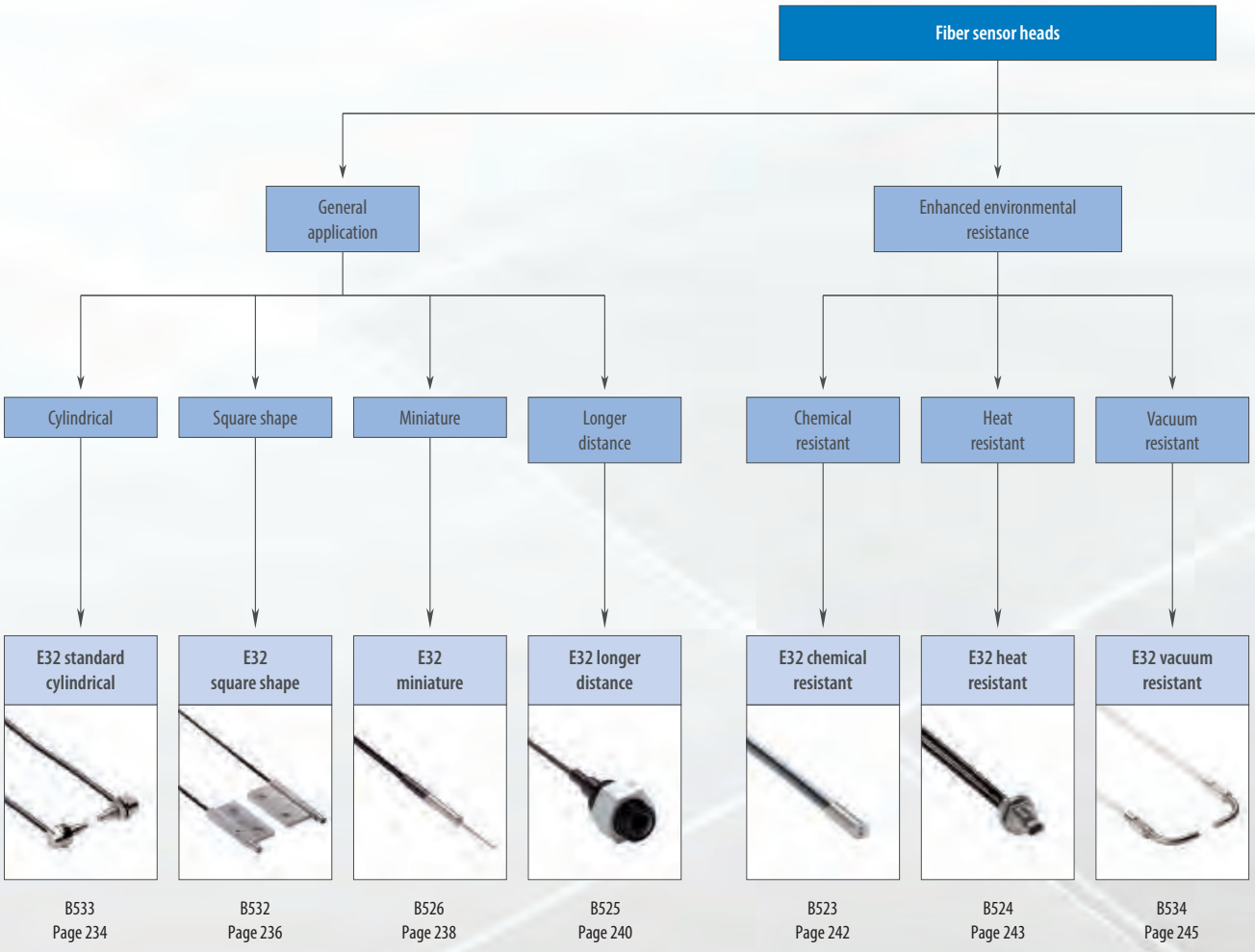
Position control

# HIGH PRECISION IN SMALL SPACES

## Precision and performance you can rely on

The requirements for fiber optic solutions can be very demanding particularly for applications with extreme temperatures and aggressive chemicals or for applications requiring highest precision with limited mounting space.
With the wide range of E32 fiber heads and the easy-usage amplifiers, the best performance fit for your application can be provided. The highest quality control procedures in design and manufacturing ensure that you get the precision and long service life that you can rely on.

- Long operational life
- Easy to install and adjust
- Wide portfolio range for best performance fit



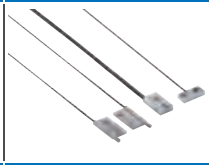
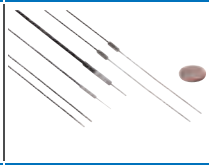
**Fiber amplifiers**

- **Special objects or installations**
  - Robot applications → **E32 robot** → B528, Page 247
  - Precision detection → **E32 precision detection** → B527, Page 248
  - Area monitoring → **E32 area monitoring** → B522, Page 227
  - Special applications → **E32 special** → B529, Page 250
- **Easy usage**
  - Easy-teach → **E3X-HD/E3X-SD** → B342, B334, Page 252/255
  - Potentiometer adjuster → **E3X-NA** → B328, Page 256
- **Advanced functionality**
  - High functionality E3NX-FA
  - High speed E3X-NA-F
  - Double amplifier E3X-MDA
  - Color detection E3X-DAC-S
  - Infrared E3X-DAH-S

| | | |
|---|---|---|
| E3NX-FA | B345 | Page 258 |
| E3X-NA_F | B339 | |
| E3X-MDA | B326 | |
| E3X-DAC-S | B325 | Page 218 |
| E3X-DAH-S | B338 | |

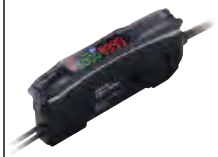
# Selection table

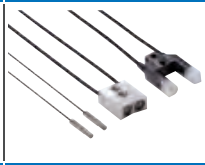
## Fiber sensor heads

| Type | Cylindrical | Square shape | Miniature | Longer distance | Chemical resistant |
|---|---|---|---|---|---|
| |  |  |  |  |  |
| **Model** | **E32 standard cylindrical** | **E32 square shape** | **E32 miniature** | **E32 longer distance** | **E32 chemical resistant** |
| **Key features** | • Standard and high-flex fibers<br>• Sizes M3 to M6 | • 3 or 4 mm thin housing<br>• Models in X,Y or Z-axis<br>• Direct mounting without bracket | • Sizes from dia 500 µm to 3 mm<br>• Bendable sleeves | • Built in focal lenses | • Fluoroplastic cover or coating |
| **Through-beam** | 1,550 mm | 1,550 mm | 1,550 mm | 20 m | 4 m |
| **Retro-reflective** | 250 mm | – | – | 1.5 m | – |
| **Diffuse-reflective** | 650 mm | 600 mm | 600 mm | 1.4 m | 350 mm |
| **Page/Quick Link** | 234 | 236 | 238 | 240 | 242 |

**Note:** All sensing distances measured with E3X-DA-SE-S. Longer sensing distances up to 80% can be achieved with E3X-DA-S.

## Fiber amplifiers

| Type | Easy teach/double display | Easy teach/single display | Potentiometer adjuster | High performance | Double amplifier |
|---|---|---|---|---|---|
| |  |  |  |  |  |
| **Model** | **E3X-HD** | **E3X-SD** | **E3X-NA** | **E3NX-FA** | **E3X-MDA** |
| **361°** | PRO | LITE | LITE | PRO$^{plus}$ | n.a. |
| **Key features** | • Easy operation by smart tuning<br>• Dynamic power control<br>• Fieldbus connectivity | • 1 button object teaching<br>• Auto teach during operation | • Easy adjustment by potentiometer | • High functionality signal processing (timer, counter, dynamic power control, etc.<br>• High signal resolution<br>• Increased sensing distance<br>• Double output/external input<br>• Fieldbus connectivity | • 2 inputs and AND, OR signal comparison |
| **Response time (min.)** | 1 ms<br>(50 µs in super-high-speed mode) | 1 ms | 200 µs | 1 ms<br>(30 µs in super-high-speed mode) | 1 ms<br>(130 µs in high speed mode) |
| **Page/Quick Link** | 252 | 255 | 256 | 258 | B326 |

| Heat resistant | Vacuum resistant | Robot applications | Precision detection | Area monitoring | Special application |
|---|---|---|---|---|---|
|  |  |  |  |  |  |
| **E32 heat resistant** | **E32 vacuum resistant** | **E32 robot** | **E32 precision detection** | **E32 area monitoring** | **E32 special** |
| • Heat resistant up to 400°C | • Leakage rate of $1 \times 10^{-10}$ Pa*m$^3$/s max | • Free moving multicore fibers for >1 Mio bending cycles | • Detection accuracy up to 100 µm<br>• Coaxial fibers<br>• Adjustable focal points | • Area monitoring up to 70 mm | • Detection of special objects (wafer, liquid level, flat glass, print mark ...) |
| 3 m | 950 mm | 1,350 mm | 3.8 m | 4 m | 3.8 m |
| – | – | – | – | – | – |
| 500 mm | – | 350 mm | 600 mm | 300 mm | 20 mm |
| 243 | 245 | 247 | 248 | 227 | 250 |

| High speed | Color/print mark detection | Infrared LED |
|---|---|---|
|  |  |  |
| **E3X-NA-F** | **E3X-DAC-S** | **E3X-DAH-S** |
| n.a. | n.a. | n.a. |
| • Short turn on time of 20 µs | • White LED and RGB ratio comparison | • Infrared LED |
| 20 µs | 1 ms<br>(60 µs in super high speed mode) | 1ms<br>(55µs in super high speed mode) |
| B339 | 218 | B338 |

## Standard cylindrical fiber sensor heads

The standard cylindrical fiber optic sensor heads provide reliable object detection, easy installation and long sensor lifetime for all general applications.

- High-flex fibers and 90° cable exit for fiber breakage prevention
- Models with hexagonal back for simplified one-nut mounting
- Sizes M3 to M6

## Ordering information

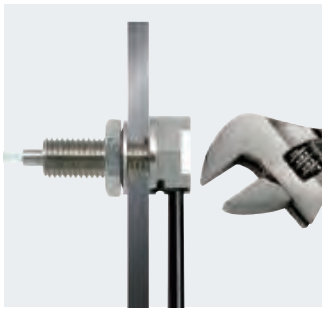
| Sensor type | Size | Sensing distance (in mm)*1 | | | | Order code | |
|---|---|---|---|---|---|---|---|
| | | Standard fiber | | High-flex fiber | | Standard fiber | High-flex fiber |
| | | E3X-HD | E3NX-FA | E3X-HD | E3NX-FA | | |
| | M4 | 1550 | 2300 | 1400 | 1400 | E32-TC200 2M | E32-ET11R 2M |
| | M3 | 450 | 670 | 130 | 190 | E32-TC200E 2M | E32-ET21R 2M |
| | dia 4 mm | 1500 | 2300 | – | | E32-ETC220 2M | – |
| easy mount | M4 | – | | 1000 | 1500 | – | E32-T11N 2M |
| easy mount | M6 | – | – | 1200 | 1800 | – | E32-LR11NP 2M |
| | M6 | 250 | 370 | – | | E32-R21 | – |
| | M6 | 600 | 900 | 550 | 820 | E32-DC200 2M | E32-ED11R 2M |
| | M4 | 160 | 240 | 60 | 90 | E32-D211 2M | E32-D211R 2M |
| | M3 | 160 | 240 | 150 | 220 | E32-DC200E 2M | E32-ED21R 2M |
| easy mount | M6 | – | | 350 | 520 | – | E32-D11N 2M |
| | M4 | – | | 350 | 520 | – | E32-D21N 2M |
| | dia 6 mm | 220 | 300 | 100 | 150 | E32-D14L 2M | E32-D14LR 2M |

*1 Sensing distance measured with Standard Mode

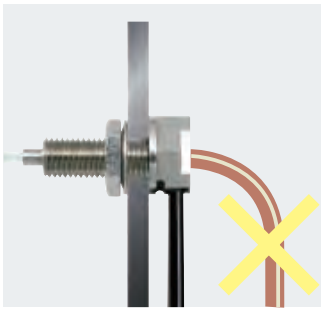
## Specifications

| Item | | Standard | | | | | High Flex | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | E32-_C200<br>E32-_C220 | E32-D14L | E32-_C200E | E32-D211 | E32-R21 | E32-E_R<br>E32-T11N<br>E32-D11N | E32-D14LR<br>E32-D211R | E32-D21N | E32-LR11NP |
| Permissible bending radius | | R25 | | R10 | | | R1 | | R2 | |
| Cut to length | | Yes | | | | | | | | |
| Ambient temperature | | –40°C to 70°C | | | | | | | | |
| Material | Head | Brass-nickel plated | Stainless steel | Brass-nickel plated | Stainless steel | Plastic (ABS) | Brass-nickel plated | Stainless steel | Brass-nickel plated | |
| | Fiber | PMMA | | | | | | | | |
| | Sheath | Polyethylene coating | | | | | PVC coating | | | |
| Degree of protection | | IEC 60529 IP67 | | | | | | | | IP50 |

Hi-flex multicore fibers for flexibility in installation without fiber breakage



Models with hexagonal back for simple one-nut mounting



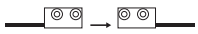
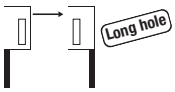
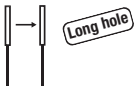
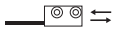
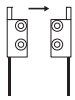
Cable exit shifted by 90° for preventing fiber breakage

## Square shape fiber sensor heads

The fiber heads in square shaped housing provide fast and easy installation on flat surfaces.

- Models with sensing direction in X, Y or Z axis
- 3 or 4mm thick housings for minimal height requirement
- Standard or high-flex fibers

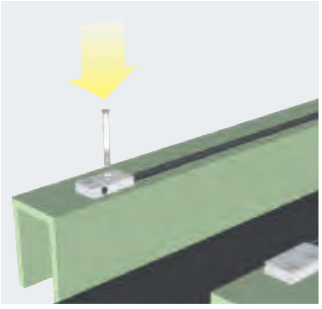
## Ordering information

| Sensor type | Size in mm (standard / high-flex) | Sensing distance (in mm)*1 | | | | Order code | |
|---|---|---|---|---|---|---|---|
| | | Standard fiber | | High-flex fiber | | Standard fiber | High-flex fiber |
| | | E3X-HD | E3NX-FA | E3X-HD | E3NX-FA | | |
|  | 15×8×3 / 15×10×4 | 1550 | 1550 | 1400 | 2100 | E32-T15X 2M | E32-ETS10R 2M |
|  | 15×8×3 | 950 | 1400 | 450 | 670 | E32-T15Y 2M | E32-T15YR 2M |
|  | 15×8×3 / 15×9×4 | 950 | 1400 | 1300 | 1800 | E32-T15Z 2M | E32-ETS14R 2M |
|   | 13×9×4 | – | | 1300 | 1800 | – | E32-ET15YR 2M |
|   | | – | | 1300 | 1800 | – | E32-ET15ZR 2M |
|  | 15×10×3 | 600 | 900 | 350 | 520 | E32-D15X 2M | E32-D15XR 2M |
|  | 15×10×3 | 200 | 300 | 100 | 150 | E32-D15Y 2M | E32-D15YR 2M |
|  | 15×10×3 / 13×6×2.3 | 200 | 300 | 100 | 150 | E32-D15Z 2M | E32-EDS24R 2M |
|  | 24.5×10×3 | – | | 1780 | 2600 | – | E32-A03-1 2M |
| | 21×9×2 | – | | 680 | 1000 | – | E32-A04-1 2M |

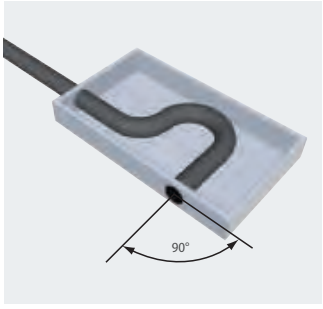
*1 Sensing distance measured with Standard Mode

## Specifications

| Item | | Standard | | | High flex | |
|---|---|---|---|---|---|---|
| | | E32-_15 | E32-A03_ | E32-A04_ | E32-E | E32-_15_R |
| Permissible bending radius | | R25 | R10 | | R1 | |
| Cut to length | | Yes | | | | |
| Ambient temperature | | –40°C to 70°C | | | | |
| Material | Head | Aluminium | Brass-nickel plated | Stainless steel | Aluminium | |
| | Fiber | PMMA | | | | |
| | Sheath | Polyethylene coating | | | | PVC coating |
| Degree of protection | | IEC 60529 IP67 | IEC 60529 IP50 | | IEC 60529 IP67 | |



Space saving and fast mounting without additional brackets




Precise positioning during manufacturing for 90° optics to achieve minimal tolerance variations in optical output axis angle

## Miniature fiber sensor heads

The miniature fiber heads provide high accuracy in smallest spaces and reliable detection of minute objects.

- Sizes from dia 500 µm to 3 mm
- Side view models with precision axis alignment for highest accuracy
- Bendable sleeves for precision positioning

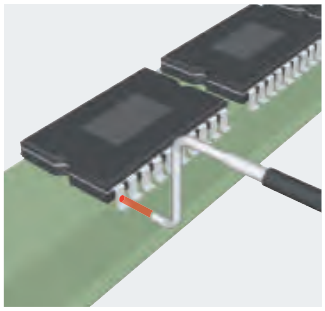
## Ordering information

| Sensor type | Size | Sensing distance (in mm)*1 | | | | Order code | |
|---|---|---|---|---|---|---|---|
| | | Standard fiber | | High-flex fiber | | Standard fiber | High-flex fiber |
| | | E3X-HD | E3NX-FA | E3X-HD | E3NX-FA | | |
| | dia 3 mm | 1550 | 2300 | 1000 | 1500 | E32-T12 2M | E32-T12R 2M |
| | dia 2 mm | 450 | 670 | 250 | 370 | E32-T22 2M | E32-T22R 2M |
| | dia 1.5 mm | 450 | 670 | 450 | 670 | E32-T222 2M | E32-T222R 2M |
| | dia 1 mm | – | | 250 | 370 | – | E32-T223R 2M |
| | dia 3 mm | 950 | 1420 | 450 | 670 | E32-T14L 2M | E32-T14LR 2M |
| | dia 2 mm | 680 | 1020 | – | | E32-A04 2M | – |
| | dia 1 mm | 250 | 370 | 100 | 150 | E32-T24 | E32-T24R 2M |
| Bendable sleeve | dia 1.2 mm | 1550 | 2300 | 1000 | 1500 | E32-TC200B*2 | E32-TC200BR*2 |
| | dia 0.9 mm | 450 | 670 | 250 | 370 | E32-TC200F*2 | E32-TC200FR*2 |
| | dia 3 mm | 160 | 240 | 60 | 90 | E32-D22 2M | E32-D22R 2M |
| | dia 2 mm | 150 | 220 | 80 | 120 | E32-D32 2M | E32-D32R 2M |
| | dia 1.5 mm | – | | 60 | 90 | – | E32-D22B 2M |
| | dia 2 mm | 60 | 90 | 30 | 40 | E32-D24 | E32-D24R 2M |
| | dia 2.5 mm | 600 | 900 | 350 | 520 | E32-DC200B 2M*2 *3 | E32-DC200BR *2 *3 |
| Bendable sleeve | dia 1.2 mm | 160 | 240 | 60 | 90 | E32-DC200F*2 | E32-DC200FR*2 |
| | dia 0.8 mm | – | – | 30 | 40 | – | E32-D33 2M |
| | dia 0.5 mm | – | – | 6 | 9 | – | E32-D331 2M |

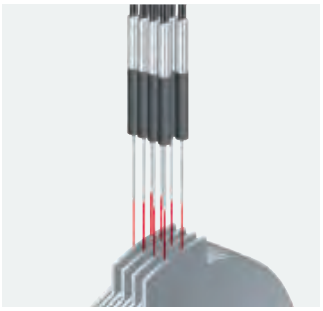
*1 Sensing distance measured in Standard Mode
*2 Models with 40 mm sleeve instead of 90 mm sleeve are available by adding '4' to the order code at the end, e.g. E32-TC200B4
*3 Sleeve cannot be bent

## Specifications

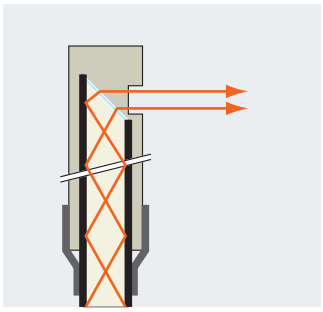
| Item | | Standard | | | | | | High-flex | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | E32-DC200B<br>E32-T12<br>E32-TC200B | E32-T14L | E32-D32 | E32-D22<br>E32-T222<br>E32-TC200F | E32-D24<br>E32-DC200F<br>E32-T22<br>E32-T24 | E32-A04 | E32-D32R<br>E32-D33<br>E32-D331 | E32-D22B | E32-DC200BR<br>E32-T12R<br>E32-TC200BR | E32-D22R<br>E32-T222R<br>E32-TC200FR | E32-D24R<br>E32-DC200FR<br>E32-T14LR<br>E32-T22R<br>E32-T223R<br>E32-T24R |
| Permissible bending radius | | R25 | | | R10 | | | R4 | | R1 | | |
| Cut to length | | Yes | | | | | | | | | | |
| Ambient temperature | | –40°C to 70°C | | | | | | | | | | |
| Material | Head | Brass-nickel plated | Stainless steel | | Brass-nickel plated | Stainless steel | | | | Brass-nickel plated | | Stainless steel |
| | Fiber | PMMA | | | | | | | | | | |
| | Sheath | Polyethylene coating | | PVC and polyethylene | Polyethylene coating | | | PVC and polyethylene | PVC coating | | Polyethylene coating | |
| Degree of protection | | IEC 60529 IP67 | | | | | IEC 60529 IP50 | IEC 60529 IP67 | | | | |



Bendable metal sleeves for precision positioning of sensors after installation



0.5 mm diameter (diffuse reflective) or 1 mm diameter (through beam) when mounting space is crucial



High precision fiber surface cutting and positioning during manufacturing to achieve minimal deviation of optical output axis angle

## Longer distance fiber sensor heads

With built-in focal lenses the longer distance fiber heads provide enhanced operational stability in dusty environments or long distance applications

- Sensing distance up to 20 m
- Built-in focal lens
- Sizes from dia 2 mm to M14
- Easy installation - no need to attach auxiliary lenses

## Ordering information

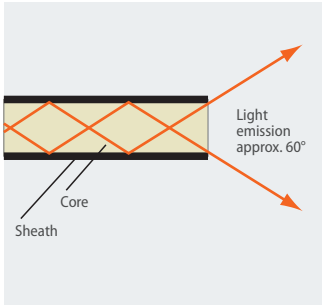
| Sensor type | Size | Sensing distance (in mm)*1 | | | | Order code | |
|---|---|---|---|---|---|---|---|
| | | Standard fiber | | High-flex fiber | | Standard fiber | High-flex fiber |
| | | E3X-HD | E3NX-FA | E3X-HD | E3NX-FA | | |
| | M14 | 20000 | 20000 | – | – | E32-T17L | – |
| | 25.2 × 10.5 × 8 mm | 4000 | 4000 | – | – | E32-T14 | – |
| easy mount | M4 | – | | 3500 | 4000 | – | E32-LT11N 2M |
| | M4 | 4000 | 4000 | 3500 | 4000 | E32-LT11 2M | E32-LT11R 2M |
| | M3 | 1350 | 2000 | – | – | E32-TC200A 2M | – |
| | dia 3 mm | 2600 | 3900 | – | – | E32-T12L 2M | – |
| | dia 2 mm | 850 | 1200 | – | – | E32-T22L 2M | – |
| Reflector | 21.5 × 27 × 10 mm | 1500 | 2250 | – | – | E32-R16 2M | – |
| easy mount | M6 | – | | 350 | 520 | – | E32-LD11N 2M |
| | 22 × 17.5 × 9 mm | 1400 | 2100 | – | – | E32-D16 2M | – |
| | M6 | 360 | 540 | 350 | 520 | E32-LD11 2M | E32-LD11R 2M |
| | M4 | 260 | 390 | – | – | E32-D21L 2M | – |
| | dia 3 mm | 450 | 670 | – | – | E32-D12 2M | – |

*1 Sensing distance measured in Standard Mode

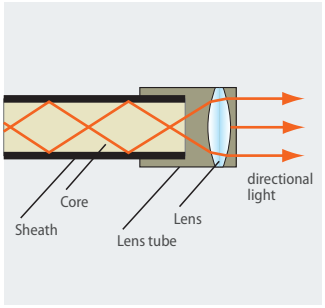
## Specifications

| Item | | Through-beam | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | E32-T17L/ E32-T14 | E32-LT11N | E32-LT11 | E32-T12L | E32-TC200A | E32-LT11R | E32-T22L |
| Permissible bending radius | | R25 | R2 | R25 | | | R1 | R10 |
| Cut to length | | Yes | | | | | | |
| Ambient temperature | | –40°C to 70°C | | | | | | |
| Material | Head | ABS | Brass-nickel plated | | | | | Stainless steel |
| | Fiber | PMMA | | | | | | |
| | Sheath | Polyethylene coating | | | | | | |
| Degree of protection | | IP67 | IP50 | | IP67 | | IP50 | IP67 |

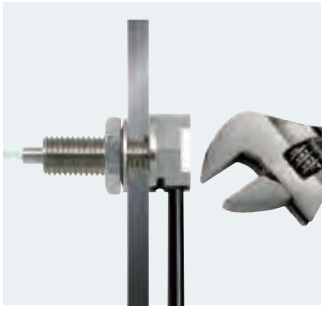
| Item | | Retro-reflective | Diffuse-reflective | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | E32-R16 | E32-D16 | E32-LD11N | E32-LD11 | E32-LD11R | E32-D21L | E32-D12 |
| Permissible bending radius | | R25 | R4 | R2 | R25 | R10 | R10 | R25 |
| Cut to length | | Yes | | | | | | |
| Ambient temperature | | –40°C to 70°C | | | | | | |
| Material | Head | ABS | Aluminium | Brass-nickel plated | | | | Stainless steel |
| | Fiber | PMMA | | | | | | |
| | Sheath | Polyethylene coating | PVC coating | Polyethylene coating | | | | |
| Degree of protection | | IP67 | IP40 | IP50 | | | IP67 | |



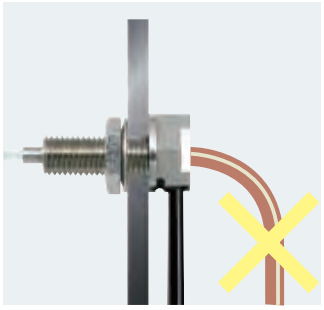

Light emission of conventional fibers




With built-in focal lenses, longer sensing distances can be achieved up to 5 times longer compared to conventional sensors



Models with hexagonal back for simple one-nut mounting



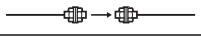
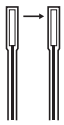
Cable exit shifted by 90° for preventing fiber breakage

## Chemical resistant fiber sensor heads

The chemical resistant fibers provide long sensor lifetime in areas with frequent cleaning, usage of chemicals and higher temperatures.

- fluoroplastic cover for highest chemical resistance
- temperature resistance up to 200°C

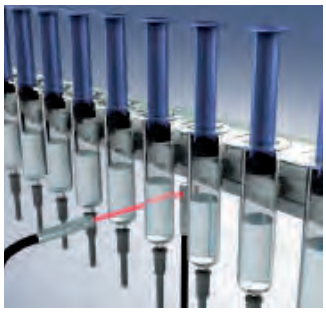
## Ordering information

| Sensor type | Size | Sensing distance (in mm)*1 | | Key feature | Order code |
|---|---|---|---|---|---|
| | | E3X-HD | E3NX-FA | | |
|  | M4 | 1350 | 2000 | Fluororesin coating | E32-T11U 2M |
|  | dia 5 mm | 3200 | 4000 | Fluororesin cover | E32-ET11F 2M |
| | | 4000 | 4000 | | E32-T12F |
|  | | 800 | 1200 | | E32-T14F 2M |
|  | M6 | 350 | 520 | Fluororesin coating | E32-D11U 2M |
|  | dia 7 mm | 300 | 450 | Fluororesin cover | E32-ED11F 2M |
| | dia 6 mm | 190 | 280 | | E32-D12F |
|  | | 80 | 120 | | E32-D14F 2M |
|  | | 1400 | 2100 | Fluororesin cover<br>Heat resistant to 200°C | E32-T81F-S 2M |
|  | dia 5 mm | 2800 | 4000 | Fluororesin cover<br>Heat resistant to 150°C | E32-T51F 2M |

*1 Sensing distance measured in Standard Mode

## Specifications

| Item | | Fluororesin coating | | Full fluororesin cover | | Full fluororesin cover and heat resistance | |
|---|---|---|---|---|---|---|---|
| | | E32-T11U | E32-D11U | E32-E_11F | E32-_12F/E32-_14F | E32-T51F | E32-T81F-S |
| Permissible bending radius (in mm) | | R1 | R4 | R75 | R40 | | R10 |
| Cut to length | | yes | | | | | no |
| Ambient temperature | | –40°C to 70°C | | | | –40°C to 150°C | –40°C to 200°C |
| Material | Head | Brass-nickel plated | | Fluororesin | | | |
| | Fiber | PMMA | | | | | Glass |
| | Sheath | Fluororesin coating | | Fluororesin cover | | | |
| Degree of protection | | IEC60529 IP67 | | | | | |



The fluororesin cover provides highest chemical resistance for longest lifetime in frequently cleaned environments like aseptic filling in pharmaceutical applications


Enhanced temperature resistant models

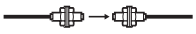
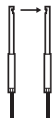
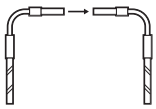
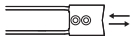
Highest chemical resistance

## Heat resistant fiber sensor heads

The wide range of heat resistant fibers provides long sensor lifetime with highest protection in demanding environments

- heat resistant up to 400°C
- sizes from dia 2 mm to M6
- models for long distances or high detection accuracy

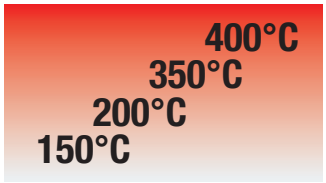
## Ordering information

| Sensor type | Size | Sensing distance (in mm)*1 | | Key feature | Order code | |
|---|---|---|---|---|---|---|
| | | E3X-HD | E3NX-FA | | For E3NX-FA and E3X-HD amplifiers | For E3X-NA amplifier |
|  | M4 | 3000 | 4000 | –40°C to 150°C | E32-ET51 2M | |
| | | 800 | 1200 | –40°C to 100°C*2, high-flex | E32-T51R 2M | |
| | | 550 | 820 | –40°C to 200°C | E32-T81R-S 2M | |
| | | 900 | 1350 | –60°C to 350°C | E32-T61-S 2M | |
|  | dia 2 mm | 450 | 670 | –40°C to 150°C | E32-T54 2M | |
|  | dia 3 mm | 2600 | 3900 | –40°C to 200°C | E32-T84S-S 2M | |
|  | M6 | 500 | 750 | –40°C to 150°C | E32-ED51 2M | |
| | | 280 | 420 | –40°C to 100°C*2, high-flex | E32-D51R 2M | |
| | | 180 | 270 | –40°C to 200°C | E32-D81R-S 2M | E32-D81R 2M |
|  | | 180 | 270 | –60°C to 350°C | E32-D61-S 2M | E32-D61 |
|  | M4 | 120 | 180 | –40°C to 400°C | E32-D73-S 2M | E32-D73 |
|  | 23×20×9 mm | 15–38 | | –40°C to 150°C | E32-A09H 2M | |
| | 30×24×9 mm | 20–30 | | –40°C to 300°C | E32-A09H2 2M | |
|  | 25×18×5 mm | 1–5 | | –40°C to 300°C | E32-L64 2M | |
| | 36×18×5 mm | 5–18 | | | E32-L66 2M | |

*1 Sensing distance measured in Standard Mode
*2 Short term resistance. For continuous operation –40°C to 90°C

## Specifications

| Item | | –40°C to 150°C | –40°C to 100°C | –40°C to 150°C | | –40°C to 200°C | | –40°C to 300°C | | –60°C to 350°C | –40°C to 400°C |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | E32-E_51 | E32-D51R/ T51R | E32-T54 | E32-A09H | E32-_ 81_ | E32-T84_ | E32-A09H2 | E32-L6_ | E32-_ 61_ | E32-D73_ |
| Permissible bending radius (in mm) | | R35 | R2 | R35 | | R10 | R25 | | | | |
| Cut to length | | Yes | | | | No | | | | | |
| Material | Head | Brass-nickel plated | Stainless steel | | Aluminium | Stainless steel | | | | | |
| | Fiber | PMMA | Acrylate resin | PMMA | | Glass | | | | | |
| | Sheath | Fluoro resin | Polyurethane resin | Fluoro resin | | | Stainless steel spiral coating | Stainless steel tube | Stainless steel spiral coating | | Stainless steel tube |
| Degree of protection | | IEC 60529 IP67 | IEC 60529 IP50 | IEC 60529 IP67 | | | | | IEC 60529 IP40 | IEC 60529 IP67 | |




The temperature range optimised material selection provides best application fit and value - performance ratio.

Stainless steel spiral coating for flexibility with highest mechanical protection.

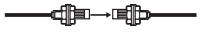
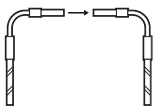
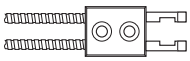
## Vacuum resistant fiber sensor heads

For applications in cleanest and hot environments the vacuum resistant fibers and connecting flanges provide long operational lifetime and vacuum integrity.

- Leakage rate of $1 \times 10^{-10}$ Pa*m$^3$/s max
- Heat resistance up to 200°C
- Detergent resistant fluororesin or stainless steel fiber sheath

## Ordering information

### Sensor

| Sensor type | Size | Sensing distance (in mm)*1 | | Temperature range | Order code |
|---|---|---|---|---|---|
| | | E3X-HD | E3NX-FA | | |
|  | M4 | 400 | 600 | –40°C to 120°C | E32-T51V 1M |
|  | dia 3 | 250 | 370 | –40°C to 120°C | E32-T54V 1M |
| | dia 3 | 950 | 1400 | –60°C to 200°C | E32-T84SV 1M |
|  | 33 × 18 × 5.5 mm | 5 | | –40°C to 70°C | E32-G86V-1 3M |

*1 Sensing distance measured with Standard Mode

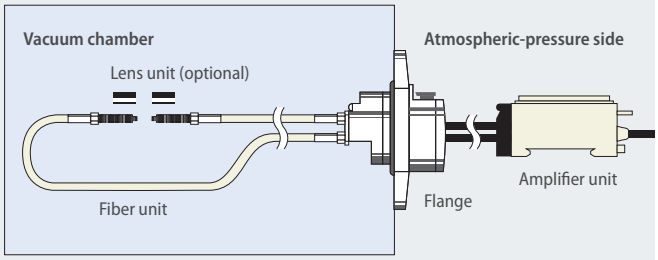
### Flange

| Type | Size | Order code |
|---|---|---|
| 4 channel flange | 80 × 80 × 49 mm | E32-VF4 |
| 1 channel flange | 96 × dia 30 mm max. | E32-VF1 |
| Flange-to-amplifier connection fiber | 2 m length | E32-T10V 2M |

## Specifications

| Item | | Fiber sensor heads | | | | Flange-to-amplifier fiber |
|---|---|---|---|---|---|---|
| | | E32-T51V | E32-T54V | E32-T84SV | E32-G86V-1 | E32-T10V |
| Permissible bending radius | | R30 | | R25 | | |
| Cut to length | | No | | | | Yes |
| Material | Head | Aluminium | Stainless steel | | | – |
| | Fiber | Glass | | | | PMMA |
| | Sheath | Fluororesin coating | | Stainless steel spiral coating | | Polyethylene coating |
| Degree of protection | | – | | | | |

| Item | | Flange | |
|---|---|---|---|
| | | E32-VF1 | E32-VF4 |
| Leakage rate | | $1 \times 10^{-10}$ Pa*m³/s max | |
| Ambient temperature | | –25°C to 55°C | |
| Material | Flange | Aluminium and stainless steel | Aluminium |
| | Seal | Fluorocarbon rubber (viton) | |




The vacuum resistant fiber heads and flanges are sealed to prevent gas leakage into vacuum areas

## Robot application fiber sensor heads

For applications on frequently or fast moving parts, the robot fibers reduce the risk of fiber breakage with a guaranteed operational life of more than 1 million bending cycles

- Free moving multicore fibers for > 1 mio bending cycles
- Square shapes for easy surface installation
- Cylindrical sizes from dia 1.5 mm to M6



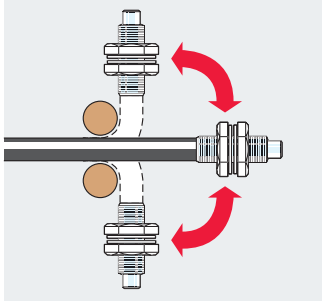
## Ordering information

| Sensor type | Size | Sensing distance (in mm)*1 | | Order code |
|---|---|---|---|---|
| | | E3X-HD | E3NX-FA | |
| | M4 | 1350 | 2000 | E32-T11 2M |
| | M3 | 400 | 600 | E32-T21 2M |
| | dia 3 mm | 1350 | 2000 | E32-T12B |
| | dia 2 mm | 400 | 600 | E32-T221B |
| | dia 1.5 mm | 400 | 600 | E32-T22B |
| | 15 × 18 × 3 mm | 1350 | 2000 | E32-T15XB 2M |
| | M6 | 350 | 520 | E32-D11 2M |
| | M4 | 140 | 210 | E32-D21B 2M |
| | M3 | 60 | 90 | E32-D21 2M |
| | dia 1.5 mm | 60 | 90 | E32-D22B 2M |
| | 15 × 10 × 3 mm | 350 | 520 | E32-D15XB 2M |

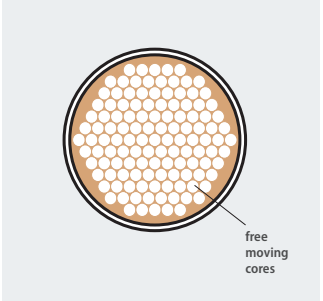
*1 Sensing distance measured in Standard Mode

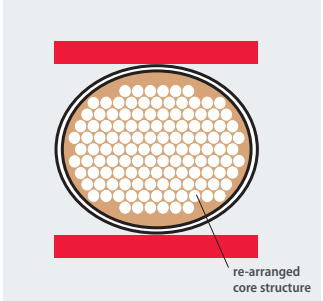
## Specifications

| Item | | Square | Cylindrical | | | |
|---|---|---|---|---|---|---|
| | | E32-D15XB<br>E32-T15XB | E32-T21 | E32-D11<br>E32-T11 | E32-D21<br>E32-T12B<br>E32-T22B | E32-D21B<br>E32-D22B<br>E32-T221B |
| Permissible bending radius | | R4 | | | | |
| Cut to length | | Yes | | | | |
| Ambient temperature | | –40°C to 70°C | | | | |
| Material | Head | Aluminium | Brass-nickel plated | | | Stainless steel |
| | Fiber | PMMA | | | | |
| | Sheath | PVC coating | Polyethylene coating | PVC coating | | |
| Degree of protection | | IEC 60529 IP67 | | | | |



Guaranteed more than 1 mio bending operations



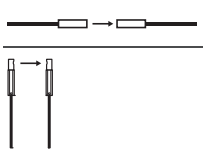
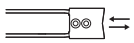
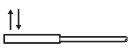

Free moving fiber cores prevent fiber breakage and light intensity loss when the fiber is bent.

## Precision detection fiber sensor heads

Highest precision in design and manufacturing of the fibers and focal lenses ensure highest beam and spot accuracy allowing the detection of smallest objects and height differences of less than 100 µm.

- Coaxial fibers with focal lenses for spot diamters of 100 µm
- Through-beam models with highly focused beam and precise optical axis alignment
- Limited reflective models for height difference detection of less than 100 µm

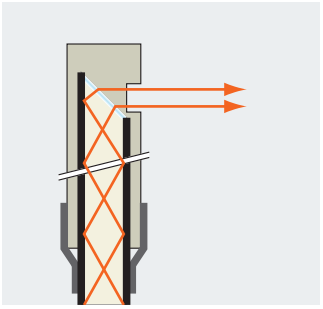
## Ordering information

| Sensor type | Preferred usage | Size | Key feature | Sensing distance *1 (in mm) | | Order code |
|---|---|---|---|---|---|---|
| | | | | E3X-HD | E3NX-FA | |
|  | Precise thin object detection /accurate positioning | dia 3 mm | • High precision optical axis adjustment<br>• Very focused beam | 3800 | 4000 | E32-T22S |
| | | | | 1780 | 2650 | E32-A03 2M |
| | | dia 2 mm | | 680 | 1000 | E32-A04 2M |
|  | Very small object detection | M6 | – | 600 | 900 | E32-CC200 2M*2 |
| | | M3 | Spot dia 0.5 mm | 120 | 180 | E32-EC31 2M |
| | | | Spot dia 0.2 mm | 17 | | E32-EC41 1M + E39-F3B |
| | | | Spot dia 0.1 mm | 7 | | E32-EC41 1M + E39-F3A-5 |
|  | | dia 3 mm | – | 300 | 450 | E32-D32L |
| | | dia 2 mm | – | 150 | 220 | E32-D32 2M*2 |
|  | | M6 | • 90° cable exit<br>• Hexagonal back | 350 | 520 | E32-C11N 2M |
| | | M3 | | 130 | 190 | E32-C21N 2M |
|  | | M3 | 90° cable exit | 50 | 70 | E32-C31N 2M |
| | | | Spot dia 0.5 to 3mm | 8 - 25 adjustable | | E32-EC31 2M + E39-EF51 |
| | | dia 2 mm*3 | Spot dia 0.5 to 1 mm | 6 - 15 adjustable | | E32-D32 2M + E39-F3A |
| | | | Spot dia 0.1 to 0.6 mm | 6 - 15 adjustable | | E32-C42 1M + E39-F3A |
|  | Precision height difference detection / flat surface detection<br>Object detection in front of background | 23 × 20 × 9 mm | – | 26.5±11.5 | | E32-A09 2M |
|  | | 16 × 18 × 4 mm | – | 7.2±1.8 | | E32-L25L*2 |
| | | 20 × 20 × 5 mm | – | 3.3 | | E32-L25 |
|  | | 18 × 20 × 4 mm | Precise spot e.g. for detection of a flat / reflective surface | 4±2 | | E32-L24L*2 |
| | | 34 × 25 × 8 mm | High precision (detection accuracy 100 µm) | 2.4 | | E32-EL24-1 2M |
|  | | 20.5 × 14 × 3.8 mm | Limited reflective wide beam e.g. for object detection on a flat surface | 15 | | E32-L16-N 2M |

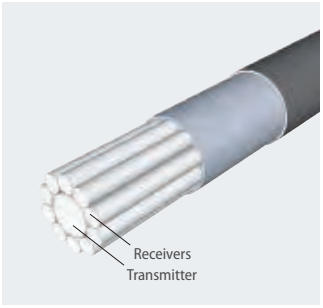
*1 Sensing distance measured in Standard Mode
*2 A high flex cable version is available. Add 'R' to the order code, e.g. E32-CC200R
*3 Outer diameter of the fiber. Outer diameter of the focal lens is dia 4mm (front part)

## Specifications

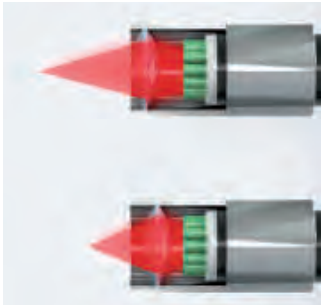
| Item | | Through-beam | | | Diffuse reflective (coaxial) | | | | Limited reflective | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | E32-T22S | E32-A03 | E32-A04 | E32-C11N<br>E32-C31N | E32-C21N | E32-CC200 | E32-C42<br>E32-D32/-D32L<br>E32-EC31/-EC41 | E32-EL24-1 | E32-L24L<br>E32-L25L | E32-L25 | E32-L16 | E32-A09 |
| Permissable bending radius | | R10 | R1 | R10 | R4 | R2 | R25 | | R10 | | R25 | | |
| Cut to length | | Yes | | | | | | | | | | | |
| Ambient temperature | | –40°C to 70°C | | | | | | | | | | | |
| Material | Head | Brass-nickel plated | | Stainless steel | Brass-nickel plated | | | Brass nickel plated | Brass-nickel plated and aluminium | Polycarbon-ate | ABS | | Aluminium |
| | Fiber | PMMA | | | | | | | | | | | |
| | Sheath | PVC coating | Polyethylene coating | | PVC coating | | PVC, polyethylene and polyole-fin coating | | Polyethylene coating | | | | |
| Degree of protection | | IEC 60529 IP67 | IEC 60529 IP50 | | IEC 60529 IP67 | | | | IEC 60529 IP50 | | IEC 60529 IP40 | | |

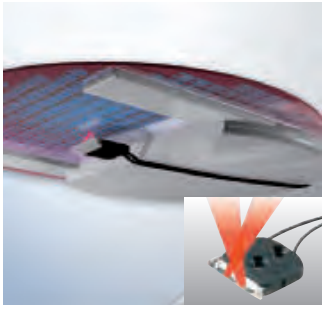


Focused and high precision beam alignment during manufacturing. Models available with typical deviation of 0.1° for very precise detections




Coaxial fibers provide an enhanced positioning and detection accuracy and allow the easy adjustment of the focal point using adjustable focal lenses





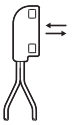
Limited reflective fibers utilize the total reflection on shiny surfaces to detect height differences or objects at a pre-defined distance.

## Special application fiber sensor heads

For a wide range of special applications, the task optimised fiber heads provide best fitting sensing performance and adaption to environmental requirements.

- Detection of special objects (liquids, labels on foils, etc.)
- Fiber heads optimised for special tasks (wafer mapping, flat glass, etc.)

## Ordering information

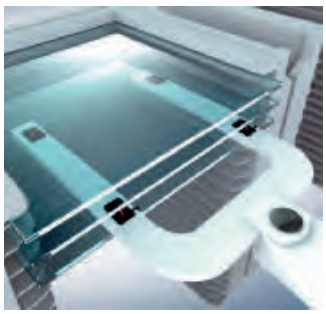
| Sensor type | | Size | Sensing distance (in mm)*1 | | Comment | Order code |
|---|---|---|---|---|---|---|
| | | | E3X-HD | E3NX-FA | | |
|  | Fork shape | 36 × 24 × 8 mm | 10 | | – | E32-G14 |
|  | Wafer mapping | dia 3 mm | 3800 | 4000 | – | E32-T22S |
|  | | dia 3 mm | 2600 | 3900 | – | E32-T24S |
| | | dia 3 mm | 1780 | 2650 | – | E32-A03 2M |
| | | dia 2 mm | 680 | 1000 | – | E32-A04 2M |
|  | Liquid level sensor | dia 6 mm | liquid contact | | Liquid level contact | E32-D82F1 4M |
|  | | 15 × 23.5 × 5 mm | tube contact | | Liquid level detection through transparent tube or container | E32-D36T 2M |
|  | Glass detection | 21 × 16.5 × 4 mm | 8 | | Metal housing | E32-A10 2M |
| | | 20.5 × 14 × 3.8 mm | 15 | | Plastic housing | E32-L16-N 2M |
| | Glass detection in hot environment | 25 × 18 × 5 mm | 1–5 | | Heat resistant up to 300°C | E32-L64 2M |
| | | 36 × 18 × 5.5 mm | 5–18 | | | E32-L66 2M |
|  | Glass detection in wet processes | 38.5 × 39 × 17.5 mm | 8 to 20 (recommended: 11) | | Heat resistant up to 85°C | E32-L11FS 2M |
|  | Label detection | 20 × 20 × 5 mm | 7.2±1.8 | | – | E32-L25L |
|  | | 18 × 20 × 4 mm | 4±2 | | – | E32-L24L |
| | | 34 × 25 × 8 mm | 2.4 | | Very precise spot (detection accuracy 100 µm) | E32-EL24-1 2M |

*1 Sensing distance measured in Standard Mode

## Specifications

| Item | | E32-D82F1<br>E32-L11FS | E32-G14 | E32-A10 | E32-L16-N | E32-L66 | E32-L64 |
|---|---|---|---|---|---|---|---|
| Permissable bending radius | | R40 | R25 | | | | |
| Cut to length | | Yes | | | | No | |
| Ambient temperature | | –40°C to 70°C | | | | –40°C to 300°C | |
| Material | Head | PFA | ABS | ABS | PVC | Stainless steel | |
| | Fiber | PMMA | | | | Glass | |
| | Sheath | Polyethylene coating | | | | Stainless steel spiral coating | |
| Degree of protection | | IEC 60529 IP67 | | IEC 60529 IP30 | IEC 60529 IP40 | IEC 60529 IP40 | IEC 60529 IP50 |

| Item | | E32-EL24-1 | E32-T24S | E32-L24L<br>E32-L25L | E32-A04 | E32-D36T | E32-A03 | E32-T22S |
|---|---|---|---|---|---|---|---|---|
| Permissable bending radius | | R10 | | | | R4 | R1 | |
| Cut to length | | Yes | | | | | | |
| Ambient temperature | | –40°C to 70°C | | | | | | |
| Material | Head | Brass-nickel plated and alumini-um | Stainless steel | Brass-nickel plated | Stainless steel | ABS | Brass-nickel plated | |
| | Fiber | PMMA | | | | | | |
| | Sheath | Polyethylene coating | PVC coating | Polyethylene coating | | PVC coating | Polyethylene coating | PVC coating |
| Degree of protection | | IEC 60529 IP67 | | IEC 60529 IP50 | | IEC 60529 IP67 | IEC 60529 IP50 | IEC 60529 IP67 |



The limited reflective fiber heads for glass detection provide a stable detection of flat glass in standard, hot or wet environment. The shapes and materials are optimized to provide the best value - performance ratio depending on the requirements.

For the detection of very small height differences like labels on foils in applications where space is crucial, the small sized limited reflective sensors provide accurate detection up to 100 µm resolution.


PRO

## Easy-teach digital fiber amplifier

The E3X-HD with 1-button Smart tune set-up provides fast and simple teaching. Dual digital display and advanced features make the E3X-HD ideal even for demanding applications.

- Easy teaching by Smart tuning within a few seconds
- Dynamic Power Control (DPC) for highest operational stability for changing environmental conditions or challenging objects
- M8 connector models
- EtherCAT and CompoNet Communication units for high-speed field bus connectivity

## Ordering information

| Item | Order code | | |
|---|---|---|---|
| | Transistor output models | | Communication unit model[*1] |
| | NPN output | PNP output | |
| Pre-wired | E3X-HD11 2M | E3X-HD41 2M | – |
| Fiber amplifier connector | E3X-HD6 | E3X-HD8 | E3X-HD0 |
| M8 connector (4pin) | E3X-HD14 | E3X-HD44 | – |

[*1] For field bus connection please chose Communication unit E3X-ECT for EtherCAT or E3X-CRT for CompoNet.

### Fiber amplifier connectors

| Shape | Type | Comment | Order code |
|---|---|---|---|
|  | Fiber amplifier connector | 2 m PVC cable | E3X-CN11 |
|  | | 30 cm PVC cable with M12 plug connector (4 pin) | E3X-CN21-M1J 0.3M |
| | | 30 cm PVC cable with M8 plug connector (4 pin) | E3X-CN21-M3J-2 0.3M |

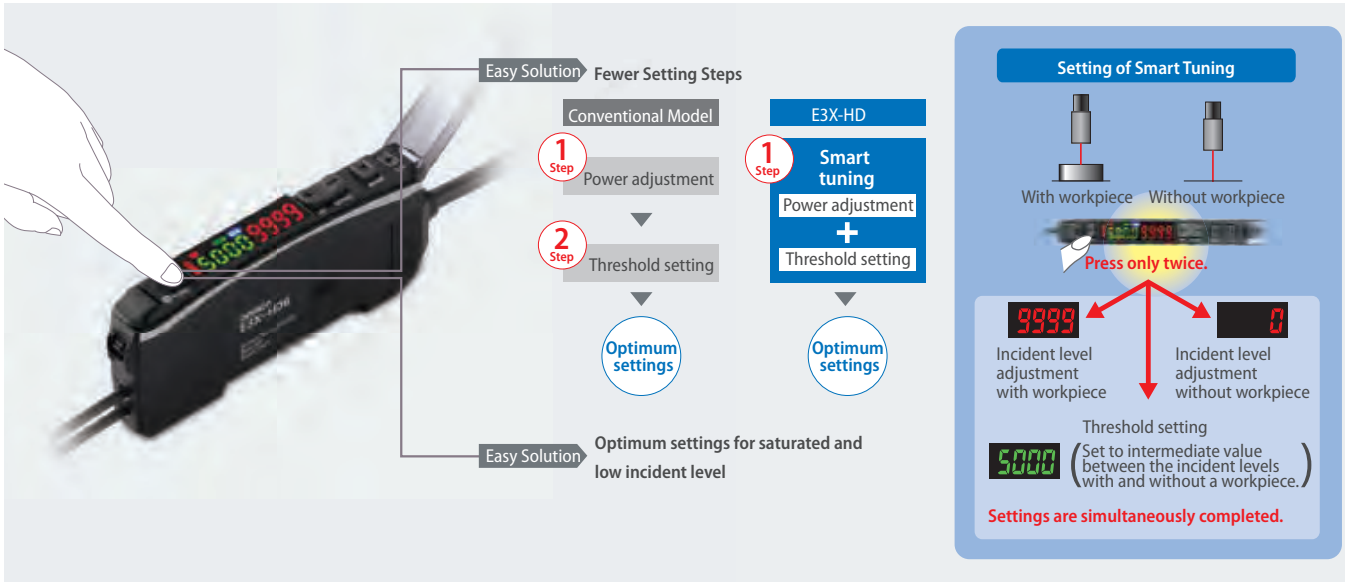
### Communication units

| Shape | Communications method | Applicable Fiber Amplifier Units | Order code |
|---|---|---|---|
|  | CompoNet | E3X-HD0<br>E3X-MDA0<br>E3X-DA0-S | E3X-CRT |
|  | EtherCAT | | E3X-ECT |

## Specifications

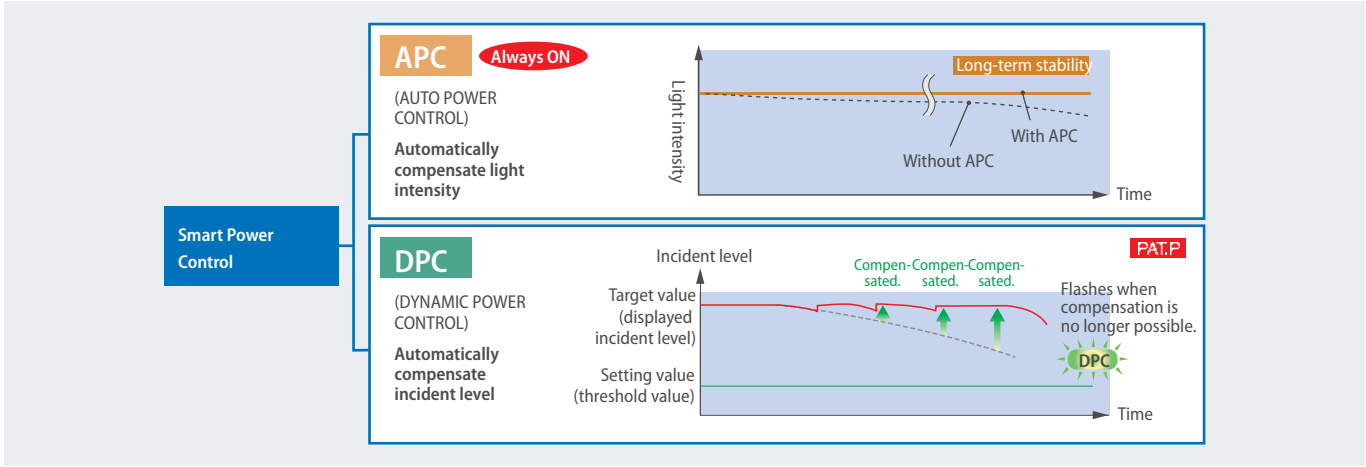
| Item | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Type | Standard models | | | | | | For Communications Unit |
| | Model | E3X-HD11 | E3X-HD41 | E3X-HD6 | E3X-HD8 | E3X-HD14 | E3X-HD44 | E3X-HD0 |
| | Connection method | Pre-wired | | Wire-saving connector | | M8-4pin connector | | Communications unit connector |
| | Control output | NPN output | PNP output | NPN output | PNP output | NPN output | PNP output | – |
| Light source (wavelength) | | Red, 4-element LED (625 nm) | | | | | | |
| Power supply voltage | | 12 to 24 VDC±10%, ripple (p-p) 10% max. | | | | | | |
| Power consumption | | Normal Mode: 720 mW max. (Current consumption: 30 mA max. at 24 VDC, 60 mA max. at 12 VDC.)<br>Power Saving Eco Mode: 530 mW max. (Current consumption: 22 mA max. at 24 VDC, 44 mA max. at 12 VDC.) | | | | | | |
| Control output | | Load power supply voltage: 26.4 VDC max., open-collector output (Varies with the model depending on output is PNP or NPN.)Load current: 50 mA max. (residual voltage: 2 V max.), OFF current: 0.5 mA max. | | | | | | – |
| Response time | Super-high-speed Mode (SHS) | Operate or reset: 50 µs (NPN models) or 55 µs (PNP models) | | | | | | |
| | High-speed Mode (HS) | Operate or reset: 250 µs | | | | | | |
| | Standard Mode (STND) | Operate or reset: 1 ms | | | | | | |
| | Giga-power Mode (GIGA) | Operate or reset: 1 ms | | | | | | |
| Mutual interference prevention | | Possible for up to 10 units | | | | | | |
| Maximum connectable Units | | 16 units | | | | | | with E3X-CRT: 16 units<br>with E3X-ECT: 30 units |

## Easy One-Button-Teaching/Smart Tuning




Easy setting of optimum power and threshold by pushing tune button twice.

## Smart power control




Enhanced signal stability control for compensating power reductions caused by temperature drift, dust or aging of LED.

## Field bus connectivity


Field bus communication allows control by an external device to simplify setup and reduce wiring effort.


LITE

## Single display digital fiber amplifier

E3X-SD allows easy one button setting and provide the best value performance ratio for standard applications.

- Auto-teaching during machine operation
- 2-point teaching within a few seconds
- Simple threshold adjustment with up/down keys

## Ordering information

| Item | Order code | |
|---|---|---|
| | NPN output | PNP output |
| Pre-wired | E3X-SD21 2M | E3X-SD51 2M |
| Fiber amplifier connector *1 | E3X-SD7 | E3X-SD9 |

*1 Order connector separately. For M8 connector models see E3X-HD.

### Fiber amplifier connectors

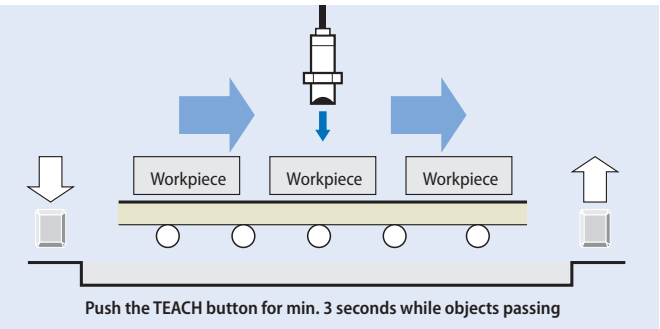
| Shape | Type | Comment | Order code |
|---|---|---|---|
|  | Fiber amplifier connector | 2 m PVC cable | E3X-CN11 |
|  | | 30 cm PVC cable with M12 plug connector (4 pin) | E3X-CN21-M1J 0.3M |
| | | 30 cm PVC cable with M8 plug connector (4 pin) | E3X-CN21-M3J-2 0.3M |

## Specifications

| Item | | E3X-SD |
|---|---|---|
| Light source (wave length) | | Red, 4-element LED (625 nm) |
| Power supply voltage | | 12 to 24 VDC ±10%, ripple (p-p): 10% max. |
| Protective circuits | | Power supply reverse polarity protection, output short-circuit protection, mutual interference prevention |
| Response time | | Operation or reset: 200 µs max |
| Sensitivity setting | | Teaching and digital up/down keys |
| Functions | Auto power control | High-speed control method for emission current |
| | Mutual interference prevention | Optical communication sync. possible for up to 5 units |
| Digital displays | | Incident level or threshold |
| Degree of protection | | IEC 60529 IP50 (with protective cover attached) |

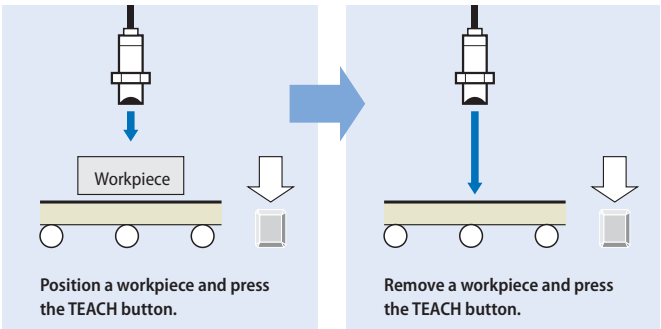
### Easy operation by ergonomic buttons

### Auto-teaching




Push the TEACH button for min. 3 seconds while objects passing

### 2-point teaching




Position a workpiece and press the TEACH button.

Remove a workpiece and press the TEACH button.


LITE

## Digital fiber amplifier with potentiometer adjustment

The E3X-NA is the ideal amplifier for standard fiber applications providing quick & easy potentiometer adjustment and bargraph display.

- Easy adjustment with potentiometer
- Mutual interference prevention
- Enhanced water resistance types

## Ordering information

### Pre-wired

| Item | Order code (for pre-wired types with 2 m cable length) | |
|---|---|---|
| | NPN output | PNP output |
| Standard | E3X-NA11 2M | E3X-NA41 2M |
| Enhanced water resistance | E3X-NA11V 2M | E3X-NA41V 2M |

### Connector version

| Item | Order code | |
|---|---|---|
| | NPN output | PNP output |
| Standard (fiber amplifier connector)*1 | E3X-NA6 | E3X-NA8 |
| Enhanced water resistance (M8 4-pin connector) | E3X-NA14V | E3X-NA44V |

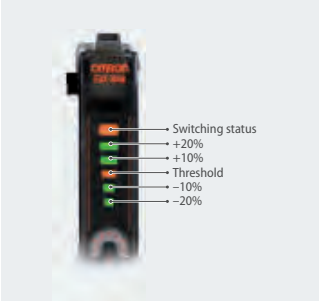
*1 Order connector separately.

### Fiber amplifier connectors

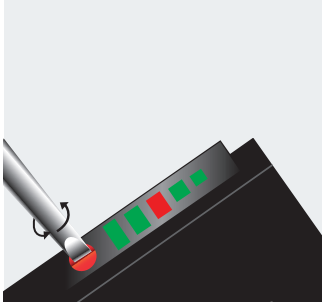
| Shape | Type | Comment | Order code |
|---|---|---|---|
|  | Fiber amplifier connector | 2 m PVC cable | E3X-CN21 |
|  | | 30 cm PVC cable with M12 plug connector (4 pin) | E3X-CN21-M1J 0.3M |
| | | 30 cm PVC cable with M8 plug connector (4 pin) | E3X-CN21-M3J-2 0.3M |

## Specifications

| Item | | Standard | Enhanced water resistance |
|---|---|---|---|
| Output | NPN output | E3X-NA11, E3X-NA6 | E3X-NA11V, E3X-NA14V |
| | PNP output | E3X-NA41, E3X-NA8 | E3X-NA41V, E3X-NA44V |
| Light source (wave length) | | Red LED (625 nm) | |
| Power supply voltage | | 12 to 24 VDC±10%, ripple (p-p): 10% max. | |
| Protective circuit | | Reverse polarity protection, output short-circuit protection, mutual interference prevention | |
| Response time | | Operation or reset: 200 µs max. | |
| Sensitivity setting | | 8-turn endless adjuster (potentiometer) | |
| Functions | | OFF-delay timer: 40 ms (fixed) | |
| Degree of protection | | IEC 60529 IP50 (with protective cover attached) | IEC 60529 IP66 (with protective cover attached) |




Bargraph display with light level, switching status and threshold indicators



Simple sensitivity adjustment by potentiometer

## High-performance digital fiber amplifier

The E3NX-FA amplifier is best choice for most challenging fiber applications in terms of long sensing distance, minute object detection or high speed processes.

- Easy teaching by Smart tuning within a few seconds
- New N-Smart technology provides significant improvement for sensing distance, minimum object detection and speed
- Easy and transparent information about sensor status by Solution Viewer and Change Finder function
- EtherCAT Communication unit for high-speed field bus connectivity

## Ordering information

| Item | Connection | Inputs/Outputs | Order code | |
|---|---|---|---|---|
| | | | NPN output | PNP output |
| Standard models | Pre-wired | 1 output | E3NX-FA11 2M | E3NX-FA41 2M |
| | Fiber amplifier connector | | E3NX-FA6 | E3NX-FA8 |
| Advanced models | Pre-wired | 2 outputs + 1 input | E3NX-FA21 2M | E3NX-FA51 2M |
| | Fiber amplifier connector | 1 output + 1 input | E3NX-FA7 | E3NX-FA9 |
| | | 2 outputs | E3NX-FA7TW | E3NX-FA9TW |
| | M8 connector | 1 output + 1 input | E3NX-FA24 | E3NX-FA54 |
| | | 2 output | – | E3NX-FA54TW |
| Networking model[*1] | Connector for communication unit | via com. protocol | E3NX-FA0 | |

[*1] For field bus connection please chose communication unit E3NW-ECT for EtherCAT.

### Fiber amplifier connectors

| Shape | Type | Comment | Order code |
|---|---|---|---|
|  | Fiber amplifier connector | 2 m PVC cable (4 pin) | E3X-CN21 |
|  | | 30 cm PVC cable with M12 plug connector (4 pin) | E3X-CN21-M1J 0.3M |
| | | 30 cm PVC cable with M8 plug connector (4 pin) | E3X-CN21-M3J-2 0.3M |

### Communication units

| Shape | Communications method | Applicable Amplifier Units | Order code |
|---|---|---|---|
|  | Sensor communication unit for EtherCAT | E3NX-FA0<br>E3NC-LA0<br>E3NC-SA0 | E3NW-ECT |
|  | Sensor dispersion (slave) unit | | E3NW-DS |

## Specifications

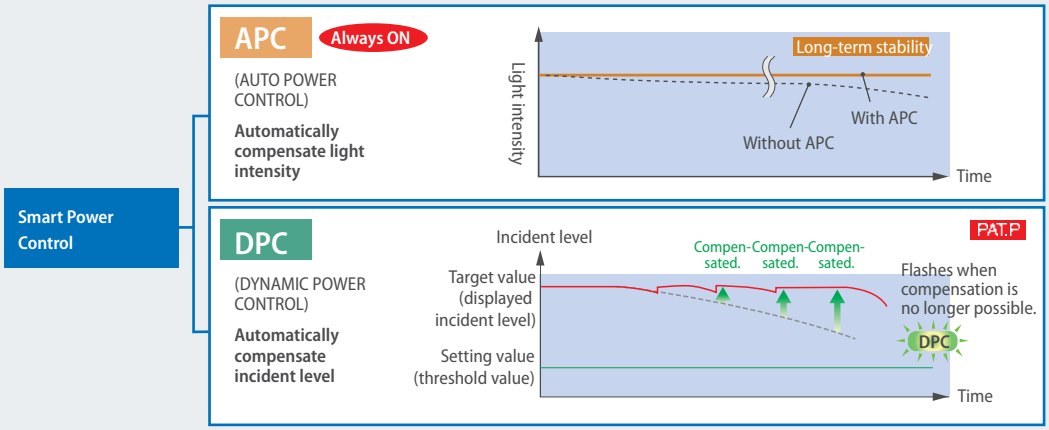
| Item | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Type | | Standard models | | Advanced models | | | | | Model for sensor communications unit |
| | NPN output | E3NX-FA11 | E3NX-FA6 | E3NX-FA21 | E3NX-FA7 | E3NX-FA7TW | E3NX-FA24 | – | E3NX-FA0 |
| | PNP output | E3NX-FA41 | E3NX-FA8 | E3NX-FA51 | E3NX-FA9 | E3NX-FA9TW | E3NX-FA54 | E3NX-FA54TW | |
| | Connection method | Pre-wired | Wire-saving connector | Pre-wired | Wire-saving connector | | M8 connector | | Connector for sensor communications unit |
| Inputs/outputs | Outputs | 1 output | | 2 outputs | 1 output | 2 outputs | 1 output | 2 outputs | via com. protocol |
| | External inputs | – | | 1 input | 1 input | – | 1 input | – | – |
| Light source (wavelength) | | Red, 4-element LED (625 nm) | | | | | | | |
| Power supply voltage | | 10 to 30 VDC, including 10% ripple (p-p) | | | | | | | |
| Power consumption | | At power supply voltage of 24 VDC<br>Standard model or model for sensor communications unit:<br>Normal mode: 960 mW max. (current consumption: 40 mA max.),<br>Power saving eco mode: 840 mW max. (current consumption: 35 mA max.)<br>Advanced model:<br>Normal mode: 1,080 mW max. (current consumption: 45 mA max.),<br>Power saving eco mode: 930 mW max. (current consumption: 40 mA max.) | | | | | | | |
| Control output | | Load power supply voltage: 30 VDC max., open-collector output<br>Load current: groups of 1 to 3 amplifires: 100 mA max., groups of 4 to 30 amplifires: 20 mA max.<br>Residual voltage: at load current of less than 10 mA: 1 V max.<br>at load current of 10 to 100 mA: 2 V max.<br>OFF current: 0.1 mA max. | | | | | | | – |
| Response time | Super-high-speed Mode (SHS)[*1] | Operate or reset for model with 1 output: 30 µs, with 2 outputs: 32 µs | | | | | | | |
| | High-speed Mode (HS) | Operate or reset: 250 µs | | | | | | | |
| | Standard Mode (Stnd) | Operate or reset: 1 ms | | | | | | | |
| | Giga-power Mode (GIGA) | Operate or reset: 16 ms | | | | | | | |
| No. of units for mutual interference prevention | Super-high-speed Mode (SHS)[*1] | 0 | | | | | | | |
| | High-speed Mode (HS) | 10 | | | | | | | |
| | Standard Mode (Stnd) | 10 | | | | | | | |
| | Giga-power Mode (GIGA) | 10 | | | | | | | |
| Functions | | Auto power control (APC), dynamic power control (DPC), timer, zero reset, resetting settings, eco mode, bank switching, power tuning, and hysteresis width | | | | | | | |
| Maximum connectable units | | 30 | | | | | | | |

[*1] The mutual interference prevention function is disabled if the detection mode is set to super-high-speed mode.

### Easy One-Button-Teaching/Smart Tuning


Easy setting of optimum power and threshold by pushing tune button twice.

### Smart power control

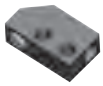
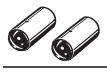
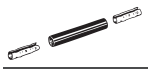



Enhanced signal stability control for compensating power reductions caused by temperature drift, dust or aging of LED. Alarm output added for predictive maintenance.

### N-Smart platform


The N-Smart platform provides wide portfolio of advanced sensors – all with the same intuitive operation concept and field bus connectivity.

## Accessories

| Shape | Type | Comment | Order code |
|---|---|---|---|
|  | Focal lens | – Extends sensing distance by more than 500%<br>– For M4 Through beam fibers E32-TC200, E32-ET11R, E32-T11 (fits M2.6 thread)<br>– 2 pcs per set | E39-F1 |
|  | Focal lens (side view) | – For M4 through beam fibers E32-TC200, E32-ET11R, E32-T11, E32-T61-S, E32-T81R-S (fits M2.6 thread)<br>– Temperature range –40 to 200°C<br>– 2 pcs per set | E39-F2 |
|  | Focal lens (variable) | – For precision detection with E32-D32, E32-EC41 | E39-F3A |
|  | Focal lens | – For precision detection with E32-EC41 | E39-F3A-5 |
|  | | – For precision detection with E32-EC41 | E39-F3B |
| | | – For precision detection with M6 coaxial diffuse reflective fibers (e.g. E32-CC200) | E39-F18 |
|  | Focal lens (side view, variable) | – For precision detection with E32-EC31 | E39-EF51 |
|  | Focal lens (heat resistant) | – Extends sensing distance by more than 500%<br>– For M4 through beam fibers E32-ET51, E32-T61, E32-T61-S, E32-T81R, E32-T81R-S (fits M4 thread)<br>– Temperature range –60 to 350°C<br>– 2 pcs per set | E39-EF1-37-2<br>E39-F16 |
|  | Focal lens (vacuum resistant, heat resistant) | – Fits E32-T51V and E32-T54V (fits M2.6 thread)<br>– 2 units per set<br>– Heat resistant up to 120°C | E39-F1V |
|  | Fiber cutter | – Included in applicable fiber | E39-F4 |
|  | Thin fiber attachment | – Amplifier adapter for thin fibers<br>– Included in applicable fiber (2 sets) | E39-F9 |
|  | Sleeve bender | – For E32-TC200B(4)<br>– For E32-TC200F(4)<br>– For E32-DC200F(4) | E39-F11 |
|  | Single fiber extension connector | – Fiber extension connector for 2.2 mm dia standard fibers<br>– One unit | E39-F10 |
|  | Dual fiber extension connector | – For fibers with dia 2.2 | E39-F13 |
| | | – For fiber with dia 1.0 | E39-F14 |
| | | – For fibers with dia between 1.0 and 2.2 | E39-F15 |
|  | Protective spiral tube *1 | – For M3 diffuse type sensors<br>– Length 1 m | E39-F32A |
| | | – For M3 through beam type sensors<br>– Length 1 m | E39-F32B |
| | | – For M4 through beam type sensors<br>– Length 1 m | E39-F32C |
| | | – For M6 diffuse type sensors<br>– Length 1 m | E39-F32D |
|  | Fiber on roll *2 | – Dia 2.2 mm<br>– Standard monocore, 10 mm bending radius<br>– –40 to 80°C | E32-E01 100M |
| | | – Dia 1.1 mm<br>– Standard monocore, 15 mm bending radius<br>– –40 to 80°C | E32-E02 100M |
| | | – Dia 2.2 mm<br>– High flex multicore, 1 mm bending radius<br>– –40 to 80°C | E32-E01R 100M |
| | | – Dia 1.1 mm<br>– High flex multicore, 1 mm bending radius<br>– –40 to 80°C | E32-E02R 100M |
| | | – Dia 2.2 mm<br>– High temperature monocore, 20 mm bending radius<br>– –60 to 150°C | E32-E05 100M |

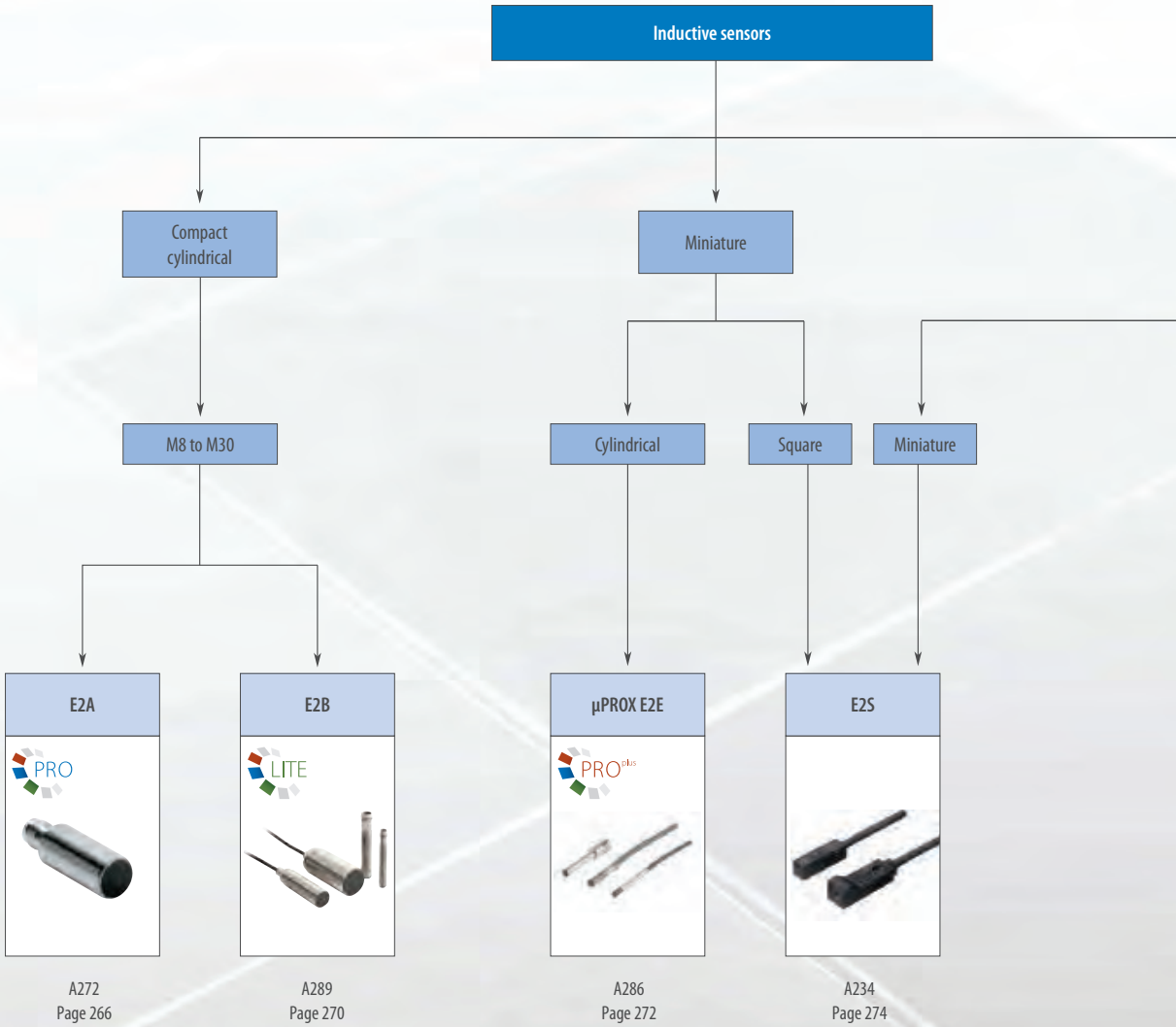
*1 Protective spiral tubes with 0.5 m length are available. Add '5' to order code … e.g. E39-F32A5
*2 Fiber length 100 m on a roll – cut to length

# ZERO TOLERANCE ON FAILURE

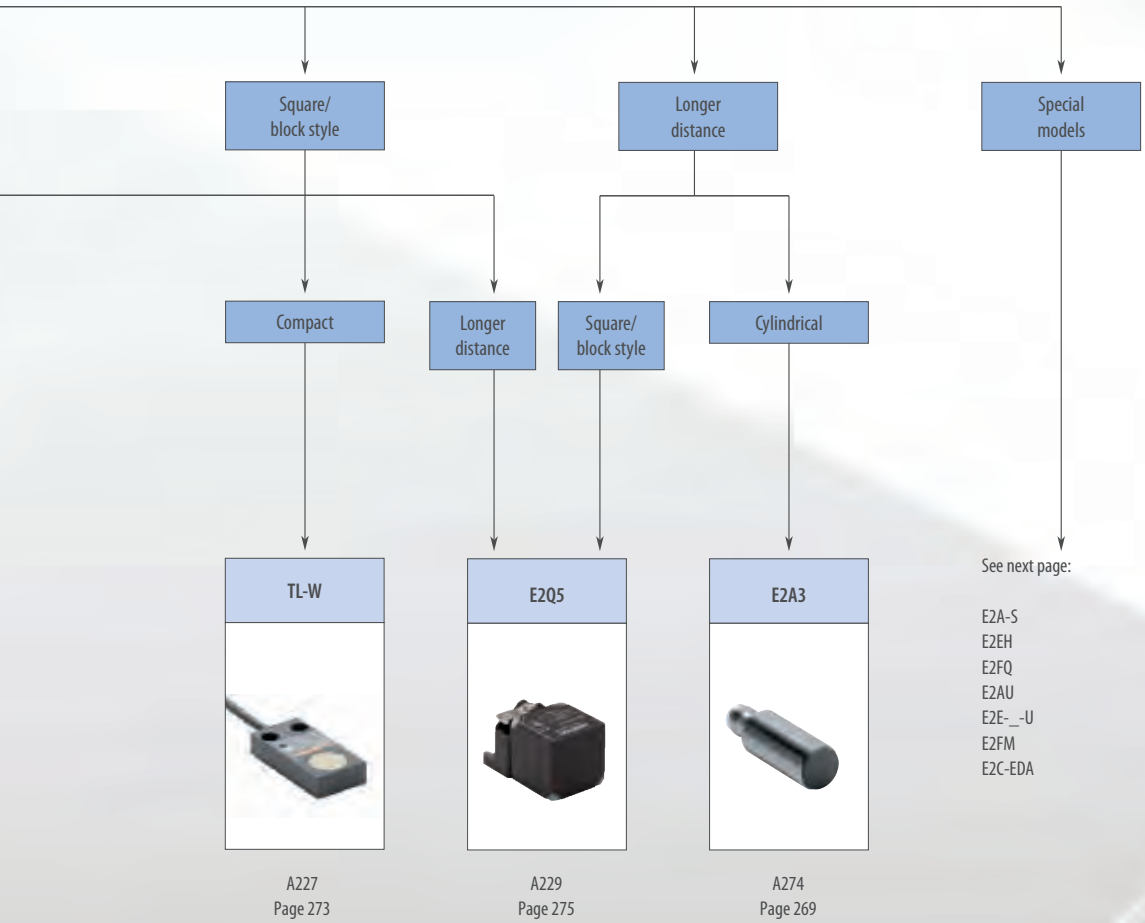
## Tested reliability for demanding conditions

Our inductive sensors are designed and tested to ensure a long service life and to achieve maximum machine availability even in the harshest environments.
This trusted reliability makes the E2A one of the world's most popular and successful inductive proximity sensors with more than one million units sold every year.

- Wide portfolio and application range
- Highest reliability even in demanding environments
- Designed for flexibility - modular housing design for best performance fit



361°


Square/ block style
Longer distance
Special models
Compact
Longer distance
Square/ block style
Cylindrical
TL-W
E2Q5
E2A3
See next page:
E2A-S
E2EH
E2FQ
E2AU
E2E-_-U
E2FM
E2C-EDA
A227
Page 273
A229
Page 275
A274
Page 269

# Selection table

| Format | | Cylindrical | | | |
|---|---|---|---|---|---|
| | |  |  |  |  |
| **Model** | | **E2A** | **E2A3** | **E2A-S** | **E2B** |
| **361° product line** | | PRO | PRO$^{plus}$ | PRO | LITE |
| **Type** | | Compact | Long distance | Compact | Compact |
| **Material** | | Brass, SUS | Brass | Stainless steel | Stainless steel |
| Max. sensing distance | dia. 3 | – | – | – | – |
| | dia. 4 | – | – | – | – |
| | M5 | – | – | – | – |
| | dia. 6.5 | – | – | – | – |
| | M8 | 2/4 mm | 3 mm | 2/4 mm | 2/4 mm |
| | M12 | 4/8 mm | 6 mm | 4/8 mm | 4/8 mm |
| | M18 | 8/16 mm | 11 mm | 8/16 mm | 8/16 mm |
| | M30 | 15/30 mm | 20 mm | 15/20 mm | 15/30 mm |
| | 19 × 6 × 6 | – | – | – | – |
| | 22 × 8 × 6 | – | – | – | – |
| | 31 × 18 × 10 | – | – | – | – |
| | 53 × 40 × 23 | – | – | – | – |
| | 67 × 40 × 40 | – | – | – | – |
| Mount. | Shielded | ■ | ■ | ■ | ■ |
| | Non-shielded | ■ | – | ■ | ■ |
| Oper. mode | NO | ■ | ■ | ■ | ■ |
| | NC | ■ | ■ | ■ | ■ |
| | NO + NC | ■ | – | ■ | – |
| Wiring | DC 2-wire | ■ | – | – | – |
| | DC 3-wire | ■ | ■ | ■ | ■ |
| | DC 4-wire | ■ | – | ■ | – |
| | AC 2-wire | – | – | – | – |
| Voltage | 10 to 30 VDC | ■ | ■ | ■ | ■ |
| | 12 to 240 VAC | – | – | – | – |
| IP rating | IP67 | ■ | ■ | ■ | ■ |
| | IP69K | ■ | ■ | ■ | – |
| | Page/Quick Link | 266 | 269 | 268 | 270 |

## Special models

| Type | Vehicle usage certified | Detergent and heat resistant | Chemical resistant | Small diameter |
|---|---|---|---|---|
| |  |  |  |  |
| **Model** | **E2AU** | **E2EH** | **E2FQ** | **µPROX E2E** |
| **361° product line** | PRO$^{plus}$ | PRO$^{plus}$ | PRO$^{plus}$ | PRO$^{plus}$ |
| **Key features** | • e1 type approval (according to automotive directive 2005/83/EC)<br>• E1 (according to vehicle regulation ECE-R10) | • Stainless steel housing<br>• 120°C heat resistance | • PTFE housing | • High frequency of 5 kHz: suitable for high-speed counting<br>• All sizes are also available as non-shielded types |
| **dia. 3** | – | – | – | ■ |
| **dia. 4** | | | | ■ |
| **dia. 6.5** | – | – | – | ■ |
| **M5** | | | | ■ |
| **M8** | – | – | – | – |
| **M12** | ■ | ■ | ■ | – |
| **M18** | ■ | ■ | ■ | – |
| **M30** | ■ | ■ | ■ | – |
| **Page/Quick Link** | 277 | 276 | A246 | 272 |

| Format | | Square | | |
|---|---|---|---|---|
| | |  |  |  |
| **Model** | | **TL-W** | **E2S** | **E2Q5** |
| **Type** | | Compact | Miniature | Long distance |
| **Material** | | ABS | Polyarylate | PBT |
| **Max. sensing distance** | dia. 3 | – | – | – |
| | dia. 4 | – | – | – |
| | M5 | – | – | – |
| | dia. 5.4 | – | – | – |
| | M8 | – | – | – |
| | M12 | – | – | – |
| | M18 | – | – | – |
| | M30 | – | – | – |
| | 19 × 6 × 6 | – | 1.6 mm | – |
| | 22 × 8 × 6 | 3 mm | 2.5 mm | – |
| | 31 × 18 × 10 | 5 mm | – | – |
| | 53 × 40 × 23 | 20 mm | – | – |
| | 67 × 40 × 40 | – | – | 40 mm |
| **Mount.** | Shielded | ■ | – | ■ |
| | Non-shielded | ■ | ■ | ■ |
| **Oper. mode** | NO | ■ | ■ | ■ |
| | NC | ■ | ■ | – |
| | NO + NC | – | – | ■ |
| **Wiring** | DC 2-wire | ■ | ■ | – |
| | DC 3-wire | ■ | ■ | ■ |
| | DC 4-wire | – | – | ■ |
| | AC 2-wire | – | – | – |
| **Voltage** | 10 to 30 VDC | ■ | ■ | ■ |
| | 12 to 240 VAC | – | – | – |
| **IP rating** | IP67 | ■ | ■ | ■ |
| | IP69K | – | – | ■ |
| | Page/Quick Link | 273 | 274 | 275 |

## Special models

| Type | Full metal face | Oil resistant | High precision positioning |
|---|---|---|---|
| |  |  |  |
| **Model** | **E2FM** | **E2E-_U** | **E2C-EDA** |
| **361° product line** | PRO$^{plus}$ | PRO$^{plus}$ | PRO$^{plus}$ |
| **Key features** | • Immune to aluminum and cast iron chips on sensing surface<br>• Oil resistant | • Tested oil resistance on commonly used lubricants | • Distance teaching up to µm accuracy |
| **dia. 3** | – | – | ■ |
| **dia. 4** | – | – | – |
| **dia. 6.5** | – | – | – |
| **M5** | – | – | – |
| **M8** | ■ | ■ | – |
| **M12** | ■ | ■ | ■ |
| **M18** | ■ | ■ | ■ |
| **M30** | ■ | ■ | – |
| **Page/Quick Link** | 279 | 278 | 281 |

■ Standard ☐ Available – No/not available

PRO

## Extended sensing range inductive sensor in cylindrical brass housing

The high quality and the long-life design of the E2A extended sensing distance provide high operational reliability, accurate performance and long sensor lifetime for a wide range of applications.

- Extended (double) sensing distance
- IP67 and IP69k for highest water protection
- DC 3-wire (NO, NC)
- Wide temperature range –40 to 70°C
- 200 mA max load current
- Wide installation and connectivity range through modular concept

## Ordering information

### Pre-wired

| Size | | | Sensing distance | Thread length (overall length) | Output configuration | Order code (for pre-wired types with 2 m PVC cable) | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | Operation mode NO | Operation mode NC | DC 4-wire (NO+NC-PNP models) |
| M8 | ■ | – | 2.0 mm | 27 (40) mm | PNP*1 | E2A-S08KS02-WP-B1 2M*2 | E2A-S08KS02-WP-B2 2M*2 | E2A-S08LS02-WP-B3 2M*3 |
| | – | ■ | 4.0 mm | 21 (40) mm | PNP*1 | E2A-S08KN04-WP-B1 2M*2 | E2A-S08KN04-WP-B2 2M*2 | E2A-S08LN04-WP-B3 2M*3 |
| M12 | ■ | – | 4.0 mm | 34 (50) mm | PNP*1 | E2A-M12KS04-WP-B1 2M | E2A-M12KS04-WP-B2 2M | E2A-M12KS04-WP-B3 2M |
| | – | ■ | 8.0 mm | 27 (50) mm | PNP*1 | E2A-M12KN08-WP-B1 2M | E2A-M12KN08-WP-B2 2M | E2A-M12KN08-WP-B3 2M |
| M18 | ■ | – | 8.0 mm | 39 (59) mm | PNP*1 | E2A-M18KS08-WP-B1 2M | E2A-M18KS08-WP-B2 2M | E2A-M18KS08-WP-B3 2M |
| | – | ■ | 16.0 mm | 29 (59) mm | PNP*1 | E2A-M18KN16-WP-B1 2M | E2A-M18KN16-WP-B2 2M | E2A-M18KN16-WP-B3 2M |
| M30 | ■ | – | 15.0 mm | 44 (64) mm | PNP*1 | E2A-M30KS15-WP-B1 2M | E2A-M30KS15-WP-B2 2M | E2A-M30KS15-WP-B3 2M |
| | – | ■ | 20.0 mm*4 | 29 (64) mm | PNP*1 | E2A-M30KN20-WP-B1 2M | E2A-M30KN20-WP-B2 2M | E2A-M30KN20-WP-B3 2M |

### Connector types (M12)

| Size | | | Sensing distance | Thread length (overall length) | Output configuration | Order code (for M12 connector types) | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | Operation mode NO | Operation mode NC | DC 4-wire (NO+NC-PNP models) |
| M8 | ■ | – | 2.0 mm | 27 (43) mm | PNP*1 | E2A-S08KS02-M1-B1*2 | E2A-S08KS02-M1-B2*2 | E2A-S08LS02-M3-B3*5 |
| | – | ■ | 4.0 mm | 21 (43) mm | PNP*1 | E2A-S08KN04-M1-B1*2 | E2A-S08KN04-M1-B2*2 | E2A-S08LN04-M3-B3*5 |
| M12 | ■ | – | 4.0 mm | 24 (48) mm | PNP*1 | E2A-M12KS04-M1-B1 | E2A-M12KS04-M1-B2 | E2A-M12KS04-M1-B3 |
| | – | ■ | 8.0 mm | 27 (48) mm | PNP*1 | E2A-M12KN08-M1-B1 | E2A-M12KN08-M1-B2 | E2A-M12KN08-M1-B3 |
| M18 | ■ | – | 8.0 mm | 39 (53) mm | PNP*1 | E2A-M18KS08-M1-B1 | E2A-M18KS08-M1-B2 | E2A-M18KS08-M1-B3 |
| | – | ■ | 16.0 mm | 29 (53) mm | PNP*1 | E2A-M18KN16-M1-B1 | E2A-M18KN16-M1-B2 | E2A-M18KN16-M1-B3 |
| M30 | ■ | – | 15.0 mm | 44 (58) mm | PNP*1 | E2A-M30KS15-M1-B1 | E2A-M30KS15-M1-B2 | E2A-M30KS15-M1-B3 |
| | – | ■ | 20.0 mm*4 | 29 (58) mm | PNP*1 | E2A-M30KN20-M1-B1 | E2A-M30KN20-M1-B2 | E2A-M30KN20-M1-B3 |

### DC 2-Wire models

| Size | | | Sensing distance | Thread length (overall length) | Body material | Operation mode | Order code (for pre-wired types with 2 m PVC cable) |
|---|---|---|---|---|---|---|---|
| | | | | | | | DC 2-wire (NO)*1 |
| M8 | ■ | – | 2.0 mm | 27 (40) mm | Stainless steel | NO | E2A-S08KS02-WP-D1 2M |
| | – | ■ | 4.0 mm | 21 (40) mm | | | E2A-S08KN04-WP-D1 2M |
| M12 | ■ | – | 4.0 mm | 34 (50) mm | Brass-nickel plated | | E2A-M12KS04-WP-D1 2M |
| | – | ■ | 8.0 mm | 27 (50) mm | | | E2A-M12KN08-WP-D1 2M |
| M18 | ■ | – | 8.0 mm | 39 (59) mm | | | E2A-M18KS08-WP-D1 2M |
| | – | ■ | 16.0 mm | 29 (59) mm | | | E2A-M18KN16-WP-D1 2M |
| M30 | ■ | – | 15.0 mm | 44 (64) mm | | | E2A-M30KS15-WP-D1 2M |
| | – | ■ | 20.0 mm | 29 (64) mm | | | E2A-M30KN20-WP-D1 2M |

### Gold-plated pins models

| Size | | | Sensing distance | Thread length (overall length) | Output configuration | Connection | Body material | Operation mode | Order code |
|---|---|---|---|---|---|---|---|---|---|
| M8 | ■ | – | 2 mm | 27 (40) mm | NPN | Connector M8 3 pin: gold-plated | Stainless steel | NO | E2A-S08KS02-M5-C1-4 |
| | ■ | – | | 49 (62) mm | | | | | E2A-S08LS02-M5-C1-4 |
| M12 | ■ | – | 4 mm | 34 (48) mm | PNP | Connector M12 4 pin: gold-plated | Brass-nickel plated | | E2A-M12KS04-M1-B1-4 |
| | – | ■ | 8 mm | | | | | | E2A-M12KN08-M1-B1-4 |

*1 NPN models are available. For ordering replace "-B1", "-B2", "-B3"or "-D1" by "-C1", "-C2" or "-C3".
*2 M8 sized housings are only available in stainless steel (SUS 303).
*3 Longer housing with thread length 49 mm and overall length 62 mm.
*4 Models with longer sensing distances of 30 mm and 35 mm are available.
*5 Models with M8 4-pin connector and thread length 49 mm and overall length 61 mm.

## Specifications

(Exemplary for shielded versions.)

| Item | | M8 | M12 | M18 | M30 |
|---|---|---|---|---|---|
| | | E2A-S08KS | E2A-M12KS | E2A-M18KS | E2A-M30KS |
| Sensing distance | | 2 mm±10% | 4 mm±10% | 8 mm±10% | 15 mm±10% |
| Response frequency | | 1,500 Hz | 1,000 Hz | 500 Hz | 250 Hz |
| Power supply voltage (operating voltage) | | 12 to 24 VDC. Ripple (p-p): 10% max. (10 to 32 VDC) | | | |
| Protective circuits | | Power supply reverse polarity protection, surge suppressor, short-circuit protection | Output reverse polarity protection, power supply reverse polarity protection, surge suppressor, short-circuit protection | | |
| Ambient temperature | Operating | –40 to 70°C | | | |
| | Storage | –40 to 85°C (with no icing or condensation) | | | |
| Degree of protection | | IP67 after IEC 60529; IP69K after DIN 40050 part 9 | | | |
| Material | Case | Stainless steel | Brass-nickel plated | | |
| | Sensing surface | PBT | | | |

### Optional features

Refer to complete datasheet or contact your OMRON representative for the below optional features

### Sensing module and body

– single sensing distance (ideal for compatibility with previous machine generations)
– Long body (ideal for mounting through thicker constructions)

### Connection

– M8 4-pin (for ordering replace -M1 by -M3 e.g. E2A-S08KS02-M3-B1)
– M8 3-pin (for ordering replace -M1 by -M5 e.g. E2A-S08KS02-M5-B1)
– PUR cable
– Pigtails with M8 or M12 plugs

### Output

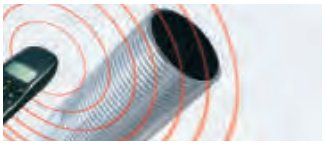
– 400 mA max. load current (ideal for switching higher load currents directly)
– DC 2-wire (ideal for reduced wiring; leakage current can be used to detect cable breakage)
– DC 4-wire (NO+NC output – ideal for reduced stock for spare parts; antivalent signal can be used to detect cable breakage)

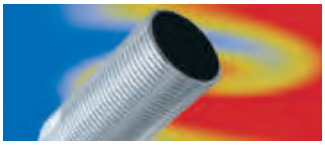



High water resistance


Cable breakage protection


High mechanical resistance


High electro-magnetic noise immunity


High resistance against temperature change


High vibration resistance

## Extended sensing range inductive sensor in cylindrical stainless steel housing

The performance and operational reliability of the E2A family is also available in stainless steel housing.

- Stainless steel housing (SUS 303)

PRO

## Ordering information

### Pre-wired

| Size | ■ | ■ | Sensing distance | Thread length (overall length) | Output configuration | Order code (for pre-wired types with 2 m PVC cable) | |
|---|---|---|---|---|---|---|---|
| | | | | | | Operation mode NO | Operation mode NC |
| M8 | ■ | – | 2.0 mm | 27 (40) mm | PNP*1 | E2A-S08KS02-WP-B1 2M | E2A-S08KS02-WP-B2 2M |
| | – | ■ | 4.0 mm | 21 (40) mm | PNP*1 | E2A-S08KN04-WP-B1 2M | E2A-S08KN04-WP-B2 2M |
| M12 | ■ | – | 4.0 mm | 34 (50) mm | PNP*1 | E2A-S12KS04-WP-B1 2M | E2A-S12KS04-WP-B2 2M |
| | – | ■ | 8.0 mm | 27 (50) mm | PNP*1 | E2A-S12KN08-WP-B1 2M | E2A-S12KN08-WP-B2 2M |
| M18 | ■ | – | 8.0 mm | 39 (59) mm | PNP*1 | E2A-S18KS08-WP-B1 2M | E2A-S18KS08-WP-B2 2M |
| | – | ■ | 16.0 mm | 29 (59) mm | PNP*1 | E2A-S18KN16-WP-B1 2M | E2A-S18KN16-WP-B2 2M |
| M30 | ■ | – | 15.0 mm | 44 (64) mm | PNP*1 | E2A-S30KS15-WP-B1 2M | E2A-S30KS15-WP-B2 2M |
| | – | ■ | 20.0 mm*2 | 29 (64) mm | PNP*1 | E2A-S30KN20-WP-B1 2M | E2A-S30KN20-WP-B2 2M |

### Connector types (M12)

| Size | ■ | ■ | Sensing distance | Thread length (overall length) | Output configuration | Order code (for M12 connector types) | |
|---|---|---|---|---|---|---|---|
| | | | | | | Operation mode NO | Operation mode NC |
| M8 | ■ | – | 2.0 mm | 27 (43) mm | PNP*1 | E2A-S08KS02-M1-B1 | E2A-S08KS02-M1-B2 |
| | – | ■ | 4.0 mm | 21 (43) mm | PNP*1 | E2A-S08KN04-M1-B1 | E2A-S08KN04-M1-B2 |
| M12 | ■ | – | 4.0 mm | 24 (48) mm | PNP*1 | E2A-S12KS04-M1-B1 | E2A-S12KS04-M1-B2 |
| | – | ■ | 8.0 mm | 27 (48) mm | PNP*1 | E2A-S12KN08-M1-B1 | E2A-S12KN08-M1-B2 |
| M18 | ■ | – | 8.0 mm | 39 (53) mm | PNP*1 | E2A-S18KS08-M1-B1 | E2A-S18KS08-M1-B2 |
| | – | ■ | 16.0 mm | 29 (53) mm | PNP*1 | E2A-S18KN16-M1-B1 | E2A-S18KN16-M1-B2 |
| M30 | ■ | – | 15.0 mm | 44 (58) mm | PNP*1 | E2A-S30KS15-M1-B1 | E2A-S30KS15-M1-B2 |
| | – | ■ | 20.0 mm*2 | 29 (58) mm | PNP*1 | E2A-S30KN20-M1-B1 | E2A-S30KN20-M1-B2 |

*1 NPN models are available. For ordering replace "-B1" or "-B2" by "-C1" or "-C2".
*2 Models with longer sensing distances of 30 mm and 35 mm are available.

## Specifications

(Exemplary for shielded versions)

| Item | | M8 | M12 | M18 | M30 |
|---|---|---|---|---|---|
| | | E2A-S08KS | E2A-M12KS | E2A-M18KS | E2A-M30KS |
| Sensing distance | | 2 mm±10% | 4 mm±10% | 8 mm±10% | 15 mm±10% |
| Response frequency | | 1,500 Hz | 1,000 Hz | 500 Hz | 250 Hz |
| Power supply voltage (operating voltage) | | 12 to 24 VDC. Ripple (p-p): 10% max. (10 to 32 VDC) | | | |
| Protective circuits | | Power supply reverse polarity protection, surge suppressor, short-circuit protection | Output reverse polarity protection, power supply reverse polarity protection, surge suppressor, short-circuit protection | | |
| Ambient temperature | Operating | –40 to 70°C | | | |
| | Storage | –40 to 85°C (with no icing or condensation) | | | |
| Degree of protection | | IP67 after IEC 60529; IP69K after DIN 40050 part 9 | | | |
| Material | Case | Stainless steel (SUS 303) | | | |
| | Sensing surface | PBT | | | |

PRO

## Long (triple) distance inductive sensor in cylindrical brass housing

The E2A3 family features an optimised sensing performance to achieve triple sensing distance for quasi flush mounting requirements.

- Triple distance for enhanced sensor protection from mechanical damage
- IP67 and IP69k

## Ordering information

### Pre-wired

(For different cable materials and lengths, special housing length or special connectors, please refer to complete datasheet.)

| Size | | | Sensing distance | Thread length (overall length) | Output configuration | Order code (for pre-wired types with 2 m PVC cable) | |
|---|---|---|---|---|---|---|---|
| | | | | | | Operation mode: NO | Operation mode: NC |
| M8 | ■ | – | 3.0 mm | 27 (40) mm | PNP | E2A3-S08KS03-WP-B1 2M | E2A3-S08KS03-WP-B2 2M |
| | | | | | NPN | E2A3-S08KS03-WP-C1 2M | E2A3-S08KS03-WP-C2 2M |
| M12 | ■ | – | 6.0 mm | 34 (50) mm | PNP | E2A3-M12KS06-WP-B1 2M | E2A3-M12KS06-WP-B2 2M |
| | | | | | NPN | E2A3-M12KS06-WP-C1 2M | E2A3-M12KS06-WP-C2 2M |
| M18 | ■ | – | 11.0 mm | 39 (60) mm | PNP | E2A3-M18KS11-WP-B1 2M | E2A3-M18KS11-WP-B2 2M |
| | | | | | NPN | E2A3-M18KS11-WP-C1 2M | E2A3-M18KS11-WP-C2 2M |
| M30 | ■ | – | 20.0 mm | 44 (65) mm | PNP | E2A3-M30KS20-WP-B1 2M | E2A3-M30KS20-WP-B2 2M |
| | | | | | NPN | E2A3-M30KS20-WP-C1 2M | E2A3-M30KS20-WP-C2 2M |

### Connector types (M12)

| Size | | | Sensing distance | Thread length (overall length) | Output configuration | Order code (for M12 connector types) | |
|---|---|---|---|---|---|---|---|
| | | | | | | Operation mode: NO | Operation mode: NC |
| M8 | ■ | – | 3.0 mm | 27 (44) mm | PNP | E2A3-S08KS03-M1-B1 | E2A3-S08KS03-M1-B2 |
| | | | | | NPN | E2A3-S08KS03-M1-C1 | E2A3-S08KS03-M1-C2 |
| M12 | ■ | – | 6.0 mm | 34 (49) mm | PNP | E2A3-M12KS06-M1-B1 | E2A3-M12KS06-M1-B2 |
| | | | | | NPN | E2A3-M12KS06-M1-C1 | E2A3-M12KS06-M1-C2 |
| M18 | ■ | – | 11.0 mm | 39 (54) mm | PNP | E2A3-M18KS11-M1-B1 | E2A3-M18KS11-M1-B2 |
| | | | | | NPN | E2A3-M18KS11-M1-C1 | E2A3-M18KS11-M1-C2 |
| M30 | ■ | – | 20.0 mm | 44 (59) mm | PNP | E2A3-M30KS20-M1-B1 | E2A3-M30KS20-M1-B2 |
| | | | | | NPN | E2A3-M30KS20-M1-C1 | E2A3-M30KS20-M1-C2 |

## Specifications

| Item | | M8 | M12 | M18 | M30 |
|---|---|---|---|---|---|
| | | E2A3-S08KS03 | E2A3-M12KS06- | E2A3-M18KS11 | E2A3-M30KS20 |
| Sensing distance | | 3 mm±10% | 6 mm±10% | 11 mm±10% | 20 mm±10% |
| Response frequency | | 700 Hz | 350 Hz | 250 Hz | 80 Hz |
| Power supply voltage (operating voltage) | | 12 to 24 VDC. Ripple (p-p): 10% max. (10 to 32 VDC) | | | |
| Protective circuits | | Power supply reverse polarity protection, surge suppressor, short-circuit protection | Output reverse polarity protection, power supply reverse polarity protection, surge suppressor, short-circuit protection | | |
| Ambient temperature | Operating | –25 to 70°C | | | |
| | Storage | | | | |
| Degree of protection | | IP67 after IEC 60529; IP69K after DIN 40050 part 9 | | | |
| Material | Case | Stainless steel | Brass-nickel plated | | |
| | Sensing surface | PBT | | | |

## The ideal solution for standard industrial conditions

Thanks to the simple construction and Omron's innovative "hot melt" production process, the E2B sensors embody two characteristics: value-for-money and high reliability.

- All-round-visible indicator
- The laser printed part number
- Vibration shock resistance: IEC 60947-5-2 (10 to 55 Hz)
- Operating temperature: –25 to 70°C
- Water resistance: IP67

## Ordering information

### Pre-wired

| Size |  |  | Sensing distance | Output configuration | Order code (for pre-wired types with 2 m PVC cable) | |
|---|---|---|---|---|---|---|
| | | | | | Operation mode NO | Operation mode NC |
| M8 | ■ | – | 2.0 mm | PNP[*1] | E2B-S08KS02-WP-B1 2M[*2] | E2B-S08KS02-WP-B2 2M[*2] |
| | – | ■ | 4.0 mm | PNP[*1] | E2B-S08KN04-WP-B1 2M[*2] | E2B-S08KN04-WP-B2 2M[*2] |
| M12 | ■ | – | 4.0 mm | PNP[*1] | E2B-M12KS04-WP-B1 2M | E2B-M12KS04-WP-B2 2M |
| | – | ■ | 8.0 mm | PNP[*1] | E2B-M12KN08-WP-B1 2M | E2B-M12KN08-WP-B2 2M |
| M18 | ■ | – | 8.0 mm | PNP[*1] | E2B-M18KS08-WP-B1 2M | E2B-M18KS08-WP-B2 2M |
| | – | ■ | 16.0 mm | PNP[*1] | E2B-M18KN16-WP-B1 2M | E2B-M18KN16-WP-B2 2M |
| M30 | ■ | – | 15.0 mm | PNP[*1] | E2B-M30KS15-WP-B1 2M | E2B-M30KS15-WP-B2 2M |
| | – | ■ | 30.0 mm | PNP[*1] | E2B-M30LN30-WP-B1 2M | E2B-M30LN30-WP-B2 2M |

### Connector types

| Size |  |  | Sensing distance | Output configuration | Order code | |
|---|---|---|---|---|---|---|
| | | | | | Operation mode NO | Operation mode NC |
| M8 | ■ | – | 2.0 mm | PNP[*1] | E2B-S08KS02-MC-B1[*2] | E2B-S08KS02-MC-B2[*2] |
| | – | ■ | 4.0 mm | PNP[*1] | E2B-S08KN04-MC-B1[*2] | E2B-S08KN04-MC-B2[*2] |
| M12 | ■ | – | 4.0 mm | PNP[*1] | E2B-M12KS04-M1-B1 | E2B-M12KS04-M1-B2 |
| | – | ■ | 8.0 mm | PNP[*1] | E2B-M12KN08-M1-B1 | E2B-M12KN08-M1-B2 |
| M18 | ■ | – | 8.0 mm | PNP[*1] | E2B-M18KS08-M1-B1 | E2B-M18KS08-M1-B2 |
| | – | ■ | 16.0 mm | PNP[*1] | E2B-M18KN16-M1-B1 | E2B-M18KN16-M1-B2 |
| M30 | ■ | – | 15.0 mm | PNP[*1] | E2B-M30KS15-M1-B1 | E2B-M30KS15-M1-B2 |
| | – | ■ | 30.0 mm | PNP[*1] | E2A-M30LN30-M1-B1 | E2B-M30LN30-M1-B2 |

[*1] NPN models are available. For ordering replace "-B1" or "-B2" by "-C1" or "-C2".
[*2] M8 sized housings are only available in stainless steel (SUS 303).

**Optional features**
Refer to complete datasheet or contact your OMRON representative for the below optional features

**Sensing module and body**
– Single sensing distance (ideal for compatibility with previous machine generations)
– Long body (ideal for mounting through thicker constructions)

**Connection**
– M8 3-pin -MC e.g. E2B-S08KS02-MC-B1

**Output**
– 200 mA max. load current

## Specifications

(Exemplary for shielded versions.)

| Item | | M8 | M12 | M18 | M30 |
|---|---|---|---|---|---|
| | | E2B-S08KS | E2B-M12KS | E2B-M18KS | E2B-M30KS |
| Sensing distance | | 2 mm±10% | 4 mm±10% | 8 mm±10% | 15 mm±10% |
| Response frequency | | 1,500 Hz | 1,000 Hz | 500 Hz | 250 Hz |
| Power supply voltage (operating voltage) | | 12 to 24 VDC. Ripple (p-p): 10% max. (10 to 32 VDC) | | | |
| Protective circuits | | Output reverse polarity protection, Power source circuit reverse polarity protection | | | |
| Ambient temperature | Operating and storage | –25 to 70°C | | | |
| Degree of protection | | IP67 after IEC 60529 | | | |
| Material | Case | Stainless steel | Brass-nickel plated | | |
| | Sensing surface | PBT | | | |

High-visibility ring LED indicator

Laser printing part number

## Small diameter proximity sensors for high precision detection

Omron's latest inductive technology has now been applied to a new range of small diameter inductive sensors. The new µPROX E2E provides precision detection and allows installation in even the most confined spaces. The portfolio has been extended to include non-shielded types and versions with pig-tail connector leads.

- Miniature size: 3, 4, 6.5 mm and M4, M5 diameters
- High frequency of 5 kHz: suitable for high-speed counting
- All sizes are also available as non-shielded types
- IP67 water ingress protection
- Highly visible indicators for easy operation confirmation

## Ordering information

| Size |  |  | Sensing distance | Connection | Output configuration | Order code | |
|---|---|---|---|---|---|---|---|
| | | | | | | Operation mode NO | Operation mode NC |
| dia 3 mm | ■ | | 0.8 mm | PW | PNP | E2E-C03SR8-WC-B1 2M OMS | E2E-C03SR8-WC-B2 2M OMS |
| | | | | | NPN | E2E-C03SR8-WC-C1 2M OMS | E2E-C03SR8-WC-C2 2M OMS |
| | | ■ | 2 mm | PW | PNP | E2E-C03N02-WC-B1 2M OMS | E2E-C03N02-WC-B2 2M OMS |
| | | | | | NPN | E2E-C03N02-WC-C1 2M OMS | E2E-C03N02-WC-C2 2M OMS |
| M4 | ■ | | 0.8 mm | PW | PNP | E2E-S04SR8-WC-B1 2M OMS | E2E-S04SR8-WC-B2 2M OMS |
| | | | | | NPN | E2E-S04SR8-WC-C1 2M OMS | E2E-S04SR8-WC-C2 2M OMS |
| | | ■ | 2 mm | PW | PNP | E2E-S04N02-WC-B1 2M OMS | E2E-S04N02-WC-B2 2M OMS |
| | | | | | NPN | E2E-S04N02-WC-C1 2M OMS | E2E-S04N02-WC-C2 2M OMS |
| dia 4 mm | ■ | | 1.2 mm | PW | PNP | E2E-C04S12-WC-B1 2M OMS | E2E-C04S12-WC-B2 2M OMS |
| | | | | | NPN | E2E-C04S12-WC-C1 2M OMS | E2E-C04S12-WC-C2 2M OMS |
| | | ■ | 3 mm | PW | PNP | E2E-C04N03-WC-B1 2M OMS | E2E-C04N03-WC-B2 2M OMS |
| | | | | | NPN | E2E-C04N03-WC-C1 2M OMS | E2E-C04N03-WC-C2 2M OMS |
| M5 | ■ | | 1.2 mm | PW | PNP | E2E-S05S12-WC-B1 2M OMS | E2E-S05S12-WC-B2 2M OMS |
| | | | | | NPN | E2E-S05S12-WC-C1 2M OMS | E2E-S05S12-WC-C2 2M OMS |
| | | ■ | 3 mm | PW | PNP | E2E-S05N03-WC-B1 2M OMS | E2E-S05N03-WC-B2 2M OMS |
| | | | | | NPN | E2E-S05N03-WC-C1 2M OMS | E2E-S05N03-WC-C2 2M OMS |
| dia 6.5 mm | ■ | | 2 mm | PW | PNP | E2E-C06S02-WC-B1 2M OMS | E2E-C06S02-WC-B2 2M OMS |
| | | | | | NPN | E2E-C06S02-WC-C1 2M OMS | E2E-C06S02-WC-C2 2M OMS |
| | | | | M8(3P) | PNP | E2E-C06S02-MC-B1 OMS | E2E-C06S02-MC-B2 OMS |
| | | | | | NPN | E2E-C06S02-MC-C1 OMS | E2E-C06S02-MC-C2 OMS |
| | | ■ | 4 mm | PW | PNP | E2E-C06N04-WC-B1 2M OMS | E2E-C06N04-WC-B2 2M OMS |
| | | | | | NPN | E2E-C06N04-WC-C1 2M OMS | E2E-C06N04-WC-C2 2M OMS |
| | | | | M8(3P) | PNP | E2E-C06N04-MC-B1 OMS | E2E-C06N04-MC-B2 OMS |
| | | | | | NPN | E2E-C06N04-MC-C1 OMS | E2E-C06N04-MC-C2 OMS |

## Specifications

| Item | | dia. 3/M4 | | dia. 4/M5 | | dia. 6.5 | |
|---|---|---|---|---|---|---|---|
| | | E2E-C03S/-S04S | E2E-C03N/-S04N | E2E-C04S/-S05S | E2E-C04N/-S05N | E2E-C06S | E2E-C06N |
| Sensing distance | | 0.8 mm±10% | 2.0 mm±10% | 1.2 mm±10% | 3.0 mm±10% | 2.0 mm±10% | 4 mm±10.% |
| Setting distance | | 0 to 0.56 mm | 0 to 1.4 mm | 0 to 0.84 mm | 0 to 2.1 mm | 0 to 1.4 mm | 0 to 2.8 mm |
| Response frequency | | 5 kHz | 3 kHz | 4 kHz | 2 kHz | 3 kHz | 4 kHz |
| Supply voltage | | 10 to 30 VDC | | | | | |
| Current consumption | | ≤10 mA | | | | | |
| Max. control output | | ≤50 mA | | ≤100 mA | | ≤200 mA | |
| Residual output voltage | | ≤2 V | | | | | |
| Ambient temperature range | | –25 to 70°C | | | | | |
| Ambient temperature fluctuation | | ≤15% | | | | | |
| Degree of protection | | IEC 60529 IP67 | | | | | |
| Material | Case | Stainless steel (SUS303) | | | | | |
| | Sensing surface | Heat-resistant ABS | | | | | |

## Flat shape inductive sensor in compact plastic housing

The TL-W family offers a wide range of block style inductive sensors for simple mounting on flat surfaces. With sensing distances from 1.5 mm to 20 mm the TL-W is the ideal solution for all standard applications.

- IP67
- DC 2-wire and DC 3-wire models
- Sensing distances from 1.5 mm to 20 mm
- Side facing sensing face

## Ordering information

### DC 2-wire

| Size in mm (H × W × D) | | | Sensing distance | Order code (for pre-wired types with 2 m PVC cable) | |
|---|---|---|---|---|---|
| | | | | Operation mode normally open (NO) | Operation mode normally closed (NC) |
| 31 × 18 × 10 | – | ■ | 5 mm | TL-W5MD1 | TL-W5MD2 |

### DC 3-wire

| Size in mm (H × W × D) | | | Sensing distance | Order code (for pre-wired types with 2 m PVC cable) | | | |
|---|---|---|---|---|---|---|---|
| | | | | PNP-NO | PNP-NC | NPN-NO | NPN-NC |
| 25 × 8 × 5 | – | ■ | 1.5 mm | TL-W1R5MB1 | – | TL-W1R5MC1 | – |
| 22 × 8 × 6 | | | 3 mm | TL-W3MB1 | TL-W3MB2 | TL-W3MC1 | TL-W3MC2 |
| 31 × 18 × 10 | | | 5 mm | TL-W5MB1 | TL-W5MB2 | TL-W5MC1 | TL-W5MC2 |
| 53 × 40 × 23 | | | 20 mm | – | – | TL-W20ME1 | TL-W20ME2 |
| 31 × 18 × 10 | ■ | – | 5 mm | TL-W5F1 | TL-W5F2 | TL-W5E1 | TL-W5E2 |

## Specifications

| Item | | TL-W5MD_ | TL-W1R5M_1 | TL-W3M_ _ | TL-W5M_ _ | TL-W5E_/F_ | TL-W20ME_ |
|---|---|---|---|---|---|---|---|
| Sensing distance | | 5 mm±10% | 1.5 mm±10% | 3 mm±10% | 5 mm±10% | | 20 mm±10% |
| Response frequency | | 500 Hz | 1 kHz min. | 600 Hz min. | 500 Hz min. | 300 Hz min. | 40 Hz min. |
| Power supply voltage (operating voltage) | | 12 to 24 VDC (10 to 30 VDC) ripple (p-p): 10% max. | | | | 10 to 30 VDC with a ripple (p-p) of 20% max. | 12 to 24 VDC (10 to 30 VDC) ripple (p-p): 10% max. |
| Protective circuits | | Surge absorber; short-circuit protection | Surge suppressor; power supply reverse polarity protection | | | | |
| Ambient temperature | Operating | –25 to 70°C (with no icing or condensation) | | | | | |
| | Storage | | | | | | |
| Degree of protection | | IEC60529 IP67 | | | | | |
| Material | Case | Heat-resistant ABS resin | | | | Diecast aluminum | Heat-resistant ABS resin |
| | Sensing surface | Heat-resistant ABS resin | | | | | |

## Miniature square inductive sensor in plastic housing

The E2S family features miniature block style plastic housings for simple mounting on flat surfaces. The durable plastic housing with front or side facing sensing surfaces, provide best value-performance ratio for machine part movement detection.

- Miniature housing
- Front and side facing sensing faces
- Models with simple one-screw mounting
- IP67

## Ordering information

### DC 2-wire

| Size in mm (H × W × D) |  |  | Sensing distance | Sensing face | | Order code (pre-wired types with 1 m cable length) | |
|---|---|---|---|---|---|---|---|
| | | | |  |  | Operation mode NO | Operation mode NC |
| 19 × 6 × 6 | – | ■ | 1.6 mm | ■ | – | E2S-W11 1M | E2S-W12 1M |
| | | | | – | ■ | E2S-Q11 1M | E2S-Q12 1M |
| 23 × 8 × 8 | | | 2.5 mm | ■ | – | E2S-W21 1M | E2S-W22 1M |
| | | | | – | ■ | E2S-Q21 1M | E2S-Q22 1M |

### DC 3-wire

| Size in mm (H × W × D) |  |  | Sensing distance | Sensing face | | Output specifications | Order code (pre-wired types with 1m cable length) | |
|---|---|---|---|---|---|---|---|---|
| | | | |  |  | | Operation mode NO | Operation mode NC |
| 19 × 6 × 6 | – | ■ | 1.6 mm | ■ | – | NPN | E2S-W13 1M | E2S-W14 1M |
| | | | | – | ■ | | E2S-Q13 1M | E2S-Q14 1M |
| 27 × 8 × 8 | | | 2.5 mm | ■ | – | | E2S-W23 1M | E2S-W24 1M |
| | | | | – | ■ | | E2S-Q23 1M | E2S-Q24 1M |
| 19 × 6 × 6 | | | 1.6 mm | ■ | – | PNP | E2S-W15 1M | E2S-W16 1M |
| | | | | – | ■ | | E2S-Q15 1M | E2S-Q16 1M |
| 23 × 8 × 8 | | | 2.5 mm | ■ | – | | E2S-W25 1M | E2S-W26 1M |
| | | | | – | ■ | | E2S-Q25 1M | E2S-Q26 1M |

## Specifications

| Item | | E2S-W1<br>E2S-Q1 | E2S-W2<br>E2S-Q2 |
|---|---|---|---|
| Sensing distance | | 1.6 mm±10% | 2.5 mm±15% |
| Response frequency | | 1 kHz min. | |
| Power supply voltage (operating voltage) | | 12 to 24 VDC (10 to 30 VDC), ripple (p-p): 10% max. | |
| Protective circuits | | Surge suppressor; power supply reverse polarity protection | |
| Ambient temperature | Operating | –25 to 70°C | |
| | Storage | –40 to 85°C (with no icing or condensation) | |
| Degree of protection | | IEC60529 IP67 | |
| Material | Case | Polyarylate | |

## Long distance inductive proximity sensor in plastic housing

The long sensing distance and simple installation on flat surfaces make the E2Q5 ideal for the detection of large metal objects for example in automotive assembly lines.

- M12 Plug-in connection
- Integrated short circuit and reverse polarity protection
- Sensing face positioning: Y-axis 15°, X-axis 90° increments

## Ordering information

### Connector types (M12)

| Size in mm (H × W × D) |  |  | Sensing distance | Sensing face | Output configuration | Order code (for M12 connector types) | |
|---|---|---|---|---|---|---|---|
| | | | | | | Operation mode NO | Operation mode NO + NC |
| 67 × 40 × 40 | ■ | – | 20 mm | Changeable | NPN | E2Q5-N20E1-M1 | E2Q5-N20E3-M1 |
| | | | | | PNP | E2Q5-N20F1-M1 | E2Q5-N20F3-M1 |
| | – | ■ | 40 mm | | NPN | E2Q5-N40ME1-M1 | E2Q5-N40ME3-M1 |
| | | | | | PNP | E2Q5-N40MF1-M1 | E2Q5-N40MF3-M1 |

## Specifications

| Item | | E2Q5-N20_ _-M1 | E2Q5-N40M_3-M1 |
|---|---|---|---|
| Sensing distance | | 20 mm±10% | 40 mm±10% |
| Response frequency | | 150 Hz | |
| Power supply voltage | | 10 to 30 VDC | |
| Protective circuits | | Output reverse polarity protection, short-circuit protection | |
| Ambient temperature | Operating | –25 to 85°C | |
| Degree of protection | | IEC 60529 IP 67; IP69k after DIN 40050 part 9 | |
| Material | Case | PBT | |
| | Sensing face | PBT | |

## Heat and detergent resistant inductive sensor in cylindrical stainless steel housing

The heat and detergent resistant inductive sensors allow reliable metal object or machine part detection in demanding environments such as food processing.

- Temperature resistant up to 120°C
- SUS316L housing with heat resistant plastic sensing face
- IP69k for highest water resistance
- ECOLAB tested and certified detergent resistance

## Ordering information

### Pre-wired

| Size | | | Sensing distance | Output configuration | Order code (for pre-wired types with 2 m heat resistant PVC cable) | |
|---|---|---|---|---|---|---|
| | | | | | Operation mode NO | Operation mode NC |
| M12 | ■ | – | 3 mm | PNP | E2EH-X3B1 2M | E2EH-X3B2 2M |
| | | | | NPN | E2EH-X3C1 2M | E2EH-X3C2 2M |
| | | | | DC 2-wire | E2EH-X3D1 2M | E2EH-X3D2 2M |
| M18 | | | 7 mm | PNP | E2EH-X7B1 2M | E2EH-X7B2 2M |
| | | | | NPN | E2EH-X7C1 2M | E2EH-X7C2 2M |
| | | | | DC 2-wire | E2EH-X7D1 2M | E2EH-X7D2 2M |
| M30 | | | 12 mm | PNP | E2EH-X12B1 2M | E2EH-X12B2 2M |
| | | | | NPN | E2EH-X12C1 2M | E2EH-X12C2 2M |
| | | | | DC 2-wire | E2EH-X12D1 2M | E2EH-X12D2 2M |

### Connector types (M12)

| Size | | | Sensing distance | Output | Order code (for M12 connector types) | |
|---|---|---|---|---|---|---|
| | | | | | Operation mode NO | Operation mode NC |
| M12 | ■ | – | 3 mm | PNP | E2EH-X3B1-M1 | E2EH-X3B2-M1 |
| | | | | NPN | E2EH-X3C1-M1 | E2EH-X3C2-M1 |
| | | | | DC 2-wire | E2EH-X3D1-M1G | E2EH-X3D2-M1G |
| M18 | | | 7 mm | PNP | E2EH-X7B1-M1 | E2EH-X7B2-M1 |
| | | | | NPN | E2EH-X7C1-M1 | E2EH-X7C2-M1 |
| | | | | DC 2-wire | E2EH-X7D1-M1G | E2EH-X7D2-M1G |
| M30 | | | 12 mm | PNP | E2EH-X12B1-M1 | E2EH-X12B2-M1 |
| | | | | NPN | E2EH-X12C1-M1 | E2EH-X12C2-M1 |
| | | | | DC 2-wire | E2EH-X12D1-M1G | E2EH-X12D2-M1G |

## Specifications

| Item | | M12 | M18 | M30 |
|---|---|---|---|---|
| | | E2EH-X3__ | E2EH-X7__ | E2EH-X12__ |
| Sensing distance | | 3 mm±10% | 7 mm±10% | 12 mm±10% |
| Response frequency (average) | | 500 Hz | 300 Hz | 100 Hz |
| Power supply voltage (operating voltage range) | | 12 to 24 VDC, ripple (p-p): 10% max. (10 to 32 VDC) (24 VDC max. at 100°C or higher) | | |
| Protective circuits | | Surge suppression, short circuit protection, power supply reverse polarity protection, output reverse polarity protection | | |
| Ambient temperature*1 | | DC 3-wire models: 0 to 100°C (0 to 120°C for 1,000 hours), DC 2-wire models: 0 to 100°C (0 to 110°C for 1,000 hours) | | |
| Degree of protection | | IEC 60529 IP67, IP69k after DIN 40050-9 | | |
| Material | Case, clamping nuts | Stainless steel (SUS316L) | | |
| | Sensing surface | PBT (polybutylene terephthalate) | | |
| | Cable | Heat-resistant PVC | | |

*1 Operation with power supplied for 1,000 h has been verified at 120°C for DC 3-wire models and at 110°C for DC 2-wire models. Do not bend the cable repeatedly at 100°C or higher.

120°C

Enhanced temperature resistance

Enhanced detergent resistance

## Inductive sensor for mobile usage in cylindrical brass housing

Designed and tested to keep your mobile machines moving.

- IP69k tested and certified for highest water resistance
- e1 type approval (according to Automotive Directive 2005/83/EC)
- E1 type approval (according to vehicle regulation ECE-R10)
- Cable or connector breakage protection

## Ordering information

### Pre-wired

| Size | ■ | – | Sensing distance | Thread length (overall length) | Output configuration | Order code (for pre-wired types with 2 m PVC cable)*1 | |
|---|---|---|---|---|---|---|---|
| | | | | | | Operation mode: NO | Operation mode: NC |
| M12 | ■ | – | 4.0 mm | 34 mm (50 mm) | PNP | E2AU-M12KS04-WP-B1 2M | E2AU-M12KS04-WP-B2 2M |
| | | | | 56 mm (72 mm) | PNP | E2AU-M12LS04-WP-B1 2M | E2AU-M12LS04-WP-B2 2M |
| M18 | ■ | – | 8.0 mm | 39 mm (59 mm) | PNP | E2AU-M18KS08-WP-B1 2M | E2AU-M18KS08-WP-B2 2M |
| | | | | 61 mm (81 mm) | PNP | E2AU-M18LS08-WP-B1 2M | E2AU-M18LS08-WP-B2 2M |
| M30 | ■ | – | 15.0 mm | 44 mm (64 mm) | PNP | E2AU-M30KS15-WP-B1 2M | E2AU-M30KS15-WP-B2 2M |
| | | | | 66 mm (86 mm) | PNP | E2AU-M30LS15-WP-B1 2M | E2AU-M30LS15-WP-B2 2M |

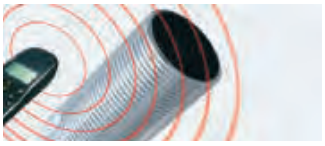
*1 NPN types and pre-wired types with PUR cable are available. Contact your OMRON representative

### Connector types (M12)

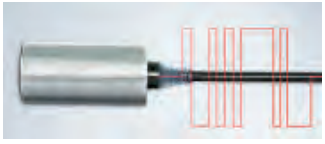
| Size | ■ | – | Sensing distance | Thread length (overall length) | Output configuration | Order code (for M12 connector types) | |
|---|---|---|---|---|---|---|---|
| | | | | | | Operation mode: NO | Operation mode: NC |
| M12 | ■ | – | 4.0 mm | 34 mm (48 mm) | PNP | E2AU-M12KS04-M1-B1 | E2AU-M12KS04-M1-B2 |
| | | | | 56 mm (70 mm) | PNP | E2AU-M12LS04-M1-B1 | E2AU-M12LS04-M1-B2 |
| M18 | ■ | – | 8.0 mm | 39 mm (53 mm) | PNP | E2AU-M18KS08-M1-B1 | E2AU-M18KS08-M1-B2 |
| | | | | 61 mm (75 mm) | PNP | E2AU-M18LS08-M1-B1 | E2AU-M18LS08-M1-B2 |
| M30 | ■ | – | 15.0 mm | 44 mm (58 mm) | PNP | E2AU-M30KS15-M1-B1 | E2AU-M30KS15-M1-B2 |
| | | | | 66 mm (80 mm) | PNP | E2AU-M30LS15-M1-B1 | E2AU-M30LS15-M1-B2 |

## Specifications

| Item | | M12 | M18 | M30 |
|---|---|---|---|---|
| | | E2AU-M12_ | E2AU-M18_ | E2AU-M30_ |
| Sensing distance | | 4 mm±10% | 8 mm±10% | 15 mm±10% |
| Response frequency | | 1,000 Hz | 500 Hz | 250 Hz |
| Power supply voltage (operating voltage) | | 12 to 24 VDC. Ripple (p-p): 10% max.(10 to 32 VDC) | | |
| Protective circuits | | Output reverse polarity protection, power supply reverse polarity protection, surge suppressor, short-circuit protection | | |
| Ambient temperature | Operating | –40 to 70°C | | |
| | Storage | –40 to 85°C (with no icing or condensation) | | |
| Degree of protection | | IP67 after IEC 60529, IP69K after DIN 40050 part 9 | | |
| Material | Case | Brass-nickel plated | | |
| | Sensing surface | PBT | | |



High electro-magnetic noise immunity (fields and cable induced)



e1 type approval after 2005/83/EC

E1 type approval after ECE-R10

## Oil resistant inductive sensor in cylindrical brass housing

The E2E-_-U offers tested oil resistance on commonly used oils in the automotive industry for reliable long-life operation in automotive assembly lines.

- Oil resistant PUR cable
- M8, M12, M18 and M30 standard sizes
- IP67g (water and oil resistance)

PRO plus

## Ordering information

### DC 2-wire (pre-wired)

| Size |  |  | Sensing distance | Order code (for pre-wired types with 2 m PUR cable) | |
|---|---|---|---|---|---|
| | | | | Operation mode NO | Operation mode NC |
| M8 | ■ | – | 2 mm | E2E-X2D1-U | E2E-X2D2-U |
| M12 | | | 3 mm | E2E-X3D1-U | E2E-X3D2-U |
| M18 | | | 7 mm | E2E-X7D1-U | E2E-X7D2-U |
| M30 | | | 10 mm | E2E-X10D1-U | E2E-X10D2-U |

### DC 2-wire (pre-wired with M12)

| Size |  |  | Sensing distance | Order code (for pre-wired types with 30 cm PUR cable and M12 plug)) | |
|---|---|---|---|---|---|
| | | | | Operation mode NO | Operation mode NC |
| M8 | ■ | – | 2 mm | E2E-X2D1-M1TGJ-U 0.3M | E2E-X2D2-M1TGJ-U 0.3M |
| M12 | | | 3 mm | E2E-X3D1-M1TGJ-U 0.3M | E2E-X3D2-M1TGJ-U 0.3M |
| M18 | | | 7 mm | E2E-X7D1-M1TGJ-U 0.3M | E2E-X7D2-M1TGJ-U 0.3M |
| M30 | | | 10 mm | E2E-X10D1-M1TGJ-U 0.3M | E2E-X10D2-M1TGJ-U 0.3M |

## Specifications

| Item | | M8 | M12 | M18 | M30 |
|---|---|---|---|---|---|
| | | E2E-X2D_ | E2E-X3D_ | E2E-X7D_ | E2E-X10D_ |
| Sensing distance | | 2 mm±10% | 3 mm±10% | 7 mm±10% | 10 mm±10% |
| Response frequency | | 1.5 kHz | 1.0 kHz | 0.5 kHz | 0.4 kHz |
| Power supply voltage (operating voltage) | | 12 to 24 VDC (10 to 30 VDC), ripple (p-p): 10% max. | | | |
| Protective circuits | | Surge suppressor, output short-circuit protection (for control and diagnostic output) | | | |
| Ambient temperature | Operating | –25 to 70°C | | | |
| | Storage | –40 to 85°C (with no icing or condensation) | | | |
| Degree of protection | | IEC 60529 IP67 (JEM standard IP67g (waterproof and oil-proof)) | | | |
| Material | Case | Stainless steel (SUS303) | Brass-nickel plated | | |
| | Sensing surface | PBT (polybutylene terephthalate) | | | |
| | Cable | PUR for jacket, PE | | | |

## Inductive sensor in cylindrical full metal housing (case + sensing face)

The high durability stainless steel sensing face provides more than 20 times longer protection against mechanical damage than conventional sensors. The high mineral oil and coolant resistance and the immunity against small metal chips on the surface make this sensor ideal for metal cutting or drilling applications.

- Full body stainless steel housing for highest mechanical protection
- Low frequency modulation for metal chip immunity
- Flame retardant cable for high protection against welding spatter damage (pigtail models)

## Ordering information

### DC 2-wire (with M12 pigtail connector)

| Size | | | Sensing distance | Order code*1 (for pre-wired types with 30 cm PVC cable and M12 plug) |
|---|---|---|---|---|
| M8 | ■ | – | 1.5 mm | E2FM-X1R5D1-M1TGJ |
| M12 | | | 2 mm | E2FM-X2D1-M1TGJ |
| M18 | | | 5 mm | E2FM-X5D1-M1TGJ |
| M30 | | | 10 mm | E2FM-X10D1-M1TGJ |

### DC 3-wire, M12 Connector types

| Size | | | Sensing distance | Order code*1 (for M12 connector types) | |
|---|---|---|---|---|---|
| | | | | PNP | NPN |
| M8 | ■ | – | 1.5 mm | E2FM-X1R5B1-M1 | E2FM-X1R5C1-M1 |
| M12 | | | 2 mm | E2FM-X2B1-M1 | E2FM-X2C1-M1 |
| M18 | | | 5 mm | E2FM-X5B1-M1 | E2FM-X5C1-M1 |
| M30 | | | 10 mm | E2FM-X10B1-M1 | E2FM-X10C1-M1 |

### DC 3-wire, pre-wired types

| Size | | | Sensing distance | Order code*1 (for pre-wired types with 2 m PVC cable) | |
|---|---|---|---|---|---|
| | | | | PNP | NPN |
| M8 | ■ | – | 1.5 mm | E2FM-X1R5B1 2M | E2FM-X1R5C1 2M |
| M12 | | | 2 mm | E2FM-X2B1 2M | E2FM-X2C1 2M |
| M18 | | | 5 mm | E2FM-X5B1 2M | E2FM-X5C1 2M |
| M30 | | | 10 mm | E2FM-X10B1 2M | E2FM-X10C1 2M |

*1 Output configuration normally open (NO)

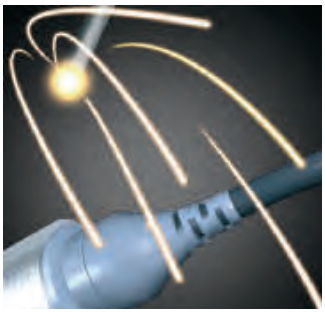
## Specifications)

| Item | | M8 | M12 | M18 | M30 |
|---|---|---|---|---|---|
| | | E2FM-X1R5 | E2FM-X2 | E2FM-X5 | E2FM-X10 |
| Sensing distance | | 1.5 mm±10% | 2 mm±10% | 5 mm±10% | 10 mm±10% |
| Response frequency | | 200 Hz | 100 Hz | 100 Hz | 50 Hz |
| Power supply voltage (operating voltage range) | | 12 to 24 VDC (10 to 30 VDC), ripple (p-p): 10% max. | | | |
| Protective circuits | | E2FM-_D1: Surge suppressor, output short-circuit protection<br>E2FM-_B1/C1: Output reverse polarity protection (not E2FM-X1R5B1-M1), power supply reverse polarity protection, surge suppressor, short-circuit protection | | | |
| Ambient temperature | Operating | –25 to 70°C (with no icing or condensation) | | | |
| | Storage | | | | |
| Degree of protection | | IEC60529 IP67, IP69k after DIN 40050 part 9 | | | |
| Material | Case | Stainless steel (SUS303) | | | |
| | Sensing surface | Stainless steel (SUS303) | | | |
| | Cable | PVC (flame retardant) | | | |

E2FM extra strong sensing face

Conventional metal face product


No interference by small metal chips on sensing surface


Cable resistant to welding spatter

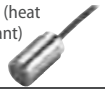
## High precision positioning inductive proximity sensor with seperate amplifier

The separate amplifier inductive sensor family E2C-EDA offers high precision distance positioning and detection. The teach-in function allows simple installation, and with the window function (2 outputs) production tolerance checks can easily be set up and modified.

- Typically several hundred µm detection precision
- Precision distance teaching
- Window function (2 outputs) for production tolerance checks

## Ordering information

### Sensor heads

| Appearance | | | | Sensing distance | Repeat accuracy | Order code |
|---|---|---|---|---|---|---|
| Cylindrical  | 3 dia. × 18 | ■ | – | 0.6 mm | 1 µm | E2C-EDR6-F |
| | 5.4 dia. × 18 | | | 1 mm | 1 µm | E2C-ED01*1 |
| | 8 dia. × 22 | | | 2 mm | 2 µm | E2C-ED02*1 |
| Screw  | M10 × 22 | | | 2 mm | 2 µm | E2C-EM02*1 |
| Flat  | 30 × 14 × 4.8 | | | 5 mm | 2 µm | E2C-EV05*1 |
| Screw  | M18 × 46.3 | – | ■ | 7 mm | 5 µm | E2C-EM07M*1 |
| Screw (heat resistant)  | M12 × 22 | ■ | – | 2 mm | 2 µm | E2C-EM02H |

*1 For models with cut-to-length cables add "-F" for example E2C-ED01-F
For models with protective stainless steel spiral tubes add "-S" for example E2C-ED01-S

### Amplifier units with cables

| Item | Functions | Order code | |
|---|---|---|---|
| | | NPN output | PNP output |
| Twin-output models | Area output, open circuit detection, differential operation | E2C-EDA11 | E2C-EDA41 |
| External-input models | Remote setting, differential operation | E2C-EDA21 | E2C-EDA51 |

### Amplifier units with connectors*1

| Item | Functions | Order code | |
|---|---|---|---|
| | | NPN output | PNP output |
| Twin-output models | Area output, open circuit detection, differential operation | E2C-EDA6 | E2C-EDA8 |
| External-input models | Remote setting, differential operation | E2C-EDA7 | E2C-EDA9 |

*1 Order fitting connector (E3X-CN21_) separately from accessories.

## Specifications

### Sensor heads

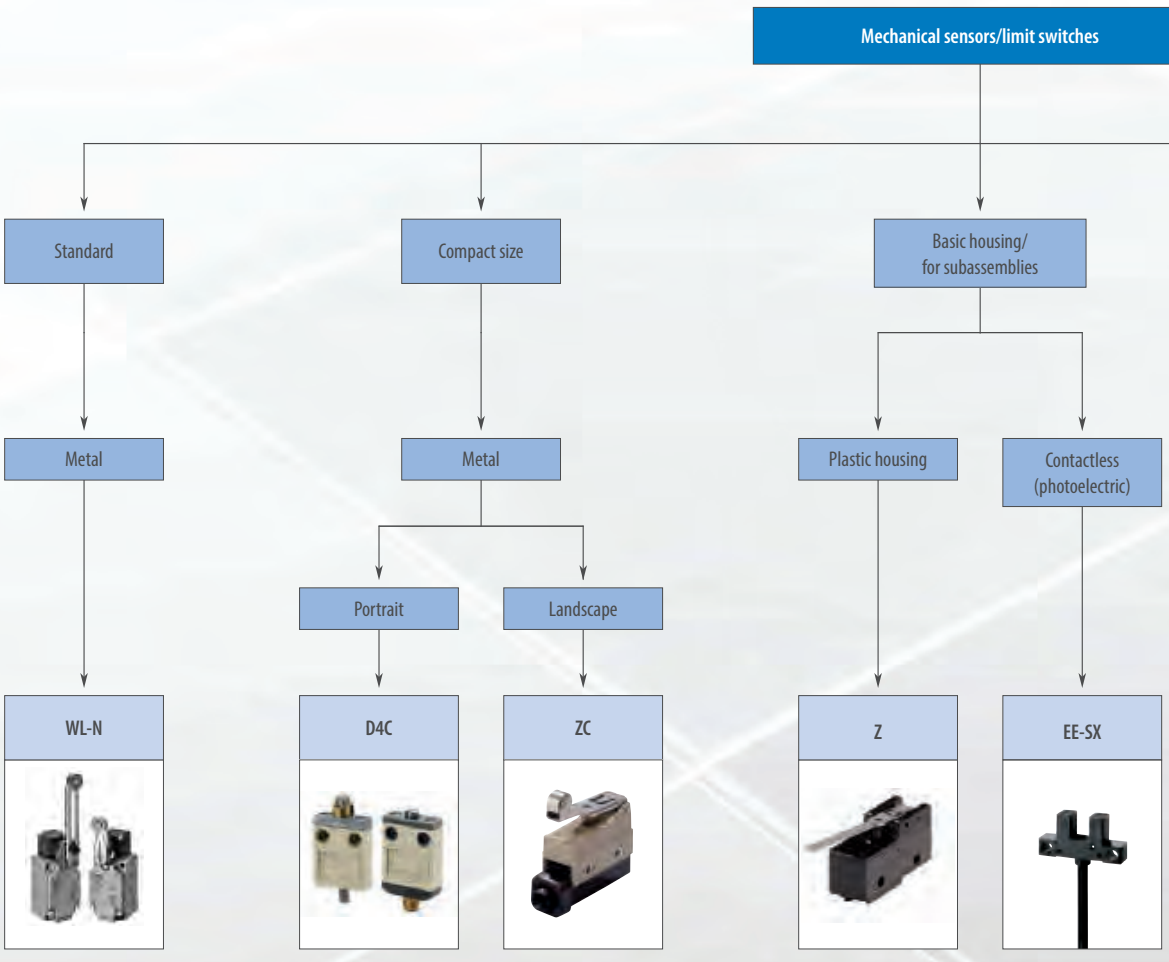
| Item | | 3 dia. | 5.4 dia. | 8 dia. | M10 | M18 | 30×14×4.8 mm | M12 |
|---|---|---|---|---|---|---|---|---|
| | | E2C-EDR6-F | E2C-ED01(-_) | E2C-ED02(-_) | E2C-EM02(-_) | E2C-EM07(-_) | E2C-EV05(-_) | E2C-EM02H |
| Ambient temperature | Operating | –10 to 60°C (with no icing or condensation) | | | | | | –10 to 200°C |
| | Storage | | | | | | | |
| Degree of protection | | IEC60529 IP67 | | | | | | IEC60529 IP60 |
| Material | Case | Brass | Stainless steel | Brass | | | Zinc | Brass |
| | Sensing surface | Heat-resistant ABS | | | | | | PEEK |

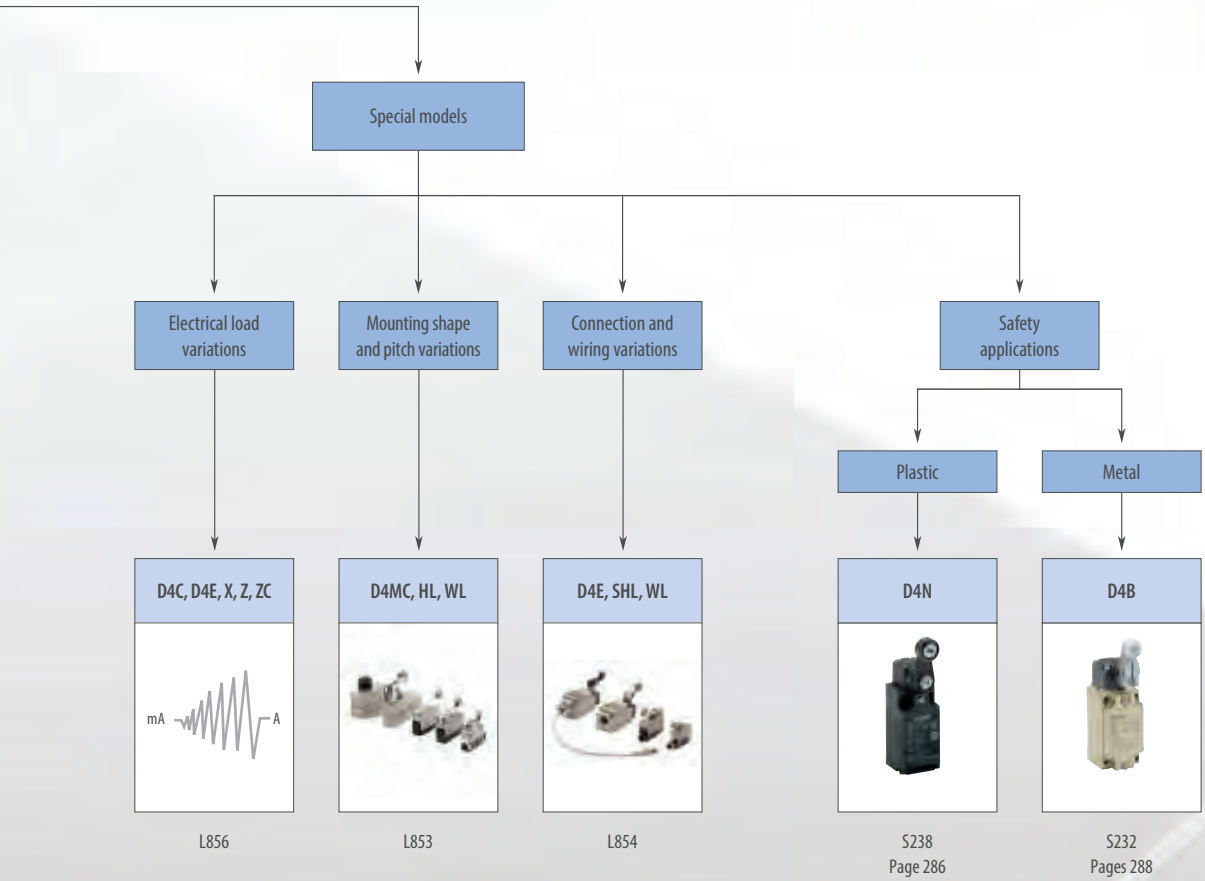
**Note:** For amplifier specifications refer to complete datashee

# THE RELIABLE AND FLEXIBLE WAY ...

## ... to stop your machines

For the detection of machine part movement especially for the detection of end positions, the mechanical and optical limit switches provide accurate and reliable operation with a large variety of actuation possibilities optimized for a widest range of application and usage requirements. The easy positioning and intuitive installation, the high immunity to changing environmental influences (electromagnetic fields, sunlight, temperatures, etc.) as well as the possibility to directly switch loads with up to 15 A make these sensors ideal for a wide range of conveying and handling applications.

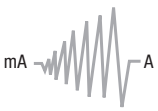



Special models
Electrical load variations
Mounting shape and pitch variations
Connection and wiring variations
Safety applications
Plastic
Metal
D4C, D4E, X, Z, ZC
D4MC, HL, WL
D4E, SHL, WL
D4N
D4B
mA
A
L856
L853
L854
S238
Page 286
S232
Pages 288

| Type | | Standard | | | Compact | Basic housing |
|---|---|---|---|---|---|---|
| | |  |  |  |  |  |
| **Model** | | **D4N** | **D4B** | **WL-N** | **D4C** | **Z** |
| **Material** | | Plastic | Metal | Metal | Metal | Plastic |
| **Screw terminal** | **No conduit** | – | – | – | – | ■ |
| | **Cable dia. 8.5 to 10.5** | – | – | – | – | – |
| | **M20** | ■ | ■ | ■ | – | – |
| | **PG13.5** | □ | – | ■ | – | – |
| | **G1/2** | □ | □ | ■ | – | – |
| | **1/2-14NPT** | □ | □ | ■ | – | – |
| **Cable connector** | **M12** | ■ | – | ■ | ■ | – |
| | **Prewired** | – | – | – | ■ | – |
| **Degree of protection** | | IP67 | | | | IP00 |
| **Page/Quick Link** | | 286 | 288 | 290 | 292 | 296 |

## Special models

| Type | High precision multi direction | Compact |
|---|---|---|
| |  |  |
| **Model** | **D5B** | **ZC** |
| **Material** | Metal | Metal |
| **Key Features** | – X, Y, Z action<br>– several µm switching accuracy<br>– M5, M8, M10 sizes | – Small housing size<br>– Screw terminals<br>– IP67 |
| **Page/Quick Link** | L833 | 294 |

| Type | Highest precision tactile measurement | Electrical load variations | Mounting shape and pitch variations | Connection and wiring variations | Safety limit switches |
|---|---|---|---|---|---|
| |  |  |  |  |  |
| **Model** | **ZX-T** | **D4C, D4E, X, Z, ZC** | **D4MC, HL, WL** | **D4E, SHL, WL** | **D4 Safety** |
| **Material** | Plastic | Plastic and Metal | Metal | Metal | Plastic and Metal |
| **Key Features** | Measurement resolution up to 0.1 µm | – Microloads (1 mA to 100 mA)<br>– High current at high voltage switching (10 A at 125 VDC)<br>– Double circuit switching | – Mounting shapes and pitches popular in different countries in the world<br>– Mounting pitch variations (base mounting, diagonal pitches, ...)<br>– Alternative actuator positions | – Screw conduit variations (PG13.5, G1/2, 1/2"14NPT<br>– Cable exit variations (pigtails, rubber snap on covers, screw on covers, with or without cable breakage protection for different cable diameters | – Mechanical form lock<br>– Manual reset<br>– Door hinge switches |
| **Page/Quick Link** | 391 | Contact your OMRON representative | | | 400 |

## Limit switch with plastic housing

The D4N series of limit switches in plastic housing is the ideal switch for all standard mechanical position detection applications both for safety and non-safety applications.

- Direct opening mechanism and approval by notified body
- Rugged plastic housing with double insulation
- Wide range of actuators
- M12 connectors or terminal block with M20 conduit

## Ordering information

| Actuator type | | Connection method | Order code*1 | | | |
|---|---|---|---|---|---|---|
| | | | 1NC/1NO (snap-action) | 1NC/1NO (slow-action) | 2NC (slow-action) | 2NC/1NO (slow-action) |
| | | | Order code | Order code | Order code | Order code |
|  | Roller lever (resin lever, resin roller) | M20 | D4N-4120 | D4N-4A20 | D4N-4B20 | D4N-4C20 |
| | | M12 connector | D4N-9120 | D4N-9A20 | D4N-9B20 | – |
|  | Plunger | M20 | D4N-4131 | D4N-4A31 | D4N-4B31 | – |
| | | M12 connector | D4N-9131 | D4N-9A31 | D4N-9B31 | – |
|  | Roller plunger | M20 | D4N-4132 | D4N-4A32 | D4N-4B32 | D4N-4C32 |
| | | M12 connector | D4N-9132 | D4N-9A32 | D4N-9B32 | – |
|  | One-way roller arm lever (horizontal) | M20 | D4N-4162 | D4N-4A62 | D4N-4B62 | D4N-4C62 |
| | | M12 connector | D4N-9162 | D4N-9A62 | D4N-9B62 | – |
|  | One-way roller arm lever (vertical) | M20 | D4N-4172 | D4N-4A72 | D4N-4B72 | – |
|  | Adjustable roller lever, form lock (metal lever, resin roller) | M20 | D4N-412G | D4N-4A2G | D4N-4B2G | – |
| | | M12 connector | D4N-912G | D4N-9A2G | D4N-9B2G | – |
|  | Adjustable roller lever, form lock (metal lever, rubber roller) | M20 | D4N-412H | D4N-4A2H | D4N-4B2H | – |
| | | M12 connector | D4N-912H | D4N-9A2H | D4N-9B2H | – |

### Switches with MBB contacts

MBB (Make Before Break) contacts have an overlapping structure, so that before the normally closed (NC) contact opens the normally open (NO) contact closes.

| Actuator type | | Connection method | Order code*1 | |
|---|---|---|---|---|
| | | | 1NC/1NO (slow-action) | 2NC/1NO (slow-action) |
|  | Roller lever (resin lever, resin roller) | M20 | D4N-4E20 | D4N-4F20 |
| | | M12 connector | D4N-9E20 | – |
|  | Roller plunger | M20 | D4N-4E32 | D4N-4F32 |
| | | M12 connector | D4N-9E32 | – |
|  | One-way roller arm lever (horizontal) | M20 | D4N-4E62 | D4N-4F62 |
| | | M12 connector | D4N-9E62 | – |

*1 The NC contacts provide the approved direct opening mechanism.

## Specifications

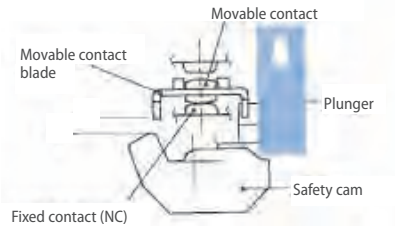
| | | |
|---|---|---|
| **Durability**[*1] | **Mechanical** | 15,000,000 operations min.[*2] |
| | **Electrical** | 500,000 operations min. for a resistive load of 3 A at 250 VAC<br>300,000 operations min. for a resistive load of 10 A at 250 VAC |
| **Operating speed** | **Roller lever** | 1 mm/s to 0.5 m/s |
| **Operating frequency** | | 30 operations/minute max. |
| **Minimum applicable load** | | Resistive load of 1 mA at 5 VDC (N-level reference value) |
| **Protection against electric shock** | | Class II (double insulation) |
| **Pollution degree (operating environment)** | | 3 (EN60947-5-1) |
| **Contact gap** | | Snap-action: 2x0.5 mm min<br>Slow-action: 2x2 mm min |
| **Conditional short-circuit current** | | 100 A (EN60947-5-1) |
| **Rated open thermal current ($I_{th}$)** | | 10 A (EN60947-5-1) |
| **Ambient temperature** | **Operating** | –30 to 70°C with no icing |
| **Degree of protection** | | IP67 (EN60947-5-1) |

[*1] The durability is acquired for an ambient temperature of 5 to 35°C and an ambient humidity of 40% to 70%.
[*2] 10,000,000 operations min. for fork lever actuator.

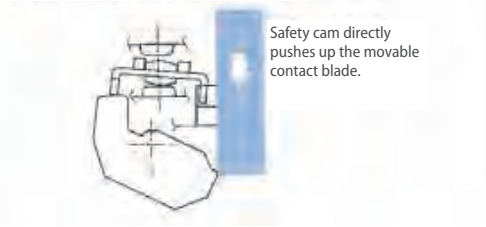
### 1NO/1NC Contact (Snap-action)

If metal deposition between mating contacts occurs on the NC contact side, they can be pulled apart by the shearing force and tensile force generated when part B of the safety cam or plunger engages part A of the movable contact blade. When the safety cam or plunger is moved in the direction of the arrow, the Limit Switch releases.

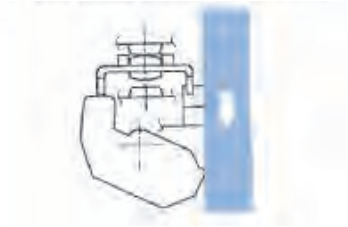
1. When metal deposition occurs.



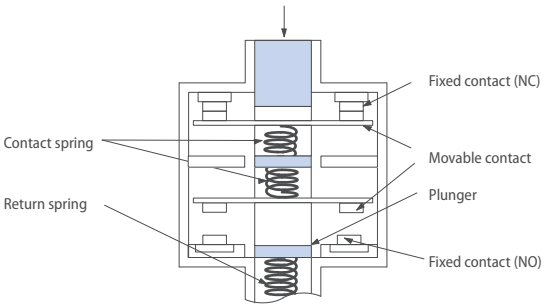

2. When contacts are being pulled apart.



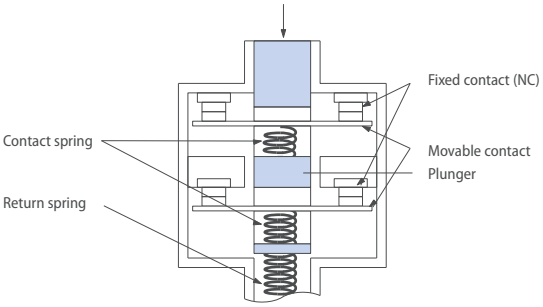

3. When contacts are completely pulled apart.



### 1NC/1NO Contact (Slow-action)




### 2NC Contact (Slow-action)




NC contacts conform to EN60947-5-1 Direct Opening

When metal deposition occurs, the contacts are separated from each other by the plunger being pushed in.

⊖ is marked on the product to indicate approval of direct opening.

## Limit switch with metal housing

The D4B series of limit switches in a rugged metal housing is suitable for both safety and non-safety applications due to its direct opening mechanism and TÜV approval. Furthermore with the increased temperature range and enhanced mechanical switching lifetime, the D4B is first choice for all applications from standard to demanding environments and for highest flexibility in mounting and connectivity preferences.

- Direct opening mechanism and approval by notified body
- Rugged metal housing and extended mechanical switching lifetime (snap action models)
- Terminal block for direct wiring

## Ordering information

| Actuator type | | Connection method | Order code[*1] | | |
|---|---|---|---|---|---|
| | | | 1NC/1NO (snap-action) | 1NC/1NO (slow-action) | 2NC (slow-action) |
| | Roller lever[*2] | Terminal block with M20 conduit[*3] | D4B-4111N | D4B-4511N | D4B-4A11N |
| | Adjustable roller lever | | D4B-4116N | D4B-4516N | D4B-4A16N |
| | Adjustable rod lever | | D4B-4117N | D4B-4517N | D4B-4A17N |
| | Plain | | D4B-4170N | D4B-4570N | D4B-4A70N |
| | Roller | | D4B-4171N | D4B-4571N | D4B-4A71N |
| | Coil spring | | D4B-4181N[*4] | – | – |
| | Plastic rod | | D4B-4187N[*4] | – | – |

[*1] The NC contacts provide the approved direct opening mechanism.

[*2] For models with stainless steel rollers and temperature resistance of -40°C refer to WL-_-TC.
[*3] Models with G1/2 or 1/2"14NPT conduit are available. For ordering refer to complete datasheet. For PG13.5 conduit models for non-safety applications contact your OMRON representative.
[*4] No direct opening mechanism.

## Specifications

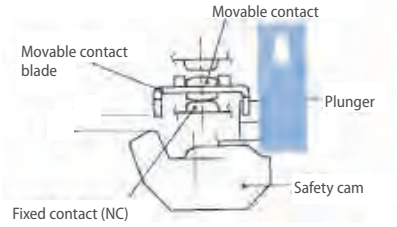
| Item | | Snap-action | Slow-action |
|---|---|---|---|
| Durability[*1] | Mechanical | 30,000,000 operations min. | 10,000,000 operations min. |
| | Electrical | 500,000 operations min. (at a 250 VAC, 10 A resistive load) | |
| Operating speed | | 1 mm/s to 0.5 m/s | |
| Operating frequency | Mechanical | 120 operations/min | |
| | Electrical | 30 operations/min | |
| Rated frequency | | 50/60 Hz | |
| Contact resistance | | 25 mΩ max. (initial value) | |
| Pollution degree (operating environment) | | 3 (EN60947-5-1) | |
| Conditional short-circuit current | | 100 A (EN60947-5-1) | |
| Conventional enclosed thermal current ($I_{th}$) | | 20 A (EN60947-5-1) | |
| Protection against electric shock | | Class I (with ground terminal) | |
| Ambient temperature | Operating | –40 to 80°C (with no icing)[*2] | |
| Degree of protection | | IP67 (EN60947-5-1) | |

[*1] The values are acquired for an ambient temperature of 5 to 35°C and an ambient humidity of 40% to 70%.
[*2] –25 to 80°C for the flexible-rod actuator.

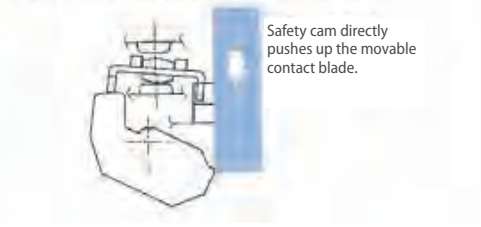
### 1NO/1NC Contact (Snap-action)

If metal deposition between mating contacts occurs on the NC contact side, they can be pulled apart by the shearing force and tensile force generated when part B of the safety cam or plunger engages part A of the movable contact blade. When the safety cam or plunger is moved in the direction of the arrow, the Limit Switch releases.

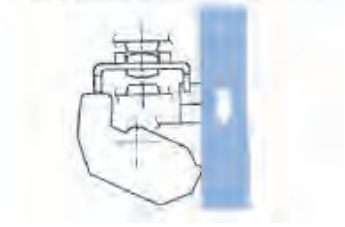
1. When metal deposition occurs.



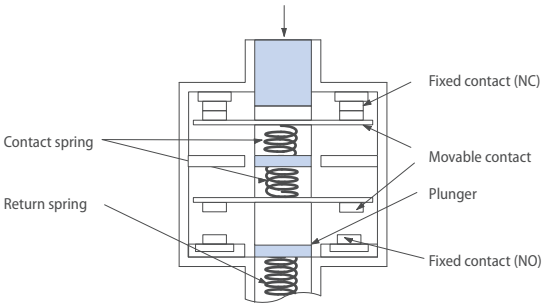

2. When contacts are being pulled apart.



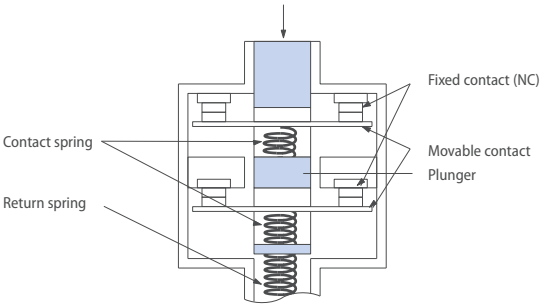

3. When contacts are completely pulled apart.



### 1NC/1NO Contact (Slow-action)




### 2NC Contact (Slow-action)




NC contacts conform to EN60947-5-1 Direct Opening

When metal deposition occurs, the contacts are separated from each other by the plunger being pushed in.

⊖ is marked on the product to indicate approval of direct opening.

## WL-N Series limit switches simplify installation

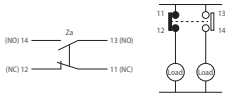
Models focus on the most popular features to make stocking easier.

- Improved durability and performance
- Applicable to either standard loads or microloads
- LED with 3D light-dispersing structure
- Reduced part numbers
- Easy wiring
- Direct and pre-wiring
- Ground terminal models are approved by EN and IEC and bear the CE marking UL,CSA

## Ordering Information

| Actuator type | | Contact Form and features | Connection method | CE Mark | Order code |
|---|---|---|---|---|---|
|  | Roller lever R38 | DPDB[*1] | Screw terminal (Pg13,5 conduit with ground terminal)[*2] | Yes | WLCA2-2NG-N |
|  | Adjustable roller lever: R25 to 89 mm, pretravel 15°±5° | DPDB, Heat-resistant: 5 to 120°C | | | WLCA12-THG-N |
| | Adjustable roller lever: R25 to 89 mm, pretravel 15°±5° | DPDB, LED | | | WLCA12-GLD-N |
|  | Roller lever R50, pretravel 15°±5° | DPDB | | | WLCA2-7G-N |
| | Roller lever R63, pre-travel 15°±5° | DPDB | | | WLCA2-8G-N |
|  | Adjustable rod lever: 25 to 140 mm, pretravel 15°±5° | DPDB, Heat-resistant: 5 to 120°C | | | WLCL-THG-N |
| | Adjustable rod lever: 25 to 140 mm, pretravel 15°±5° | DPDB, LED, | Pre-wired Connector M12 (Smart Click), with ground terminal | | WLCL-2NLD-DGJ-N |
|  | Roller lever R38, High sensitive pre-travel 10°+2/–1° | DPDB, LED | | | WLG2-LDFS-DGJS-N |

*1 DPDB – The double-pole, double-break structure ensures circuit braking.




*2 Models with screw terminals with M20 conduit instead of PG13.5 are available. Contact your OMRON representative.

## Specifications

### Characteristics

| | | |
|---|---|---|
| Degree of protection | | IP67 |
| Durability[*1] | Mechanical | 15,000,000 operations min.[*2] |
| | Electrical | 750,000 operations min.[*3] |
| Operating speed | | 1 mm/s to 1 m/s (in case of WLCA2-N) |
| Operating frequency | Mechanical | 120 operations/minute min. |
| | Electrical | 30 operations/minute min. |
| Rated frequency | | 50/60 Hz |
| Insulation resistance | | 100 MΩ min. (at 500 VDC) |
| Contact resistance | | 25 mΩ max. (initial value for the built-in switch when tested alone) |
| Dielectric strength | Between terminals of the same polarity | 1,000 VAC (600 VAC), 50/60 Hz for 1 min |
| | Between currentcarrying metal part and ground | 2,200 VAC (1,500 VAC), 50/60 Hz for 1 min |
| | Between each terminal and non-currentcarrying metal part | 2,200 VAC (1,500 VAC), 50/60 Hz for 1 min |
| Vibration resistance | Malfunction | 10 to 55 Hz, 1.5-mm double amplitude |
| Shock resistance | Destruction | 1,000 m/s2 max. |
| | Malfunction | 300 m/s2 |
| Ambient operating temperature | | –10 to 80°C (with no icing)[*4] |
| Ambient operating humidity | | 35% to 95% RH |
| Weight | | Approx. 255 g (in case of WLCA2-N) |

[*1] The values are calculated at an operating temperature of 5 to 35°C and an operating humidity of 40% to 70% RH. Contact your OMRON sales representative for more detailed information on other operating environments.
[*2] Durability is 1,000,000 operations min. for high-sensitivity models. 500,000 operations min. for weather-proof models.
[*3] Durability is 500,000 operations min. for high-sensitivity models. 500,000 operations min. for weather-proof models.
[*4] For low-temperature models this is –40 to 40°C (with no icing). For heatresistant models the range is 5 to 120°C.

**Note:** 1. The above figures are initial values.
2. The figures in parentheses for dielectric strength are those for the highsensitivity overtravel models.

### Ratings

| Item | Rated voltage (V) | | Non-inductive load (A) | | | | Inductive load (A) | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Resistive load | | Lamp load | | Inductive load | | Motor load | |
| | | | NC | NO | NC | NO | NC | NO | NC | NO |
| Basic switches | AC | 125 | 10 | | 3 | 1.5 | 10 | | 5 | 2.5 |
| | | 250 | 10 | | 2 | 1 | 10 | | 3 | 1.5 |
| | | 500 | 10 | | 1.5 | 0.8 | 3 | | 1.5 | 0.8 |
| | DC | 8 | 10 | | 6 | 3 | 10 | | 6 | |
| | | 14 | 10 | | 6 | 3 | 10 | | 6 | |
| | | 30 | 6 | | 4 | 3 | 6 | | 4 | |
| | | 125 | 0.8 | | 0.2 | 0.2 | 0.8 | | 0.2 | |
| | | 250 | 0.4 | | 0.1 | 0.1 | 0.4 | | 0.1 | |
| High-sensitivity switches | AC | 125 | 5 | | – | | – | | – | |
| | | 250 | 5 | | – | | – | | – | |
| | DC | 125 | 0.4 | | – | | – | | – | |
| | | 250 | 0.2 | | – | | – | | – | |

## Compact limit switch in metal housing

The 16 mm flat and compact size make the D4C range of limit switches very popular for all standard applications but especially where mounting space is limited or protruding housings may interfere with machine operation. The triple sealed construction, the rugged metal housing and the precisely manufactured movable parts ensure long operational life in standard or oily environments (special models).

- 16 mm flat compact size
- Rugged metal housing
- Models with M12 connector or oil resistant VCTF cable

## Ordering Information

| Actuator type | Load range (VDC)*1 | Operation LED indicator | | Connection method | | | | Order code |
|---|---|---|---|---|---|---|---|---|
| | 0.8 W to 60 W max | No | Yes | | | | | |
| Plunger  | n | ■ | – | | ■ | | *2 | D4CC-3001 |
| | | | | | | 3 m | | D4C-1201 |
| | | – | ■ | | ■ | | | D4CC-4001 |
| | | | | | | 3 m | | D4C-3201 |
| Sealed plunger  | | ■ | – | | ■ | | | D4CC-3031 |
| | | | | | | 3 m | | D4C-1231 |
| | | – | ■ | | ■ | | | D4CC-4031 |
| | | | | | | 3 m | | D4C-3231 |
| Plunger with M14 mounting  | | ■ | – | | ■ | | | D4CC-3041 |
| | | | | | | 3 m | | D4C-1241 |
| | | – | ■ | | ■ | | | D4CC-4041 |
| | | | | | | 3 m | | D4C-3241 |
| Roller plunger  | | ■ | – | | ■ | | | D4CC-3002 |
| | | | | | | 3 m | | D4C-1202 |
| | | – | ■ | | ■ | | | D4CC-4002 |
| | | | | | | 3 m | | D4C-3202 |
| Sealed roller plunger  | | ■ | – | | ■ | | | D4CC-3032 |
| | | | | | | 3 m | | D4C-1232 |
| | | – | ■ | | ■ | | | D4CC-4032 |
| | | | | | | 3 m | | D4C-3232 |
| Roller plunger with M14 mounting  | | ■ | – | | ■ | | | D4CC-3042 |
| | | | | | | 3 m | | D4C-1242 |
| | | – | ■ | | ■ | | | D4CC-4042 |
| | | | | | | 3 m | | D4C-3242 |
| Crossroller plunger  | | ■ | – | | ■ | | | D4CC-3003 |
| | | | | | | 3 m | | D4C-1203 |
| | | – | ■ | | ■ | | | D4CC-4003 |
| | | | | | | 3 m | | D4C-3203 |
| Sealed crossroller plunger  | | ■ | – | | ■ | | | D4CC-3033 |
| | | | | | | 3 m | | D4C-1233 |
| | | – | ■ | | ■ | | | D4CC-4033 |
| | | | | | | 3 m | | D4C-3233 |
| Crossroller plunger with M14 mounting  | | ■ | – | | ■ | | | D4CC-3043 |
| | | | | | | 3 m | | D4C-1243 |
| | | – | ■ | | ■ | | | D4CC-4043 |
| | | | | | | 3 m | | D4C-3243 |
| Roller lever  | | ■ | – | | ■ | | | D4CC-3024 |
| | | | | | | 3 m | | D4C-1220 |
| | | – | ■ | | ■ | | | D4CC-4024 |
| | | | | | | 3 m | | D4C-3220 |
| Coil spring  | | ■ | – | | ■ | | | D4CC-3050 |
| | | | | | | 3 m | | D4C-1250 |
| | | – | ■ | | ■ | | | D4CC-4050 |
| | | | | | | 3 m | | D4C-3250 |

*1 See specifications for details on max. current per rated voltage and load type. Micro load models with 5mW to 0.8W are available. For ordering refer to complete datasheet.
*2 Pre-wired models with 30 cm PVC cable and M12 plug (pigtail) are available. Contact your OMRON representative.

## Specifications

### Voltage and current rating

| Model | Rated voltage | Rated current*1 | Non-inductive load | | | | Inductive load | | | | Inrush current | | Applicable load range (5 to 30 VDC) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Resistive load | | Lamp load | | Inductive load | | Motor load | | | | |
| | | | NC | NO | NC | NO | NC | NO | NC | NO | NC | NO | |
| D4C-1□□□ | 125 VAC | | 5 A | 5 A | 1.5 A | 0.7 A | 3 A | 3 A | 2.5 A | 1.3 A | 20 A max. | 10 A max. | – |
| | 250 VAC | 2 A | 5 A | 5 A | 1 A | 0.5 A | 2 A | 2 A | 1.5 A | 0.8 A | | | |
| | 8 VDC | | 5 A | 5 A | 2 A | 2 A | 5 A | 4 A | 3 A | 3 A | | | 0.8 W to 60 W |
| | 14 VDC | | 5 A | 5 A | 2 A | 2 A | 4 A | 4 A | 3 A | 3 A | | | |
| | 30 VDC | 2 A | 4 A | 4 A | 2 A | 2 A | 3 A | 3 A | 3 A | 3 A | | | |
| | 125 VDC | | 0.4 A | 0.4 A | 0.05 A | 0.05 A | 0.4 A | 0.4 A | 0.05 A | 0.05 A | | | – |
| | 250 VDC | | 0.2 A | 0.2 A | 0.03 A | 0.03 A | 0.2 A | 0.2 A | 0.03 A | 0.03 A | | | |
| D4C-3□□□ | 30 VDC | 2 A | 4 A | 4 A | 2 A | 2 A | 3 A | 3 A | 3 A | 3 A | | | 0.8 W to 60 W |
| D4CC-3□□□<br>D4CC-4□□□ | 30 VDC | 1 A | 1 A | 1 A | 1 A | 1 A | 1 A | 1 A | 1 A | 1 A | 5 A max. | 2.5 A max | 0.8 W to 30 W |
| D4C-6□□□ | 30 VDC | 0.1 A | 0.1 A | 0.1 A | – | | – | | | | 20 A max. | 10 A max. | 5 mW to 0.8 W |

*1 For D4C- cable types these ratings are certified by TÜV Rheinland according to EN60947-5-1 (file no R9451333).

### General specifications

| Item | | D4C-_ (cable types) | D4CC-_ (connector types) |
|---|---|---|---|
| Durability*1 | Mechanical | 10,000,000 operations min | |
| | Electrical | 200,000 operations min | |
| Operating frequency | Mechanical | 120 operations/min | |
| | Electrical | 30 operations/min | |
| LED indicator | | D4C-3_, D4C-6_, D4CC-4_: Operation indicator (red)<br>Operation indicator turns OFF when the switch operates.*2 | |
| Ambient temperature | Operating | –10 to 70°C (with no icing) | |
| Degree of protection | | IEC 60529: IP67 | |

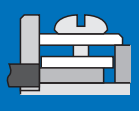
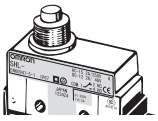
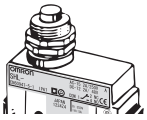
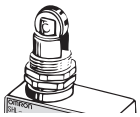
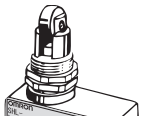
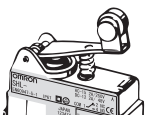
*1 Values are acquired at 5 to 35°C operating temperature, 40% to 70% operating humidity.
*2 Models where operation indicator turns ON when the switch operates are available by adding "-B" to the order code. Contact your OMRON representative for availability.

## Limit switch in compact metal housing with terminal block

The compact housing size and the terminal block with side facing cable exit allow the mounting where space is crucial and self-wiring connection is preferred. The rugged and tight housing construction provides high protection while the low-force actuators make the ZC limit switch ideal for switching smaller or lighter objects.

- Terminal block for self-wiring with side facing cable exit
- Low-force actuators for switching smaller or lighter objects
- Rugged metal housing with IP67 protection

## Ordering Information

| Actuator type | | Connection method  | Order code |
|---|---|---|---|
|  | Plunger | Terminal block with side facing cable exit (left/right changeable) for cables dia 8.5 to 10.5 mm[*1] | ZC-D55 |
|  | Plunger with M14 mounting | | ZC-Q55 |
|  | Sealed roller plunger | | ZC-N2255 |
|  | Roller plunger with M14 mounting | | ZC-Q2255 |
|  | Sealed cross roller plunger | | ZC-N2155 |
|  | Cross roller plunger with M14 mounting | | ZC-Q2155 |
|  | Hinge lever – 50R | | ZC-W55 |
| | Hinge lever – 70R | | ZC-W155 |
|  | Hinge roller lever – 50R | | ZC-W255 |
| | Hinge roller lever – 70R | | ZC-W2155 |

[*1] Models with M20 conduit or other connection variations are available. Refer to OPTIONAL FEATURES in complete datasheet for details.

## Specifications

### Voltage and current rating

| Model | Rated voltage | Non-inductive load | | | Inductive load | | | | Inrush current | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Resistive load | Lamp load | | Inductive load | | Motor load | | | |
| | | NC and NO | NC | NO | NC | NO | NC | NO | NC | NO |
| Standard type | 125 VAC | 10 | 3 | 1.5 | 10 | | 5 | 2.5 | 30 A | 15 A |
| | 250 VAC | | 2.5 | 1.25 | | | 3 | 1.5 | | |
| | 8 VDC | | 3 | 1.5 | 6 | | 5 | 2.5 | | |
| | 14 VDC | | | | | | | | | |
| | 30 VDC | 6 | | | 5 | | | | | |
| | 125 VDC | 0.5 | 0.4 | 0.4 | 0.05 | | | | | |
| | 250 VDC | 0.25 | 0.2 | 0.2 | 0.03 | | | | | |
| High current at high VDC switching type[*1] | 8 VDC | 10 | 3 | 1.5 | 10 | | 5 | 2.5 | | |
| | 14 VDC | | | | | | | | | |
| | 30 VDC | | | | | | | | | |
| | 125 VDC | | | | 7.5 | 6 | | | | |
| | 250 VDC | 3 | 1.5 | 0.75 | 2 | 1.5 | 2 | 1.5 | | |

[*1] Refer to OPTIONAL FEATURES in complete datasheet for details.

### General specifications

| | | |
|---|---|---|
| **Durability** | **Mechanical** | 10.000.000 operations min |
| | **Electrical** | 500.000 operations min |
| **Operating speed** | **Plunger** | 0.05 mm/s to 0.5 m/s |
| **Operating frequency** | **Mechanical** | 120 operations/min |
| | **Electrical** | 20 operations/min |
| **Insulation resistance** | | 100 MΩ min (at 500VDC) |
| **Contact resistance (initial)** | | 15 mΩ max |
| **Dielectric strength** | | 1,000 VAC, 50/60 Hz for 1 min between non-continuous terminals<br>2,000 VAC, 50/60 Hz for 1 min between each terminal and non-current-carrying metal part |
| **Vibration resistance** | **Malfunction** | 10 to 55 Hz, 1.5 mm double amplitude |
| **Shock resistance** | **Destruction** | 1,000 $m/s^2$ min |
| | **Malfunction** | 300 $m/s^2$ min |
| **Ambient temperature** | **Operating** | –10 to 80°C (with no icing) |
| **Ambient humidity** | **Operating** | 35% to 95% RH |
| **Degree of protection** | | IEC 60529: IP67 |

### Additional specifications after EN60947-5-1 (TÜV Rheinland File No J50041904)

| | |
|---|---|
| **Category** | AC-12 10A/250 VAC |
| **Rated insulation voltage** | 1,000 VAC |
| **Short circuit protective device** | 10A fuse type gG (IEC60269) |
| **Protection against electrical shock** | Class II |

### Operating characteristics

Values for OF and RF are in N and values for PT, OT, MD and OP are in mm unless otherwise specified.

| | ZC-D□ | ZC-Q2□ | ZC-Q5□ | ZC-N2□ | ZC-W1□ | ZC-W21□ | ZC-W25□ | ZC-W5□ |
|---|---|---|---|---|---|---|---|---|
| **Operating force (OF)** | 11.8 | | | 6.86 | 2.75 | | 3.92 | |
| **Release force (RF)** | 4.9 | | | 1.67 | 0.59 | | 0.78 | |
| **Pre-travel (PT)** | 1.5 | | | | – | | | |
| **Overtravel (OT)** | 2.4 | 3 | | 2.5 | 8.4 | | 6 | |
| **Movement differential (MD)** | 0.2 | | | | 1.4 | | 1 | |
| **Operating Position (OP)** | 32.4±0.8 | 47.4±0.8 | 38.2±0.8 | 47.4±0.8 | 28.5±1.2 | 43.0±1.2 | | 28.5±1.2 |

## Limit switch with basic plastic housing

The Z series of basic switches in plastic housing provide the same electrical and mechanical switching capability and lifetime as standard limit switches. But with the basic plastic housing the basic switches are an ideal solution with best value for money for uncritical environments or when separately encased in subassemblies.

- Cost efficient basic plastic housing for subassemblies
- Same electrical and mechanical switching ratings as standard limit switches

## Ordering information

| Actuator type*1 | | Order code*2 | |
|---|---|---|---|
| | | Solder terminal | Screw terminal |
| | Pin plunger | Z-15G | Z-15G-B |
| | Short spring plunger | Z-15GD | Z-15GD-B |
| | Leaf spring | Z-15GL | Z-15GL-B |
| | Reverse hinge lever | Z-15GM | Z-15GM-B |
| | Reverse hinge roller lever | Z-15GM2 | Z-15GM2-B |
| | Plunger with M12 mounting | Z-15GQ | Z-15GQ-B |
| | Hinge lever | Z-15GW | Z-15GW-B |
| | Hinge roller lever | Z-15GW2 | Z-15GW2-B |

*1 Other actuator types are available. For the full range refer to the complete datasheet.
*2 Contacts are directly accessible. Additional protective measures are required e.g. order covers from accessories.

## Specifications

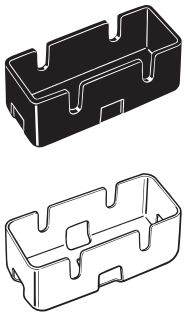
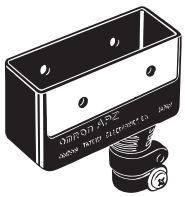
| Rated voltage | Non-inductive load | | | | Inductive load | | | |
|---|---|---|---|---|---|---|---|---|
| | Resistive load | | Lamp load | | Inductive load | | Motor load | |
| | NC | NO | NC | NO | NC | NO | NC | NO |
| 125 VAC | 15 A | | 3 A | 1.5 A | 15 A | | 5 A | 2.5 A |
| 250 VAC | 15 A | | 2.5 A | 1.25 A | 15 A | | 3 A | 1.5 A |
| 8 VDC | 15 A | | 3 A | 1.5 A | 15 A | | 5 A | 2.5 A |
| 14 VDC | 15 A | | 3 A | 1.5 A | 10 A | | 5 A | 2.5 A |
| 30 VDC | 6 A | | 3 A | 1.5 A | 5 A | | 5 A | 2.5 A |
| 125 VDC | 0.5 A*1 | | 0.5 A | 0.5 A | 0.05 A | | 0.05 A | 0.05 A |

*1 For switching high currents at high voltages (e.g. 10A at 125VDC) contact your OMRON representative.

| | | |
|---|---|---|
| Durability | Mechanical | 10,000,000 operations min. |
| | Electrical | 500,000 operations min. |
| Operating speed | Plunger | 0.01 mm to 1 m/s |
| Operating frequency | Mechanical | 240 operations/min |
| | Electrical | 20 operations/min |
| Ambient temperature | Operating | –25 to 80°C (with no icing) |
| Degree of protection | | IP00 |

## Accessories

### Terminal covers (protection of electrical contacts against accidental contact of e. g. fingers)

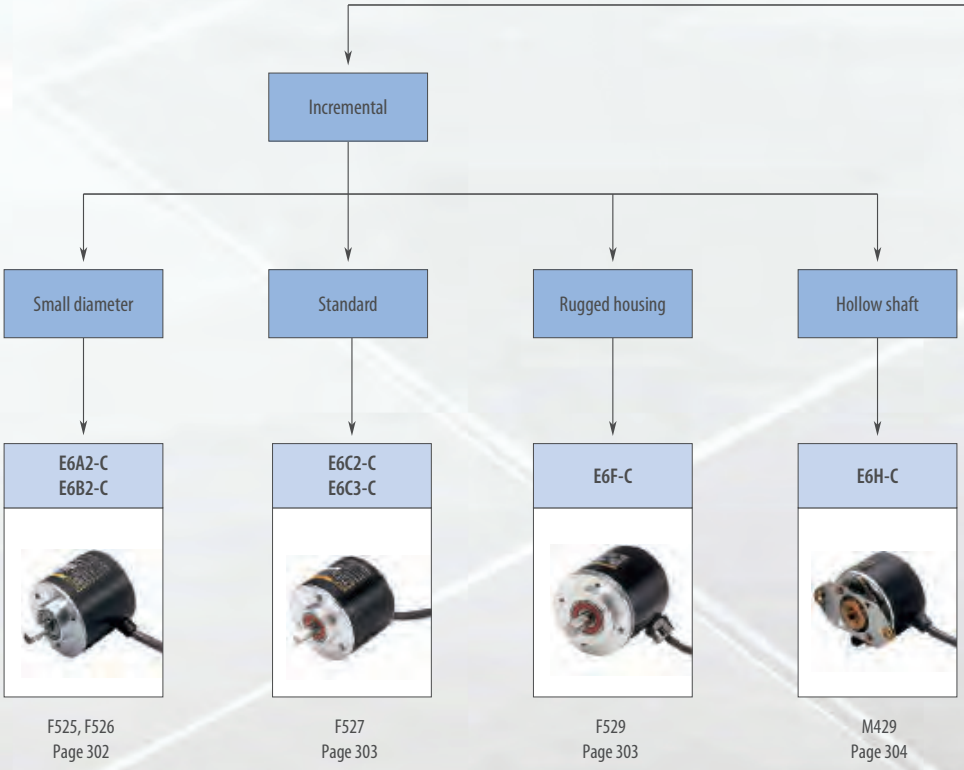
| Type | | Material | Order code | |
|---|---|---|---|---|
| | | | for soldering terminal models | for screw terminal models |
|  | Cover with 5 thinner parts (plastic type) or holes (metal type) as cable exit positions. Protective cover is fixed to basic switch with mounting screws of basic switch. | plastic | AP-A | AP-B |
| | | metal | AP1-A | AP1-B |
|  | Cover with bottom cable exit | | AP-Z | |

# ACCURACY AND ROBUSTNESS MADE RELIABLE

## Close the loop – angle, position and velocity on hand

Rotary encoders create information which represent the movement of your application. To meet challenging demands, Omron offers a wide range of absolute and incremental encoders.

- Wide resolution variety
- Models with rugged housing
- Models for multi- turn applications

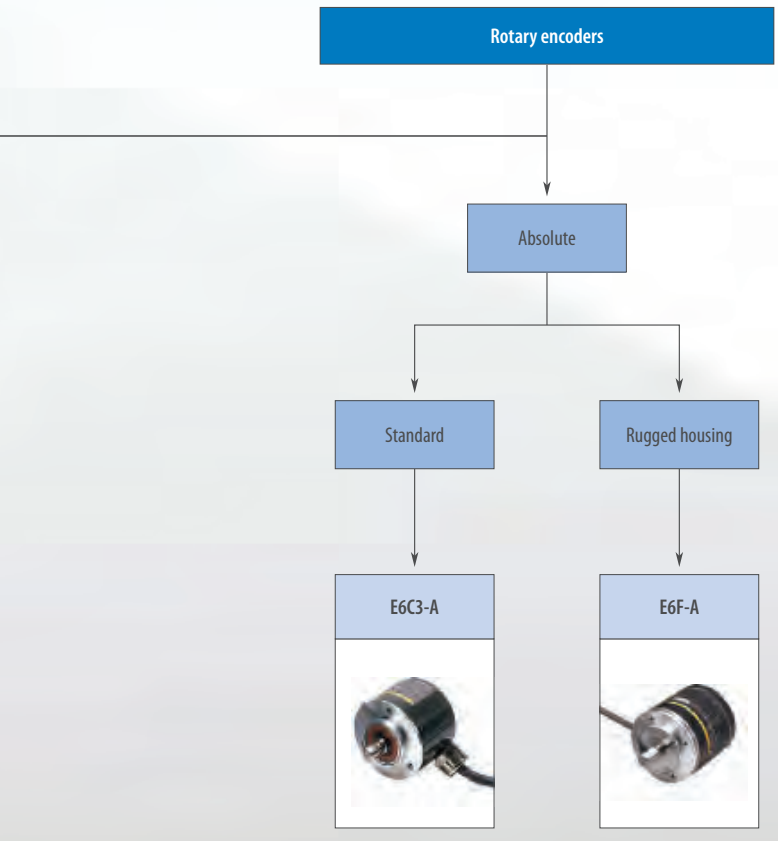



F525, F526
Page 302

F527
Page 303

F529
Page 303

M429
Page 304


Rotary encoders
Absolute
Standard
Rugged housing
E6C3-A
E6F-A
F522
Page 305
F524
Page 305

| Output | | Incremental | | | | |
|---|---|---|---|---|---|---|
| | |  |  |  | |  |
| **Model** | | **E6A2-C** | **E6B2-C** | **E6C2-C** | **E6C3-C** | **E6F-C** |
| Type | | Small diameter shaft | | Standard | | Rugged housing |
| Resolution range | Min. | 10 | | | 100 | |
| | Max. | 500 | 2,000 | | 3,600 | 1,000 |
| Output | NPN | ■ | ■ | ■ | ■ | ■ |
| | PNP | – | ■ | ■ | – | – |
| Size dia. in mm | | 25 | 40 | 50 | 50 | 60 |
| Max. force | Radial | 10 | 30 | 50 | 80 | 120 |
| | Axial | 5 | 20 | 30 | 50 | 50 |
| IP rating | IP50 | ■ | ■ | – | – | – |
| | IP64 | – | – | ■ | – | – |
| | IP65 | – | – | – | ■ | ■ |
| Max. rotation frequency | | 5,000 | 6,000 | | 5,000 | |
| Page/Quick Link | | 302 | | 303 | | |

| Output | | Incremental | Absolute | | | |
|---|---|---|---|---|---|---|
| | |  |  |  | | |
| **Model** | | **E6H-C** | **E6C3-A** | **E6F-A** | | |
| Type | | Hollow shaft | Standard | Rugged housing | | |
| Resolution Range | Min. | 300 | 6 | 256 | | |
| | Max. | 3,600 | 1,024 | | | |
| Output | NPN | ■ | ■ | ■ | | |
| | PNP | – | ■ | ■ | | |
| Size dia. in mm | | 40 (hollow) | 50 | 60 | | |
| Max. force | Radial | 29.4 | 80 | 120 | | |
| | Axial | 4.9 | 50 | 50 | | |
| IP rating | IP50 | ■ | – | – | | |
| | IP64 | – | – | – | | |
| | IP65 | – | ■ | ■ | | |
| Max. rotation frequency | | 10,000 | 5,000 | 5,000 | | |
| Page/Quick Link | | 304 | 305 | | | |

■ Standard ☐ Available – No/not available

## Incremental rotary encoder in miniature housing

The E6A family of rotary encoders features a small sized dia. 25 mm housing.

- Small sized dia. 25 mm housing

### Ordering information

| Size dia. in mm | Output phase | Power supply voltage | Output form | Resolution (pulse/rotation) | Order code |
|---|---|---|---|---|---|
| 25 | A | 5 to 12 VDC | NPN voltage output | 10, 20, 60, 100, 200, 300, 360, 500 | E6A2-CS3E |
| | | | NPN open collector | 10, 20, 60, 100, 200, 300, 360, 500 | E6A2-CS3C |
| | | 12 to 24VDC | | | E6A2-CS5C |
| | A, B | 5 to 12 VDC | NPN voltage output | 100, 200, 360, 500 | E6A2-CW3E |
| | | | NPN open collector | 100, 200, 360, 500 | E6A2-CW3C |
| | | 12 to 24VDC | | | E6A2-CW5C |
| | A, B, Z | 5 to 12 VDC | NPN voltage output | 100, 200, 360, 500 | E6A2-CWZ3E |
| | | | NPN open collector | 100, 200, 360, 500 | E6A2-CWZ3C |
| | | 12 to 24VDC | | | E6A2-CWZ5C |

# E6B2-C

## Incremental rotary encoder in compact housing

The E6B family of incremental rotary encoders features a housing size dia. 40 mm.

- Line driver output models available

### Ordering information

| Size dia. in mm | Power supply voltage | Output form | Resolution (pulse/rotation) | Order code |
|---|---|---|---|---|
| 40 | 5 to 24 VDC | NPN open collector output | 10, 20, 30, 40, 50, 60, 100, 200, 300, 360, 400, 500, 600, 720, 800, 1,000, 1,024, 1,200, 1,500 1,800, 2,000 | E6B2-CWZ6C |
| | 12 to 24VDC | PNP open collector output | 100, 200, 360, 500, 600, 1,000, 2,000 | E6B2-CWZ5B |
| | 5 to 12 VDC | NPN voltage output | 10, 20, 30, 40, 50, 60, 100, 200, 300, 360, 400, 500, 600, 1,000, 1,200, 1,500 1,800, 2,000 | E6B2-CWZ3E |
| | 5 VDC | Line driver output | 10, 20, 30, 40, 50, 60, 100, 200, 300, 360, 400, 500, 600, 1,000, 1,024, 1,200, 1,500 1,800, 2,000 | E6B2-CWZ1X |

## Incremental rotary encoder with enhanced water resistant

The E6C family of dia. 50 mm incremental rotary encoders features an improved water resistance compared to standard models.

- IP64f or IP65f drip-proof, oil-proof construction

### Ordering information

| | Size dia. in mm | Power supply voltage | Output form | Resolution (pulse/rotation) | Order code |
|---|---|---|---|---|---|
| Standard models | 50 | 5 to 24 VDC | NPN open collector output | 10, 20, 30, 40, 50, 60, 100, 200, 300, 360, 400, 500, 600, 720, 800, 1,000, 1,024, 1,200, 1,500, 1,800, 2,000 | E6C2-CWZ6C |
| | | 12 to 24VDC | PNP open collector output | 100, 200, 360, 500, 600, 1,000, 2,000 | E6C2-CWZ5B |
| | | 5 to 12 VDC | NPN voltage output | 10, 20, 30, 40, 50, 60, 100, 200, 300, 360, 400, 500, 600, 720, 800, 1,000, 1,024, 1,200, 1,500, 1,800, 2,000 | E6C2-CWZ3E |
| | | 5 VDC | Line driver output | 10, 20, 30, 40, 50, 60, 100, 200, 300, 360, 400, 500, 600, 720, 800, 1,000, 1,024, 1,200, 1,500, 1,800, 2,000 | E6C2-CWZ1X |
| 8 dia. tough model | | 12 to 24VDC | Complimentary output | 100, 200, 300, 360, 500, 600, 720, 800, 1,000, 1,024, 1,200, 1,500, 1,800, 2,000, 2,048, 2,500, 3,600 | E6C3-CWZ5GH |
| | | 5 to 12 VDC | NPN voltage output | 100, 200, 300, 360, 500, 600, 720, 800, 1,000, 1,024, 1,200, 1,500, 1,800, 2,000, 2,048, 2,500, 3,600 | E6C3-CWZ3EH |
| | | 5 to 12 VDC | Line driver output | 100, 200, 300, 360, 500, 600, 720, 800, 1,000, 1,024, 1,200, 1,500, 1,800, 2,000, 2,048, 2,500, 3,600 | E6C3-CWZ3XH |

# E6F-C

## Incremental rotary encoder in rugged housing

The E6F family of dia. 60 mm rotary encoders features a rugged housing.

- Strong shaft for max 120 N in radial direction and max 50 N in thrust direction)
- Water- and oil-proof structure (IP65f)

### Ordering information

| Size dia. in mm | Power supply voltage | Output form | Resolution (pulse/rotation) | Order code |
|---|---|---|---|---|
| 60 | 12 to 24VDC | Complimentary output | 100, 200, 360, 500, 600, 1000 | E6F-CWZ5G |

## Incremental rotary encoder with hollow shaft

The E6H family of incremental encoders features a dia. 40 mm housing with hollow shaft.

- Wide operating voltage range from 5 to 24 VDC
- Line drive output available (100 m max.)

## Ordering information

| Size dia. in mm | Power supply voltage | Output form | Resolution (pulse/rotation) | Order code |
|---|---|---|---|---|
| 40 | 5 to 24 VDC | Open collector output | 300, 360, 500, 600, 720, 800, 1,000, 1,024, 1,200, 1,500, 1,800, 2,000, 2,048, 2,500, 3,600 | E6H-CWZ6C |
| | 5 to 12 VDC | Voltage output | 300, 360, 500, 600, 720, 800, 1,000, 1,024, 1,200, 1,500, 1,800, 2,000, 2,048, 2,500, 3,600 | E6H-CWZ3E |
| | 5 to 12 VDC | Line drive output | 300, 360, 500, 600, 720, 800, 1,000, 1,024, 1,200, 1,500, 1,800, 2,000, 2,048, 2,500, 3,600 | E6H-CWZ3X |

## Absolute rotary encoder with enhanced water resistance

The E6C family of dia. 50 mm incremental rotary encoders features an improved water resistance compared to standard models.

- IP65f drip-proof, oil-proof construction

### Ordering information

| Size dia. in mm | Power supply voltage | Output form | Output code | Resolution (pulse/rotation) | Connection method | Order code |
|---|---|---|---|---|---|---|
| 50 | 12 to 24VDC | NPN open collector output | Gray code | 256, 360 | Connector type | E6C3-AG5C-C |
| | | | | 256, 360, 720, 1,024 | Pre-wired type | E6C3-AG5C |
| | | | Binary | 32, 40 | | E6C3-AN5C |
| | | | BCD | 6, 8, 12 | | E6C3-AB5C |
| | | PNP open collector output | Gray code | 256, 360, 720, 1,024 | | E6C3-AG5B |
| | | | Binary | 32, 40 | | E6C3-AN5B |
| | | | BCD | 6, 8, 12 | | E6C3-AB5B |
| | 5 VDC | NPN voltage output | Binary | 256 | | E6C3-AN1E |
| | 12 VDC | | | | | E6C3-AN2E |

# E6F-A

## Absolute rotary encoder in rugged housing

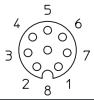
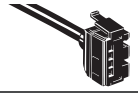
The E6F family of dia. 60 mm rotary encoders features a rugged housing.

- Stronger shaft and higher durability (120 N in radial direction and 50 N in thrust direction) than previous E6F Encoders
- Drip-proof construction meets IP64F standards
- High-resolution models (1024 pulses max. per revolution)
- Faster response for high-speed control applications (grey code: 20 kHz)

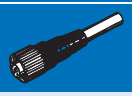
### Ordering information

| Size dia. in mm | Power supply voltage | Output form | Output code | Resolution (pulses/revolution) | Connection method | Order code |
|---|---|---|---|---|---|---|
| 60 | 12 to 24 VDC | NPN open collector | BCD | 360 | Pre-wired | E6F-AB5C |
| | | | | | Connector type[*1] | E6F-AB5C-C |
| | | | Gray code | 256, 360, 720, 1,024 | Pre-wired | E6F-AG5C |
| | | PNP open collector | BCD | 360 | Pre-wired | E6F-AB5B |
| | | | Gray code | 256, 360, 720, 1,024 | Pre-wired | E6F-AG5B |

[*1] For extension cables order E69-DF5 (5M) or E69-DF10 (10M).

| Size | Shape | Type | Features | Material | | Order code | |
|---|---|---|---|---|---|---|---|
| | | | | Nut | Cable |  |  |
| M8 |  | PRO | 3 pin | Brass (CuZn) | PVC 2 m | XS3F-M8PVC3S2M-EU | XS3F-M8PVC3A2M-EU |
| | | | | | PUR 2 m | XS3F-M8PUR3S2M-EU | XS3F-M8PUR3A2M-EU |
| | | | 4pin | | PVC 2 m | XS3F-M8PVC4S2M-EU | XS3F-M8PVC4A2M-EU |
| | | | | | PUR 2 m | XS3F-M8PUR4S2M-EU | XS3F-M8PUR4A2M-EU |
|  |  | LITE | 3 pin | Brass (CuZn) | PVC 2 m | XS3F-LM8PVC3S2M | XS3F-LM8PVC3A2M |
| | | | 4 pin | | | XS3F-LM8PVC4S2M | XS3F-LM8PVC4A2M |
| |  | PROplus Detergent resistant Wash-down | 4 pin | Stainless steel (SUS316L) | PP*1 2 m | Y92E-S08PP4S 2M | Y92E-S08PP4A 2M |
|  |  | PROplus Robotic (drag chain) | 4 pin | Brass (CuZn) | Robotic PVC 2 m | XS3F-M421-402-R | XS3F-M422-402-R |
| | | | | | Robotic PUR 2 m | Y92E-M08PUR4S2M-L | Y92E-M08PUR4A2M-L |
| | | High robotic (drag chain & torsion) | | | High robotic PUR 2 m | Y92E-M08PUR4S2M-R | Y92E-M08PUR4A2M-R |
| M12 |  | PRO | 3 wire | Brass (CuZn) | PVC 2 m | XS2F-M12PVC3S2M-EU | XS2F-M12PVC3A2M-EU |
| | | | | | PUR 2 m | XS2F-M12PUR3S2M-EU | XS2F-M12PUR3A2M-EU |
| | | | 4 wire | | PVC 2 m | XS2F-M12PVC4S2M-EU | XS2F-M12PVC4A2M-EU |
| | | | | | PUR 2 m | XS2F-M12PUR4S2M-EU | XS2F-M12PUR4A2M-EU |
| | | | 5 wire | | PVC 2 m | XS2F-M12PVC5S2M-EU | XS2F-M12PVC5A2M-EU |
| | | | | | PUR 2 m | XS2F-M12PUR5S2M-EU | XS2F-M12PUR5A2M-EU |
| |  | LITE | 3 wire | Brass (CuZn) | PVC 2 m | XS2F-LM12PVC3S2M | XS2F-LM12PVC3A2M |
| | | | 4 wire | | | XS2F-LM12PVC4S2M | XS2F-LM12PVC4A2M |
|  |  | PROplus LED (power and output LED, PNP) | 3 wire | Nickel plated brass | PVC 2 m | – | XS2F-M12PVC3A2MPLED |
| | | | 4 wire | | | – | XS2F-M12PVC4A2MPLED |
| | | | 3 wire | | PUR 2 m | – | XS2F-M12PUR3A2MPLED |
| | | | 4 wire | | | – | XS2F-M12PUR4A2MPLED |
| |  | PROplus Detergent resistant Wash-down | 4 wire | Stainless steel (SUS316L) | PP*1 2 m | Y92E-S12PP4S 2M | Y92E-S12PP4A 2M |
| |  | PROplus 105°C Heat resistant | 4 wire | Stainless steel (SUS316L) | Heat resistant PVC 2 m | XS2F-E421-D80-E | XS2F-E422-D80-E |
|  |  | Twist & click | 4 wire | Nickel plated Zinc | PVC 2 m | XS5F-D421-D80-F | XS5F-D422-D80-F |
| | | | | | PUR 2 m | XS5F-D421-D80-P | XS5F-D422-D80-P |
| |  | PROplus Robotic (drag chain) | 4 wire | Brass (CuZn) | Robotic PVC 2 m | XS2F-D421-D80-F | XS2F-D422-D80-F |
| | | | | | Robotic PUR 2 m | Y92E-M12PUR4S2M-L | Y92E-M12PUR4A2M-L |
| | | High robotic (drag chain & torsion) | | | High grade robotic PUR 2 m | Y92E-M12PUR4S2M-R | Y92E-M12PUR4A2M-R |
|  |  | 8 pin | 8 wire shielded cable | Brass (CuZn) | Shielded PUR 2m | Y92E-M12PURSH8S2M-L | – |
| Fiber amplifier (E3X) connector |  | Fiber amplifier connectors | Special fiber connector - 4 wire | PBT | PVC 2 m | E3X-CN21 | |
| |  | | Special fiber connector + M8 plug | Plug: Zinc diecast | PVC 30 cm with M8 4-pin plug | E3X-CN21-M3J-2 0.3M | |
| | | | Special fiber connector + M12 plug | | PVC 30 cm with M12 4-pin plug | E3X-CN21-M1J 0.3M | |

*1 PP - polypropylene

| Size | Shape | Type | Features | Material | | Order code | |
|---|---|---|---|---|---|---|---|
| | | | | Nut | Cable |  |  |
| M12 |  | IDC (Insulation Displacement Contact) | Fast and easy IDC pressure-welded assembly<br>One connector for cable diameters of 3 mm to 8 mm<br>IP 67 for waterproof connection<br>Smartclick connection | Brass | n.a. | XS5G-D418<br>XS5C-D418 | |
| M8/M12 |  | Confection-able | Plugs and connectors for self assembly | Brass | n.a. | XS2G, XS2C<br>Y92E_conf | |
| M12 |  | Field I/0 boxes | Direct wiring or DeviceNet communi-cation | – | | XW3B, DRT2 | |
| M8/M12 |  | T-connectors, covers, accessories and extended wiring portfolio | n.a. | – | | XS2R, XS3R, XY2F, … | |

# Quality control & Inspection

## Find information fast!

Quick Links shortens your search. Quick Links are unique codes assigned to Omron products listed in this guide. Enter Quick Link codes in the search box on industrial.omron.eu to access detailed information on products in this guide.

Content

# Quality control & Inspection

## Inspection & Ident systems



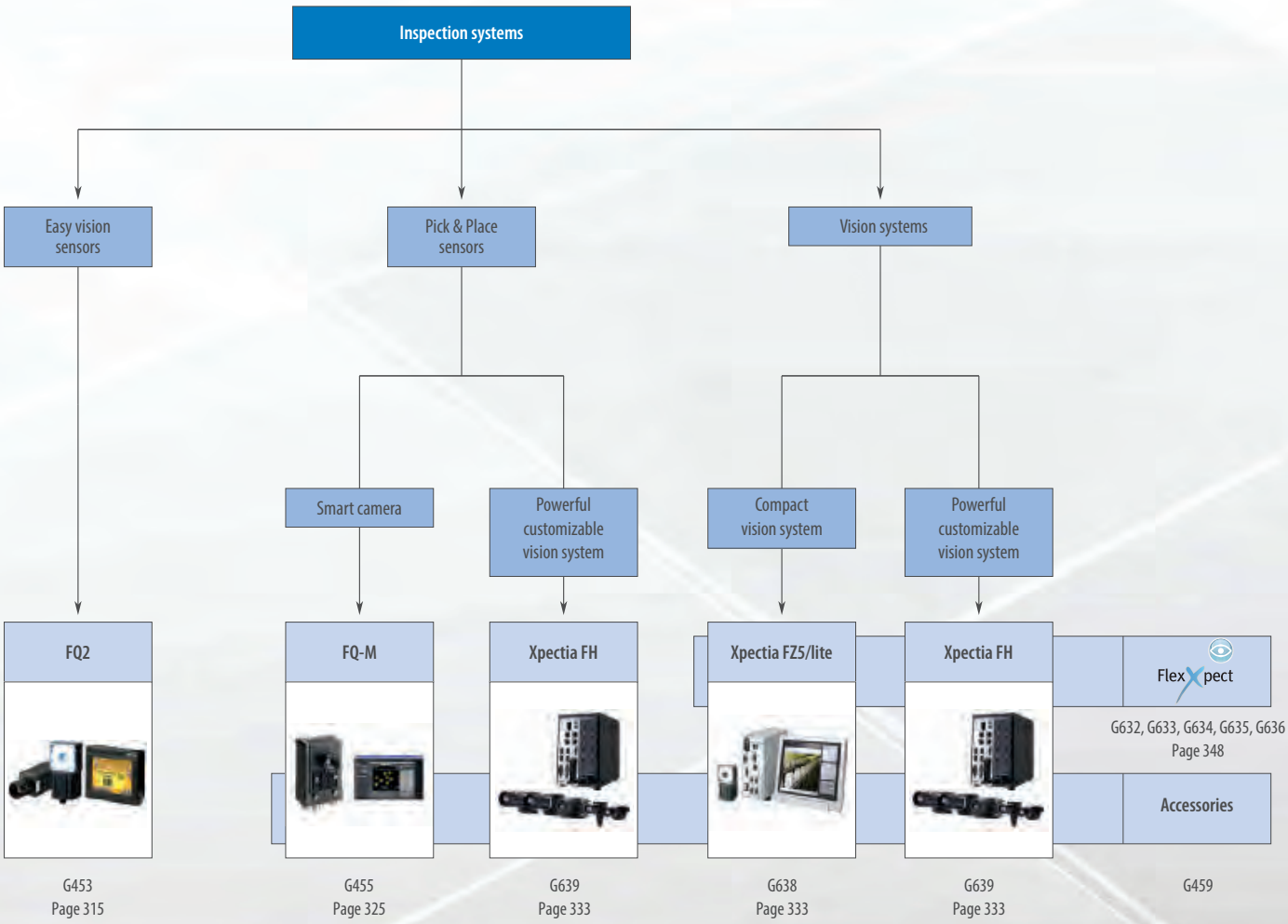
## Measurement sensors

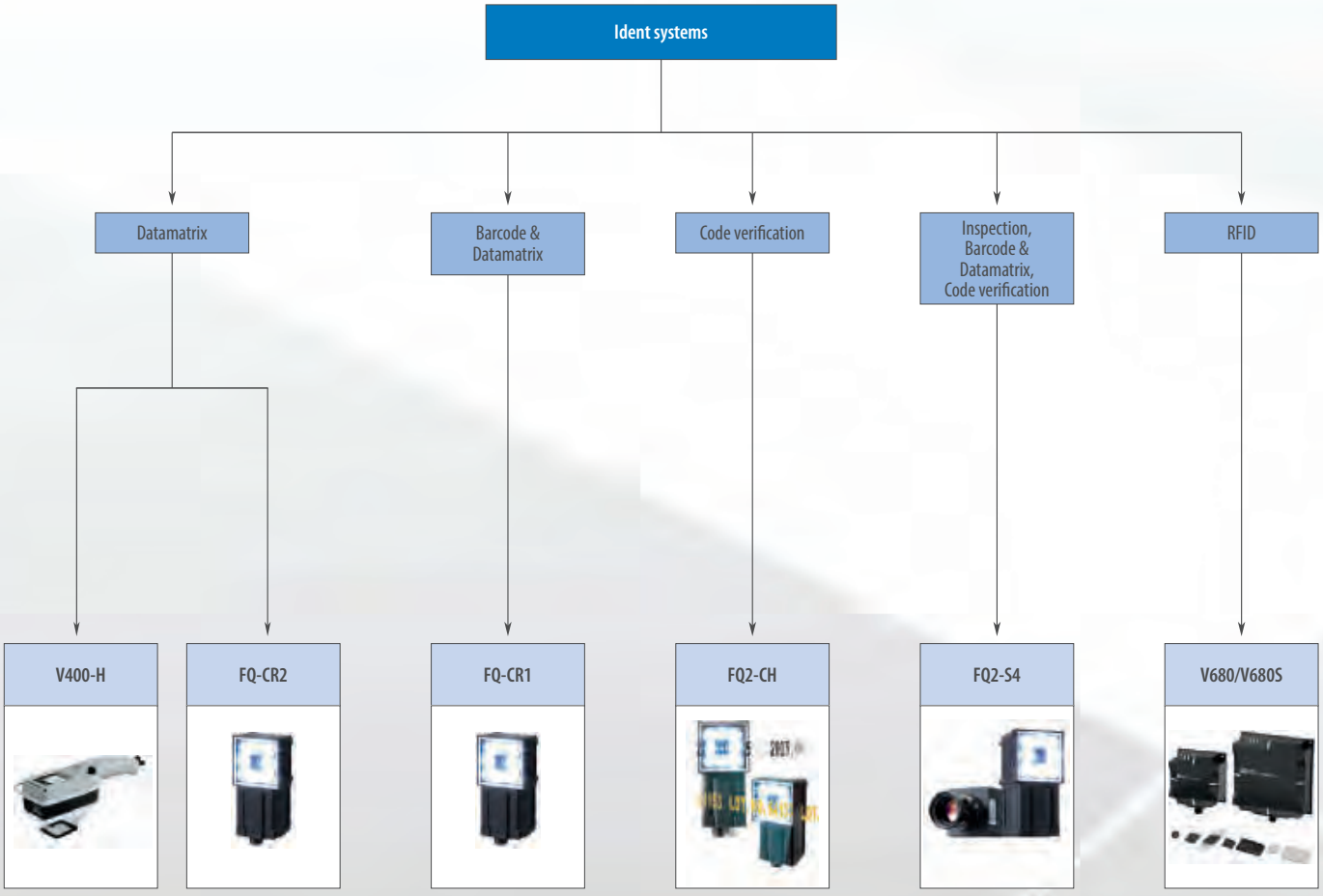
# EASY VISION: TOUCH, COMMUNICATE AND GO

## Built-in LCD monitor for setup and immediate image visualization

The easy vision sensor FQ2 solves the applications by an intuitive teach & go procedure. For advanced applications features such as multiple inspections, position correction, intelligent image filtering and ethernet communication are offered by the Xpectia lite. The high end is addressed by the Xpectia FJ.

- Easy vision – intuitive user interfaces
- Communication – centralized set-up & inspection via Ethernet
- High-end vision – PC-based system for challenging applications
- True color – close to human eye identification and image processing




D322 G462 G524 G463 G464 D526 Page 358

# Selection table

| | | | Vision sensor | Pick & Place | | Vision systems | |
|---|---|---|---|---|---|---|---|
| | | |  |  |  |  |  |
| **Model** | | | **FQ2** | **FQ-M** | **Xpectia FH** | **Xpectia FZ5/Lite** | **Xpectia FH** |
| Selection criteria | **Number of connectable cameras** | | Smart camera | Smart camera | 8 | 4 | 8 |
| | **Camera type** | | Monochrome/Color | Color | Digital color or black & white | Digital color or black & white | Digital color or black & white |
| | **Resolution (usable) Display dots** | | 752 × 480<br>928 × 828<br>1,280 × 1,024 | 752 × 480 | from 640 × 480 to 2,040 × 2,048 | from 640 × 480 to 2,488 × 2,044 | from 640 × 480 to 2,040 × 2,048 |
| | **Working distance mm** | **Min.** | 8 | Depends on selected lens | Depends on selected lens | Depends on selected lens | Depends on selected lens |
| | | **Max.** | 970 | – | – | – | – |
| | **Field of view** | **Min.** | 7.5 × 4.7 | Depends on selected lens | Depends on selected lens | Depends on selected lens | Depends on selected lens |
| | | **Max.** | 300 × 268 | – | – | – | – |
| | **Number of storable configurations** | | 32 | 32 | – | – | – |
| | **Number of tools/configuration** | | 32 | 32 | limited only by memory space | limited only by memory space | limited only by memory space |
| | **IP-Rating camera head** | | IP67 | IP40 | Depends on setup & tools, IP20 | Depends on setup & tools, IP20 | Depends on setup & tools, IP20 |
| | **Supply voltage** | | 24 VDC | 24 VDC | – | – | – |
| Features | **Image processing tools** | | Search, shape search II, sensitive search, area, color data, edge position, edge pitch, edge width, labeling, FQ2-S4 has additional: OCR, Bar code, 2D-code, 2D-code (DMP) and Model dictionary The types of characters and codes to be read are the same as those of FQ2-CH and FQ-CR1 & FQ-CR2 | Contour based search, labelling, edge position | App. 70 processing tools for object or defect recognition, measurements, calculations, input/output, display and more. Includes also character recognition and high precision edge code inspection tools | App. 70 processing tools for object or defect recognition, measurements, calculations, input/output, display and more. Includes also character recognition and high precision edge code inspection tools | App. 70 processing tools for object or defect recognition, measurements, calculations, input/output, display and more. Includes also character recognition and high precision edge code inspection tools |
| | **Image preprocessing** | | High dynamic range (HDR), polarizing filter (attachment), and white balance | High dynamic range (HDR), white balance | Smoothing, edge enhancement, edge extraction, erosion, dilation, median, background suppression - multiple passes, configurable | Smoothing, edge enhancement, edge extraction, erosion, dilation, median, background suppression - multiple passes, configurable | Smoothing, edge enhancement, edge extraction, erosion, dilation, median, background suppression - multiple passes, configurable |
| | **Flow programming** | | – | – | ■ | ■ | ■ |
| | **User interface** | | PC-Tool or Touch Display | PC-Tool or Touch Display | ■ | ■ | ■ |
| | **Optional PC configuration software** | | Yes | Yes | ■ | ■ | ■ |
| | **Security tools** | | – | ■ | – | – | – |
| Communication | **RS-232C** | | Optional via FQ-SDU2 | – | ■ | ■ | ■ |
| | **USB** | | – | – | ■ | ■ | ■ |
| | **Ethernet** | | Yes | ■ | ■ | ■ | ■ |
| | **EtherCAT** | | – | Yes | Yes | – | Yes |
| | **Number of digital I/O** | | 7 in/3 out | 9 in/5 out | 19 in/34 out | 11 in/26 out | 19 in/34 out |
| | **Page/Quick Link** | | 315 | 325 | 333 | 333 | 333 |

| | | | Code reader | | | | |
|---|---|---|---|---|---|---|---|
| | | |  |  |  |  |  |
| **Model** | | | **FQ-CR1** | **FQ-CR2** | **FQ2-CH** | **FQ2-S4** | **V400-H** |
| Selection criteria | Number of connectable cameras | | Smart camera | Smart camera | Smart camera | Smart camera | 1 |
| | Camera type | | Monochrome | Monochrome | Monochrome | Monochrome/Color | Digital black & white |
| | Resolution (usable)<br>Display dots | | 752 × 480 | 752 × 480 | 752 × 480 | 752 × 480<br>928 × 828<br>1,280 × 1,024 | – |
| | Working distance mm | Min. | 8 | 8 | 8 | 8 | 40 mm |
| | | Max. | 970 | 970 | 970 | 970 | 40 mm |
| | Field of view | Min. | 7.5 × 4.7 | 7.5 × 4.7 | 7.5 × 4.7 | 7.5 × 4.7 | 5 × 5 mm |
| | | Max. | 300 × 191 | 300 × 191 | 300 × 191 | 300 × 268 | 30 × 30 mm |
| | Number of storable configurations | | 32 | 32 | 32 | 32 | limited by SD card |
| | Number of tools/configuration | | 32 | 32 | 32 | 32 | – |
| | IP-Rating camera head | | IP67 | IP67 | IP67 | IP67 | IP64 |
| | Supply voltage | | 24 VDC | 24 VDC | 24 VDC | 24 VDC | 5 VDC |
| Features | Image processing tools | | 2D-codes:<br>Data Matrix, QR Code, Micro QR Code, PDF417, Micro PDF417, GS1-Data Matrix<br>Bar codes:<br>JAN/EAN/UPC, Code39, Codabar (NW-7), IFT (interleaved2 of 5), Code93, Code128/GS1-128, GS1-DataBar, GS1-128 Composite Code, Pharmacode | 2D-codes:<br>Data Matrix, QR Code | OCR<br>- Alphabet A to Z<br>- Number 0 to 9<br>- Symbol '-. : /<br>Model dictionary | Search, shape search II, sensitive search, area, color data, edge position, edge pitch, edge width, labeling, OCR, Bar code, 2D-code, 2D-code (DMP) and Model dictionary<br>The types of characters and codes to be read are the same as those of FQ2-CH and FQ-CR1 & FQ-CR2 | Data Matrix, ECC200, 10×10 to 64×64, 8×18 to 16×48, QR Code (Models 1, 2), 21×21 to 57×57 (Versions 1 to 10). |
| | Image preprocessing | | High dynamic range (HDR), polarizing filter (attachment), and white balance | High dynamic range (HDR), polarizing filter (attachment), and white balance | High dynamic range (HDR), polarizing filter (attachment), and white balance | High dynamic range (HDR), polarizing filter (attachment), and white balance | – |
| | Flow programming | | – | – | – | – | – |
| | User interface | | PC-Tool or Touch Display | PC-Tool or Touch Display | PC-Tool or Touch Display | PC-Tool or Touch Display | – |
| | Optional PC configuration software | | Yes | Yes | Yes | Yes | – |
| | Security tools | | – | – | – | – | – |
| Communication | RS-232C | | – | – | Optional via FQ-SDU2 | Optional via FQ-SDU2 | – |
| | USB | | – | – | – | – | – |
| | Ethernet | | Yes | Yes | Yes | Yes | – |
| | EtherCAT | | – | – | – | – | – |
| | Number of digital I/O | | 7 in/3 out | 7 in/3 out | 7 in/3 out | 7 in/3 out | – |
| | Page/Quick Link | | G524 | G462 | G463 | G464 | D322 |

■ Standard – No/not available

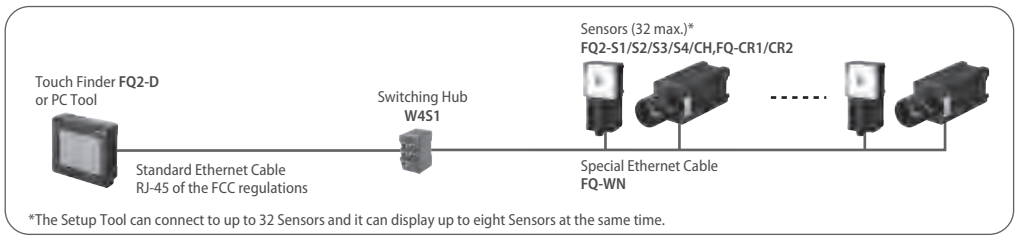
## The new standard in image inspection and code verification

The FQ2 vision sensor family is set to redefine the vision sensor market, providing advanced inspection, code reading and verification only previously available in higher end vision systems. With over 100 camera options, the FQ2 provides users with the ultimate flexibility to solve applications, whether you need high resolution, code reading, integrated lighting, or a cost effective solution to solve a simple application, there is an FQ2 which fits your needs.

- Powerful functionality with versatile line-up
- All-in-one-housing
- Easy searching with Shape Search II
- Direct Part Marked (DPM)
- Unique OCR technology
- Code verification

## System Configuration

**Up to 32 Sensors can be set up and monitored from a single Touch Finder or PC Tool.**
**Various types of Sensors can be used at the same time.**
**However, I/O type and wiring method vary depending on the Sensor, so select the necessary devices.**

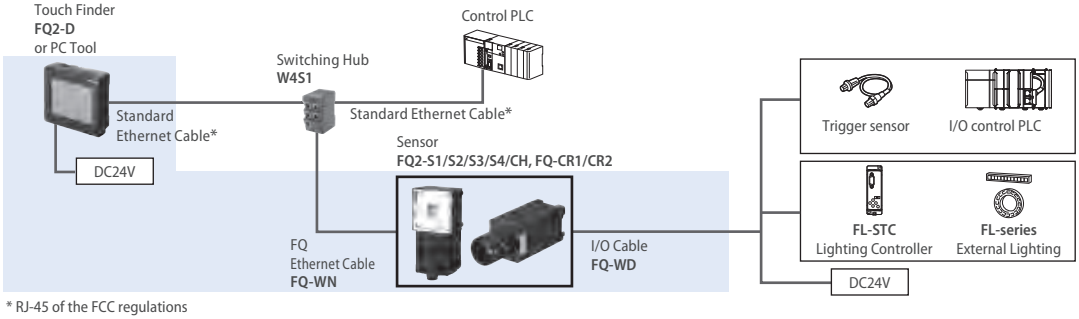



*The Setup Tool can connect to up to 32 Sensors and it can display up to eight Sensors at the same time.

**Note:** If you register as a member after purchasing a Sensor, you can download free setup software that runs on a PC and can be used in place of Touch Finder. Refer to the member registration sheet for details.

### Ethernet (EtherNet/IP, No-protocol, or PLC Link) Connection

FQ2-S1 | FQ2-S2 | FQ2-S3 | FQ2-S4 | FQ2-CH | FQ-CR1 | FQ-CR2

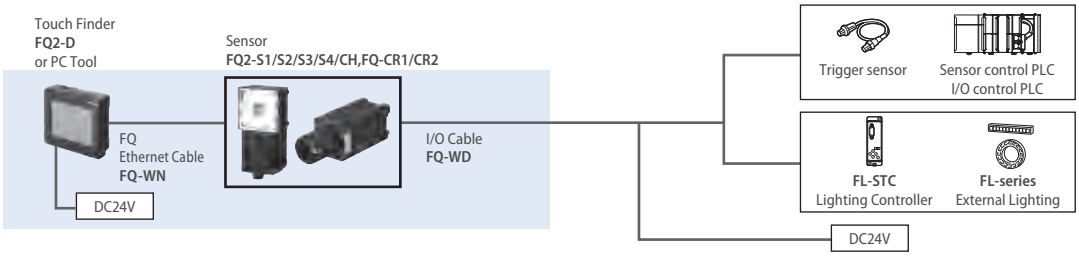



* RJ-45 of the FCC regulations

### Parallel Interface Connection

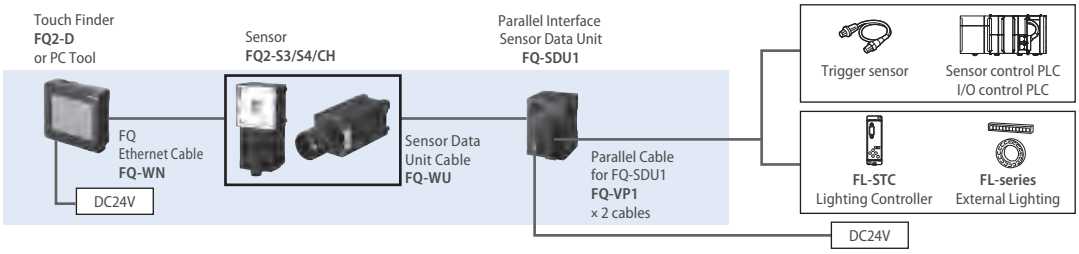
Connection with Standard Parallel Interface of the Sensor

FQ2-S1 | FQ2-S2 | FQ2-S3 | FQ2-S4 | FQ2-CH | FQ-CR1 | FQ-CR2



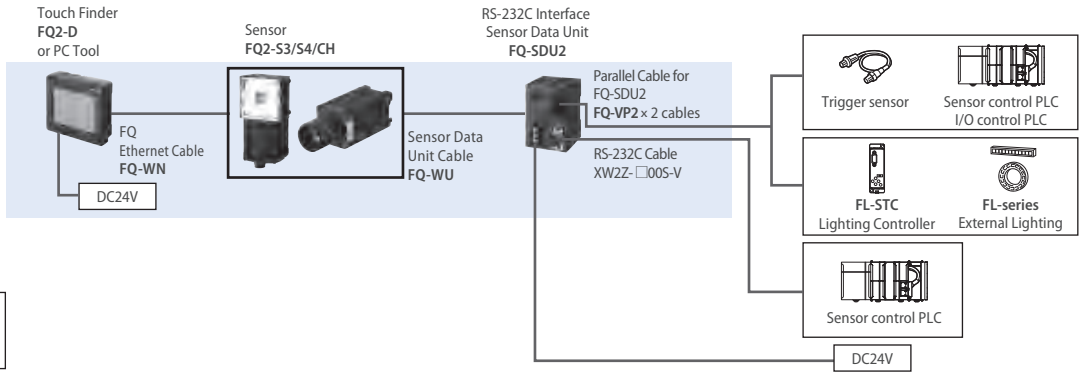

Connection through a Parallel Interface Sensor Data Unit

FQ2-S1 | FQ2-S2 | FQ2-S3 | FQ2-S4 | FQ2-CH | FQ-CR1 | FQ-CR2



**RS-232C Serial Connection**

FQ2-S1 FQ2-S2
FQ2-S3 FQ2-S4
FQ2-CH FQ-CR1
FQ-CR2




Model compatible with communications interface

Compatible
Not compatible

## Ordering Information

### Sensor

#### Inspection model

**FQ2-S1 Series [Single-function Type]**

| Field of vision | | Narrow View | Standard View | Wide View (Long-distance) | Wide View (Short-distance) |
|---|---|---|---|---|---|
| Number of pixels | | 350,000 pixels | | | |
| Color | NPN | FQ2-S10010F | FQ2-S10050F | FQ2-S10100F | FQ2-S10100N |
| | PNP | FQ2-S15010F | FQ2-S15050F | FQ2-S15100F | FQ2-S15100N |
| Field of vision/Installation distance | | Refer to Figure 1 on page 317. | Refer to Figure 2 on page 317. | Refer to Figure 3 on page 317. | Refer to Figure 4 on page 317. |

**FQ2-S2 Series [Standard Type]**

| Field of vision | | Narrow View | Standard View | Wide View (Long-distance) | Wide View (Short-distance) |
|---|---|---|---|---|---|
| Number of pixels | | 350,000 pixels | | | |
| Color | NPN | FQ2-S20010F | FQ2-S20050F | FQ2-S20100F | FQ2-S20100N |
| | PNP | FQ2-S25010F | FQ2-S25050F | FQ2-S25100F | FQ2-S25100N |
| Field of vision/Installation distance | | Refer to Figure 1 on page 317. | Refer to Figure 2 on page 317. | Refer to Figure 3 on page 317. | Refer to Figure 4 on page 317. |

**FQ2-S3 Series [High-resolution Type]**

| Field of vision | | Narrow View | Standard View | Wide View (Long-distance) | Wide View (Short-distance) | C-mount |
|---|---|---|---|---|---|---|
| Number of pixels | | 760,000 pixels | | | | 1.3 million pixels |
| Color | NPN | FQ2-S30010F-08 | FQ2-S30050F-08 | FQ2-S30100F-08 | FQ2-S30100N-08 | FQ2-S30-13 |
| | PNP | FQ2-S35010F-08 | FQ2-S35050F-08 | FQ2-S350100F-08 | FQ2-S35100N-08 | FQ2-S35-13 |
| Monochrome | NPN | FQ2-S30010F-08M | FQ2-S30050F-08M | FQ2-S30100F-08M | FQ2-S30100N-08M | FQ2-S30-13M |
| | PNP | FQ2-S35010F-08M | FQ2-S35050F-08M | FQ2-S35100F-08M | FQ2-S35100N-08M | FQ2-S35-13M |
| Field of vision/Installation distance | | Refer to Figure 5 on page 317. | Refer to Figure 6 on page 317. | Refer to Figure 7 on page 317. | Refer to Figure 8 on page 317. | Refer to optical chart on p. 318 |

#### Inspection/ID model

**FQ2-S4 Series [Standard Type]**

| Field of vision | | Narrow View | Standard View | Wide View (Long-distance) | Wide View (Short-distance) |
|---|---|---|---|---|---|
| Number of pixels | | 350,000 pixels | | | |
| Color | NPN | FQ2-S40010F | FQ2-S40050F | FQ2-S40100F | FQ2-S40100N |
| | PNP | FQ2-S45010F | FQ2-S45050F | FQ2-S45100F | FQ2-S45100N |
| Monochrome | NPN | FQ2-S40010F-M | FQ2-S40050F-M | FQ2-S40100F-M | FQ2-S40100N-M |
| | PNP | FQ2-S45010F-M | FQ2-S45050F-M | FQ2-S45100F-M | FQ2-S45100N-M |
| Field of vision/Installation distance | | Refer to Figure 1 on page 317. | Refer to Figure 2 on page 317. | Refer to Figure 3 on page 317. | Refer to Figure 4 on page 317. |

**[High-resolution Type]**

| Field of vision | | Narrow View | Standard View | Wide View (Long-distance) | Wide View (Short-distance) | C-mount |
|---|---|---|---|---|---|---|
| Number of pixels | | 760,000 pixels | | | | 1.3 million pixels |
| Color | NPN | FQ2-S40010F-08 | FQ2-S40050F-08 | FQ2-S40100F-08 | FQ2-S40100N-08 | FQ2-S40-13 |
| | PNP | FQ2-S45010F-08 | FQ2-S45050F-08 | FQ2-S45100F-08 | FQ2-S45100N-08 | FQ2-S45-13 |
| Monochrome | NPN | FQ2-S40010F-08M | FQ2-S40050F-08M | FQ2-S40100F-08M | FQ2-S40100N-08M | FQ2-S40-13M |
| | PNP | FQ2-S45010F-08M | FQ2-S45050F-08M | FQ2-S45100F-08M | FQ2-S45100N-08M | FQ2-S45-13M |
| Field of vision/Installation distance | | Refer to Figure 5 on page 317. | Refer to Figure 6 on page 317. | Refer to Figure 7 on page 317. | Refer to Figure 8 on page 317. | Refer to optical chart on p. 318 |

## ID Model

**FQ2-CH Series [Optical Character Recognition Sensor]**

| Field of vision | | Narrow View | Standard View | Wide View (Long-distance) | Wide View (Short-distance) |
|---|---|---|---|---|---|
| Number of pixels | | 350,000 pixels | | | |
| Monochrome | NPN | FQ2-CH10010F-M | FQ2-CH10050F-M | FQ2-CH10100F-M | FQ2-CH10100N-M |
| | PNP | FQ2-CH15010F-M | FQ2-CH15050F-M | FQ2-CH15100F-M | FQ2-CH15100N-M |
| Field of vision/Installation distance | | Refer to Figure 1 on page 317. | Refer to Figure 2 on page 317. | Refer to Figure 3 on page 317. | Refer to Figure 4 on page 317. |

**FQ-CR1 Series [Multi Code Reader]**

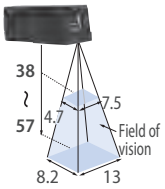
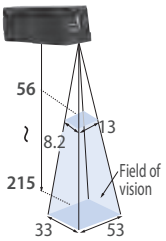
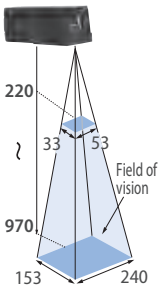
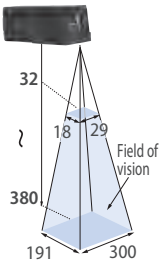
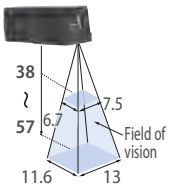
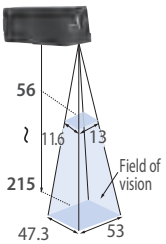
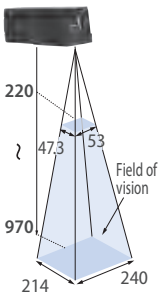
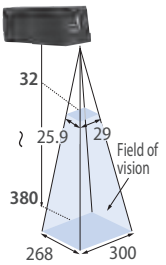
| Field of vision | | Narrow View | Standard View | Wide View (Long-distance) | Wide View (Short-distance) |
|---|---|---|---|---|---|
| Number of pixels | | 350,000 pixels | | | |
| Monochrome | NPN | FQ-CR10010F-M | FQ-CR10050F-M | FQ-CR10100F-M | FQ-CR10100N-M |
| | PNP | FQ-CR15010F-M | FQ-CR15050F-M | FQ-CR15100F-M | FQ-CR15100N-M |
| Field of vision/Installation distance | | Refer to Figure 1 on page 317. | Refer to Figure 2 on page 317. | Refer to Figure 3 on page 317. | Refer to Figure 4 on page 317. |

**FQ-CR2 Series [2D Code Reader]**

| Field of vision | | Narrow View | Standard View | Wide View (Long-distance) | Wide View (Short-distance) |
|---|---|---|---|---|---|
| Number of pixels | | 350,000 pixels | | | |
| Monochrome | NPN | FQ-CR20010F-M | FQ-CR20050F-M | FQ-CR20100F-M | FQ-CR20100N-M |
| | PNP | FQ-CR25010F-M | FQ-CR25050F-M | FQ-CR25100F-M | FQ-CR25100N-M |
| Field of vision/Installation distance | | Refer to Figure 1 on page 317. | Refer to Figure 2 on page 317. | Refer to Figure 3 on page 317. | Refer to Figure 4 on page 317. |

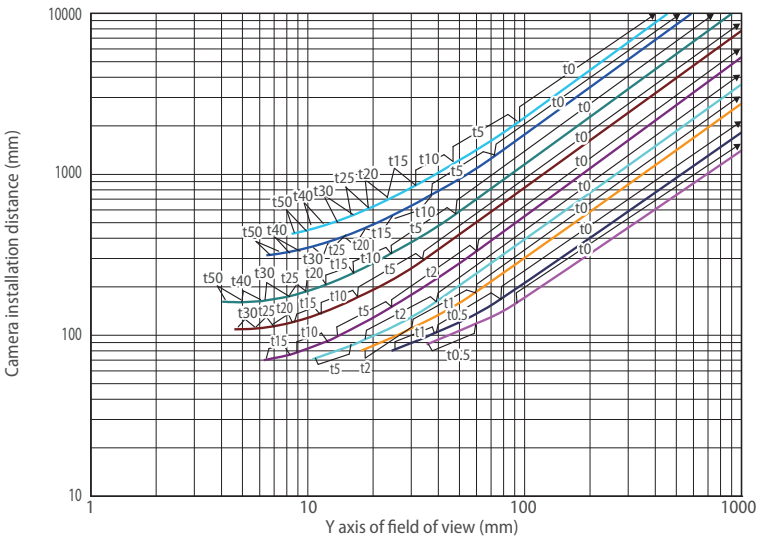
### Field of vision/Installation distance

(Unit: mm)

| Field of vision | Narrow View | Standard View | Wide View (Long-distance) | Wide View (Short-distance) |
|---|---|---|---|---|
| Appearance |  |  |  |  |
| 350,000 pixels type | Figure 1 | Figure 2 | Figure 3 | Figure 4 |
| |  |  |  |  |
| 760,000 pixels type | Figure 5 | Figure 6 | Figure 7 | Figure 8 |
| |  |  |  |  |

## Optical Chart for C-mount Camera FQ2-S3□-13□/-S4□-13□

### High-resolution, Low-distortion Lenses 3Z4S-LE SV-□□□□H




3Z4S-LE

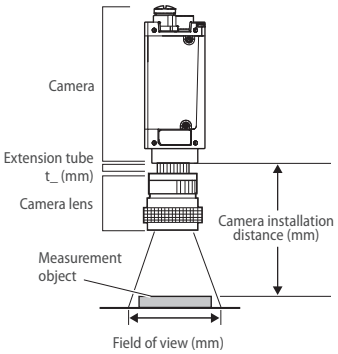
- SV-0614H
- SV-0814H
- SV-1214H
- SV-1614H
- SV-2514H
- SV-3514H
- SV-5014H
- SV-7525H
- SV-10028H

Extension tube

Examples
t0: Extension tube is not required.
t5: A 5-mm extension tube is required.

**Meaning of Optical Chart**
The X axis of the optical chart shows the field of vision (mm) (See Note.), and the Y axis of the optical chart shows the camera installation distance (mm).

**Note:** The lengths of the fields of vision given in the optical charts are the lengths of the Y axis.




## Touch Finder

| Type | Appearance | Order code |
|---|---|---|
| DC power supply |  | FQ2-D30 |
| AC/DC/battery | | FQ2-D31 |

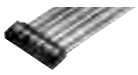
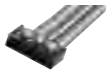
## Cables

| Type | Appearance | Cable length | Order code |
|---|---|---|---|
| FQ Ethernet Cables (connect Sensor to Touch Finder, Sensor to PC) |  Robotic cable | 2m | FQ-WN002 |
| | | 5m | FQ-WN005 |
| | | 10m | FQ-WN010 |
| | | 20m | FQ-WN020 |
| I/O Cables |  Robotic cable | 2m | FQ-WD002 |
| | | 5m | FQ-WD005 |
| | | 10m | FQ-WD010 |
| | | 20m | FQ-WD020 |

## Sensor Data Unit (FQ2-S3/S4/CH only)

| Type | Appearance | Output type | Order code |
|---|---|---|---|
| Parallel Interface |  | NPN | FQ-SDU10 |
| | | PNP | FQ-SDU15 |
| RS-232C Interface |  | NPN | FQ-SDU20 |
| | | PNP | FQ-SDU25 |

## Cables for Sensor Data Unit

| Type | Appearance | Cable length | Order code |
|---|---|---|---|
| Sensor Data Unit Cable |  Robotic cable | 2m | FQ-WU002 |
| | | 5m | FQ-WU005 |
| | | 10m | FQ-WU010 |
| | | 20m | FQ-WU020 |
| Parallel Cable for FQ-SDU1*1 |  | 2m | FQ-VP1002 |
| | | 5m | FQ-VP1005 |
| | | 10m | FQ-VP1010 |
| Parallel Cable for FQ-SDU2*1 |  | 2m | FQ-VP2002 |
| | | 5m | FQ-VP2005 |
| | | 10m | FQ-VP2010 |
| RS-232C Cable for FQ-SDU2*1 |  | 2m | XW2Z-200S-V |
| | | 5m | XW2Z-500S-V |

*1 When using FQ-SDU□□, 2 cables are required for all I/O signals.

## External Lighting

| Type | Model |
|---|---|
| FLV series | Refer to FLV series catalog Q198 |

## Accessories

| Application | Appearance | Name | Order code |
|---|---|---|---|
| For Sensor |  | Mounting Bracket*1 | FQ-XL |
| |  | Mounting Bracket | FQ-XL2 |
| |  | Mounting Base for C-mount type*2 | FQ-XLC |
| |  | Polarizing Filter Attachment*1 | FQ-XF1 |
| For Touch Finder |  | Panel Mounting Adapter | FQ-XPM |
| |  | AC Adapter (for AC/DC/battery model)*4 | FQ-A□ |
| |  | Battery (for AC/DC/battery model) | FQ-BAT1 |
| |  | Touch Pen*4 | FQ-XT |
| |  | Strap | FQ-XH |
| |  | SD CARD (4 GB) | HMC-SD491 |

*1 Included with Integrated Sensor.
*2 Included with Sensor with C-mount.
*4. AC Adapters for Touch Finder with DC/AC/Battery Power Supply.Select the model for the country in which the Touch Finder will be used.

| Plug Type | Voltage | Certified standards | Order code |
|---|---|---|---|
| A | 125 V max. | PSE | FQ-AC1 |
| | | UL/CSA | FQ-AC2 |
| | 250 V max. | CCC mark | FQ-AC3 |
| C | 250 V max. | – | FQ-AC4 |
| BF | 250 V max. | – | FQ-AC5 |
| C | 250 V max. | – | FQ-AC6 |

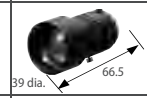
*4. Enclosed with Touch Finder.

### Industrial Switching Hubs (Recommended)

| Appearance | Number of ports | Failure detection | Current consumption | Order code |
|---|---|---|---|---|
|  | 3 | None | 0.22 A | W4S1-03B |
|  | 5 | None | 0.22 A | W4S1-05B |
| | | Supported | | W4S1-05C |

### Lenses for C-mount Camera. Refer to optical chart on p. 318 for selection of a lens.

#### High-resolution, Low-distortion Lenses

| Model | 3Z4S-LE SV-0614H | 3Z4S-LE SV-0814H | 3Z4S-LE SV-1214H | 3Z4S-LE SV-1614H | 3Z4S-LE SV-2514H | 3Z4S-LE SV-3514H | 3Z4S-LE SV-5014H | 3Z4S-LE SV-7525H | 3Z4S-LE SV-10028H |
|---|---|---|---|---|---|---|---|---|---|
| Appearance |  |  |  |  |  |  |  |  |  |
| Focal length | 6 mm | 8 mm | 12 mm | 16 mm | 25 mm | 35 mm | 50 mm | 75 mm | 100 mm |
| Brightness | F1.4 | F1.4 | F1.4 | F1.4 | F1.4 | F1.4 | F1.4 | F2.5 | F2.8 |
| Filter size | M40.5 P0.5 | M35.5 P0.5 | M27 P0.5 | M27 P0.5 | M27 P0.5 | M35.5 P0.5 | M40.5 P0.5 | M34.0 P0.5 | M37.5 P0.5 |

#### Extension Tubes

| Model | 3Z4S-LE SV-EXR |
|---|---|
| Contents | Set of 7 tubes<br>(40 mm, 20 mm,10 mm, 5 mm, 2.0 mm,1.0 mm, and 0.5 mm)<br>Maximum outer diameter: 30 mm dia. |

**Note:** Do not use the 0.5-mm, 1.0-mm, and 2.0-mm Extension Tubes attached to each other. Since these Extension Tubes are placed over the threaded section of the Lens or other Extension Tube, the connection may loosen when more than one 0.5-mm, 1.0-mm or 2.0-mm Extension Tube are used together.

**Note:** Reinforcement is required to protect against vibration when Extension Tubes exceeding 30 mm are used.

## Ratings and Performance

### Sensor

#### Inspection Model FQ2-S1/S2/S3 Series

| Item | | Single-function type | Standard type | High-resolution type | | | |
|---|---|---|---|---|---|---|---|
| Model | NPN | FQ2-S10□□□□ | FQ2-S20□□□□ | FQ2-S30□□□□-08 | FQ2-S30□□□□-08M | FQ2-S30-13 | FQ2-S30-13M |
| | PNP | FQ2-S15□□□□ | FQ2-S25□□□□ | FQ2-S35□□□□-08 | FQ2-S35□□□□-08M | FQ2-S35-13 | FQ2-S35-13M |
| Field of view | | Refer to Ordering Information on p.19. (Tolerance (field of vision): ±10% max.) | | | | Select a lens according to the field of vision and installation distance.<br>Refer to optical chart on p. 318. | |
| Installation distance | | | | | | | |
| Main functions | Inspection items | Search, shape search II, sensitive search, area, color data, edge position, edge pitch, edge width, and labeling | | | | | |
| | Number of simultaneous measurements | 1 | 32 | | | | |
| | Position compensation | Supported (360º Model position compensation, Edge position compensation) | | | | | |
| | Number of registered scenes | 8 | 32 | | | | |
| | Calibration | Supported | | | | | |
| Image input | Image processing method | Real color | | | Monochrome | Real color | Monochrome |
| | Image filter | High dynamic range (HDR), image adjustment (Color Gray Filter, Weak smoothing, Strong smoothing, Dilate, Erosion, Median, Extract edges, Extract horizontal edges, Extract vertical edges, Enhance edges, Background suppression), polarizing filter (attachment), and white balance (Sensors with Color Cameras only) | | | | | |
| | Image elements | 1/3-inch color CMOS | | 1/2-inch color CMOS | 1/2-inch Monochrome CMOS | 1/2-inch color CMOS | 1/2-inch Monochrome CMOS |
| | Shutter | Built-in lighting ON: 1/250 to 1/50,000<br>Built-in lighting OFF: 1/1 to 1/50,000 | | Built-in lighting ON: 1/250 to 1/60,000<br>Built-in lighting OFF: 1/1 to 1/60,000 | | 1/1 to 1/60,000 | |
| | Processing resolution | 752 × 480 | | 928 × 828 | | 1,280 × 1,024 | |
| | Partial input function | Supported horizontally only. | | Supported horizontally and vertically | | | |
| | Lens mounts | – | | | | C-mount | |
| Lighting | Lighting method | Pulse | | | | – | |
| | Lighting color | White | | | | – | |
| Data logging | Measurement data | In Sensor: 1,000 items (If a Touch Finder is used, results can be saved up to the capacity of an SD card.) | | | | | |
| | Images | In Sensor: 20 images (If a Touch Finder is used, images can be saved up to the capacity of an SD card.) | | | | | |
| Auxiliary function | | Math (arithmetic, calculation functions, trigonometric functions, and logic functions) | | | | | |
| Measurement trigger | | External trigger (single or continuous)<br>Communications trigger (Ethernet TCP no-protocol, Ethernet UDP no-protocol, Ethernet FINS/TCP no-protocol, EtherNet/IP, PLC Link, or PROFINET) | | | | | |

| Item | | Single-function type | Standard type | High-resolution type | | | |
|---|---|---|---|---|---|---|---|
| Model | NPN | FQ2-S10□□□□ | FQ2-S20□□□□ | FQ2-S30□□□□-08 | FQ2-S30□□□□-08M | FQ2-S30-13 | FQ2-S30-13M |
| | PNP | FQ2-S15□□□□ | FQ2-S25□□□□ | FQ2-S35□□□□-08 | FQ2-S35□□□□-08M | FQ2-S35-13 | FQ2-S35-13M |
| I/O specifications | Input signals | 7 signals<br>Single measurement input (TRIG)<br>Control command input (IN0 to IN5) | | | | | |
| | Output signals | 3 signals<br>Control output (BUSY)<br>Overall judgement output (OR)<br>Error output (ERROR)<br>The assignments of the three output signals (OUT0 to OUT2) can be changed to the individual judgements of the inspection items, the image input ready output (READY), or the external lighting timing output (STGOUT). | | | | | |
| | Ethernet specifications | 100Base-TX/10Base-T | | | | | |
| | Communications | Ethernet TCP no-protocol, Ethernet UDP no-protocol, Ethernet FINS/TCP no-protocol, EtherNet/IP, PLC Link, or PROFINET | | | | | |
| | I/O expansion | – | – | Possible by connecting FQ-SDU1_ Sensor Data Unit. 11 inputs and 24 outputs | | | |
| | RS-232C | – | – | Possible by connecting FQ-SDU2_ Sensor Data Unit. 8 inputs and 7 outputs | | | |
| Ratings | Power supply voltage | 21.6 to 26.4 VDC (including ripple) | | | | | |
| | Current consumption | 2.4 A max. | | | | 0.3 A max. | |
| Environmental immunity | Ambient temperature range | Operating: 0 to 50°C<br>Storage: −25 to 65°C<br>(with no icing or condensation) | | Operating: 0 to 40°C<br>Storage: −25 to 65°C<br>(with no icing or condensation) | | | |
| | Ambient humidity range | Operating and storage: 35% to 85% (with no condensation) | | | | | |
| | Ambient atmosphere | No corrosive gas | | | | | |
| | Vibration resistance (destruction) | 10 to 150 Hz, single amplitude: 0.35 mm, X/Y/Z directions<br>8 min each, 10 times | | | | | |
| | Shock resistance (destruction) | 150 $m/s^2$ 3 times each in 6 direction (up, down, right, left, forward, and backward) | | | | | |
| | Degree of protection | IEC 60529 IP67 (Except when Polarizing Filter Attachment is mounted or connector cap is removed.) | | | | IEC 60529 IP40 | |
| Materials | | Sensor: PBT, PC, SUS<br>Mounting Bracket: PBT<br>Polarizing Filter Attachment: PBT, PC<br>Ethernet connector: Oil-resistance vinyl compound<br>I/O connector: Lead-free heat-resistant PVC | | | | Cover: Zinc-plated steel,<br>Thickness: 0.6 mm<br>Case: Aluminum diecast alloy (ADC-12)<br>Mounting base: Polycarbonate ABS | |
| Weight | | Narrow View/Standard View:Approx.160 g<br>Wide View: Approx.150 g | | | | Approx. 160 g without base,<br>Approx. 185 g with base | |
| Accessories included with sensor | | Mounting Bracket (FQ-XL) (1)<br>Polarizing Filter Attachment (FQ-XF1) (1)<br>Instruction Manual, Quick Startup Guide<br>Member Registration Sheet, Warning Label | | | | Mounting Base (FQ-XLC) (1)<br>Mounting Screw (M3 × 8mm) (4)<br>Instruction Manual, Quick Startup Guide<br>Member Registration Sheet | |
| LED class | | Class 2(Applicable standards: IEC 60825-1:1993 +A1:1997 +A2:2001, EN 60825-1:1994 +A1:2002 +A2:2001, and JIS C 6802:2005) | | | | – | |
| Applicable standards | | EN standard EN 61326 and EC Directive No.2004/104/EC | | EN 61326-1:2006 and IEC 61010-1 | | | |

## Inspection/ID Model FQ2-S4 Series

| Item | | Inspection/ID Model | | | | | |
|---|---|---|---|---|---|---|---|
| Model | NPN | FQ2-S40□□□□ | FQ2-S40□□□□-M | FQ2-S40□□□□-08 | FQ2-S40□□□□-08M | FQ2-S40□□□□-13 | FQ2-S40□□□□-13M |
| | PNP | FQ2-S45□□□□ | FQ2-S45□□□□-M | FQ2-S45□□□□-08 | FQ2-S45□□□□-08M | FQ2-S45□□□□-13 | FQ2-S45□□□□-13M |
| Field of view<br>Installation distance | | Refer to Ordering Information on p.19. (Tolerance (field of vision): ±10% max.) | | | | Select a lens according to the field of vision and installation distance.<br>Refer to optical chart on p. 318. | |
| Main functions | Inspection items | Search, shape search II, sensitive search, area, color data, edge position, edge pitch, edge width, labeling, OCR[*1], Bar code[*2], 2D-code[*2], 2D-code (DMP)[*3], and Model dictionary | | | | | |
| | Number of simultaneous measurements | 32 | | | | | |
| | Position compensation | Supported (360° Model position compensation, Edge position compensation) | | | | | |
| | Number of registered scenes | 32 | | | | | |
| | Calibration | Supported | | | | | |
| | Retry function | Normal retry, Exposure retry, Scene retry, Trigger retry | | | | | |
| Image input | Image processing method | Real color | Monochrome | Real color | Monochrome | Real color | Monochrome |
| | Image filter | High dynamic range (HDR), image adjustment (Color Gray Filter, Weak smoothing, Strong smoothing, Dilate, Erosion, Median, Extract edges, Extract horizontal edges, Extract vertical edges, Enhance edges, Background suppression), polarizing filter (attachment), and white balance (Sensors with Color Cameras only) | | | | | |
| | Image elements | 1/3-inch color CMOS | 1/3-inch Monochrome CMOS | 1/2-inch color CMOS | 1/2-inch Monochrome CMOS | 1/2-inch color CMOS | 1/2-inch Monochrome CMOS |
| | Shutter | Built-in lighting ON: 1/250 to 1/50,000<br>Built-in lighting OFF: 1/1 to 1/50,000 | | Built-in lighting ON: 1/250 to 1/60,000<br>Built-in lighting OFF: 1/1 to 1/60,000 | | 1/1 to 1/60,000 | |
| | Processing resolution | 752 × 480 | | 928 × 828 | | 1,280 × 1,024 | |
| | Partial input function | Supported horizontally only. | | Supported horizontally and vertically | | | |
| | Lens mounts | – | | | | C-mount | |
| Lighting | Lighting method | Pulse | | | | – | |
| | Lighting color | White | | | | – | |

| Item | | Inspection/ID Model | | | | | |
|---|---|---|---|---|---|---|---|
| Model | NPN | FQ2-S40□□□□ | FQ2-S40□□□□-M | FQ2-S40□□□□-08 | FQ2-S40□□□□-08M | FQ2-S40□□□□-13 | FQ2-S40□□□□-13M |
| | PNP | FQ2-S45□□□□ | FQ2-S45□□□□-M | FQ2-S45□□□□-08 | FQ2-S45□□□□-08M | FQ2-S45□□□□-13 | FQ2-S45□□□□-13M |
| Data logging | Measurement data | In Sensor: 1,000 items (If a Touch Finder is used, results can be saved up to the capacity of an SD card.) | | | | | |
| | Images | In Sensor: 20 images (If a Touch Finder is used, images can be saved up to the capacity of an SD card.) | | | | | |
| Auxiliary function | | Math (arithmetic, calculation functions, trigonometric functions, and logic functions) | | | | | |
| Measurement trigger | | External trigger (single or continuous)<br>Communications trigger (Ethernet TCP no-protocol, Ethernet UDP no-protocol, Ethernet FINS/TCP no-protocol, EtherNet/IP, PLC Link , or PROFINET) | | | | | |
| I/O specifications | Input signals | 7 signals<br>Single measurement input (TRIG)<br>Control command input (IN0 to IN5) | | | | | |
| | Output signals | 3 signals<br>Control output (BUSY)<br>Overall judgement output (OR)<br>Error output (ERROR)<br>The assignments of the three output signals (OUT0 to OUT2) can be changed to the individual judgements of the inspection items, the image input ready output (READY), or the external lighting timing output (STGOUT). | | | | | |
| | Ethernet specifications | 100Base-TX/10Base-T | | | | | |
| | Communications | Ethernet TCP no-protocol, Ethernet UDP no-protocol, Ethernet FINS/TCP no-protocol, EtherNet/IP, PLC Link, or PROFINET | | | | | |
| | I/O expansion | Possible by connecting FQ-SDU1_ Sensor Data Unit. 11 inputs and 24 outputs | | | | | |
| | RS-232C | Possible by connecting FQ-SDU2_ Sensor Data Unit. 8 inputs and 7 outputs | | | | | |
| Ratings | Power supply voltage | 21.6 to 26.4 VDC (including ripple) | | | | | |
| | Current consumption | 2.4 A max. | | | | 0.3 A max. | |
| Environmental immunity | Ambient temperature range | Operating: 0 to 40ºC<br>Storage: –25 to 65ºC<br>(with no icing or condensation) | | | | | |
| | Ambient humidity range | Operating and storage: 35% to 85% (with no condensation) | | | | | |
| | Ambient atmosphere | No corrosive gas | | | | | |
| | Vibration resistance (destruction) | 10 to 150 Hz, single amplitude: 0.35 mm, X/Y/Z directions<br>8 min each, 10 times | | | | | |
| | Shock resistance (destruction) | 150 m/s$^2$ 3 times each in 6 direction (up, down, right, left, forward, and backward) | | | | | |
| | Degree of protection | IEC 60529 IP67 (Except when Polarizing Filter Attachment is mounted or connector cap is removed.) | | | | IEC 60529 IP40 | |
| Materials | | Sensor: PBT, PC, SUS<br>Mounting Bracket: PBT<br>Polarizing Filter Attachment: PBT, PC<br>Ethernet connector: Oil-resistance vinyl compound<br>I/O connector: Lead-free heat-resistant PVC | | | | Cover: Zinc-plated steel,<br>Thickness: 0.6 mm<br>Case: Aluminum diecast alloy (ADC-12)<br>Mounting base: Polycarbonate ABS | |
| Weight | | Narrow View/Standard View:Approx.160 g<br>Wide View:Approx.150 g | | | | Approx. 160 g without base,<br>Approx. 185 g with base | |
| Accessories included with sensor | | Mounting Bracket (FQ-XL)(1)<br>Polarizing Filter Attachment (FQ-XF1) (1)<br>Instruction Manual, Quick Startup Guide<br>Member Registration Sheet, Warning Label | | | | Mounting Base (FQ-XLC) (1)<br>Mounting Screw (M3 × 8mm)(4)<br>Instruction Manual, Quick Startup Guide<br>Member Registration Sheet | |
| LED class | | Class 2(Applicable standards: IEC 60825-1:1993 +A1:1997 +A2:2001,<br>EN 60825-1:1994 +A1:2002 +A2:2001, and JIS C 6802:2005) | | | | – | |
| Applicable standards | | EN 61326-1:2006 and IEC 61010-1 | | | | | |

*1 The types of characters to be read are the same as those of FQ2-CH Optical Character Recognition Sensor.
*2 The types of codes to be read are the same as those of FQ-CR1 Multi Code Reader.
*3 The types of codes to be read are the same as those of FQ-CR2 2D Code Reader.

ID Model FQ2-CH, FQ-CR1/CR2 Series

| Item | | Optical Character Recognition Sensor | Multi Code Reader | 2D Code Reader |
|---|---|---|---|---|
| Model | NPN | FQ2-CH10□□□□-M | FQ-CR10□□□□-M | FQ-CR20□□□□-M |
| | PNP | FQ2-CH15□□□□-M | FQ-CR15□□□□-M | FQ-CR25□□□□-M |
| Field of view | | Refer to Ordering Information on page 316. (Tolerance (field of vision): ±10% max.) | | |
| Installation distance | | | | |
| Main functions | Inspection items | OCR<br>· Alphabet A to Z<br>· Number 0 to 9<br>· Symbol ' - . : /<br>Model dictionary | 2D Code (Data Matrix(EC200), QR Code, MicroQR Code, PDF417, MicroPDF417, GS1-Data Matrix)<br>Bar Code (JAN/EAN/UPC, Code39, Codabar (NW-7), ITF (Interleaved 2 of 5), Code 93, Code128/GS1-128, GS1 DataBar* (Truncated, Stacked, Omnidirectional, Stacked Omnidirectional, Limited, Expanded, Expanded Stacked), Pharmacode, GS1-128 Composite Code (CC-A, CC-B, CC-C) | 2D Code<br>(Data Matrix(EC200), QR Code) |
| | Image filter | Weak smoothing, Strong smoothing, Dilate, Erosion, Median, Extract edges, Extract horizontal edges, Extract vertical edges, Enhance edges, Background suppression | None | Filter function (Smooth, Dilate, Erosion, Median), Code Error Correction Position Display |
| | Verification function | Supported | Supported | None |
| | Retry function | Normal retry, Exposure retry, Scene retry, Trigger retry | | |
| | Number of simultaneous measurements | 32 | | |
| | Position compensation | Supported (360° Model position compensation, Edge position compensation) | None | |
| | Number of registered scenes | 32 | | |
| Image input | Image processing method | Monochrome | | |
| | Image filter | High dynamic range (HDR) and polarizing filter (attachment) | | |
| | Image elements | 1/3-inch Monochrome CMOS | | |
| | Shutter | Built-in lighting ON: 1/250 to 1/50,000<br>Built-in lighting OFF: 1/1 to 1/50,000 | 1/250 to 1/30,000 | 1/250 to 1/32,258 |
| | Processing resolution | 752 × 480 | | |
| | Partial input function | Supported horizontally only. | | |
| Lighting | Lighting method | Pulse | | |
| | Lighting color | White | | |
| Data logging | Measurement data | In Sensor: 1,000 items (If a Touch Finder is used, results can be saved up to the capacity of an SD card.) | | |
| | Images | In Sensor: 20 images (If a Touch Finder is used, images can be saved up to the capacity of an SD card.) | | |
| Auxiliary function | | Math (arithmetic, calculation functions, trigonometric functions, and logic functions) | | |
| Measurement trigger | | External trigger (single or continuous)<br>Communications trigger (Ethernet TCP no-protocol, Ethernet UDP no-protocol, Ethernet FINS/TCP no-protocol, EtherNet/IP, PLC Link, or PROFINET) | External trigger (single or continuous) | |
| I/O specifications | Input signals | 7 signals<br>Single measurement input (TRIG)<br>Control command input (IN0 to IN5) | | |
| | Output signals | 3 signals<br>Control output (BUSY)<br>Overall judgement output (OR)<br>Error output (ERROR)<br>The assignments of the three output signals (OUT0 to OUT2) can be changed to the individual judgements of the inspection items, the image input ready output (READY), or the external lighting timing output (STGOUT). | 3 signals<br>Control output (BUSY)<br>Overall judgement output (OR)<br>Error output (ERROR)<br>**Note:** The three output signals can be allocated for the judgements of individual inspection items. | |
| | Ethernet specifications | 100Base-TX/10Base-T | | |
| | Communications | Ethernet TCP no-protocol, Ethernet UDP no-protocol, Ethernet FINS/TCP no-protocol, EtherNet/IP, PLC Link, or PROFINET | Ethernet TCP no-protocol | |
| | I/O expansion | Possible by connecting FQ-SDU1_ Sensor Data Unit. 11 inputs and 24 outputs | – | |
| | RS-232C | Possible by connecting FQ-SDU2_ Sensor Data Unit. 8 inputs and 7 outputs | – | |
| Ratings | Power supply voltage | 21.6 to 26.4 VDC (including ripple) | | |
| | Current consumption | 2.4 A max. | | |
| Environmental immunity | Ambient temperature range | Operating: 0 to 40°C, Storage: –25 to 65°C<br>(with no icing or condensation) | Operating: 0 to 50°C, Storage: –25 to 65°C<br>(with no icing or condensation) | |
| | Ambient humidity range | Operating and storage: 35% to 85% (with no condensation) | | |
| | Ambient atmosphere | No corrosive gas | | |
| | Vibration resistance (destruction) | 10 to 150 Hz, single amplitude: 0.35 mm, X/Y/Z directions<br>8 min each, 10 times | | |
| | Shock resistance (destruction) | 150 $m/s^2$ 3 times each in 6 direction (up, down, right, left, forward, and backward) | | |
| | Degree of protection | IEC 60529 IP67 (Except when Polarizing Filter Attachment is mounted or connector cap is removed.) | | |

| Item | | Optical Character Recognition Sensor | Multi Code Reader | 2D Code Reader |
|---|---|---|---|---|
| Model | NPN | FQ2-CH10□□□□-M | FQ-CR10□□□□-M | FQ-CR20□□□□-M |
| | PNP | FQ2-CH15□□□□-M | FQ-CR15□□□□-M | FQ-CR25□□□□-M |
| Materials | | Sensor: PBT, PC, SUS, Mounting Bracket: PBT, Polarizing Filter Attachment: PBT, PC<br>Ethernet connector: Oil-resistance vinyl compound, I/O connector: Lead-free heat-resistant PVC | | |
| Weight | | Narrow View/Standard View: Approx.160 g Wide View: Approx. 150 g | | |
| Accessories included with sensor | | Mounting Bracket (FQ-XL)(1), Polarizing Filter Attachment (FQ-XF1) (1), Instruction Manual, Quick Startup Guide, Member Registration Sheet, Warning Label | | |
| LED class | | Class 2(Applicable standards: IEC 60825-1:1993 +A1:1997 +A2:2001,EN 60825-1:1994 +A1:2002 +A2:2001, and JIS C 6802:2005) | | |
| Applicable standards | | EN 61326-1:2006 and IEC61010-1 | | |

## Touch Finder

| Item | | | Type | Model with DC power supply | Model with AC/DC/battery power supply |
|---|---|---|---|---|---|
| | | | Model | FQ2-D30 | FQ2-D31 |
| Number of connectable Sensor | | | | Number of sensors that can be recognized (switched): 32 max. number or sensor that can displayed on monitor: 8 max. | |
| Main functions | Types of measurement displays | | | Last result display, Last NG display, trend monitor, histograms | |
| | Types of display images | | | Through, frozen, zoom-in, and zoom-out images | |
| | Data logging | | | Measurement results, measured images | |
| | Menu language | | | English, German, French, Italian, Spanish, Traditional Chinese, Simplified Chinese, Korean, Japanese | |
| Indications | LCD | Display device | | 3.5-inch TFT color LCD | |
| | | Pixels | | 320 × 240 | |
| | | Display colors | | 16.7 million | |
| | Backlight | Life expectancy*1 | | 50,000 hours at 25°C | |
| | | Brightness adjustment | | Provided | |
| | | Screen saver | | Provided | |
| Operation interface | Touch screen | Method | | Resistance film | |
| | | Life expectancy*2 | | 1,000,000 touch operations | |
| External interface | Ethernet | | | 100BASE-TX/10BASE-T | |
| | SD card | | | SDHC-compliant, Class 4 or higher recommended | |
| Ratings | Power supply voltage | | | DC power connection: 21.6 to 26.4 VDC (including ripple) | DC power connection: 21.6 to 26.4 VDC (including ripple)<br>AC adapter (manufactured by Sino-American Japan Co., Ltd) connection: 100 to 240 VAC, 50/60 Hz<br>Battery connection: FQ-BAT1 Battery (1cell, 3.7 V) |
| | Continuous operation on Battery*3 | | | – | 1.5 h |
| | Power consumption | | | DC power connection: 0.2 A max. | DC power connection: 0.2 A max.<br>Charging battery: 0.4 A max. |
| Environmental immunity | Ambient temperature range | | | Operating: 0 to 50°C<br>Storage: –25 to 65°C<br>(with no icing or condensation) | Operating: 0 to 50°C when mounted to DIN Track or panel<br>Operation on Battery: 0 to 40°C: –25 to 65°C<br>(with no icing or condensation) |
| | Ambient humidity range | | | Operating and storage: 35% to 85% (with no condensation) | |
| | Ambient atmosphere | | | No corrosive gas | |
| | Vibration resistance (destruction) | | | 10 to 150 Hz, single amplitude: 0.35 mm, X/Y/Z directions 8 min each, 10 times | |
| | Shock resistance (destruction) | | | 150 m/s$^2$ 3 times each in 6 direction (up, down, right, left, forward, and backward) | |
| | Degree of protection | | | IEC 60529 IP20 (when SD card cover, connector cap, or harness is attached) | |
| Weight | | | | Approx. 270 g (without Battery and hand strap attached) | |
| Materials | | | | Case: ABS | |
| Accessories included with Touch Finder | | | | Touch Pen (FQ-XT), Instruction Manual | |

*1 This is a guideline for the time required for the brightness to diminish to half the initial brightness at room temperature and humidity. The life of the backlight is greatly affected by the ambient temperature and humidity and will be shorter at lower or higher temperatures.
*2 This value is only a guideline. No guarantee is implied. The value will be affected by operating conditions.
*3 This value is only a guideline. No guarantee is implied. The value will be affected by the operating environment and operating conditions.

## Sensor Data Units (FQ2-S3/S4/CH only)

| Item | | | Parallel Interface | RS-232C Interface |
|---|---|---|---|---|
| Model | NPN | | FQ-SDU10 | FQ-SDU20 |
| | PNP | | FQ-SDU15 | FQ-SDU25 |
| I/O specifications | Parallel I/O | Connector 1 | 16 outputs (D0 to D15) | 6 inputs (IN0 to IN5) |
| | | Connector 2 | 11 inputs (TRIG, RESET, IN0 to IN7, and DSA)<br>8 outputs (GATE, ACK, RUN, BUSY, OR, ERROR, STGOUT, and SHTOUT) | 2 inputs (TRIG and RESET)<br>7 outputs (ACK, RUN, BUSY, OR, ERROR, STGOUT, and SHTOUT) |
| | RS-232C | | – | 1 channel, 115,200 bps max. |
| | Sensor interface | | FQ2-S3 connected with FQ-WU□□□: OMRON interface<br>*Number of connected Sensors: 1 | |
| Ratings | Power supply voltage | | 21.6 to 26.4 VDC (including ripple) | |
| | Insulation resistance | | Between all DC external terminals and case: 0.5 MΩ min (at 250 VDC) | |
| | Current consumption | | 2.5 A max.: FQ2-S□□□□□□-□□□ and FQ-SDU□□<br>0.4 A max.: FQ2-S3□-□□□ and FQ-SDU□□<br>0.1 A max.: FQ-SDU□□ only | |
| Environmental immunity | Ambient temperature range | | Operating: 0 to 50°C, Storage: –20 to 65°C (with no icing or condensation) | |
| | Ambient humidity range | | Operating and storage: 35% to 85% (with no condensation) | |
| | Ambient atmosphere | | No corrosive gas | |
| | Vibration resistance (destruction) | | 10 to 150 Hz, single amplitude: 0.35 mm, X/Y/Z directions, 8 min each, 10 times | |
| | Shock resistance (destruction) | | 150 m/s$^2$ 3 times each in 6 directions (up, down, right, left, forward, and backward) | |
| | Degree of protection | | IEC 60529 IP20 | |
| Materials | | | Case: PC + ABS, PC | |
| Weight | | | Approx. 150 g | |
| Accessories included with Sensor Data Unit | | | Instruction Manual | |

## Battery

| ItemModel | FQ-BAT1 |
|---|---|
| Battery type | Secondary lithium ion battery |
| Nominal capacity | 1,800 mAh |
| Rated voltage | 3.7 V |
| Ambient temperature range | Operating: 0 to 40°C<br>Storage: –25 to 65°C (with no icing or condensation) |
| Ambient humidity range | Operating and storage: 35% to 85% (with no condensation) |
| Charging method | Charged in Touch Finder (FQ2-D31). AC adapter (FQ-AC□) is required. |
| Charging time*1 | 2 h |
| Usage time*1 | 1.5 h |
| Battery backup life*2 | 300 charging cycles |
| Weight | 50 g max. |

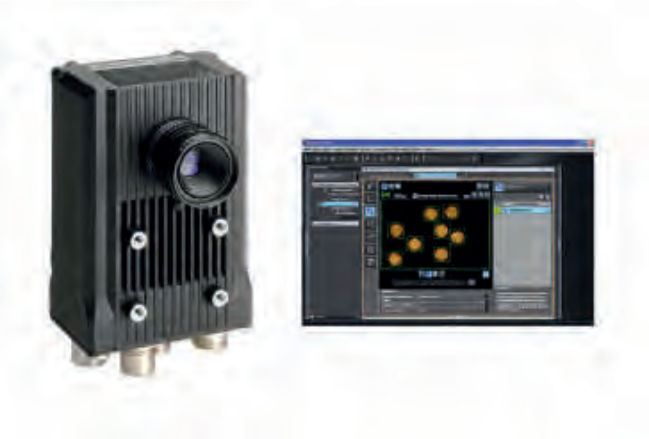
*1 This value is only a guideline. No guarantee is implied. The value will be affected by operating conditions
*2 This is a guideline for the time required for the capacity of the Battery to be reduced to 60% of the initial capacity. No guarantee is implied. The value will be affected by the operating environment and operating conditions.

## System Requirements for PC tool for FQ

The following Personal Computer system is required to use the software.

| | |
|---|---|
| OS | Microsoft Windows XP Home Edition/Professional SP2 or higher (32-bit version)<br>Microsoft Windows 7 Home Premium or higher (32-bit/64-bit version) |
| CPU | Core 2 Duo 1.06 GHz or the equivalent or higher |
| RAM | 1GB min. |
| HDD | 500 MB min. available space*1 |
| Monitor | 1,024 × 768 dots min. |

*1 Available space is also required separately for data logging.



## FQ-M Vision sensor

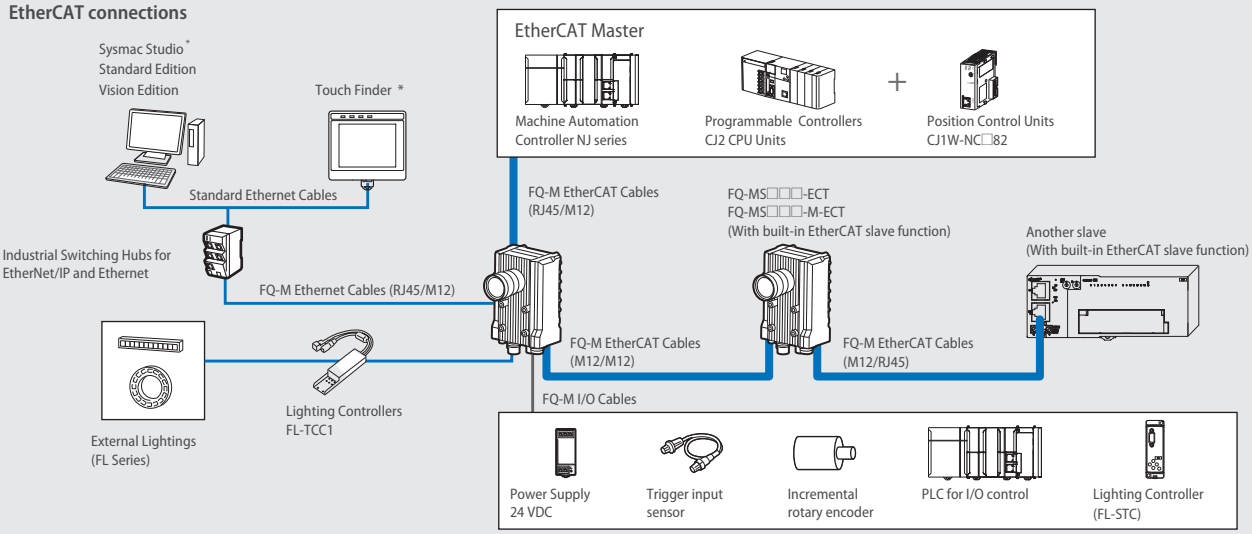
The new FQ-M series is a vision sensor designed specifically for Pick & Place applications. It comes with EtherCAT embedded and can be integrated easily into any environment. The FQ-M is compact, fast and includes an incremental encoder input for easy tracking calibration. Omron's Sysmac Studio software is the perfect tool for configuring the FQ-M and is complemented by the TouchFinder console for on-site monitoring.

Designed for motion tracking

- Made specifically for pick & place applications
- Connectivity with EtherCAT/Ethernet
- Encoder input for conveyor tracking and calibration
- Contour based object detection
- Smart calibration wizard
- Sysmac Studio software for vision system operation and setting

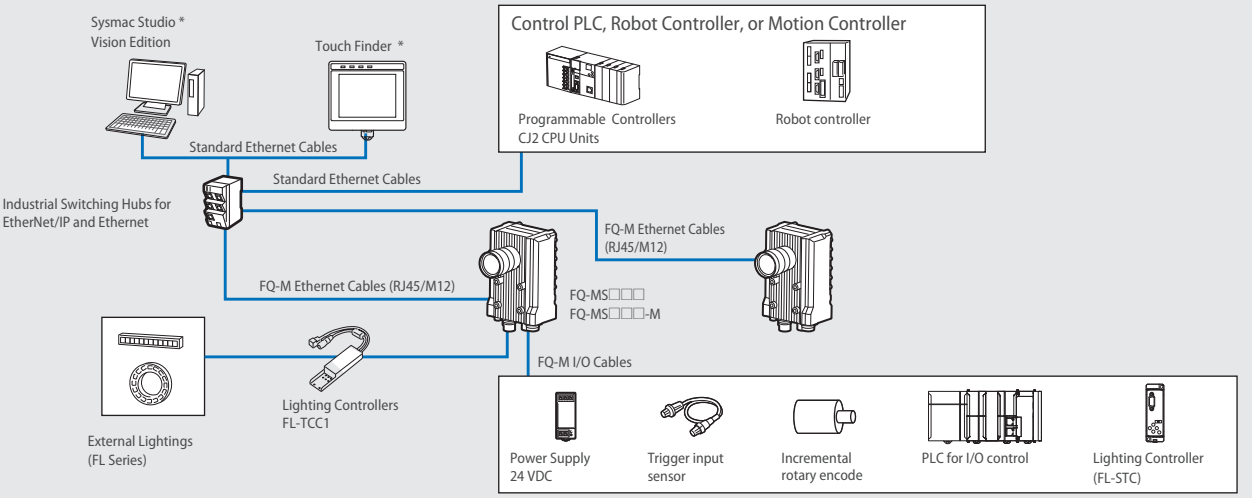
## System configuration

### EtherCAT connections




* Sysmac Studio and Touch Finder can not be used together. When both are connected, Sysmac Studio will have a priority.
When you use the Sysmac Studio Standard Edition and connect the FQ series and the Machine Automation Controller NJ-series, connect them with a general-purpose Ethernet cable or a USB cable.

### No-protocol Ethernet and PLC Link Connections




* Sysmac Studio and Touch Finder can not be used together.
When both are connected, Sysmac Studio will have a priority.

**Note:** 1. EtherCAT and Ethernet (PLC Link) can not be used simultaneously.
2. It is not possible to configure and adjust the FQ-M via an NJ-series controller, when they are connected via an EtherCAT network. For configuration and adjustment of FQ-M, connect the FQ-M and a computer or a Touch Finder via an Ethernet network.

## Ordering Information

### Sensors

| Appearance | Type | | | Order code |
|---|---|---|---|---|
|  | Color | NPN | EtherCAT communication function not provided | FQ-MS120 |
| | | PNP | | FQ-MS125 |
| | Monochrome | NPN | | FQ-MS120-M |
| | | PNP | | FQ-MS125-M |
| | Color | NPN | EtherCAT communication function provided | FQ-MS120-ECT |
| | | PNP | | FQ-MS125-ECT |
| | Monochrome | NPN | | FQ-MS120-M-ECT |
| | | PNP | | FQ-MS125-M-ECT |

### Automation Software Sysmac Studio

Please purchase a DVD and required number of licenses the first time you purchase the Sysmac Studio. DVDs and licenses are available individually. Each model of licenses does not include any DVD.

| Product name | Specifications | Number of licenses | Media | Standards | Order code |
|---|---|---|---|---|---|
| **Sysmac Studio Standard Edition Ver.1.□□**[*1] | The Sysmac Studio provides an integrated development environment to set up, program, debug, and maintain NJ-series Controllers and other Machine Automation Controllers, as well as EtherCAT slaves.<br><br>Sysmac Studio runs on the following OS.<br>Windows XP (Service Pack 3 or higher, 32-bit version) /<br>Vista (32-bit version)/7 (32-bit/64-bit version)<br><br>The Sysmac Studio Standard Edition DVD includes Support Software to set up EtherNet/IP Units,<br>DeviceNet slaves, Serial Communications Units, and Support Software for creating screens on HMIs (CX-Designer).<br>For details, refer to the Sysmac Integrated Catalogue (P072). | – (Media only) | DVD | – | SYSMAC-SE200D |
| | | 1 license[*2] | – | – | SYSMAC-SE201L |
| **Sysmac Studio Vision Edition Ver.1.□□** | Sysmac Studio Vision Edition is a limited license that provides selected functions required for Vision Sensor FQ-M settings.<br>Because this product is a license only, you need the Sysmac Studio Standard Edition DVD media to install it. | 1 license | – | – | SYSMAC-VE001L |

[*1] The FQ-M series is supported by Sysmac Studio version 1.01 or higher.
[*2] Multi licenses are available for the Sysmac Studio (3, 10, 30, or 50 licenses).

### Touch Finder

| Appearance | Type | Order code |
|---|---|---|
|  | DC power supply | FQ-MD30 |
| | AC/DC/battery[*1] | FQ-MD31 |

[*1] AC Adapter and Battery are sold separately.

### Bend resistant Cables for FQ-M Series

| Appearance | Type | | | Order code |
|---|---|---|---|---|
|  | For EtherCAT and Ethernet cable<br>Angle: M12/ Straight: RJ45 | | Cable length: 5 m | FQ-MWNL005 |
| | | | Cable length: 10 m | FQ-MWNL010 |
|  | For EtherCAT and Ethernet cable<br>Straight type (M12/RJ45) | | Cable length: 5m | FQ-WN005-E |
| | | | Cable length: 10 m | FQ-WN010-E |
|  | For EtherCAT cable<br>Angle type (M12/M12) | | Cable length: 5 m | FQ-MWNEL005 |
| | | | Cable length: 10 m | FQ-MWNEL010 |
|  | For EtherCAT cable<br>Straight type (M12/M12) | | Cable length: 5m | FQ-MWNE005 |
| | | | Cable length: 10 m | FQ-MWNE010 |
|  | I/O Cables | Angle type | Cable length: 5 m | FQ-MWDL005 |
| | | | Cable length: 10 m | FQ-MWDL010 |
|  | | Straight type | Cable length: 5 m | FQ-MWD005 |
| | | | Cable length: 10 m | FQ-MWD010 |

## Accessories

| Appearance | Type | | Order code |
|---|---|---|---|
|  | For Touch Finder | Panel Mounting Adapter | FQ-XPM |
|  | | AC Adapter<br>(for models for DC/AC/Battery) | FQ-AC□[*1] |
|  | | Battery<br>(for models for DC/AC/Battery) | FQ-BAT1 |
|  | | Touch Pen<br>(enclosed with Touch Finder) | FQ-XT |
|  | | Strap | FQ-XH |
|  | | SD Card (2 GB) | HMC-SD291 |

[*1] AC Adapters for Touch Finder with DC/AC/Battery Power Supply. Select the model for the country in which the Touch Finder will be used.

| Plug type | Voltage | Certified standards | Order code |
|---|---|---|---|
| A | 125 V max. | PSE | FQ-AC1 |
| | | UL/CSA | FQ-AC2 |
| | 250 V max. | CCC mark | FQ-AC3 |
| C | 250 V max. | – | FQ-AC4 |
| BF | 250 V max. | – | FQ-AC5 |
| O | 250 V max. | – | FQ-AC6 |

## Industrial Switching Hubs for EtherNet/IP and Ethernet

| Appearance | Number of ports | Failure detection | Current consumption | Order code |
|---|---|---|---|---|
|  | 3 | None | 0.22 A | W4S1-03B |
|  | 5 | None | 0.22 A | W4S1-05B |
| | | Supported | | W4S1-05C |

**Note:** **1.** Industrial switching hubs are cannot be used for EtherCAT.

## EtherCAT junction slaves

| Appearance | Number of ports | Power supply voltage | Current consumption | Order code |
|---|---|---|---|---|
|  | 3 | 20.4 to 28.8 VDC<br>(24 VDC −15% to 20%) | 0.08 A | GX-JC03 |
|  | 6 | | 0.17 A | GX-JC06 |

Note: 1. Please do not connect EtherCAT junction slave with OMRON position control unit, Model CJ1W-NC□81/□82.
**2.** EtherCAT junction slaves cannot be used for EtherNet/IP and Ethernet.

## Cameras peripheral devices

| Type | | Order code |
|---|---|---|
| Cameras peripheral devices | CCTV Lenses | 3Z4S-LE Series |
| External Lightings | | FL Series |
| Lighting Controllers | For FL Series | FL-TCC1 |

## Specifications

### Sensors

| Item | Type | EtherCAT communication function not provided | | EtherCAT communication function provided | |
|---|---|---|---|---|---|
| | | Color | Monochrome | Color | Monochrome |
| Model | NPN | FQ-MS120 | FQ-MS120-M | FQ-MS120-ECT | FQ-MS120-M-ECT |
| | PNP | FQ-MS125 | FQ-MS125-M | FQ-MS125-ECT | FQ-MS125-M-ECT |
| Field of vision, Installation distance | | Selecting a lens according to the field of vision and installation distance. | | | |
| Main functions | Inspection items | Shape search, Search, Labeling, Edge position | | | |
| | Number of simultaneous inspections | 32 | | | |
| | Number of registered scenes | 32 | | | |
| Image input | Image processing method | Real color | Monochrome | Real color | Monochrome |
| | Image elements | 1/3-inch color CMOS | 1/3-inch monochrome CMOS | 1/3-inch color CMOS | 1/3-inch monochrome CMOS |
| | Image filter | High dynamic range (HDR) and white balance | High dynamic range (HDR) | High dynamic range (HDR) and white balance | High dynamic range (HDR) |
| | Shutter | Electronic shutter; select shutter speeds from 1/10 to 1/30000 (sec) | | | |
| | Processing resolution | 752 (H) × 480 (V) | | | |
| | Pixel size | 6.0 ( m) × 6.0 ( m) | | | |
| | Frame rate (image read time) | 60 fps (16.7 ms) | | | |
| External Lightings | Connecting method | Connection via a strobe light controller | | | |
| | Connectable lighting | FL series | | | |
| Data logging | Measurement data | In Sensor: Max. 32,000 items*1 | | | |
| | Images | In Sensor: 20 images*1 | | | |
| Measurement trigger | | I/O trigger, Encoder trigger, Communications trigger (Ethernet No-protocol, PLC Link, or EtherCAT) | | | |
| I/O specifications | Input signals | 9 signals<br>Single measurement input (TRIG)<br>Error clear input (IN0)<br>Encoder counter reset input (IN1)<br>Encoder input (A±, B±, Z±)*2 | | | |
| | Output signals | 5 signals*3<br>OUT0 Overall judgement output (OR)<br>OUT1 Control output (BUSY)<br>OUT2 Error output (ERROR)<br>OUT3 (Shutter output: SHTOUT)<br>OUT4 (Strobe trigger output: STGOUT) | | | |
| | Ethernet specifications | 100BASE-TX/10BASE-TX | | | |
| | EtherCAT specifications | – | | Dedicated protocol for EtherCAT 100BASE-TX | |
| | Connection method | Special connector cables<br>Power supply and I/O: 1 Special connector I/O cable<br>Touch Finder, Computer and Ethernet: 1 Ethernet cable<br>EtherCAT: 2 EtherCAT cable | | | |
| LED display | | OR: Judgment result indicator<br>ERR: Error indicator<br>BUSY: BUSY indicator<br>ETN: Ethernet communications indicator | | | |
| | EtherCAT display | – | | L/A IN (Link/Activity IN) ×1<br>L/A OUT (Link/Activity OUT) ×1<br>RUN ×1<br>ERR ×1 | |
| Ratings | Power supply voltage | 21.6 to 26.4 VDC (including ripple) | | | |
| | Insulation resistance | Between all lead wires and case: 0.5 M (at 250 V) | | | |
| | Current consumption | 450mA max. (When the FL-series Strobe controller and lighting are used.)<br>250mA max. (When external lighting is not used.) | | | |
| Environmental immunity | Ambient temperature range | Operating: 0 to 50 °C, Storage: –20 to 65 °C (with no icing or condensation) | | | |
| | Ambient humidity range | Operating and storage: 35% to 85% (with no condensation) | | | |
| | Ambient atmosphere | No corrosive gas | | | |
| | Vibration resistance (destruction) | 10 to 150 Hz, single amplitude: 0.35 mm, X/Y/Z directions, 8 min each, 10 times | | | |
| | Shock resistance (destruction) | 150 m/s$^2$ 3 times each in 6 direction (up, down, right, left, forward, and backward) | | | |
| | Degree of protection | IEC60529 IP40 | | | |
| Materials | | Case: alminium die casting, Rear cover: alminium plate | | | |
| Weight | | Approx. 390 g (Sensor only) | | Approx. 480 g (Sensor only) | |
| Accessories | | Instruction Manual | | | |

*1 If a Touch Finder is used, results can be saved up to the capacity of an SD card.
*2 Encoder input specifications.
*3 The five output signals can be allocated for the judgements of individual inspection items.

### Pulse input Specifications (When an open collector type encoder is used.)

| Item | | Specification | | |
|---|---|---|---|---|
| Input voltage | | 24 VDC±10% | 12 VDC±10% | 5 VDC±5% |
| Input current | | 4.8 mA (at 24 VDC, typical value) | 2.4 mA (at 12 VDC, typical value) | 1.0 mA (at 5 VDC, typical value) |
| NPN | ON voltage*1 | 4.8 V max. | 2.4 V max. | 1.0 V max. |
| | OFF voltage*2 | 19.2 V min. | 9.6 V min. | 4.0 V min. |
| PNP | ON voltage*1 | 19.2 V min. | 9.6 V min. | 4.0 V min. |
| | OFF voltage*2 | 4.8 V max. | 2.4 V max. | 1.0 V max. |
| Maximum response frequency*3 | | 50 kHz (I/O cable: when the FQ-MWD005 or FQ-MWDL005 cables is used.)<br>20 kHz (I/O cable: when the FQ-MWD010 or FQ-MWDL010 cables is used.) | | |
| Input impedance | | 5.1 k | | |

*1 ON voltage: Voltage to change from OFF to ON state. The ON voltage is the difference of voltages between the GND terminal of the encoder power terminals and each input terminal.
*2 OFF voltage: Voltage to change from ON to OFF state. The ON voltage is the difference of voltages between the GND terminal of the encoder power terminals and each input terminal.
*3 Select maximum response frequency depending on length of the encoder cable and response frequency of the encoder.

### Pulse input Specifications (When a line-driver output type encoder is used.)

| Item | Specification |
|---|---|
| Input voltage | EIA standard RS-422-A line driver level |
| Input impedance*1 | 120 ±5% |
| Differential input voltage | 0.2 V min. |
| Hysteresis voltage | 50 mV |
| Maximum response frequency*2 | 200 kHz (I/O cable: when the FQ-MWD005, FQ-MWDL005, FQ-MWD010, or FQ-MWDL010 cables is used.) |

*1 When terminating resistance function is used.
*2 Select maximum response frequency depending on length of the encoder cable and response frequency of the encoder.

## Touch Finder

| Item | | Type | Model with DC power supply | Model with AC/DC/battery power supply |
|---|---|---|---|---|
| Model | | | FQ-MD30 | FQ-MD31 |
| Number of connectable Sensors | | | 2 max. | |
| Main functions | Types of measurement displays | | Last result display, Last NG display, trend monitor, histograms | |
| | Types of display images | | Through, frozen, zoom-in, and zoom-out images | |
| | Data logging | | Measurement results, measured images | |
| | Menu language | | English, Japanese | |
| Indications | LCD | Display device | 3.5-inch TFT color LCD | |
| | | Pixels | 320 × 240 | |
| | | Display colors | 16,777,216 | |
| | Backlight | Life expectancy*1 | 50,000 hours at 25°C | |
| | | Brightness adjustment | Provided | |
| | | Screen saver | Provided | |
| | Indicators | Power indicator (color: green) | POWER | |
| | | Error indicator (color: red) | ERROR | |
| | | SD card access indicator (color: yellow) | SD ACCESS | |
| | | Charge indicator (color: orange) | – | CHARGE |
| Operation interface | Touch screen | Method | Resistance film | |
| | | Life expectancy*2 | 1,000,000 operations | |
| External interface | Ethernet | | 100 BASE-TX/10 BASE-T | |
| | SD card | | Omron SD card (Model: HMC-SD291) or a SDHC card of Class4 or higher rating is recommended. | |
| Ratings | Power supply voltage | DC power connection | 20.4 to 26.4 VDC (including ripple) | |
| | | AC adapter connection | – | 100 to 240 VAC, 50/60 Hz |
| | | Battery connection | – | FQ-BAT1 Battery (1 cell, 3.7 V) |
| | Continuous operation on Battery*3 | | – | 1.5 h |
| | Current consumption | | DC power connection: 0.2 A | |
| | Insulation resistance | | Between all lead wires and case: 0.5 M (at 250 V) | |
| Environmental immunity | Ambient temperature range | | Operating: 0 to 50°C<br>Storage: –25 to 65°C<br>(with no icing or condensation) | Operating: 0 to 50°C when mounted to DIN Track or panel 0 to 40°C when operated on a Battery<br>Storage: –25 to 65°C<br>(with no icing or condensation) |
| | Ambient humidity range | | Operating and storage: 35% to 85% (with no condensation) | |
| Environmental immunity | Ambient atmosphere | | No corrosive gas | |
| | Vibration resistance (destruction) | | 10 to 150 Hz, single amplitude: 0.35 mm, X/Y/Z directions 8 min each, 10 times | |
| | Shock resistance (destruction) | | 150 $m/s^2$ 3 times each in 6 direction (up, down, right, left, forward, and backward) | |
| | Degree of protection | | IEC 60529 IP20 | |
| Dimensions | | | 95 × 85 × 33 mm | |
| Materials | | | Case: ABS | |
| Weight | | | Approx. 270 g (without Battery and hand strap) | |
| Accessories | | | Touch Pen (FQ-XT), Instruction Manual | |

*1 This is a guideline for the time required for the brightness to diminish to half the initial brightness at room temperature and humidity. No guarantee is implied. The life of the backlight is greatly affected by the ambient temperature and humidity. It will be shorter at lower or higher temperatures.
*2 This value is only a guideline. No guarantee is implied. The value will be affected by operating conditions.
*3 This value is only a guideline. No guarantee is implied. The value will be affected by the operating environment and operating conditions.

### Battery Specifications

| ItemModel | FQ-BAT1 |
|---|---|
| Battery type | Secondary lithium ion battery |
| Nominal capacity | 1,800 mAh |
| Rated voltage | 3.7 V |
| Dimensions | 35.3 ×53.1 ×11.4 mm |
| Ambient temperature range | Operating: 0 to 40°C<br>Storage: −25 to 65°C<br>(with no icing or condensation) |
| Ambient humidity range | Operating and storage: 35% to 85%<br>(with no condensation) |
| Charging method | Charged in Touch Finder (FQ-MD31).<br>AC adapter (FQ-AC□) is required. |
| Charging time*1 | 2.0 h |
| Battery backup life*2 | 300 charging cycles |
| Weight | 50 g max. |

*1 This value is only a guideline. No guarantee is implied. The value will be affected by operating conditions.
*2 This is a guideline for the time required for the capacity of the Battery to be reduced to 60% of the initial capacity. No guarantee is implied.The value will be affected by the operating environment and operating conditions.

### Sysmac Studio

| Item | Requirement |
|---|---|
| Operating system (OS)*1, *2<br>Japanese or English system | Windows XP (Service Pack 3 or higher, 32-bit version) /Vista (32-bit version) / 7 (32-bit/64-bit version) |
| CPU | Windows computers with Celeron 540 (1.8 GHz) or faster CPU.<br>Core i5 M520 (2.4 GHz) or equivalent or faster recommended |
| Main memory | 2 GB min. |
| Hard disk | At least 1.6 GB of available space*3 |
| Display | XGA 1,024 ×768, 1,600 million colors.<br>WXGA 1,280 ×800 min. recommended |
| Disk drive | DVD-ROM drive |
| Communications ports | USB port corresponded to USB 2.0, or Ethernet port |

*1 Sysmac Studio Operating System Precaution:
System requirements and hard disk space may vary with the system environment.
*2 The following restrictions apply when Sysmac Studio is used with Microsoft Windows Vista or Windows 7.
Some Help files cannot be accessed.
The Help files can be accessed if the Help program distributed by Microsoft for Windows (WinHlp32.exe) is installed. Refer to the Microsoft homepage listed below or contact Microsoft for details on installing the file. (The download page is automatically displayed if the Help files are opened while the user is connected to the Internet.)
http://support.microsoft.com/kb/917607/en-us
*3 To use the file logging function, additional memory area to save the logging data is necessary.

## FQ-M Series EtherCAT Communications Specifications

| Item | Specifications |
|---|---|
| Communications standard | IEC 61158 Type12 |
| Physical layer | 100BASE-TX (IEEE802.3) |
| Connector | M12 ×2<br>E-CAT IN:EtherCAT (IN)<br>E-CAT OUT:EtherCAT (OUT) |
| Communications media | Use the cables for FQ-MWN□□, or FQ-WN□□ series. |
| Communications distance | Use the communication cable within the length of FQ-MWN□□ or FQ-WN□□ series cables. |
| Process data | Variable PDO Mapping |
| Mailbox (CoE) | Emergency messages, SDO requests, SDO responses, and SDO information |
| Distributed clock | Synchronization with DC mode 1 |
| LED display | L/A IN (Link/Activity IN) × 1, L/A OUT (Link/Activity OUT) × 1, RUN × 1, ERR × 1 |

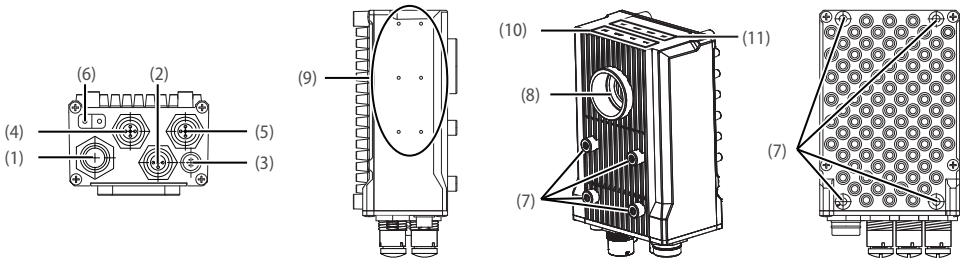
## Version Information

### FQ-M Series and Programming Devices

| FQ-M Series | Required Programming Device | |
|---|---|---|
| | Sysmac Studio Standard Edition/Vision Edition | |
| | Ver.1.00 | Ver.1.01 or higher |
| FQ-MS□□□(-M)<br>FQ-MS□□□(-M)-ECT | Not supported | Supported |

## Components and Functions

### Sensor

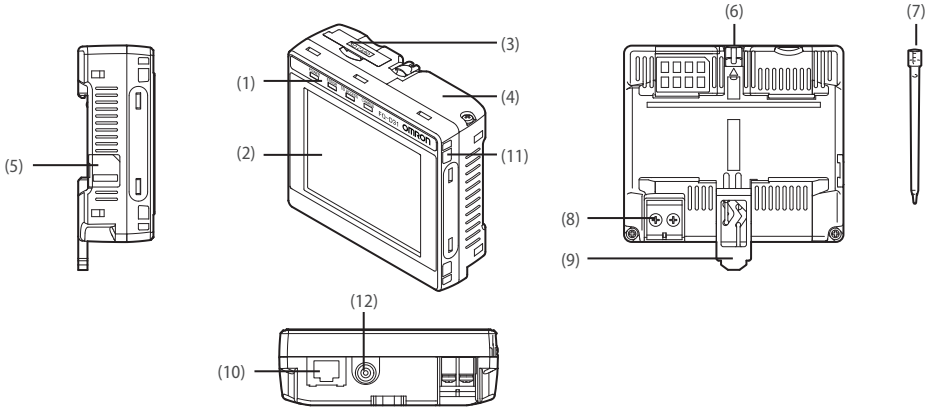



| No. | Name | Description |
|---|---|---|
| (1) | I/O Cable connector | An I/O Cable is used to connect the Sensor to the power supply and external I/O. |
| (2) | Ethernet connector | An Ethernet cable is used to connect the Sensor to external devices such as PLCs, the Touch Finder, or computers. |
| (3) | Lighting connector | Connect an external lighting (strobe controller). |
| (4) | EtherCAT connector (IN)*1 | Connect an EtherCAT compatible device. |
| (5) | EtherCAT connector (OUT)*1 | Connect an EtherCAT compatible device. |
| (6) | Node address switch*1 | Set the node address for EtherCAT communications. |
| (7) | Installation holes | Holes to install and secure the camera. |
| (8) | C-mount lens connection part | Install the C-mount lens in this part. Determine the field of view depending on the measurement target and select a suitable CCTV lens (C-mounting lens). |

| No. | Name | | Description |
|---|---|---|---|
| (9) | Strobe controller connection holes | | Install the strobe controller in this part. FL-TCC1 can be mounted. |
| (10) | Measurement process Operation indicators | OR | Lit in orange while OR signal is ON. |
| | | ETN | Lit in orange while in Ethernet communications. |
| | | ERROR | Lit in red when an error occurs. |
| | | BUSY | Lit in green while the sensor is processing. |
| (11) | EtherCAT Operation indicators | L/A IN | Lit in green when Link with EtherCAT device is established and flickers in green when communicating (data IN). |
| | | L/A OUT | Lit in green when Link with EtherCAT device is established and flickers in green when communicating (data OUT). |
| | | ECAT RUN | Lit in green when EtherCAT communication is available. |
| | | ECAT ERROR | Lit in red when an EtherCAT communications error occurs. |

*1 FQ-MS□□□-ECT and FQ-MS□□□-M-ECT only.

### Touch Finder




| No. | Name | | Description |
|---|---|---|---|
| (1) | Operation indicators | POWER | Lights green when the Touch Finder is turned ON. |
| | | ERROR | Lights red when an error occurs. |
| | | SD ACCESS | Lights yellow when an SD card is inserted. Flashes yellow when the SD card is being accessed. |
| | | CHARGE*1 | Lights orange when the Battery is charging. |
| (2) | LCD/touch panel | | Displays the setting menu, measurement results, and images input by the camera. |
| (3) | SD card slot | | An SD card can be inserted. |
| (4) | Battery cover* | | The Battery is inserted behind this cover. Remove the cover when mounting or removing the Battery. |
| (5) | Power supply switch | | The Battery is inserted behind this cover. Remove the cover when mounting or removing the Battery. |

*1 Applicable to the FQ-MD31 only.

| No. | Name | Description |
|---|---|---|
| (6) | Touch pen holder | The touch pen can be stored here when it is not being used. |
| (7) | Touch pen | Used to operate the touch panel. |
| (8) | DC power supply connector | Used to connect a DC power supply. |
| (9) | Slider | Used to mount the Touch Finder to a DIN Track. |
| (10) | Ethernet port | Used when connecting the Touch Finder to the Sensor with an Ethernet cable. Insert the connector until it locks in place. |
| (11) | Strap holder | This is a holder for attaching the strap. |
| (12) | AC power supply connector*1 | Used to connect the AC adapter. |

*1 Applicable to the FQ-MD31 only.

## Faster machine speed and high-precision operation

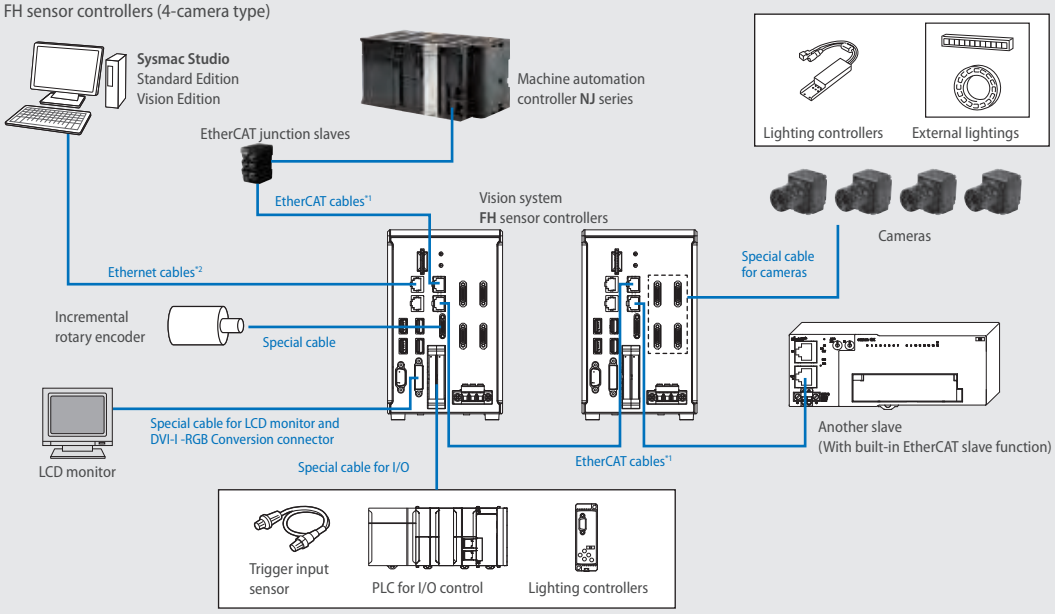
The new FH vision systems are specifically intended for seamless integration with PLCs, motion controllers and robotic control systems, and are ideally suited for applications in high-speed manufacturing machines of all types. FH vision systems featuring a new and exceptionally efficient vision algorithm, high-speed image bus, four-core processing and fast EtherCAT communications. A further benefit is that FH Vision Systems are fully compatible with the Sysmac Studio Automation software.

- Four-core image processing
- Fast EtherCAT communications
- Innovative Shape Search III
- Up to 8 high resolution cameras
- Supports Microsoft® .NET
- Compatible with Sysmac Studio Automation software

## System configuration

### EtherCAT connections for FH series

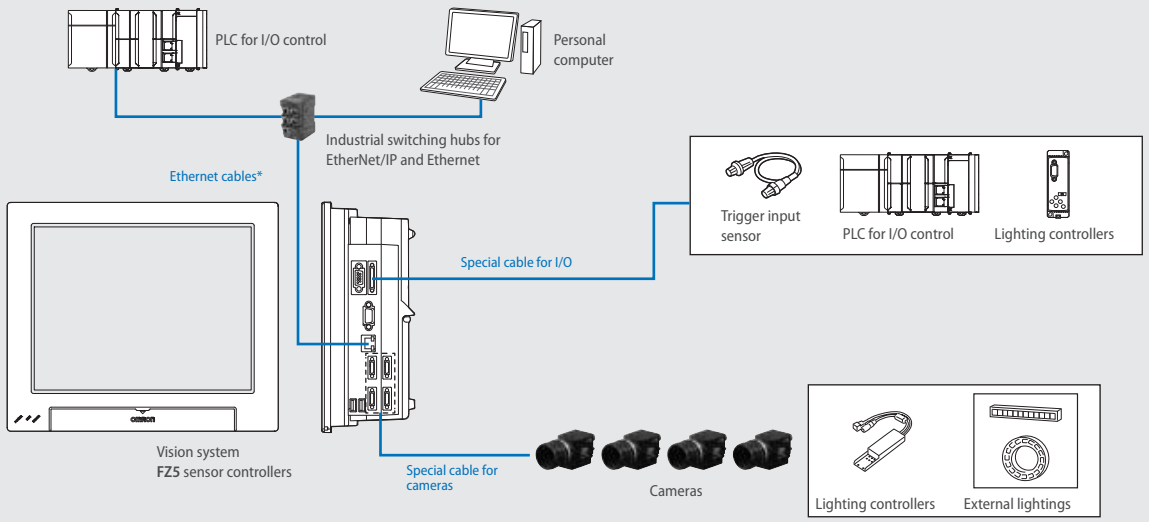
Example of the FH sensor controllers (4-camera type)




*1. To use STP (shielded twisted-pair) cable of category 5 or higher with double shielding (braiding and aluminum foil tape) for EtherCAT and RJ45 connector.
*2. To use STP (shielded twisted-pair) cable of category 5 or higher for Ethernet and RJ45 connector.

### EtherNet/IP, No-protocol Ethernet and PLC Link connections for FZ5 series

Example of the FZ5 sensor controllers (4-camera type)




* To use Straight or cross STP (shielded twisted-pair) cable of category 5 or higher for Ethernet and RJ45 connector.

## Ordering information

### FH series sensor controllers

| Item | | CPU | No. of cameras | Output | Order code |
|---|---|---|---|---|---|
|  | Box-type controllers | High-speed controllers (4 core) | 2 | NPN/PNP | FH-3050 |
| | | | 4 | NPN/PNP | FH-3050-10 |
| | | | 8 | NPN/PNP | FH-3050-20 |
| | | Standard controllers (2 core) | 2 | NPN/PNP | FH-1050 |
| | | | 4 | NPN/PNP | FH-1050-10 |
| | | | 8 | NPN/PNP | FH-1050-20 |

### FZ5 series sensor controllers

| Item | | CPU | No. of cameras | Output | Order code |
|---|---|---|---|---|---|
|  | Controllers integrated with LCD | High-speed controllers | 2 | NPN | FZ5-1100 |
| | | | | PNP | FZ5-1105 |
| | | | 4 | NPN | FZ5-1100-10 |
| | | | | PNP | FZ5-1105-10 |
| | | Standard controllers | 2 | NPN | FZ5-600 |
| | | | | PNP | FZ5-605 |
| | | | 4 | NPN | FZ5-600-10 |
| | | | | PNP | FZ5-605-10 |
|  | Box-type controllers | Lite controllers | 2 | NPN | FZ5-L350 |
| | | | | PNP | FZ5-L355 |
| | | | 4 | NPN | FZ5-L350-10 |
| | | | | PNP | FZ5-L355-10 |

### Cameras

| Item | | Descriptions | Color/ Monochrome | Image read time | Order code |
|---|---|---|---|---|---|
|  | High-speed CMOS Cameras (Lens required) For FH Sensor Controllers only | 12 million pixels (Up to four cameras can be connected to one Controller. Up to eight cameras other than 12 million-pixel cameras can be connected to a FH-3050-20 or a FH-1050-20.) | Color | 25.7 ms*1 | FH-SC12 |
| | | | Monochrome | | FH-SM12 |
|  | High-speed CMOS Cameras (Lens required) For FH Sensor Controllers only | 4 million pixels | Color | 8.5 ms*1 | FH-SC04 |
| | | | Monochrome | | FH-SM04 |
| | | 2 million pixels | Color | 4.6 ms*1 | FH-SC02 |
| | | | Monochrome | | FH-SM02 |
|  | | 300,000 pixels | Color | 3.3 ms | FH-SC |
| | | | Monochrome | | FH-SM |
|  | Digital CCD Cameras (Lens required) | 5 million pixels (When connecting FZ5-6□ or FZ5-L35□, up to two cameras can be connected.) | Color | 62.5 ms | FZ-SC5M2 |
| | | | Monochrome | | FZ-S5M2 |
|  | | 2 million pixels | Color | 33.3 ms | FZ-SC2M |
| | | | Monochrome | | FZ-S2M |
|  | | 300,000 pixels | Color | 12.5 ms | FZ-SC |
| | | | Monochrome | | FZ-S |
|  | High-speed CCD Cameras (Lens required) | 300,000 pixels | Color | 4.9 ms | FZ-SHC |
| | | | Monochrome | | FZ-SH |
|  | Small Digital CCD Cameras (Lenses for small camera required) | 300,000-pixel flat type | Color | 12.5 ms | FZ-SFC |
| | | | Monochrome | | FZ-SF |
|  | | 300,000-pixel pen type | Color | 12.5 ms | FZ-SPC |
| | | | Monochrome | | FZ-SP |
|  | Intelligent Compact CMOS Cameras (Camera + Manual Focus Lens + High power Lighting) | Narrow view | Color | 16.7 ms | FZ-SQ010F |
| | | Standard view | | | FZ-SQ050F |
|  | | Wide View (long-distance) | | | FZ-SQ100F |
| | | Wide View (short-distance) | | | FZ-SQ100N |

*1 When connected using two camera cables.

## Lenses

### C-mount Lens for 1/3-inch image sensor (Recommend: FZ-S□/FZ-SH□/FH-S□)

| Model | 3Z4S-LE SV-0614V | 3Z4S-LE SV-0813V | 3Z4S-LE SV-1214V | 3Z4S-LE SV-1614V | 3Z4S-LE SV-2514V | 3Z4S-LE SV-3518V | 3Z4S-LE SV-5018V | 3Z4S-LE SV-7527V | 3Z4S-LE SV-10035V |
|---|---|---|---|---|---|---|---|---|---|
| Appearance/ Dimensions (mm) |  |  |  |  |  |  |  |  |  |
| Focal length | 6 mm | 8 mm | 12 mm | 16 mm | 25 mm | 35 mm | 50 mm | 75 mm | 100 mm |
| Brightness | F1.4 | F1.3 | F1.4 | F1.4 | F1.4 | F1.8 | F1.8 | F2.7 | F3.5 |
| Filter size | M27.0 P0.5 | M25.5 P0.5 | M27.0 P0.5 | M27.0 P0.5 | M27.0 P0.5 | M27.0 P0.5 | M30.5 P0.5 | M30.5 P0.5 | M30.5 P0.5 |
| Maximum sensor size | 1/3 inch | 1/3 inch | 1/3 inch | 1/3 inch | 1/3 inch | 1/3 inch | 1/3 inch | 1/3 inch | 1/3 inch |
| Mount | C-mount | | | | | | | | |

### C-mount Lens for 2/3-inch image sensor (Recommend: FZ-S□2M/FZ-S□5M2/FH-S□02)
### (3Z4S-LE SV-7525H and 3Z4S-LE SV-10028H can also be used for FH-S□04)

| Model | 3Z4S-LE SV-0614H | 3Z4S-LE SV-0814H | 3Z4S-LE SV-1214H | 3Z4S-LE SV-1614H | 3Z4S-LE SV-2514H | 3Z4S-LE SV-3514H | 3Z4S-LE SV-5014H | 3Z4S-LE SV-7525H | 3Z4S-LE SV-10028H |
|---|---|---|---|---|---|---|---|---|---|
| Appearance/ Dimensions (mm) |  |  |  |  |  |  |  |  |  |
| Focal length | 6 mm | 8 mm | 12 mm | 16 mm | 25 mm | 35 mm | 50 mm | 75 mm | 100 mm |
| Brightness | F1.4 | F1.4 | F1.4 | F1.4 | F1.4 | F1.4 | F1.4 | F2.5 | F2.8 |
| Filter size | M40.5 P0.5 | M35.5 P0.5 | M27.0 P0.5 | M27.0 P0.5 | M27.0 P0.5 | M35.5 P0.5 | M40.5 P0.5 | M34.0 P0.5 | M37.5 P0.5 |
| Maximum sensor size | 2/3 inch | 2/3 inch | 2/3 inch | 2/3 inch | 2/3 inch | 2/3 inch | 2/3 inch | 1 inch | 1 inch |
| Mount | C-mount | | | | | | | | |

### C-mount Lens for 1-inch image sensor (Recommend: FH-S□02/FH-S□04)
### (3Z4S-LE SV-7525H with focal length of 75 mm and 3Z4S-LE SV-10028H with focal length of 100 mm are also available.)

| Model | 3Z4S-LE VS-0618H1 | 3Z4S-LE VS-0814H1 | 3Z4S-LE VS-1214H1 | 3Z4S-LE VS-1614H1N | 3Z4S-LE VS-2514H1 | 3Z4S-LE VS-3514H1 | 3Z4S-LE VS-5018H1 |
|---|---|---|---|---|---|---|---|
| Appearance/ Dimensions (mm) |  |  |  |  |  |  |  |
| Focal length | 6 mm | 8 mm | 12 mm | 16 mm | 25 mm | 35 mm | 50 mm |
| Aperture (F No.) | 1.8 to 16 | 1.4 to 16 | 1.4 to 16 | 1.4 to 16 | 1.4 to 16 | 1.4 to 16 | 1.8 to 16 |
| Filter size | Can not be used a filter | M55.0 P0.75 | M35.5 P0.5 | M30.5 P0.5 | M30.5 P0.5 | M30.5 P0.5 | M40.5 P0.5 |
| Maximum sensor size | 1 inch | 1 inch | 1 inch | 1 inch | 1 inch | 1 inch | 1 inch |
| Mount | C mount | | | | | | |

### M42-mount Lens for large image sensor (Recommend: FH-S□12)

| Model | 3Z4S-LE VS-L1828/M42-10 | 3Z4S-LE VS-L2526/M42-10 | 3Z4S-LE VS-L3528/M42-10 | 3Z4S-LE VS-L5028/M42-10 | 3Z4S-LE VS-L8540/M42-10 | 3Z4S-LE VS-L10028/M42-10 |
|---|---|---|---|---|---|---|
| Appearance/ Dimensions (mm) |  |  |  |  |  |  |
| Focal length | 18 mm | 25 mm | 35 mm | 50 mm | 85 mm | 100 mm |
| Aperture (F No.) | 2.8 to 16 | 2.6 to 16 | 2.8 to 16 | 2.8 to 16 | 4.0 to 16 | 2.8 to 16 |
| Filter size | M55.0 P0.75 | M55.0 P0.75 | M62.0 P0.75 | M62.0 P0.75 | M52.0 P0.75 | M52.0 P0.75 |
| Maximum sensor size | 1.8 inch | | | | | |
| Mount | M42 mount | | | | | |

## Camera Accessories

| Item | Descriptions | | | Order code |
|---|---|---|---|---|
| – | External Lighting | | – | FLV Series[*1] |
| | | | | FL Series[*1] |
|  | Lighting Controller (Required to control external lighting from a Controller) | For FLV-Series | Camera Mount Lighting Controller (One channel) | FLV-TCC1[*1] |
| | | | Camera Mount Lighting Controller (Four channels) | FLV-TCC4[*1] |
|  | | | Analog Lighting Controller | FLV-ATC Series[*1] |
|  | | For FL-Series | Camera Mount Lighting Controller | FL-TCC1[*1] |
|  | For Intelligent Compact Camera | | Mounting Bracket | FQ-XL |
|  | | | Mounting Brackets | FQ-XL2 |
|  | | | Polarizing Filter Attachment | FQ-XF1 |
| – | Mounting Bracket for FZ-S□ | | | FZ-S-XLC |
| | Mounting Bracket for FZ-S□2M | | | FZ-S2M-XLC |
| | Mounting Bracket for FZ-SH□ | | | FZ-SH-XLC |
| | Mounting Bracket for FH-S□, FZ-S□5M2 | | | FH-SM-XLC |
| | Mounting Bracket for FH-S□12 | | | FH-SM12-XLC |

[*1] Refer to the Vision Accessory Catalog (Cat. No. Q198) for details.

## Cables

| Item | Descriptions | Order code |
|---|---|---|
|  | Camera Cable<br>Cable length: 2 m, 3 m, 5m, or 10 m*1 | FZ-VS3 |
|  | Bend resistant Camera Cable<br>Cable length: 2 m, 3 m, 5m, or 10 m*1 | FZ-VSB3 |
|  | Right-angle Camera Cable*2<br>Cable length: 2 m, 3 m, 5m, or 10 m*1 | FZ-VSL3 |
|  | Bend resistant Right-angle Camera Cable*2<br>Cable length: 2 m, 3 m, 5 m, or 10 m*1 | FZ-VSLB3 |
|  | Long-distance Camera Cable<br>Cable length: 15 m*1 | FZ-VS4 |
|  | Long-distance Right-angle Camera Cable*2<br>Cable length: 15 m*1 | FZ-VSL4 |
|  | Cable Extension Unit<br>Up to two Extension Units and three Cables can be connected. (Maximum cable length: 45 m*1) | FZ-VSJ |
|  | Monitor Cable<br>Cable length: 2 m or 5 m (When you connect a LCD Monitor FZ-M08 to FH sensor controller, please use it in combination with a DVI-I -RGB Conversion Connector FH-VMRGB.) | FZ-VM |
|  | DVI-I -RGB Conversion Connector<br>For FH Sensor Controllers only | FH-VMRGB |
|  | Parallel I/O Cable<br>Cable length: 2 m or 5 m, For FZ Sensor Controllers only | FZ-VP |
|  | Parallel I/O Cable for Connector-terminal Conversion Unit<br>Cable length: 2 m or 5 m, For FZ Sensor Controllers only<br>Connector-Terminal Block Conversion Units can be connected<br>(Terminal Blocks Recommended Products: OMRON XW2R-J50G-T, XW2R-E50G-T, XW2R-P50G-T) | FZ-VPX |
|  | Parallel I/O Cable*3<br>Cable length: 2 m or 5 m, For FH Sensor Controllers only | XW2Z-S013-□*4 |
|  | Parallel I/O Cable for Connector-terminal Conversion Unit*3<br>Cable length: 0.5 m, 1 m, 1.5 m, 2 m, 3 m, 5 m, For FH Sensor Controllers only<br>Connector-Terminal Block Conversion Units can be connected<br>(Terminal Blocks Recommended Products: OMRON XW2R-□34G-T) | XW2Z-□□□EE*5 |
|  | Connector-Terminal Block Conversion Units, General-purpose devices | XW2R-□34G-T*6 |
|  | Encoder Cable for line-driver<br>Cable length: 1.5 m, For FH Sensor Controllers only | FH-VR |

*1 The maximum cable length depends on the Camera being connected, and the model and length of the Cable being used. For further information,please refer to the "Cameras/Cables" table.
When a high-speed CMOS camera FH-S□02/-S□04/-S□12 is used in the high speed mode of transmission speed, two camera cables are required.
*2 This Cable has an L-shaped connector on the Camera end.
*3 2 Cables are required for all I/O signals.
*4 Insert the cables length into □ in the model number as follows. 2 m = 2, 5 m = 5
*5 nsert the cables length into □□□ in the model number as follows. 0.5 m = 050, 1 m = 100, 1.5 m = 150, 2 m = 200, 3 m = 300, 5 m = 500
*6 Insert the wiring method into □ in the model number as follows. Phillips screw = J, Slotted screw (rise up) = E, Push-in spring = P
Refer to the XW2R Series catalog (Cat. No. G077) for details.

### Recommended EtherCAT and EtherNet/IP communications cables

Use Straight STP (shielded twisted-pair) cable of category 5 or higher with double shielding (braiding and aluminum foil tape) for EtherCAT.
Use Straight or cross STP (shielded twisted-pair) cable of category 5 or higher for EtherNet/IP.

| Item | Descriptions | | | | Order code |
|---|---|---|---|---|---|
|  | For EtherCAT[*1] | Standard type cable with connectors on both ends (RJ45/RJ45)<br>Wire gauge and number of pairs: AWG27, 4-pair cable, cable sheath material: LSZH[*2],<br>Cable color: Blue, Yellow, or Green,<br>Cables length: 0.2 m, 0.3 m, 0.5 m, 1 m, 1.5 m, 2 m, 3 m, 5 m, 7.5 m, 10 m, 15 m, 20 m | | | XS6W-6LSZH8SS□CM-Y[*3] |
|  | | Rugged type cable with connectors on both ends (RJ45/RJ45)<br>Wire gauge and number of pairs: AWG22, 2-pair cable<br>Cables length: 0.3 m, 0.5 m, 1 m, 2 m, 3 m, 5 m, 10 m, 15 m | | | XS5W-T421-□MD-K[*3] |
|  | | Rugged type cable with connectors on both ends (M12/RJ45)<br>Wire gauge and number of Pairs: AWG22, 2-pair cable<br>Cables length: 0.3 m, 0.5 m, 1 m, 2 m, 3 m, 5 m, 10 m, 15 m | | | XS5W-T421-□MC-K[*3] |
|  | | Rugged type cable with connectors on both ends (M12 L/RJ45)<br>Wire gauge and number of pairs: AWG22, 2-pair cable<br>Cables length: 0.3 m, 0.5 m, 1 m, 2 m, 3 m, 5 m, 10 m, 15 m | | | XS5W-T422-□MC-K[*3] |
| – | For EtherCAT[*1] and EtherNet/IP | Wire gauge and number of pairs: AWG24, 4-pair cable | Cables | Hitachi Cable, Ltd. | NETSTAR-C5E SAB 0.5 × 4P[*4] |
| – | | | | Kuramo Electric Co. | KETH-SB[*4] |
| – | | | | SWCC Showa Cable Systems Co. | FAE-5004[*4] |
| – | | | RJ45 connectors | Panduit Corporation | MPS588-C[*4] |
| – | | Wire gauge and number of pairs: AWG22, 2-pair cable | Cables | Kuramo Electric Co. | KETH-PSB-OMR[*5] |
| – | | | | Nihon Electric Wire&Cable Co.,Ltd. | PNET/B [*5] |
|  | | | RJ45 assembly connector | OMRON | XS6G-T421-1[*5] |
| – | For EtherNet/IP | Wire gauge and number of pairs: 0.5 mm, 4-pair cable | Cables | Fujikura Ltd. | F-LINK-E 0.5mm × 4P[*6] |
| – | | | RJ45 connectors | Panduit Corporation | MPS588 [*6] |

*1 The FH series supports the EtherCAT communication. It cannot be used in FZ series.
*2 The lineup features Low Smoke Zero Halogen cables for in-cabinet use and PUR cables for out-of-cabinet use.
*3 For details, refer to Cat.No.G019.
*4 We recommend you to use above cable for EtherCAT and EtherNet/IP, and RJ45 connector together.
*5 We recommend you to use above cable for EtherCAT and EtherNet/IP, and RJ45 assembly connector together.
*6 We recommend you to use above cable For EtherNet/IP and RJ45 connectors together.

**Note:** Please be careful while cable processing, for EtherCAT, connectors on both ends should be shield connected and for EtherNet/IP, connectors on only one end should be shield connected.

## Peripheral devices

| Item | Descriptions | | | | Order code |
|---|---|---|---|---|---|
|  | LCD monitor<br>For Box-type controllers | | | | FZ-M08 |
|  | USB memory | 2 GB | | | FZ-MEM2G |
| | | 8 GB | | | FZ-MEM8G |
|  | SD card<br>**For FH Controller only** | 2 GB | | | HMC-SD291 |
| | | 4 GB | | | HMC-SD491 |
|  | VESA attachment<br>For installing the LCD integrated-type controller | | | | FZ-VESA |
|  | Desktop controller stand<br>For installing the LCD integrated-type controller | | | | FZ-DS |
|  | Display/USB switcher | | | | FZ-DU |
| – | Mouse recommended products<br>Driverless wired mouse<br>(A mouse that requires the mouse driver to be installed is not supported.) | | | | – |
|  | EtherCAT junction slaves<br>**For FH series** | 3 port | Power supply voltage: 20.4 to 28.8 VDC (24 VDC –15 to 20%) | Current consumption: 0.08 A | GX-JC03 |
|  | | 6 port | | Current consumption: 0.17 A | GX-JC06 |
|  | Industrial Switching Hubs for EtherNet/IP and Ethernet | 3 port | Failure detection: None | Current consumption: 0.22 A | W4S1-03B |
|  | | 5 port | Failure detection: None | | W4S1-05B |
| | | 5 port | Failure detection: Supported | | W4S1-05C |

## Automation software Sysmac Studio

Please purchase a DVD and licenses the first time you purchase the Sysmac Studio. DVDs and licenses are available individually. The license does not include the DVD.

| Product | Specifications | Number of model standards licenses | Media | Order code |
|---|---|---|---|---|
| Sysmac Studio Standard Edition Ver.1.□□ | The Sysmac Studio provides an integrated development environment to set up, program, debug, and maintain NJ-series controllers and other Machine Automation controllers, as well as EtherCAT slaves.<br>Sysmac Studio runs on the following OS.<br>Windows XP (Service Pack 3 or higher, 32-bit version)/Vista (32-bit version)/7 (32-bit/64-bit version) | – (Media only) | DVD *1 | SYSMAC-SE200D |
| | | 1 license | – | SYSMAC-SE201L |
| | | 3 license | – | SYSMAC-SE203L |
| | | 10 license | – | SYSMAC-SE210L |
| | | 30 license | – | SYSMAC-SE230L |
| | | 50 license | – | SYSMAC-SE250L |
| Sysmac Studio Vision Edition Ver.1.□□ *2 | Sysmac Studio Vision Edition is a limited license that provides selected functions required for FH-series/FQ-M-series vision sensor settings. | 1 license | – | SYSMAC-VE001L |

*1 The same media is used for both the Standard Edition and the Vision Edition.
*2 With the Vision Edition, you can use only the setup functions for FH-series/FQ-M-series vision sensors.

**Note:** **1.** Site licenses are available for users who will run Sysmac Studio on multiple computers. Ask your OMRON sales representative for details.
**2.** Sysmac Studio version 1.07 or higher supports the FH series. Sysmac Studio does not support the FZ5 series.

## Development Environment

Please purchase a DVD and licenses the first time you purchase the Sysmac Studio. DVDs and licenses are available individually. The license does not include the DVD.

| Product | Specifications | Number of model standards licenses | Media | Order code |
|---|---|---|---|---|
| Application Producer | Software components that provide a development environment to further customize the standard controller features of the FH series.<br>System requirements:<br>• CPU: Intel Pentium Processor (SSE2 or higher)<br>• OS: Windows 7 Professional (32bit) or Enterprise (32bit) or Ultimate (32bit)<br>• .NET Framework: .NET Framework 3.5 or higher<br>• Memory: At least 2 GB RAM<br>Available disk space: At least 2 GB<br>• Browser: Microsoft® Internet Explorer 6.0 or later<br>• Display: XGA (1,024 × 768), True Color (32-bit) or higher<br>• Optical drive: CD/DVD drive<br>The following software is required to customize the software:<br>Microsoft® Visual Studio® 2010 Professional or<br>Microsoft® Visual Studio® 2008 Professional | – (Media only) | CD | FH-AP1 |
| | | 1 license | – | FH-AP1L |

## Specifications

### FH sensor controllers

| Type | | | High-speed Controllers (4 core) | | | Standard Controllers (2 core) | | |
|---|---|---|---|---|---|---|---|---|
| Model | | NPN | FH-3050 | FH-3050-10 | FH-3050-20 | FH-1050 | FH-1050-10 | FH-1050-20 |
| | | PNP | | | | | | |
| Main functions | Controller type | | Box-type controllers | | | | | |
| | No. of Cameras | | 2 | 4 | 8 | 2 | 4 | 8 |
| | Connected Camera | | Can be connected to all cameras. (FZ-S series/FH-S series) | | Can be connected to all cameras. (FZ-S series/FH-S series) (Can be connected to up to four 12 million-pixel cameras or up to eight cameras other than 12 million-pixel cameras.) | Can be connected to all cameras. (FZ-S series/FH-S series) | | Can be connected to all cameras. (FZ-S series/FH-S series) (Can be connected to up to four 12 million-pixel cameras or up to eight cameras other than 12 million-pixel cameras.) |
| | Processing resolution (FZ-S) | When connected to a intelligent compact camera | 752 (H) × 480 (V) | | | | | |
| | | When connected to a 300,000-pixel camera | 640 (H) × 480 (V) | | | | | |
| | | When connected to a 2 million-pixel camera | 1,600 (H) × 1,200 (V) | | | | | |
| | | When connected to a 5 million-pixel camera | 2,448 (H) × 2,044 (V) | | | | | |
| | Processing resolution (FH-S) | When connected to a 300,000-pixel camera | 640 (H) × 480 (V) | | | | | |
| | | When connected to a 2 million-pixel camera | 2,040 (H) × 1,088 (V) | | | | | |
| | | When connected to a 4 million-pixel camera | 2,040 (H) × 2,048 (V) | | | | | |
| | | When connected to a 12 million-pixel camera | 4,084 (H) × 3,072 (V) | | | | | |
| | No. of scenes | | 128 | | | | | |
| | Number of logged images*1 | When connected to a intelligent compact camera | Connected to 1 camera(Color): 232, Connected to 2 camera(Color): 116<br>Connected to 3 camera(Color): 77, Connected to 4 camera(Color): 58<br>Connected to 5 camera(Color): 46, Connected to 6 camera(Color): 38<br>Connected to 7 camera(Color): 33, Connected to 8 camera(Color): 29 | | | | | |
| | | When connected to a 300,000-pixel camera (FZ-S/FH-S) | Connected to 1 camera(Color): 270, Connected to 1 camera(Monochrome): 272<br>Connected to 2 camera(Color): 135, Connected to 2 camera(Monochrome): 136<br>Connected to 3 camera(Color/Monochrome): 90<br>Connected to 4 camera(Color): 67, Connected to 4 camera(Monochrome): 68<br>Connected to 5 camera(Color/Monochrome): 54<br>Connected to 6 camera(Color/Monochrome): 45<br>Connected to 7 camera(Color/Monochrome): 38<br>Connected to 8 camera(Color): 33, Connected to 8 camera(Monochrome): 34 | | | | | |
| | | When connected to a 2 million-pixel camera (FH-S) | Connected to 1 camera(Color/Monochrome): 37, Connected to 2 camera(Color/Monochrome): 18<br>Connected to 3 camera(Color/Monochrome): 12, Connected to 4 camera(Color/Monochrome): 9<br>Connected to 5 camera(Color/Monochrome): 7, Connected to 6 camera(Color/Monochrome): 6<br>Connected to 7 camera(Color/Monochrome): 5, Connected to 8 camera(Color/Monochrome): 4 | | | | | |
| | | When connected to a 2 million-pixel camera (FZ-S) | Connected to 1 camera(Color/Monochrome): 43, Connected to 2 camera(Color/Monochrome): 21<br>Connected to 3 camera(Color/Monochrome): 14, Connected to 4 camera(Color/Monochrome): 10<br>Connected to 5 camera(Color/Monochrome): 8, Connected to 6 camera(Color/Monochrome): 7<br>Connected to 7 camera(Color/Monochrome): 6, Connected to 8 camera(Color/Monochrome): 5 | | | | | |
| | | When connected to a 4 million-pixel camera (FH-S) | Connected to 1 camera(Color/Monochrome): 20, Connected to 2 camera(Color/Monochrome): 10<br>Connected to 3 camera(Color/Monochrome): 6, Connected to 4 camera(Color/Monochrome): 5<br>Connected to 5 camera(Color/Monochrome): 4, Connected to 6 camera(Color/Monochrome): 3<br>Connected to 7 camera(Color/Monochrome): 2, Connected to 8 camera(Color/Monochrome): 2 | | | | | |
| | | When connected to a 5 million-pixel camera (FZ-S) | Connected to 1 camera(Color/Monochrome): 16, Connected to 2 camera(Color/Monochrome): 8<br>Connected to 3 camera(Color/Monochrome): 5, Connected to 4 camera(Color/Monochrome): 4<br>Connected to 5 camera(Color/Monochrome): 3, Connected to 6 camera(Color/Monochrome): 2<br>Connected to 7 camera(Color/Monochrome): 2, Connected to 8 camera(Color/Monochrome): 2 | | | | | |
| | | When connected to a 12 million-pixel camera (FH-S) | Connected to 1 camera(Color/Monochrome): 6, Connected to 2 camera(Color/Monochrome): 3<br>Connected to 3 camera(Color/Monochrome): 2, Connected to 4 camera(Color/Monochrome): 2 | | | | | |
| | Operation | | Mouse or similar device | | | | | |
| | Settings | | Create series of processing steps by editing the flowchart (Help messages provided). | | | | | |
| External interface | Serial communications | | RS-232C: 1 CH | | | | | |
| | EtherNet communications | | No-protocol (TCP/UDP) 1000BASE-T | | | | | |
| | | | 1 port | 2 port | 2 port | 1 port | 2port | 2port |
| | EtherNet/IP communications | | Ethernet port baud rate: 1 Gbps (1000 BASE-T) | | | | | |
| | EtherCAT communications | | EtherCAT protocol (100BASE-TX) | | | | | |
| | Parallel I/O | | (In the 2-line random trigger mode)<br>17 inputs (STEP0/ENCTRIG_Z0, STEP1/ENCTRIG_Z1, ENCTRIG_A0 to 1, ENCTRIG_B0 to 1, DSA0 to 1, DI0 to 7, DI_LINE0)<br>37 outputs (RUN0 to 1, READY0 to 1, BUSY0 to 1, OR0 to 1, ERROR0 to 1, GATE0 to 1, STGOUT0/SHTOUT0, STGOUT1/SHTOUT1, STGOUT2 to 7, DO0 to 15, ACK)<br>(In the 5-line to 8-line random trigger mode)<br>19 inputs, STEP0 to 7, DI_LINE0 to 2, DI0 to 7)<br>34 outputs (READY0 to 7, BUSY0 to 7, OR0 to 7, ACK, ERROR, STGOUT/SHTOUT0 to 7) | | | | | |
| | Encoder interface | | RS422-A line driver level. Phase A/B: single-phase 4MHz (multiplying phase difference of 1MHz by 4 times), Phase Z: 1MHz | | | | | |
| | Monitor interface | | DVI-I (Single Link) output IF × 1ch | | | | | |
| | USB interface | | 4 channels (supports USB 1.1 and 2.0) | | | | | |
| | SD card interface | | SDHC card of Class4 or higher rating is recommended. | | | | | |

| Type | | | | High-speed Controllers (4 core) | | | Standard Controllers (2 core) | | |
|---|---|---|---|---|---|---|---|---|---|
| Model | | | NPN | FH-3050 | FH-3050-10 | FH-3050-20 | FH-1050 | FH-1050-10 | FH-1050-20 |
| | | | PNP | | | | | | |
| Ratings | Power supply voltage | | | 20.4 to 26.4 VDC | | | | | |
| | Current consumption (at 24.0 VDC) *2 | When connected to a intelligent compact camera | Connected to 2 cameras | 5.0 A max. | 5.4 A max. | 6.4 A max. | 4.7 A max. | 5.0 A max. | 5.9 A max. |
| | | | Connected to 4 cameras | – | 7.0 A max. | 8.1 A max. | – | 6.5 A max. | 7.5 A max. |
| | | | Connected to 8 cameras | – | – | 11.5 A max. | – | – | 10.9 A max. |
| | | When connected to a 300,000-pixel camera, 2 million-pixel camera, 4 million-pixel camera, 5 million-pixel camera or 12 million-pixel camera | Connected to 2 cameras | 4.1 A max. | 4.2 A max. | 5.2 A max. | 3.6 A max. | 3.7 A max. | 4.5 A max. |
| | | | Connected to 4 cameras | – | 4.8 A max. | 5.6 A max. | – | 4.3 A max. | 5.0 A max. |
| | | | Connected to 8 cameras | – | – | 6.8 A max. | – | – | 6.2 A max. |
| | Insulation resistance | | | Between DC power supply and controller FG: 20 MΩ or higher (rated voltage 250 V) | | | | | |
| Operation Environment | Noise Immunity | Fast transient burst | DC Power Supply | Direct infusion: 2 KV Pulse rising: 5 ns Pulse width: 50 ns Burst continuation time: 15 ms/0.75 ms Period: 300 ms Application time: 1 min | | | | | |
| | | | I/O line | Cramp: 1 KV Pulse rising: 5 ns Pulse width: 50 ns Burst continuation time: 15 ms/0.75 ms Period: 300 ms Application time: 1 min | | | | | |
| | Ambient temperature range | | | Operating: 0 to 50 °C Storage: –20 to 65 °C (with no icing or condensation) | | | | | |
| | Ambient humidity range | | | Operating and storage: 35% to 85% (with no condensation) | | | | | |
| | Ambient atmosphere | | | No corrosive gases | | | | | |
| | Grounding | | | Type D grounding (100Ω or less grounding resistance) Conventional type 3 grounding | | | | | |
| | Degree of protection | | | IEC60529 IP20 | | | | | |
| Dimensions | Dimensions | | | 190 × 115 × 182.5 mm | | | | | |
| | Weight | | | Approx. 3.2 kg | Approx. 3.4 kg | Approx. 3.4 kg | Approx. 3.2 kg | Approx. 3.4 kg | Approx. 3.4 kg |
| | Case materials | | | Cover: zinc-plated steel plate, side plate: aluminum (A6063) | | | | | |
| Accessories | | | | Controller (1)/user manual (one Japanese and one English versions)/Instruction Installation Manual (1)/Power supply terminal block connector (1)/Ferrite core (2, FH-3050 and FH-1050), 4 (FH-3050-10 and FH-1050-10), and 8 (FH-3050-20 and FH-1050-20) | | | | | |

*1 The image logging capacity changes when multiple cameras of different types are connected at the same time.
*2 The current consumption when the maximum number of cameras supported by each controller are connected. If a lighting controller model is connected to a lamp, the current consumption is as high as when an intelligent compact camera is connected.

## FZ5 sensor controllers

| Type | | | High-speed controllers | | Standard controllers | | Lite controllers | |
|---|---|---|---|---|---|---|---|---|
| Model | | NPN | FZ5-1100 | FZ5-1100-10 | FZ5-600 | FZ5-600-10 | FZ5-L350 | FZ5-L350-10 |
| | | PNP | FZ5-1105 | FZ5-1105-10 | FZ5-605 | FZ5-605-10 | FZ5-L355 | FZ5-L355-10 |
| Controller type | | | Controllers integrated with LCD | | | | Box-type controllers | |
| High-grade processing items | | | No | | | | | |
| No. of cameras | | | 2 | 4 | 2 | 4 | 2 | 4 |
| Connected camera | | | Can be connected to FZ-S series. (Can not be connected to FH-S series.) | | Can be connected to FZ-S series. (Can not be connected to FH-S series. When connecting 5 million-pixel cameras, up to two cameras can be connected.) | | | |
| Processing resolution | When connected to a intelligent compact camera | | 752 (H) × 480 (V) | | | | | |
| | When connected to a 300,000-pixel camera | | 640 (H) × 480 (V) | | | | | |
| | When connected to a 2 million-pixel camera | | 1,600 (H) × 1,200 (V) | | | | | |
| | When connected to a 5 million-pixel camera | | 2,448 (H) × 2,044 (V) | | | | | |
| No. of scenes | | | 32 | | | | | |
| Number of logged images[*1] | When connected to a intelligent compact camera | Connected to 1 camera | 232 | | 214 | | | |
| | | Connected to 2 cameras | 116 | | 107 | | | |
| | | Connected to 3 cameras | 77 | | 71 | | | |
| | | Connected to 4 cameras | 58 | | 53 | | | |
| | When connected to a 300,000-pixel camera | Connected to 1 camera | Color camera: 270, Monochrome Camera: 272 | | Color camera: 250, Monochrome Camera: 252 | | | |
| | | Connected to 2 cameras | Color camera: 135, Monochrome Camera: 136 | | Color camera: 125, Monochrome Camera: 126 | | | |
| | | Connected to 3 cameras | Color camera: 90, Monochrome Camera: 90 | | Color camera: 83, Monochrome Camera: 84 | | | |
| | | Connected to 4 cameras | Color camera: 67, Monochrome Camera: 68 | | Color camera: 62, Monochrome Camera: 63 | | | |
| | When connected to a 2 million-pixel camera | Connected to 1 camera | Color camera: 43, Monochrome Camera: 43 | | Color camera: 40, Monochrome Camera: 40 | | | |
| | | Connected to 2 cameras | Color camera: 21, Monochrome Camera: 21 | | Color camera: 20, Monochrome Camera: 20 | | | |
| | | Connected to 3 cameras | Color camera: 14, Monochrome Camera: 14 | | Color camera: 13, Monochrome Camera: 13 | | | |
| | | Connected to 4 cameras | Color camera: 10, Monochrome Camera: 10 | | Color camera: 10, Monochrome Camera: 10 | | | |
| | When connected to a 5 million-pixel camera | Connected to 1 camera | Color camera: 16, Monochrome Camera: 16 | | Color camera: 11, Monochrome Camera: 11 | | | |
| | | Connected to 2 cameras | Color camera: 8, Monochrome Camera: 8 | | Color camera: 5, Monochrome Camera: 5 | | | |
| | | Connected to 3 cameras | Color camera: 5, Monochrome Camera: 5 | | – | | | |
| | | Connected to 4 cameras | Color camera: 4, Monochrome Camera: 4 | | – | | | |
| Operation | | | Touch pen, mouse, etc. | | | | Mouse or similar device | |
| Settings | | | Create series of processing steps by editing the flowchart (Help messages provided). | | | | | |
| Serial communications | | | RS-232C/422A: 1 CH | | | | RS-232: 1CH | |
| EtherNet communications | | | Ethernet 100BASE-TX/10BASE-T | | | | Ethernet 1000BASE-T/100BASE-TX/10BASE-T | |
| EtherNet/IP communications | | | Ethernet port baud rate: 100 Mbps (100Base-TX) | | | | | |
| Parallel I/O | | | (When used in Multi-line random-trigger mode)<br>17 inputs (RESET, STEP0/ENCTRIG_Z0, STEP1/ENCTRIG_Z1, DSA0 to 1, ENCTRIG_A0 to 1, ENCTRIG_B0 to 1, DI0 to 7),<br>29 outputs (RUN/BUSY1, BUSY0, GATE0 to 1, OR0 to 1, READY0 to 1, ERROR, STGOUT0 to 3, DO0 to 15)<br>(When used in other mode)<br>13 inputs (RESET, STEP0/ENCTRIG_Z0, DSA0, ENCTRIG_A0, ENCTRIG_B0, DI0 to 7),<br>26 outputs (RUN, BUSY0, GATE0, OR0, READY0, ERROR, STGOUT0 to 3, DO0 to 15)<br>STGOUT 2 to 3 only for camera 4 ch type | | 13 inputs (RESET, STEP0/ENCTRIG_Z0, DSA0, ENCTRIG_A0, ENCTRIG_B0, DI0 to 7),<br>26 outputs (RUN, BUSY0, GATE0, OR0, READY0, ERROR, STGOUT0 to 3, DO0 to 15)<br>STGOUT 2 to 3 only for camera 4 ch type | | 11 inputs (RESET, STEP, DSA, and DI 0 to 7),<br>26 outputs (RUN, BUSY, GATE, OR, READY, ERROR, STGOUT 0 to 3, and DO 0 to 15)<br>STGOUT 2 to 3 only for camera 4 ch type | |
| Monitor interface | | | Integrated controller and LCD 12.1 inch TFT color LCD (Resolution: XGA 1,024 × 768 dots) | | | | Analog RGB video output, 1 channel (Resolution: XGA 1,024 × 768 dots) | |
| USB interface | | | 4 channels (supports USB 1.1 and 2.0) | | | | 2CH (supports USB1.1/2.0) | |
| Power supply voltage[*2] | | | 20.4 to 26.4 VDC | | | | | |
| Current consumption (at 24.0 VDC)[*3] | When connected to a intelligent compact camera | | 5.0 A max. | 7.5 A max. | 5.0 A max. | 7.5 A max. | 4.0 A max. | 5.5 A max. |
| | When connected to a intelligent or autofocus camera | | | | | | | |
| | When connected to a 300,000-pixel camera | | 3.7 A max. | 4.9 A max. | 3.7 A max. | 4.9 A max. | 2.6 A max. | 2.9 A max. |
| | When connected to a 2 million-pixel camera | | | | | | | |
| | When connected to a 5 million-pixel camera | | | | | | | |

| Type | | High-speed controllers | | Standard controllers | | Lite controllers | |
|---|---|---|---|---|---|---|---|
| Model | NPN | FZ5-1100 | FZ5-1100-10 | FZ5-600 | FZ5-600-10 | FZ5-L350 | FZ5-L350-10 |
| | PNP | FZ5-1105 | FZ5-1105-10 | FZ5-605 | FZ5-605-10 | FZ5-L355 | FZ5-L355-10 |
| Ambient temperature range | | Operating: 0 to 45°C for low cooling fan speeds, 0 to 50°C for high cooling fan speeds<br>Storage: –20 to 65°C (with no icing or condensation) | | | | Operating: 0 to 45°C, 0 to 50°C<br>Storage: –20 to 65°C<br>(with no icing or condensation) | |
| Ambient humidity range | | Operating and storage: 35% to 85% (with no condensation) | | | | | |
| Weight | | Approx. 3.2 kg | Approx. 3.4 kg | Approx. 3.2 kg | Approx. 3.4 kg | Approx. 1.8 kg | |
| Accessories | | Touch pen (one, inside the front panel), Instruction manual, 6 mounting brackets | | | | Instruction manual | |

*1 The image logging capacity changes when multiple cameras of different types are connected at the same time.
*2 Do not ground the positive terminal of the 24-VDC power supply to a Lite controller.
If the positive terminal is grounded, electrical shock may occur when an SG (0-V) part, such as the case of the controller or camera, is touched.
*3 The current consumption when the maximum number of cameras supported by each controller are connected.
If a strobe controller model is connected to a lamp, the current consumption is as high as when an intelligent camera is connected.

## Cameras

### High-speed CMOS cameras

| Model | FH-SM | FH-SC | FH-SM02 | FH-SC02 | FH-SM04 | FH-SC04 | FH-SM12 | FH-SC12 |
|---|---|---|---|---|---|---|---|---|
| Image elements | CMOS image elements (1/3-inch equivalent) | | CMOS image elements (2/3-inch equivalent) | | CMOS image elements (1-inch equivalent) | | CMOS image elements (1.76-inch equivalent) | |
| Color/Monochrome | Monochrome | Color | Monochrome | Color | Monochrome | Color | Monochrome | Color |
| Effective pixels | 640 (H) × 480 (V) | | 2,040 (H) × 1,088 (V) | | 2,040 (H) × 2,048 (V) | | 4,084 (H) × 3,072 (V) | |
| Imaging area H × V (opposing corner) | 4.8 × 3.6 (6.0 mm) | | 11.26 × 5.98 (12.76 mm) | | 11.26 × 11.26 (15.93 mm) | | 22.5 × 16.9 (28.14 mm) | |
| Pixel size | 7.4 (μm) × 7.4 (μm) | | 5.5 (μm) × 5.5 (μm) | | 5.5 (μm) × 5.5 (μm) | | 5.5 (μm) × 5.5 (μm) | |
| Shutter function | Electronic shutter;<br>Shutter speeds can be set from 20 μs to 100 ms. | | Electronic shutter;<br>Shutter speeds can be set from 25 μs to 100 ms. | | | | Electronic shutter;<br>Shutter speeds can be set from 60 μs to 100 ms. | |
| Partial function | 1 to 480 lines | 2 to 480 lines | 1 to 1,088 lines | 2 to 1,088 lines | 1 to 2,048 lines | 2 to 2,048 lines | 4 to 3,072 lines (4-line increments) | |
| Frame rate (image read time) | 308 fps (3.3 ms) | | 219 fps (4.6 ms)*1 | | 118 fps (8.5 ms)*1 | | 38.9 fps (25.7 ms)*1 | |
| Lens mounting | C mount | | | | | | M42 mount | |
| Field of vision, installation distance | Selecting a lens according to the field of vision and installation distance | | | | | | | |
| Ambient temperature range | Operating: 0 to 40 °C, Storage: –25 to 65 °C (with no icing or condensation) | | | | | | | |
| Ambient humidity range | Operating and storage: 35% to 85% (with no condensation) | | | | | | | |
| Weight | Approx.105 g | | Approx.110 g | | | | Approx.320 g | |
| Accessories | Instruction manual | | | | | | | |

*1 Frame rate in high speed mode when the camera is connected using two camera cables.

### Digital CCD cameras

| Model | FZ-S | FZ-SC | FZ-S2M | FZ-SC2M | FZ-S5M2 | FZ-SC5M2 |
|---|---|---|---|---|---|---|
| Image elements | Interline transfer reading all pixels, 1/3-inch CCD image elements | | Interline transfer reading all pixels, 1/1.8-inch CCD image elements | | Interline transfer reading all pixels, 2/3-inch CCD image elements | |
| Color/Monochrome | Monochrome | Color | Monochrome | Color | Monochrome | Color |
| Effective pixels | 640 (H) × 480 (V) | | 1,600 (H) × 1,200 (V) | | 2,448 (H) × 2,044 (V) | |
| Pixel size | 7.4 (μm) × 7.4 (μm) | | 4.4 (μm) × 4.4 (μm) | | 3.45 (μm) × 3.45 (μm) | |
| Shutter function | Electronic shutter; select shutter speeds from 20 μs to 100 ms | | | | | |
| Partial function | 12 to 480 lines | | 12 to 1,200 lines | | 12 to 2,044 lines | |
| Frame rate (image read time) | 80 fps (12.5 ms) | | 30 fps (33.3 ms) | | 16 fps (62.5 ms) | |
| Lens mounting | C-mount | | | | | |
| Field of vision, installation distance | Selecting a lens according to the field of vision and installation distance | | | | | |
| Ambient temperature range | Operating: 0 to 50°C<br>Storage: –25 to 65°C<br>(with no icing or condensation) | | Operating: 0 to 40°C<br>Storage: –25 to 65°C<br>(with no icing or condensation) | | | |
| Ambient humidity range | Operating and storage: 35% to 85% (with no condensation) | | | | | |
| Weight | Approx. 55 g | | Approx. 76 g | | Approx.140 g | |
| Accessories | Instruction manual | | | | | |

### Small CCD Digital cameras

| Model | FZ-SF | FZ-SFC | FZ-SP | FZ-SPC |
|---|---|---|---|---|
| Image elements | Interline transfer reading all pixels, 1/3-inch CCD image elements | | | |
| Color/Monochrome | Monochrome | Color | Monochrome | Color |
| Effective pixels | 640 (H) × 480 (V) | | | |
| Pixel size | 7.4 (μm) × 7.4 (μm) | | | |
| Shutter function | Electronic shutter; select shutter speeds from 20 μm to 100 ms | | | |
| Partial function | 12 to 480 lines | | | |
| Frame rate (image read time) | 80 fps (12.5 ms) | | | |
| Lens mounting | Special mount (M10.5 P0.5) | | | |
| Field of vision, installation distance | Selecting a lens according to the field of vision and installation distance | | | |
| Ambient temperature range | Operating: 0 to 50°C (camera amp)<br>0 to 45°C (camera head)<br>Storage: –25 to 65°C (with no icing or condensation) | | | |
| Ambient humidity range | Operating and storage: 35% to 85% (with no condensation) | | | |
| Weight | Approx. 150 g | | | |
| Accessories | Instruction manual, installation bracket,<br>Four mounting brackets (M2) | | Instruction manual | |

### High-speed CCD cameras

| Model | FZ-SH | FZ-SHC |
|---|---|---|
| Image elements | Interline transfer reading all pixels, 1/3-inch CCD image elements | |
| Color/Monochrome | Monochrome | Color |
| Effective pixels | 640 (H) × 480 (V) | |
| Pixel size | 7.4 (μm) × 7.4 (μm) | |
| Shutter function | Electronic shutter; select shutter speeds from 1/10 to 1/50,000 s | |
| Partial function | 12 to 480 lines | |
| Frame rate (image read time) | 204 fps (4.9ms) | |
| Field of vision, installation distance | Selecting a lens according to the field of vision and installation distance | |
| Ambient temperature range | Operating: 0 to 40°C<br>Storage: –25 to 65°C (with no icing or condensation) | |
| Ambient humidity range | Operating and storage: 35% to 85% (with no condensation) | |
| Weight | Approx. 105 g | |
| Accessories | Instruction manual | |

### Intelligent Compact CMOS cameras

| Model | FZ-SQ010F | FZ-SQ050F | FZ-SQ100F | FZ-SQ100N |
|---|---|---|---|---|
| Image elements | 1/3-inch CMOS image elements | | | |
| Color/Monochrome | Color | | | |
| Effective pixels | 752 (H) × 480 (V) | | | |
| Pixel size | 6.0 (μm) × 6.0 (μm) | | | |
| Shutter function | 1/250 to 1/32,258 | | | |
| Partial function | 8 to 752 lines | | | |
| Frame rate (image read time) | 60 fps | | | |
| Field of vision | 7.5 × 4.7 to 13 × 8.2 mm | 13 × 8.2 to 53 × 33 mm | 53 × 33 to 240 × 153 mm | 29 × 18 to 300 × 191 mm |
| Installation distance | 38 to 60 mm | 56 to 215 mm | 220 to 970 mm | 32 to 380 mm |
| LED class[*1] | Class 2 | | | |
| Ambient temperature range | Operating: 0 to 50°C<br>Storage: –25 to 65°C | | | |
| Ambient humidity range | Operating and storage: 35% to 85% (with no condensation) | | | |
| Weight | Approx. 150 g | | Approx. 140 g | |
| Accessories | Mounting bracket (FQ-XL), polarizing filter attachment (FQ-XF1), instruction manual and warning label | | | |

[*1] Applicable standards: IEC62471-2

### LCD Monitor

| Model | FZ-M08 |
|---|---|
| Size | 8.4 inches |
| Type | Liquid crystal Color TFT |
| Resolution | 1,024 × 768 dots |
| Input signal | Analog RGB video input, 1 channel |
| Power supply voltage | 21.6 to 26.4 VDC |
| Current consumption | Approx. 0.7 A max. |
| Ambient temperature range | Operating: 0 to 50°C; Storage: –25 to 65°C (with no icing or condensation) |
| Ambient humidity range | Operating and storage: 35% to 85% (with no condensation) |
| Weight | Approx. 1.2 kg |
| Accessories | Instruction sheet and 4 mounting brackets |

### Camera cables

| Model | FZ-VS3 (2 m) | FZ-VSB3 (2 m) | FZ-VSL3 (2 m) | FZ-VSLB3 (2 m) |
|---|---|---|---|---|
| Shock resistiveness (durability) | 10 to 150 Hz single amplitude 0.15 mm 3 directions, 8 strokes, 4 times | | | |
| Ambient temperature range | Operation and storage: 0 to 65 °C (with no icing or condensation) | | | |
| Ambient humidity range | Operation and storage: 40% to 70%RH (with no condensation) | | | |
| Ambient atmosphere | No corrosive gases | | | |
| Material | Cable sheath, connector: PVC | | | |
| Minimum bending radius | 69 mm | 69 mm | 69 mm | 69 mm |
| Weight | Approx. 170 g | Approx. 180 g | Approx. 170 g | Approx. 180 g |

### Monitor cable

| Model | FZ-VM |
|---|---|
| Vibration resistiveness | 10 to 150 Hz single amplitude 0.15 mm 3 directions, 8 strokes, 4 times |
| Ambient temperature range | Operation: 0 to 50°C; Storage: –20 to 65°C (with no icing or condensation) |
| Ambient humidity range | Operation and storage: 35% to 85%RH (with no condensation) |
| Ambient atmosphere | No corrosive gases |
| Material | Cable sheath: heat-resistant PVC, connector: PVC |
| Minimum bending radius | 75 mm |
| Weight | Approx. 170 g |

### Cable extension unit

| Model | FZ-VSJ |
|---|---|
| Power supply voltage*1 | 11.5 to 13.5 VDC |
| Current consumption*2 | 1.5 A max. |
| Ambient temperature range | Operating: 0 to 50°C; Storage: –25 to 65°C (with no icing or condensation) |
| Ambient humidity range | Operating and storage: 35% to 85% (with no condensation) |
| Maximum units connectable | 2 Units per camera |
| Weight | Approx. 240 g |
| Accessories | Instruction sheet and 4 mounting screws |

*1 A 12-VDC power supply must be provided to the cable extension unit when connecting the Intelligent camera, the Autofocus camera, the Intelligent compact camera, the Strobe controller, or the Lighting controller.

*2 The current consumption shows when connecting the cable extension unit to an external power supply.

### Long-distance camera cables

| Model | FZ-VS4 (15 m) | FZ-VSL4 (15 m) |
|---|---|---|
| Shock resistiveness (durability) | 10 to 150 Hz single amplitude 0.15 mm 3 directions, 8 strokes, 4 times | |
| Ambient temperature range | Operation and storage: 0 to 65 °C (with no icing or condensation) | |
| Ambient humidity range | Operation and storage: 40% to 70%RH (with no condensation) | |
| Ambient atmosphere | No corrosive gases | |
| Material | Cable sheath, connector: PVC | |
| Minimum bending radius | 78 mm | |
| Weight | Approx. 1,400 g | |

### Parallel cable

| Model | FZ-VP | FZ-VPX |
|---|---|---|
| Vibration resistiveness | 10 to 150 Hz single amplitude 0.15 mm 3 directions, 8 strokes, 4 times | |
| Ambient temperature range | Operation: 0 to 50°C; Storage: –20 to 65°C (with no icing or condensation) | |
| Ambient humidity range | Operation and storage: 35% to 85%RH (with no condensation) | |
| Ambient atmosphere | No corrosive gases | |
| Material | Cable sheath: heat-resistant PVC, Connector: resin | |
| Minimum bending radius | 75 mm | |
| Weight | Approx. 160 g | Approx. 180 g |

**Note:** FZ-VP/FZ-VPX is only for the FZ series. The FH series can use XW2Z-S013-2/-S013-5.

### Encoder cable

| Model | FH-VR |
|---|---|
| Vibration resistiveness | 10 to 150 Hz single amplitude 0.1 mm 3 directions, 8 strokes, 10 times |
| Ambient temperature range | Operation: 0 to 50°C; Storage: –10 to 60°C (with no icing or condensation) |
| Ambient humidity range | Operation and storage: 35% to 85%RH (with no condensation) |
| Ambient atmosphere | No corrosive gases |
| Material | Cable Jacket: Heat, oil and flame resistant PVC Connector: polycarbonate resin |
| Minimum bending radius | 65 mm |
| Weight | Approx. 104 g |

## Cameras/Cables connection table

| Type of camera | Model | Cable length | High-speed CMOS cameras*1 | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | 300,000-pixel | 2 million-pixel | | 4 million-pixel | | 12 million-pixel | |
| | | | FH-SM/SC | FH-SM02/SC02 | | FH-SM04/SC04 | | FH-SM12/SC12 | |
| | | | – | High speed mode of transmission speed select | Standard mode of transmission speed select | High speed mode of transmission speed select | Standard mode of transmission speed select | High speed mode of transmission speed select | Standard mode of transmission speed select |
| Camera Cables Right-angle camera cables | FZ-VS3 FZ-VSL3 | 2 m | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| | | 3 m | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| | | 5 m | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| | | 10 m | Yes | No | Yes | No | Yes | No | Yes |
| Bend resistant camera cables | FZ-VSB3 FZ-VSLB3 | 2 m | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| | | 3 m | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| | | 5 m | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| | | 10 m | Yes | No | Yes | No | Yes | No | Yes |
| Long-distance camera cable Long-distance right-angle camera cable | FZ-VS4 FZ-VSL4 | 15 m | Yes | No | Yes | No | Yes | No | Yes |

*1 High-speed CMOS camera is only for the FH series.

| Type of camera | Model | Cable length | Digital CCD cameras | | | Small digital CCD cameras Pen type/flat type | High-speed CCD cameras | Intelligent compact CMOS cameras |
|---|---|---|---|---|---|---|---|---|
| | | | 300,000-pixel | 2 million-pixel | 5 million-pixel | | | |
| | | | FZ-S/SC | FZ-S2M/SC2M | FZ-S5M2/SC5M2 | FZ-SF/SFC FZ-SP/SPC | FZ-SH/SHC | FZ-SQ□ |
| Camera Cables Right-angle camera cables | FZ-VS3 FZ-VSL3 | 2 m | Yes | Yes | Yes | Yes | Yes | Yes |
| | | 3 m | Yes | Yes | Yes | Yes | Yes | Yes |
| | | 5 m | Yes | Yes | Yes | Yes | Yes | Yes |
| | | 10 m | Yes | Yes | No | Yes | Yes | Yes |
| Bend resistant camera cables | FZ-VSB3 FZ-VSLB3 | 2 m | Yes | Yes | Yes | Yes | Yes | Yes |
| | | 3 m | Yes | Yes | Yes | Yes | Yes | Yes |
| | | 5 m | Yes | Yes | Yes | Yes | Yes | Yes |
| | | 10 m | Yes | Yes | No | Yes | Yes | Yes |
| Long-distance camera cable Long-distance right-angle camera cable | FZ-VS4 FZ-VSL4 | 15 m | Yes | Yes | No | Yes | Yes | Yes |

## EtherCAT communications specifications

| Item | | Specifications |
|---|---|---|
| Communications standard | | IEC61158 Type 12 |
| Physical layer | | 100 BASE-TX (IEEE802.3) |
| Modulation | | Base band |
| Baud rate | | 100 Mbps |
| Topology | | Depends on the specifications of the EtherCAT master. |
| Transmission media | | Twisted-pair cable of category 5 or higher (double-shielded straight cable with aluminum tape and braiding) |
| Transmission distance | | Distance between nodes: 100 m or less |
| Node address setting | | 00 to 9 |
| External connection terminals | | RJ45 × 2 (shielded) IN: EtherCAT input data, OUT: EtherCAT output data |
| Send/receive PDO data sizes | Input | 56 to 280 bytes/line (including input data, status, and unused areas) Up to 8 lines can be set.*1 |
| | Output | 28 bytes/line (including output data and unused areas) Up to 8 lines can be set.*1 |
| Mailbox data size | Input | 512 bytes |
| | Output | 512 bytes |
| Mailbox | | Emergency messages, SDO requests, and SDO information |
| Refreshing methods | | I/O-synchronized refreshing (DC) |

*1 This depends on the upper limit of the master.

## Version information

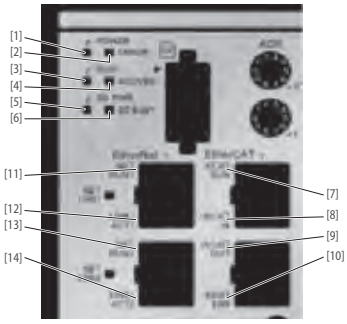
### FH Series and programming devices

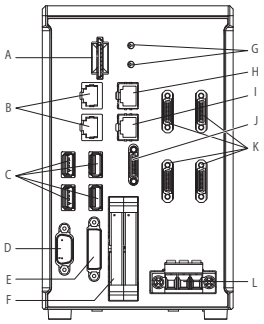
| FH series | Required programming device | |
|---|---|---|
| | Sysmac Studio Standard Edition/Vision Edition | |
| | Ver.1.06 | Ver.1.07 or higher |
| FH-3050 (-_)<br>FH-1050 (-_) | Not supported | Supported |

**Note:** 1. The auto-update to Sysmac Studio version 1.07 will be available soon.
2. Sysmac Studio does not support the FZ5 series.

## Components and functions

### Example of the FH sensor controllers BOX type (4-camera type)

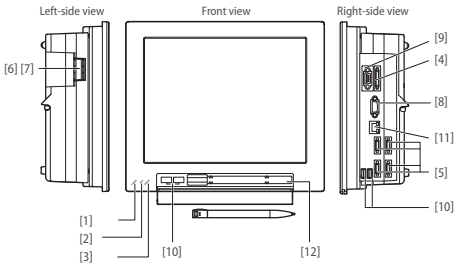


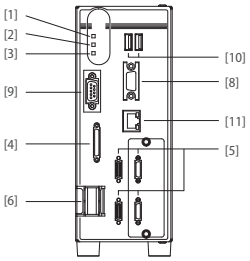

| | Name | Description |
|---|---|---|
| [1] | POWER LED | Lit while power is ON. |
| [2] | ERROR LED | Lit when an error has occurred. |
| [3] | RUN LED | Lit while the controller is in Measurement Mode. |
| [4] | ACCESS LED | Lit while the memory is accessed. |
| [5] | SD POWER LED | Lit while power is supplied to the SD card and the card is usable. |
| [6] | SD BUSY LED | Blinks while the SD memory card is accessed. |
| [7] | EtherCAT RUN LED | Lit while EtherCAT communications are usable. |
| [8] | EtherCAT LINK/ACT IN LED | Lit when connected with an EtherCAT device, and blinks while performing communications. |
| [9] | EtherCAT LINK/ACT OUT LED | Lit when connected with an EtherCAT device, and blinks while performing communications. |
| [10] | EtherCAT ERR LED | Lit when EtherCAT communications have become abnormal. |
| [11] | EtherNet NET RUN1 LED | Lit while EtherNet communications are usable. |
| [12] | EtherNet NET LINK/ACK1 LED | Lit when connected with an EtherNet device, and blinks while performing communications. |
| [13] | EtherNet NET RUN2 LED | Lit when EtherNet communications are usable. |
| [14] | EtherNet NET LINK/ACK2 LED | Lit when connected with an EtherNet device, and blinks while performing communications. |

| | Name | Description |
|---|---|---|
| A | SD memory card installation connector | Install the SD memory card. Do not plug or unplug the SD card during measurement operation. Otherwise measurement time may be affected or data may be destroyed. |
| B | EtherNet connector | Connect an EtherNet device. |
| C | USB connector | Connect a USB device. Do not plug or unplug it during measurement operation. Otherwise measurement time may be affected or data may be destroyed. |
| D | RS-232C connector | Connect an external device such as a programmable controller. |
| E | DVI-I connector | Connect a monitor. |
| F | I/O connector (control lines, data lines) | Connect the controller to external devices such as a sync sensor and PLC. |
| G | EtherCAT address setup volume | Used to set a node address (00 to 99) as an EtherCAT communication device. |
| H | EtherCAT communication connector (IN) | Connect the opposed EtherCAT device. |
| I | EtherCAT communication connector (OUT) | Connect the opposed EtherCAT device. |
| J | Encoder connector | Connect an encoder. |
| K | Camera connector | Connect cameras. |
| L | Power supply terminal connector | Connect a DC power supply. Wire the controller independently on other devices. Wire the ground line. Be sure to ground the controller alone. Perform wiring using the attached power supply connector. |

### Example of the FZ5 sensor controllers LCD-integrated type (4-camera type)




### Example of the FZ5-Lite sensor controllers LCD-integrated type (4-camera type)

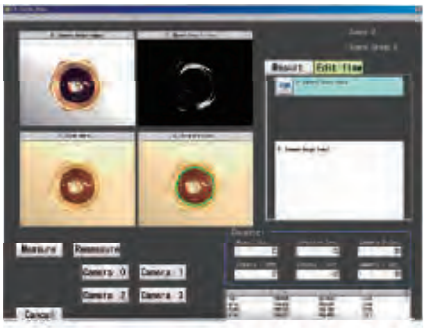



| | Name | Description |
|---|---|---|
| [1] | POWER LED | Lit while power is ON. |
| [2] | RUN LED | Lit while the controller is in Run Mode. |
| [3] | ERROR LED | Lit when an error has occurred. |
| [4] | I/O connector (control lines, data lines) | Connect the controller to external devices such as a sync sensor and PLC. |
| [5] | Camera connector | Connect cameras. |
| [6] | Power | Connect a DC power supply. Wire the power supply unit independently of other devices. After wiring, replace the terminal cover. |
| [7] | Ground terminal | Connect the ground wire. Make sure that the controller is grounded with a separate ground wire. |
| [8] | Monitor connector (analog RGB) | Connect a monitor. (Provided with Lite controller type only) |
| [9] | RS-232C/RS-422 connector | Connect an external device such as a personal computer or PLC. |
| [10] | USB connector | Connect a track ball, mouse and USB memory. A total of four USB ports are provided and any of them can be used. However, when connecting two or more USB memories, do not connect them to adjacent ports. Doing so may cause the USB memories to come into contact, resulting in malfunction or damage. |
| [11] | EtherNet connector | Connect the controller to a personal computer. |
| [12] | Touch pen (holder) | A touch pen is stored. (Provided with the LCD integrated type only) |

# FlexXpect vision platform

FlexXpect is a modular Vision platform featuring industry specific functionality. In combination with the powerful Xpectia-hardware, the FlexXpect software modules take you into a new dimension of specialisation. FlexXpect is simple to use and can be customised easily, to focus on your individual needs. The combination of Xpectia's real colour sensing, high resolution and intuitive user guidance combined with the FlexXpect value added tools represents an unbeatable duo.

Depending on industry, different requirements and regulations are in place for quality inspection. Premium class add-on functionality, tailored for industry, is delivered by FlexXpect.



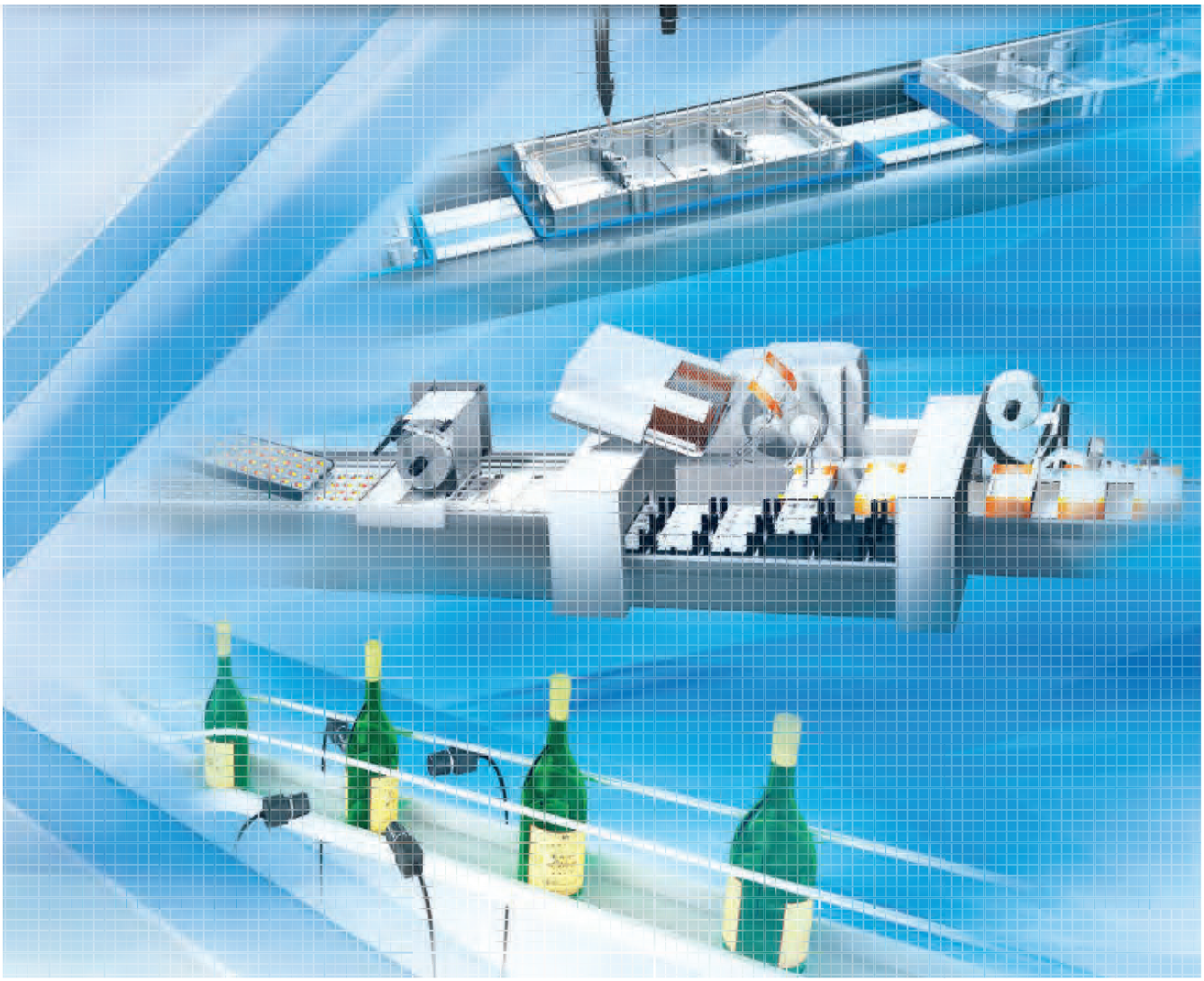
## Simplicity – easy to use

FlexXpect features an easy and intuitive user interface, which allows inspection solutions to be set-up quickly and efficiently. With a built in touch screen interface and icon based menu structure, the complexity of programming the system is kept to a minimum. The Flow-Menu is an ideal tool to re-built the process sequences inside the vision platform.

## Customised to your needs

The FlexXpect platform can be further customized to the needs of the individual application. Different levels of product modifications are supported. Based on the skill of the user and required functionality it offers:

- Flow programming
- GUI modifications
- Processing items & communication



## Your benefits

- FlexXpect-Glue Bead: Automatic one shot seal inspection
- FlexXpect-Pharma: 21 CFR Part 11 compliant
- FlexXpect-Labelling: 360° bottle inspection
- FlexXpect-PV: alignment & inspection of wafers

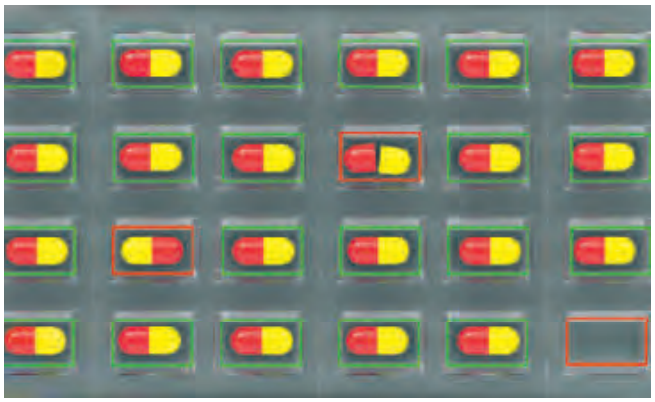
# FlexXpect Pharma

FlexXpect is a modular Vision platform. In combination with the powerful Xpectia-hardware, it takes you into a new dimension of specialisation. The FlexXpect-Pharma is targeting challenging inspections in the Pharmaceutical industry. It offers powerful inspection tools and all functions, necessary for the validation under the FDA 21 CFR Part 11. With the powerful code verification and OCR features, FlexXpect-Pharma is the ideal solution for Track & Trace applications.

### Inspect any applications in Pharma:

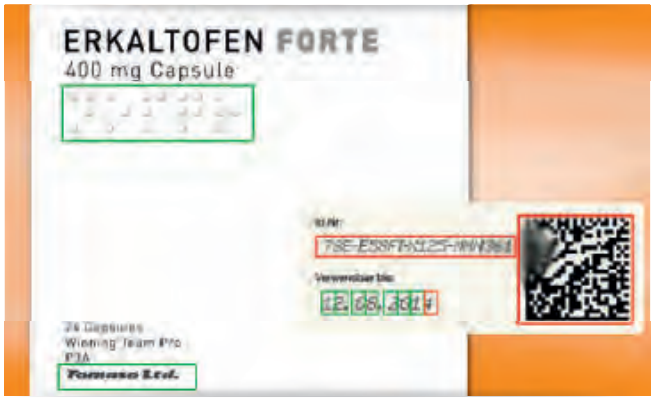
- Blister pack
- Vials
- Syringes
- Label inspection

## Inspect any applications in Pharma



Pill inspection in blisters


Polar transformation of round strings




Date/Batch code verification (OCR/OCV)

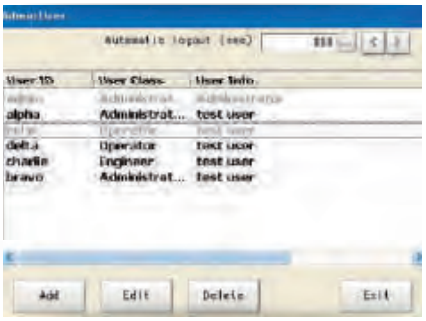
High speed code reading

## Your benefits

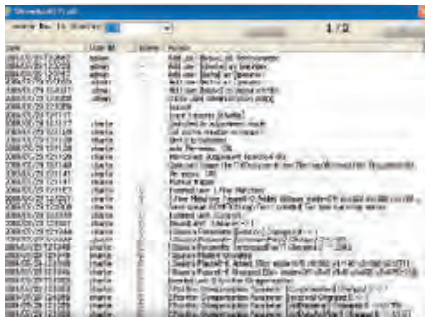
- Strong OCR/OCV (any font & print type)
- Barcode/Datamatrix
- Braille
- Pattern and edge tools
- Real colour inspection
- High resolution to detect minute defects



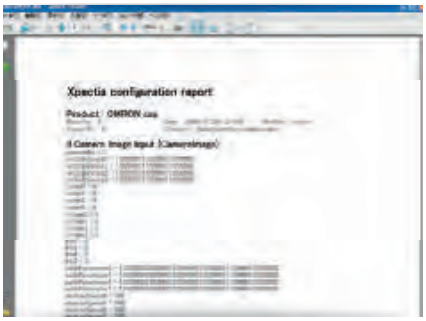
# Optimize your set-up with a click




User access administration



Audit trail




Generate and export configuration data

| Item description | Order code | Quick Link |
|---|---|---|
| FlexXpect-Pharma software module | FLEXXPECT-PHARMA | G634 |

Note: FlexXpect software modules require Xpectia/FZW hardware. This is not part of the item and needs to be ordered independently.

# FlexXpect Labelling

FlexXpect is a modular Vision platform. In combination with the powerful Xpectia-hardware, it takes you into a new dimension of specialisation. FlexXpect-Labelling has been designed to deliver tailored functionality for inspection of labels and packages.

### Powerful image processing tools for labelling:

- OCR/OCV
- Barcode/Datamatrix
- Pattern and edge tools
- Real colour inspection
- High resolution to detect minute defects

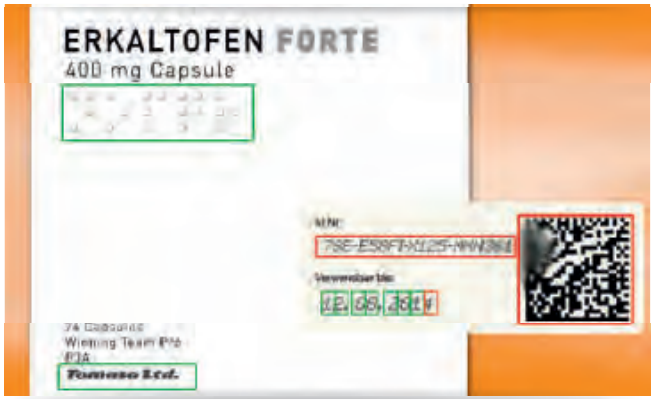
### Label unwrapping from bottles for inspection of premium beverages:

- Acquire images from up to 4x cameras
- Compensate the distortion
- Identify the overlapping areas
- Stitch the images together

## Powerful image processing tools for labelling


Strong OCR/OCV


Polar transformation of round strings




Date/Batch code verification (OCR/OCV)

High speed code reading


## Your benefits

- Strong OCR/OCV
- Code reading (Barcode, Datamatrix)
- 360° inspections of bottles
- Real colour processing items
- High resolution
- Easy & intuitive configuration



### Position and defect inspection

Produce aesthetically perfect products is a key point. FlexXpect-Labelling offers a suite of image processing tools to inspect the label for position and defects.

### Reading different codes at a time

Two or more different codes in the same field of view can be read by utilizing a high resolution camera.This function helps to reduce the inspection time.

| Item description | Order code | Quick Link |
|---|---|---|
| FlexXpect-Labelling software module | FLEXXPECT-LABELLING | G633 |

Note: FlexXpect software modules require Xpectia/FZW hardware. This is not part of the item and needs to be ordered independently.

# FlexXpect Glue Bead

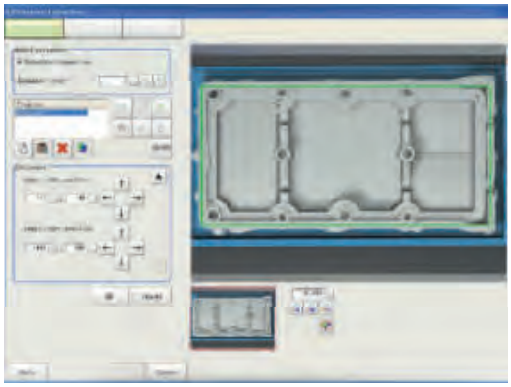
FlexXpect is a modular Vision platform. In combination with the powerful Xpectia-hardware, it takes you into a new dimension of specialisation. The FlexXpect-Glue Bead inspects the complete sealing of automotive parts in one shot. Driven by the real colour functionality, any sealing can be identified and checked, independent how visible it is. Featuring a simple set-up procedure and automatic calculation of the path, it represents a powerful and straight forward solution for any glue application.

### Glue Bead inspection:

- Correct path
- Thickness
- Interrupt

## Inspect any applications in Pharma

FlexXpect-Glue Bead features an intuitive and easy set-up procedure. No expert knowledge of the user is required.

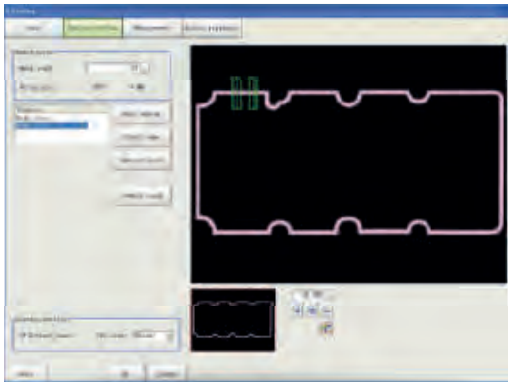


### Step 1

Define inspection area.

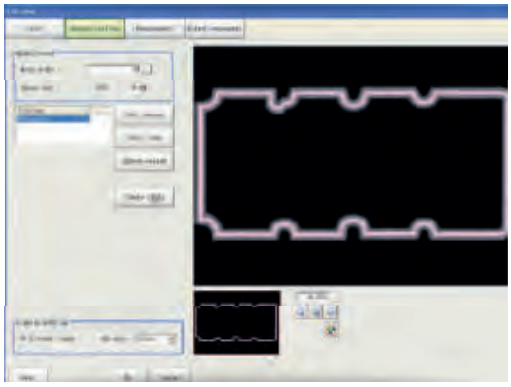
### Step 2

Teach the glue.



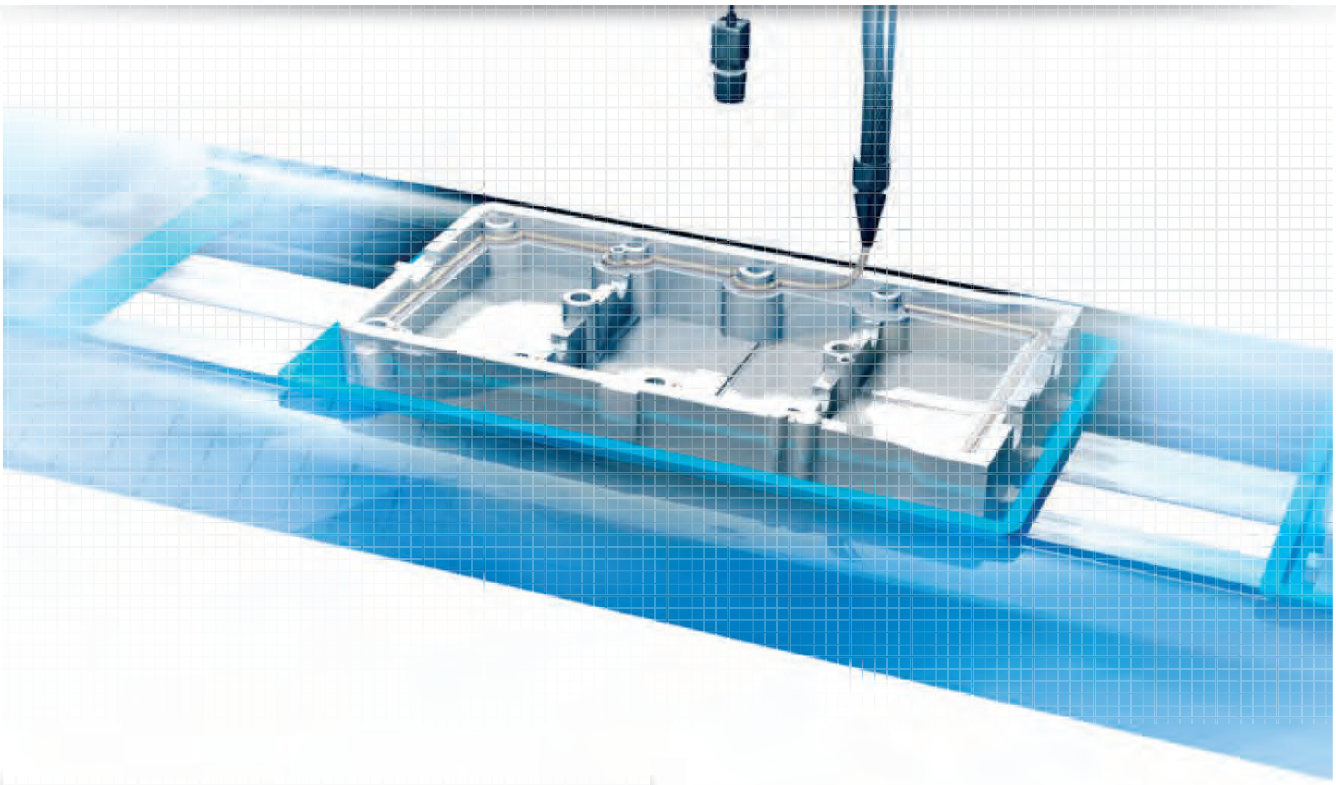
### Step 3

Define start & end point of the glue.



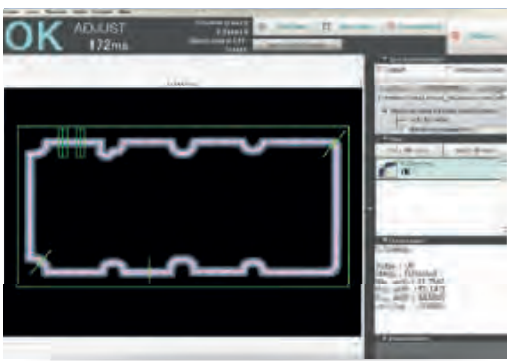
### Step 4

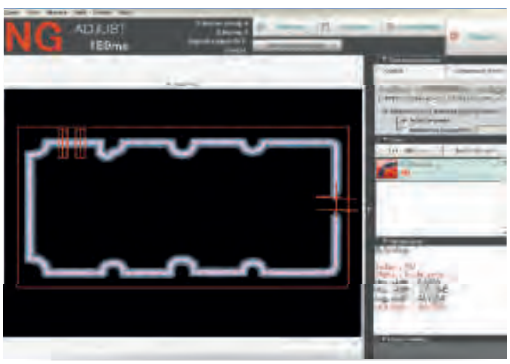
Automatic calculation of the path of the Glue Bead.



## Your benefits

- One shot inspection of the complete path
- Easy set-up
- Automatic path calculation
- Real colour glue extraction




| Item description | Order code | Quick Link |
|---|---|---|
| FlexXpect-Glue Bead software module | FLEXXPECT-GLUE BEAD | G632 |

Note: FlexXpect software modules require Xpectia/FZW hardware. This is not part of the item and needs to be ordered independently.

# FlexXpect PV

FlexXpect is a modular Vision platform. In combination with the powerful Xpectia hardware, it takes you into a new dimension of specialisation. FlexXpect-PV delivers tailored functionality for alignment and the inspection of wafers for chips and cracks.

### Feautures of FlexXpect-PV:

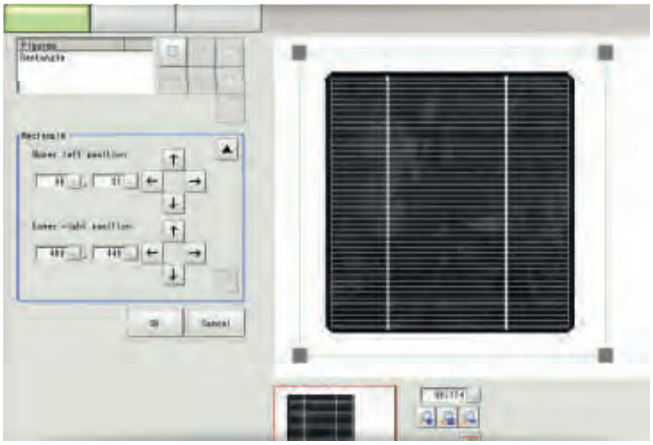
- Easy and intuitive set-up
- Automatic extraction and teaching of the PV wafer
- Precise inspections with high resolution cameras
- Automatic robot calibration
- Fade-out strings and conveyor belts

### Supported PV inspections:

- Precise wafer and string alignment
- Accurate chamfer chip inspection
- Detection of minute edge cracks
- Bus bar alignment on the wafer

## Quick set-up in simple steps:

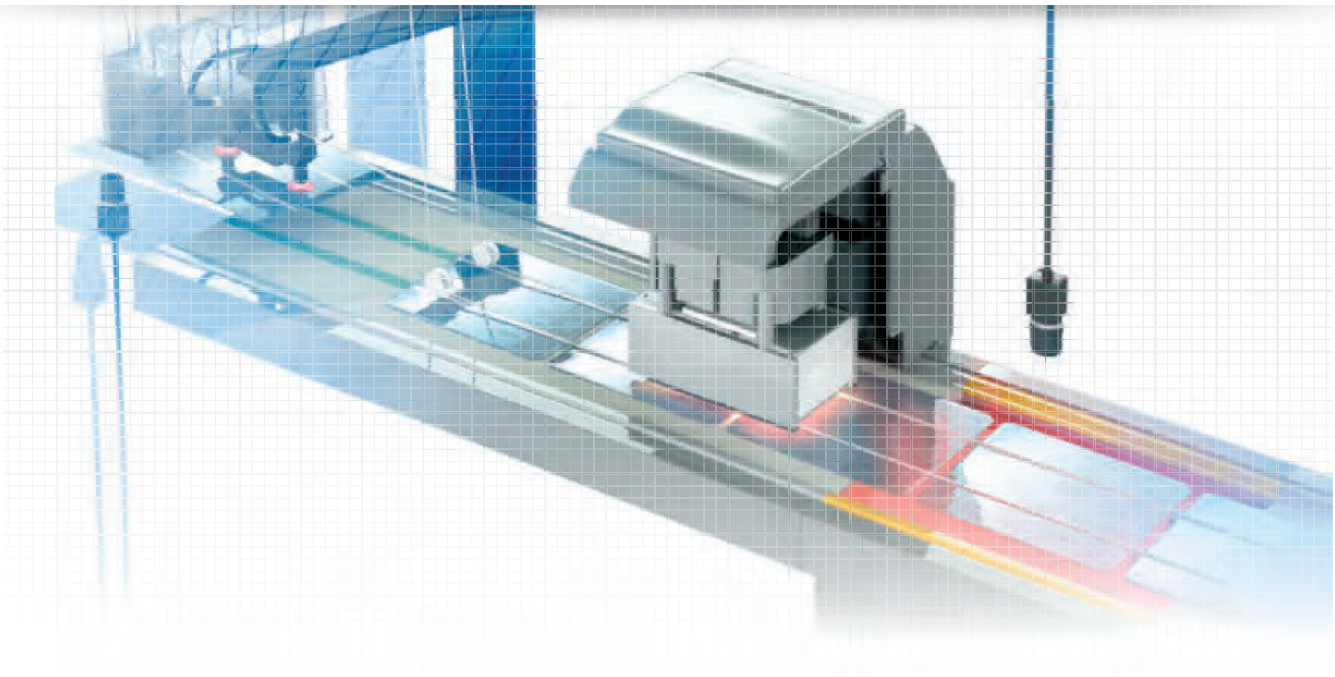
**Step 1:**
Select the inspection function

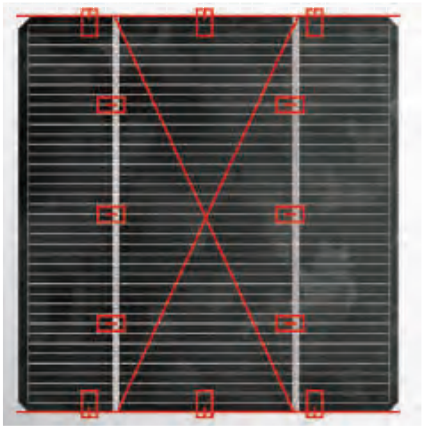


**Step 2:**
Draw a rectangle around the wafer

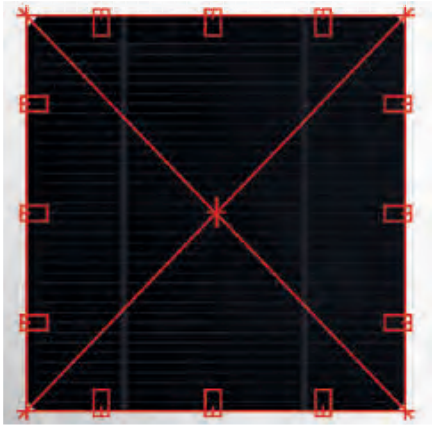
**Step 3:**
One step deletion of bus bars and conveyor belts (optional)

**Step 4:**
Start the inspectionAccurate chamfer chip inspection (0.1 mm)

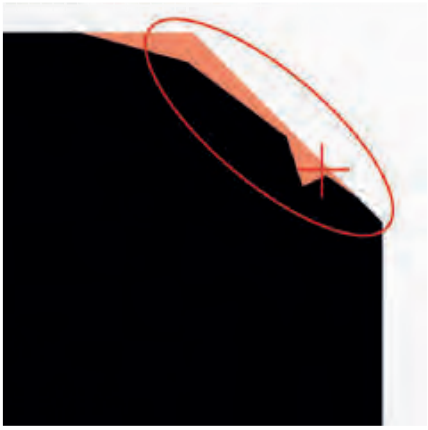




Bus bar alignment



Outline adge alignment



Precise detection of edge breakage

## Your benefits

- One shot inspection of the complete path
- Easy set-up
- Automatic path calculation
- Real colour glue extraction

| Item description | Order code | Quick Link |
|---|---|---|
| FlexXpect-PV software module | FLEXXPECT-PV | G636 |

Note: FlexXpect software modules require Xpectia/FZW hardware. This is not part of the item and needs to be ordered independently.

# V680 RFID System

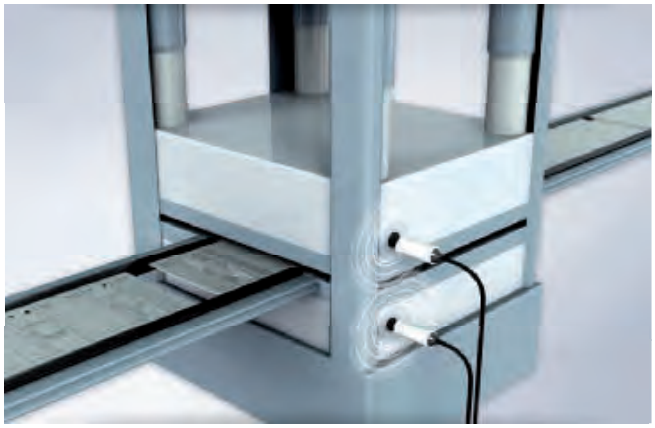
## One for all

Whenever you need to have full transparency of your production process or logistic application V680 is helping you to manage your data most comfortably and reliably.

- Diagnostic functions for maintenance
- One for all: modular platform concept
- Flexible installation: long reach antennas
- Fit for speed: high turn around time
- Save time & costs: easy setup & maintenan

### Production ID system for the paint shop

A RFID system is used to store the process parameters needed for the production of the car throughout the process. Harsh conditions through chemicals and high temperatures occur during the production steps. RFID is ideal for this application as it features high resistance tags for harsh conditions.



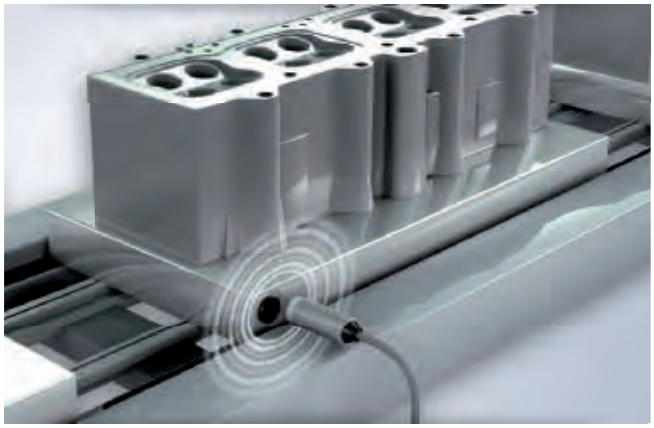
### Monitoring of the moulding history

Process and maintenance related information of a moulding press can be stored by using RFID. The information can be read out permanently or on demand from a remote location and can be used to control the process.



### Your benefits

- High speed air communication
- Standardized protocol (ISO 15693)
- Large memory (up to 32kByte) and very compact tags
- Long life time of tags (FERAM variants)
- All protocols for PLC communication



### Traceability of automotive parts

Track the parts in the production process. Process related information can be stored to guarantee high quality production.

### Carrier Management

For the administration and traceability of transport carriers along the hole process RFID represents a smart solution. V680 is working on the standardized universal frequency of 13.56MHz. The flexible platform with its versatile and compact design can be easily integrated into any point in the production process.


## 3 in 1 RFID: Antenna, amplifier & controller

- Conforms to ISO/IEC 18000-3 (15693).
- Standard-feature Ethernet (Modbus TCP) enables easy connection with one cable.
- Easy installation and "visualized" communications status minimize startup work and downtime.
- WEB browser can be used for setting, monitoring, and communications with RF tags.

## Ordering information

### V680S-series

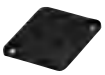
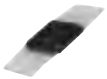
#### RF tag

| Type | Memory capacity | Appearance | Size | Installation | Order code |
|---|---|---|---|---|---|
| Battery-less | 2 kbytes |  | 40 × 40 × 5 mm | For flush mounting on metallic surface | V680S-D2KF67M |
| | | | | For flush mounting on nonmetallic surface | V680S-D2KF67 |
| | |  | 86 × 54 × 10 mm | For flush mounting on metallic surface | V680S-D2KF68M |
| | | | | For flush mounting on nonmetallic surface | V680S-D2KF68 |
| | 8 kbytes |  | 40 × 40 × 5 mm | For flush mounting on metallic surface | V680S-D8KF67M[*1] |
| | | | | For flush mounting on nonmetallic surface | V680S-D8KF67[*1] |
| | |  | 86 × 54 × 10 mm | For flush mounting on metallic surface | V680S-D8KF68M[*1] |
| | | | | For flush mounting on nonmetallic surface | V680S-D8KF68[*1] |

[*1] V680S-D8KF6_M/V680S-D8KF6_ can be used with V680S series Reader/Writer version 2.00 or higher.

### V680-series

#### RF tag

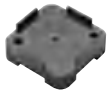
| Type | Memory capacity | Appearance | Size | Installation | Order code |
|---|---|---|---|---|---|
| Battery-less | 1 kbyte |  | 20 dia. × 2.7 mm | For flush mounting on nonmetallic surface | V680-D1KP54T |
| | |  | 34 × 34 × 3.5 mm | For flush mounting on metallic surface | V680-D1KP66MT |
| | | | | For flush mounting on nonmetallic surface | V680-D1KP66T |
| Environment-resistant type Battery-less | |  | 95 × 36.5 × 6.5 mm | For flush mounting on nonmetallic surface | V680-D1KP66T-SP |
| High-temperature type Battery-less | |  | 80 dia. × t10 mm | For mounting with special attachment | V680-D1KP58HTN |

**Note:** V680 series 8kbyte RF Tag (V680-D8KF67,V680-D8KF67M and V680-D8KF68A) can communicate with V680S series Reader/Writer. For details, refer to the User's Manual (Cat. No. Z339).

### Reader/Writer

| Type | Appearance | Size | Interface | Order code |
|---|---|---|---|---|
| Reader/Writer |  | 75 × 75 × 40 mm | Ethernet (TCP/IP: Modbus TCP) | V680S-HMD64-ETN |
| |  | 120 × 120 × 40 mm | Ethernet (TCP/IP: Modbus TCP) | V680S-HMD66-ETN |

### RF tag attachment

| Type | Appearance | Order code |
|---|---|---|
| For the V680-D1KP66T |  | V600-A86 |
| For the V680-D1KP58HTN |  | V680-A80 |
| For the V680-D1KP54T |  | V700-A80 |

### Cable

| Type | Appearance | Length | Order code |
|---|---|---|---|
| Special connector – RJ45 |  | 2 m | V680S-A41 2M |
| | | 5 m | V680S-A41 5M |
| | | 10 m | V680S-A41 10M |
| Special connector – Loose wires |  | 2 m | V680S-A42 2M |
| | | 5 m | V680S-A42 5M |
| | | 10 m | V680S-A42 10M |

### Extension cable

| Type | Appearance | Length | Order code |
|---|---|---|---|
| Special connector – Special connector |  | 10 m | V680S-A40 10M |
| | | 20 m | V680S-A40 20M |
| | | 50 m | V680S-A40 50M |

**Note:** The maximum extendable cable length using the cable and extension cable is 60 m. Only one extension cable can be used.

### Industrial switching hubs (Recommended hubs)

| Type | Appearance | Specifications | | | Order code |
|---|---|---|---|---|---|
| | | Functions | No. of ports | Failure detection | |
| Industrial switching hubs |  | Quality of Service (QoS):<br>EtherNet/IP control data priority<br>Failure detection:<br>Broadcast storm and LSI error detection<br>10/100BASE-TX, Auto-Negotiation | 3 | No | W4S1-03B |
| |  | | 5 | No | W4S1-05B |
| | | | 5 | Yes | W4S1-05C |

## Specifications

### V680S-series

#### RF tag (2-kbyte Memory)

| Item | V680S-D2KF67 | V680S-D2KF67M | V680S-D2KF68 | V680S-D2KF68M |
|---|---|---|---|---|
| Memory capacity | 2,000bytes (user area) | | | |
| Memory type | FRAM | | | |
| Data retention | 10 years after writing (85°C or less) | | | |
| Memory life | One trillion writes for each block (85°C or less), Access frequency*1: One trillion accesses | | | |
| Ambient operating temperature | −20 to 85°C (with no icing) | | | |
| Ambient storage temperature | −40 to 125°C (with no icing) | | | |
| Ambient operating humidity | 35% to 85% | | | |
| Degree of protection | IP68 (IEC 60529:2001), Oil resistance equivalent to IP67G (JIS C 0920:2003, Appendix 1)*2.<br>IPX9K (DIN 40 050) | | | |
| Vibration resistance | No abnormality after application of 10 to 2,000 Hz, 1.5-mm double amplitude, acceleration: 150 m/s$^2$, 10 sweeps each in X, Y, and Z directions for 15 minutes each | | No abnormality after application of 10 to 500 Hz, 1.5-mm double amplitude, acceleration: 100 m/s$^2$, 10 sweeps each in X, Y, and Z directions for 11 minutes each | |
| Shock resistance | No abnormality after application of 500 m/s$^2$, 3 times each in X, Y, and Z directions (Total: 18 times) | | | |
| Dimensions (W×H×D) | 40 × 40 × 5 mm | | 86 × 54 × 10 mm | |
| Materials | Exterior: PPS resin | | | |
| Weight | Approx. 11.5 g | Approx. 12 g | Approx. 44 g | Approx. 46 g |
| Metal countermeasures | None | Provided | None | Provided |

*1 The number of accesses is the total number of reads and writes.
*2 Oil resistance has been tested using a specific oil as defined in the OMRON test method.

**Note:** For details, refer to the User's Manual (Cat. No. Z339).

#### RF Tag (8-kbyte Memory)

| Item | V680S-D8KF67 | V680S-D8KF67M | V680S-D8KF68 | V680S-D8KF68M |
|---|---|---|---|---|
| Memory capacity | 8,192 bytes (user area) | | | |
| Memory type | FRAM | | | |
| Data retention | 10 years after writing (85°C or less) | | | |
| Memory life | One trillion writes for each block (85°C or less), Access frequency*1: One trillion accesses | | | |
| Ambient operating temperature | −20 to 85°C (with no icing) | | | |
| Ambient storage temperature | −40 to 125°C (with no icing) | | | |
| Ambient operating humidity | 35% to 85% | | | |
| Degree of protection | IP68 (IEC 60529:2001), Oil resistance equivalent to IP67G (JIS C 0920:2003, Appendix 1)*2.<br>IPX9K (DIN 40 050) | | | |
| Vibration resistance | No abnormality after application of 10 to 2,000 Hz, 1.5-mm double amplitude, acceleration: 150 m/s$^2$, 10 sweeps each in X, Y, and Z directions for 15 minutes each | | No abnormality after application of 10 to 500 Hz, 1.5-mm double amplitude, acceleration: 100 m/s$^2$, 10 sweeps each in X, Y, and Z directions for 11 minutes each | |
| Shock resistance | No abnormality after application of 500 m/s$^2$, 3 times each in X, Y, and Z directions (Total: 18 times) | | | |
| Dimensions (W×H×D) | 40 × 40 × 5 mm | | 86 × 54 × 10 mm | |
| Materials | Exterior: PPS resin | | | |
| Weight | Approx. 11.5 g | Approx. 12 g | Approx. 44 g | Approx. 46 g |
| Metal countermeasures | None | Provided | None | Provided |

*1 The number of accesses is the total number of reads and writes.
*2 Oil resistance has been tested using a specific oil as defined in the OMRON test method.

**Note:** For details, refer to the User's Manual (Cat. No. Z339).

### V680-series

#### RF Tag (1-kbyte Memory)

| Item | V680-D1KP54T | V680-D1KP66T | V680-D1KP66MT | V680-D1KP66T-SP |
|---|---|---|---|---|
| Memory capacity | 1,000 bytes (user area) | | | |
| Memory type | EEPROM | | | |
| Data retention time | 10 years after writing (85°C or less), 0.5 year after writing (85 to 125°C)<br>Total data retention at high temperatures exceeding 125°C is 10 hours*1 | | | 10 years after writing (85°C or less) |
| Write endurance | 100,000 writes for each block (25°C) | | | |
| Ambient operating temperature (during transmission) | −25 to 85°C (with no icing) | | | During RF Tag communications:<br>−25 to 70°C (with no icing)<br>Not during RF Tag communications:<br>−40 to 110°C (with no icing) |
| Ambient storage temperature (during data backup) | −40 to 125°C (with no icing)<br>Heat resistance: 1,000 thermal cycles each of 30 minutes at −10°C/150°C,<br>High temperature storage: 1,000 hours at 150°C*2<br>200 thermal cycles each of 30 minutes at −10°C/180°C,<br>High temperature storage: 200 hours at 180°C*3 | | | −40 to 110°C (with no icing) |
| Ambient operating humidity | 35 to 95% | | | |
| Degree of protection | IP67 (IEC 60529:2001)<br>Oil resistance equivalent to IP67G<br>(JIS C 0920:2003, Appendix 1)*4 | IP68 (IEC 60529:2001)<br>Oil resistance equivalent to IP67G<br>(JIS C 0920:2003, Appendix 1)*4 | | IP67 |
| Vibration resistance | No abnormality after application of 10 to 2,000 Hz, 1.5-mm double amplitude,<br>acceleration: 150 m/s$^2$, 10 sweeps each in X, Y, and Z directions for 15 minutes each | | | |
| Shock resistance | No abnormality after application of 500 m/s$^2$, 3 times each in X, Y, and Z directions (Total: 18 times) | | | |

| Item | V680-D1KP54T | V680-D1KP66T | V680-D1KP66MT | V680-D1KP66T-SP |
|---|---|---|---|---|
| Appearance | 20 dia. × 2.7 mm | 34 × 34 × 3.5 mm | | 95 × 36.5 × 6.5 mm (excluding protruding parts) |
| Materials | PPS resin | | | Exterior: PFA fluororesin<br>RF Tag filling: PPS resin |
| Weight | Approx. 2 g | Approx. 6 g | Approx. 7.5 g | Approx. 20 g |
| Metal countermeasures | None | None | Provided | None |

*1 After storing data at high temperatures, rewrite the data even if changes are not required. High temperatures are those exceeding 125°C up to 180°C.
*2 150°C heat resistance: The heat resistance has been checked at 150°C for up to 1,000 hours, and thermal shock has been checked through testing 1,000 thermal cycles each of 30 minutes at −10/150°C. (Test samples: 22, defects: 0)
*3 180°C heat resistance: The heat resistance has been checked at 180°C for up to 200 hours, and thermal shock has been checked through testing 200 thermal cycles each of 30 minutes at −10°C/180°C. (Test samples: 22, defects: 0)
*4 Oil resistance has been tested using a specific oil as defined in the OMRON test method.

**Note:** For details, refer to the User's Manual (Cat. No. Z339).

### RF Tag (1-kbyte Memory with High-temperature Capability)

| Item | V680-D1KP58HTN |
|---|---|
| Memory capacity | 1,000 bytes (user area) |
| Memory type | EEPROM |
| Data retention | 10 years after writing (85°C or less), 0.5 year after writing (85 to 125°C)<br>Total data retention at high temperatures exceeding 125°C is 10 hours*1 |
| Write endurance | 100,000 writes for each block (25°C) |
| Ambient operating temperature (during transmission) | −25 to 85°C (with no icing) |
| Ambient storage temperature (during data backup) | −40 to 250°C (with no icing)<br>(Data retention: −40 to 125°C) |
| Ambient storage humidity | No restrictions. |
| Degree of protection | IP67 (IEC 60529:2001)<br>Oil resistance equivalent to IP67G (JIS C 0920:2003, Appendix 1)*2 |
| Vibration resistance | No abnormality after application of 10 to 2,000 Hz, 1.5-mm double amplitude, acceleration: 150 $m/s^2$,<br>10 sweeps each in X, Y, and Z directions for 15 minutes each |
| Shock resistance | No abnormality after application of 500 $m/s^2$, 3 times each in X, Y, and Z directions (Total: 18 times) |
| Materials | Exterior: PPS resin |
| Weight | Approx. 70 g |

*1 After storing data at high temperatures, rewrite the data even if changes are not required. High temperatures are those exceeding
*2 Oil resistance has been tested using a specific oil as defined in the OMRON test method.

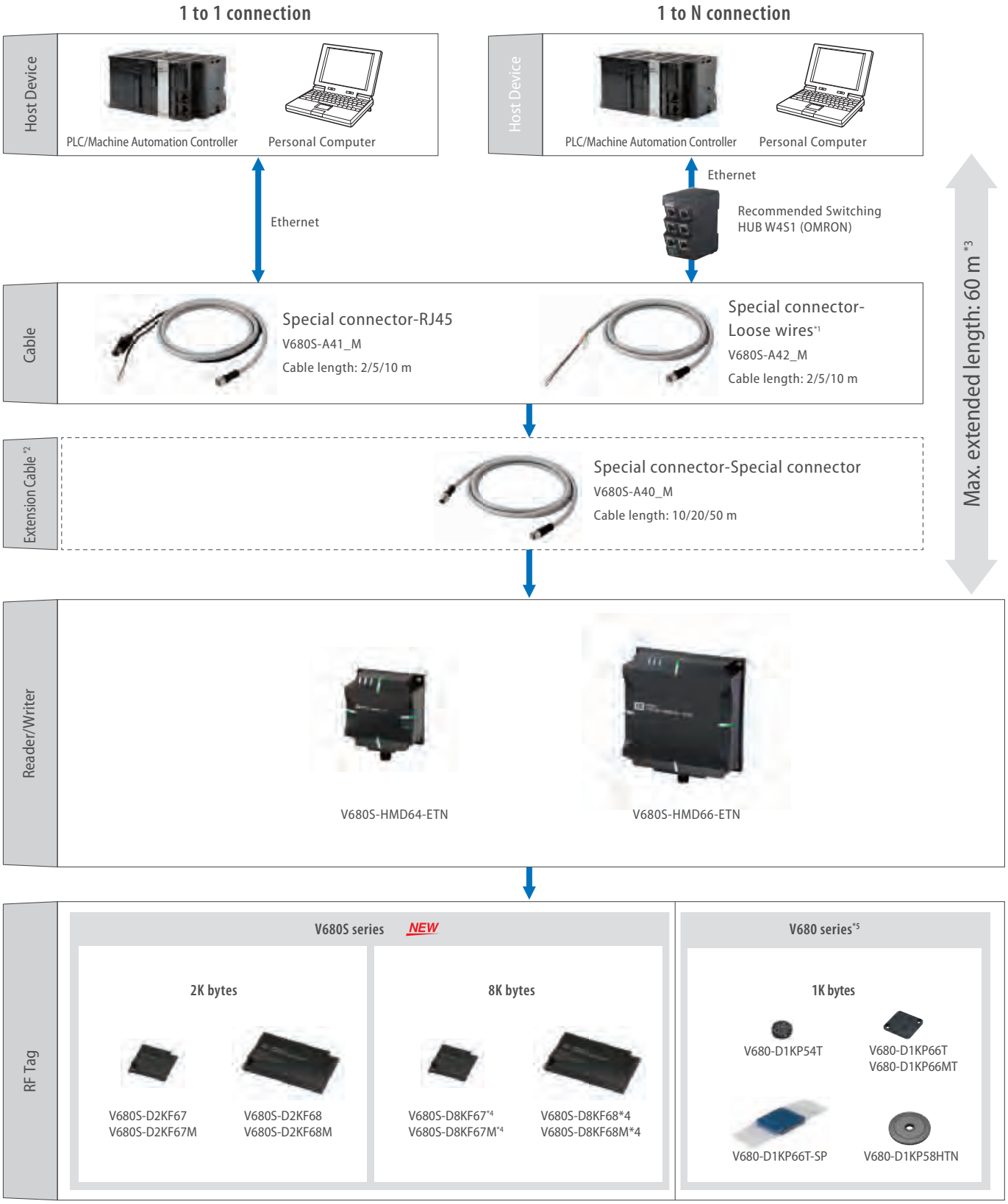
**Note:** For details, refer to the User's Manual (Cat. No. Z339).

### Reader/Writer

| Item | V680S-HMD64-ETN | V680S-HMD66-ETN |
|---|---|---|
| Dimensions (W×H×D) | 75 × 75 × 40 mm (excluding protruding parts) | 120 × 120 × 40 mm (excluding protruding parts) |
| Power supply voltage | 24 VDC (−15% to +10%) | |
| Consumption current | 0.2 A max. | |
| Ambient operating temperature | −10 to +55°C (with no icing) | |
| Ambient operating humidity | 25% to 85% (with no condensation) | |
| Ambient storage temperature | −25 to 70°C (with no icing) | |
| Ambient storage humidity | 25% to 85% (with no condensation) | |
| Insulation resistance | 20 MΩ min. (at 500 VDC) between cable terminals and case | |
| Dielectric strength | 1,000 VAC, 50/60 Hz for 1 min between cable terminals and case | |
| Vibration resistance | No abnormality after application of 10 to 500 Hz, 1.5-mm double amplitude, acceleration: 100 $m/s^2$, 10 sweeps in each of 3 axis directions (up/down, left/right, and forward/backward) for 11 minutes each | |
| Shock resistance | No abnormality after application of 500 $m/s^2$, 3 times each in 6 directions (Total: 18 times) | |
| Degree of protection | IP67 (IEC 60529: 2001)<br>Oil resistance equivalent to IP67F (JIS C 0920: 2003, Appendix 1)*1 | |
| Materials | Case: PBT resin, Filled resin: Urethane resin | |
| Mass | Approx. 270g | Approx. 640g |
| Installation method | Four M4 screws (Use a screw of 12 mm or more in length.) | |
| Host device communications interface | Ethernet 10BASE-T/100BASE-TX | |
| Host device communications protocol | MODBUS TCP | |
| Accessories | Instruction sheet, Copy of Description of Regulations and Standard, IP address label, Ferrite core*2 | |

*1 Oil resistance has been tested using a specific oil as defined in the OMRON test method.
*2 Provided only with the V680S-HMD66-ETN.

## System configuration



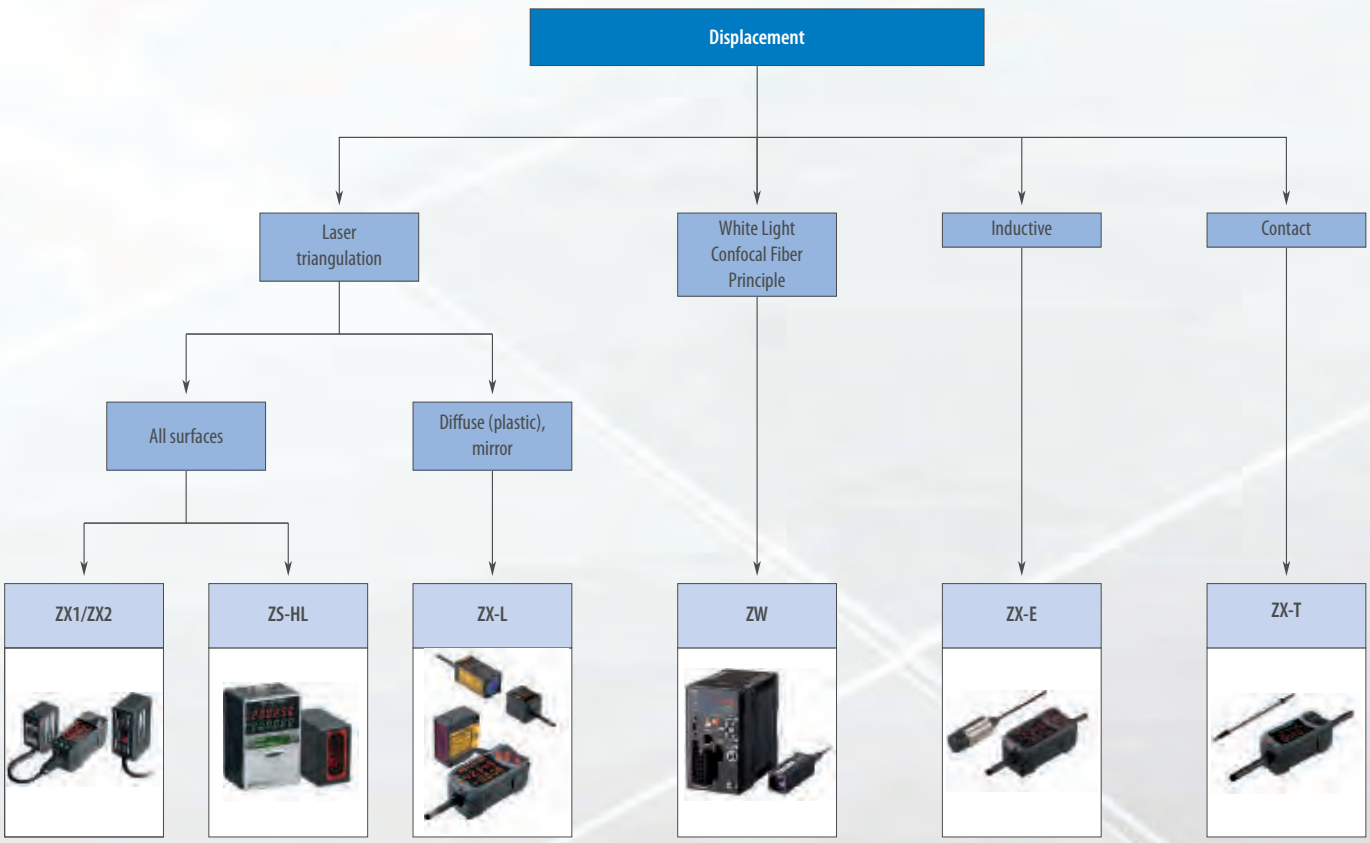

*1 A customer should treat wires terminal of the connector.
*2 Only one extension cable can be used.
*3 When the industrial Switching Hub is used, the maximum extendable cable length between the Reader/Writer and the Industrial Switching Hub is 60 m.
*4 V680S-D8KF6_M/V680S-D8KF6_ can be used with V680S series Reader/Writer version 2.00 or higher.
*5 V680 series 8K byte RF Tag (V680-D8KF67,V680-D8KF67M and V680-D8KF68A) can communicate with V680S series Reader/Writer. For details, refer to the User's Manual (Cat. No. Z339).

# HIGH PRECISION QUALITY INSPECTION

## Zero defect becomes reality – scalable accuracy in inspection

The Smart displacement sensor family offers a modular and scalable approach to solve the most challenging measurement tasks. The powerful portfolio enables you to measure profiles, thickness, distance, evenness/warpage, as well as width, edge, etc. Several measurement profiles can be performed simultaneously, using a single- or multi-controller unit. Aided by Omron's advanced technologies, the highest accuracy over long distances, speed and reliability will be achieved.

- Accurate and fast – 0.25 µm at less than 110 µs sampling time
- Scalable – multi-controller unit to coordinate and calculate up to 9 units
- Smart – data storage and remote control via networking capabilities




C437, C436
Page 371/373

C425
Page 376

C426
Page 381

C438
Page 384

C427
Page 389

C428
Page 391



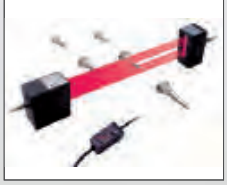

Profile

Position/
Diameter/Width

**ZG2**

C422
Page 393

**ZX-GT**



C435
Page 397

# Selection table

| | | Laser displacement sensor | | | Confocal fiber sensor |
|---|---|---|---|---|---|
| | |  |  |  |  |
| Selection criteria | Model | ZX1/ZX2 | ZS-HL | ZX-L | ZW |
| | Measurement range Z Min. | 50±10 mm | 10±0.5 mm | 30±2 mm | 7 mm |
| | Max. | 600±400 mm | 1500±500 mm | 300±200 mm | 40 mm |
| | Measurement range X Min. | – | – | – | – |
| | Max. | – | – | – | – |
| | Resolution Z | 1.5 µm | 0.25 µm | 0.25 µm | 0.01 µm |
| | Resolution X | – | – | – | – |
| | Linearity (±% of full scale) | 0.05% | 0.05% | 0.2% | 0.1% |
| | Response time | 60 µs | 110 µs | 150 µs | 500 µs |
| | Spot beam | ■ | ■ | ■ | ■ |
| | Line beam | ■ | ■ | ■ | – |
| | IP-rating head | IP67 | IP64/IP67 | IP50 | IP40 |
| | IP-rating controller | IP40 | IP40 | IP40 | IP20 |
| | Ambient oper. temperature | 0 to 50°C | 0 to 50°C | 0 to 50°C | 0 to 40°C |
| | Number of connectable sensors | 5 | 9 | 5 | 4 |
| Features | Thickness measurement | ■ | ■ | ■ | ■ |
| | Eccentricity | ■ | ■ | ■ | – |
| | Height | ■ | ■ | ■ | ■ |
| | Step | ■ | ■ | ■ | – |
| | Profile | – | – | – | – |
| | Distance | – | – | – | – |
| | Evenness | – | – | – | – |
| | Warpage | – | – | – | – |
| | Edge | – | – | – | – |
| | Width | – | – | – | – |
| | Peak | ■ | ■ | ■ | – |
| | Peak to peak | ■ | ■ | ■ | – |
| | Bottom | ■ | ■ | ■ | – |
| | Self-trigger | ■ | ■ | ■ | – |
| | Calibration | ■ | ■ | ■ | ■ |
| | Signal scaling | ■ | – | – | ■ |
| | PC-software | – | ■ | ■ | ■ |
| Application | Mirror | ■ | ■ | – | ■ |
| | Glass | ■ | ■ | – | ■ |
| | Metal | ■ | ■ | □ | ■ |
| | Plastic | ■ | ■ | ■ | ■ |
| | Black rubber | ■ | ■ | – | ■ |
| | Paper | ■ | ■ | □ | ■ |
| Supply voltage | 12 to 24 VDC | ■ | – | ■ | ■ |
| | 21.6 to 26.4 VDC | – | ■ | – | ■ |
| Control I/O | 4 to 20 mA | ■ | ■ | ■ | ■ |
| | 1 to 5 VDC | ■ | – | ■ | – |
| | Judgement output High/Pass/Low | ■ | ■ | ■ | ■ |
| | Trigger | ■ | ■ | ■ | ■ |
| Commu-nication | RS-232C | ■ | ■ | ■ | – |
| | USB2.0 | ■ | ■ | – | – |
| | Page/Quick Link | 371/373 | 376 | 381 | 384 |

| | | Inductive displacement sensor | Contact displacement sensor | Profile sensor | Laser micrometer |
|---|---|---|---|---|---|
| | |  |  |  |  |
| Selection criteria | Model | ZX-E | ZX-T | ZG2 | ZX-GT |
| | Measurement range Z Min. | 0.5 mm | 1 mm | 20 ±0.5 mm | – |
| | Max. | 7 mm | 10 mm | 210 ±30 mm | 28 mm |
| | Measurement range X Min. | – | – | 3 mm | – |
| | Max. | – | – | 70 mm | – |
| | Resolution Z | 1 µm | 0.1 µm | 0.2 µm | 10 µm |
| | Resolution X | – | – | 3 mm/631 pixels | – |
| | Linearity (±% of full scale) | 0.5% | 0.3% | 0.5% | 0.1% |
| | Response time | 150 µs | 1 ms | 5 ms | 150 µs |
| | Spot beam | – | – | – | – |
| | Line beam | – | – | □ | – |
| | IP-rating head | IP67 | IP67 | IP64/66 | IP40 |
| | IP-rating controller | IP40 | IP40 | IP20 | IP40 |
| | Ambient oper. temperature | 0 to 50°C | 0 to 50°C | 0 to 50°C | 0 to 50°C |
| | Number of connectable sensors | 5 | 7 | 1 | 5 |
| Features | Thickness measurement | ■ | ■ | ■ | ■ |
| | Eccentricity | ■ | ■ | ■ | ■ |
| | Height | ■ | ■ | ■ | ■ |
| | Step | ■ | ■ | ■ | ■ |
| | Profile | – | – | □ | – |
| | Distance | ■ | ■ | – | – |
| | Evenness | ■ | ■ | – | – |
| | Warpage | ■ | ■ | – | – |
| | Edge | – | – | – | ■ |
| | Width | – | – | □ | ■ |
| | Peak | ■ | ■ | ■ | ■ |
| | Peak to peak | ■ | ■ | ■ | ■ |
| | Bottom | ■ | ■ | ■ | ■ |
| | Self-trigger | ■ | ■ | ■ | ■ |
| | Calibration | – | – | ■ | – |
| | Signal scaling | ■ | ■ | – | ■ |
| | PC-software | ■ | ■ | ■ | ■ |
| Application | Mirror | – | ■ | ■ | ■ |
| | Glass | – | ■ | ■ | ■ |
| | Metal | ■ | ■ | ■ | ■ |
| | Plastic | – | ■ | ■ | ■ |
| | Black rubber | – | ■ | ■ | ■ |
| | Paper | – | – | ■ | ■ |
| Supply voltage | 12 to 24 VDC | ■ | ■ | – | ■ |
| | 21.6 to 26.4 VDC | – | – | ■ | ■ |
| Control I/O | 4 to 20 mA | ■ | ■ | ■ | ■ |
| | 1 to 5 VDC | ■ | ■ | – | ■ |
| | Judgement output High/Pass/Low | ■ | ■ | ■ | ■ |
| | Trigger | ■ | ■ | ■ | ■ |
| Commu-nication | RS-232C | ■ | ■ | ■ | ■ |
| | USB2.0 | ■ | – | ■ | – |
| | Page/Quick Link | 389 | 391 | 393 | 397 |

■ Standard □ Available – No/not available

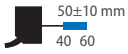
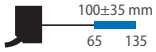
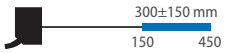
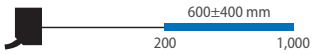
## Highest performance for optimized productivity

Highest performance is now available in matchbox size. We are defining a new class of measurement sensors using an advanced HSDR-CMOS (High Speed and Dynamic Range) camera chip.

- Stable measurement for objects with any surface
- Best in class performance for accuracy and speed
- Compact size for quick mounting
- Increased measurement range
- Simple configuration by one-button, Smart Tuning
- Reliable measurement in harsh environments
- Integrated display

## Ordering information

### Sensors

| Appearance | Connection method | Cable length | Sensing distance | Order code | |
|---|---|---|---|---|---|
| | | | | NPN output | PNP output |
|  | Pre-wired | 2 m |   | ZX1-LD50A61 2M | ZX1-LD50A81 2M |
| | | 5 m | | ZX1-LD50A61 5M | ZX1-LD50A81 5M |
| | Pre-wired connector | 0.5 m | | ZX1-LD50A66 0.5M | ZX1-LD50A86 0.5M |
| | Pre-wired | 2 m |   | ZX1-LD100A61 2M | ZX1-LD100A81 2M |
| | | 5 m | | ZX1-LD100A61 5M | ZX1-LD100A81 5M |
| | Pre-wired connector | 0.5 m | | ZX1-LD100A66 0.5M | ZX1-LD100A86 0.5M |
|  | Pre-wired | 2 m |   | ZX1-LD300A61 2M | ZX1-LD300A81 2M |
| | | 5 m | | ZX1-LD300A61 5M | ZX1-LD300A81 5M |
| | Pre-wired connector | 0.5 m | | ZX1-LD300A66 0.5M | ZX1-LD300A86 0.5M |
| | Pre-wired | 2 m |   | ZX1-LD600A61 2M | ZX1-LD600A81 2M |
| | | 5 m | | ZX1-LD600A61 5M | ZX1-LD600A81 5M |
| | Pre-wired connector | 0.5 m | | ZX1-LD600A66 0.5M | ZX1-LD600A86 0.5M |

### Accessories (sold separately)

**Extension cables for pre-wired connector models**

An Extension cable is not provided with the sensor. Order an extension cable separately.

| Cable length | Order code |
|---|---|
| 10 m | ZX0-XC10R |
| 20 m | ZX0-XC20R |

## Specifications

| Model | NPN output | ZX1-LD50A61<br>ZX1-LD50A66 | ZX1-LD100A61<br>ZX1-LD100A66 | ZX1-LD300A61<br>ZX1-LD300A66 | ZX1-LD600A61<br>ZX1-LD600A66 |
|---|---|---|---|---|---|
| Item | PNP output | ZX1-LD50A81<br>ZX1-LD50A86 | ZX1-LD100A81<br>ZX1-LD100A86 | ZX1-LD300A81<br>ZX1-LD300A86 | ZX1-LD600A81<br>ZX1-LD600A86 |
| Measurement range | | 50±10 mm | 100±35 mm | 300±150 mm | 600±400 mm |
| Light source (wave length) | | Visible-light semiconductor laser<br>(wavelength: 660 nm, 1 mW max., IEC/EN Class 2, FDA Class II[*1]) | | | |
| Spot diameter (typical)<br>(Defined at the measurement center distance)[*2] | | 0.17 mm dia. | 0.33 mm dia. | 0.52 mm dia. | 0.56 mm dia. |
| Power supply voltage | | 10 to 30 VDC, including 10% ripple (p-p) | | | |
| Current consumption | | 250 mA max. (at power supply voltage 10 VDC) | | | |
| Control output | | Load power supply voltage: 30 VDC max., Load current: 100 mA max.<br>(Residual voltage: 1 V max. (load current 10 mA or less), 2 V max. (load current of 10 to 100 mA)) | | | |
| Analog output | | Current output: 4 to 20 mA, maximum load resistance: 300 Ω | | | |
| Indicators | | Digital display (red), output indicator (OUT1, OUT2) (orange), zero reset indicator (orange), menu indicator (orange), laser ON indicator (green), and smart tuning indicator (blue) | | | |
| Response time | Judgment output | Super-high-speed (SHS) Mode: 1 ms<br>High-speed (HS) Mode: 10 ms<br>Standard (Stnd) Mode: 100 ms | | | |
| | Laser OFF input | 200 ms max. | | | |
| | Zero reset input | 200 ms max. | | | |
| Temperature characteristic[*3] | | 0.03% F.S./°C | | | 0.04% F.S./°C |
| Linearity[*4] | | ±0.15% F.S. | | ±0.25% F.S. | ±0.25% F.S.<br>(200 to 600 mm)<br>±0.5% F.S.<br>(entire range) |
| Resolution [*5] | | 2 µm | 7 µm | 30 µm | 80 µm |
| Ambient illumination | | Illumination on received light surface:<br>7,500 lx or less (incandescent light) | | Illumination on received light surface:<br>5,000 lx or less (incandescent light) | |
| Ambient temperature | | Operating: –10 to 55°C, Storage: –15 to 70°C (with no icing or condensation) | | | |
| Ambient humidity | | Operating and storage: 35% to 85% (with no condensation) | | | |
| Dielectric strength | | 1,000 VAC, 50/60 Hz, 1 minute3 | | | |
| Vibration resistance (destruction) | | 10 to 55 Hz, 1.5-mm double amplitude, 2 hours each in X, Y, and Z directions | | | |
| Shock resistance (destruction) | | 500 m/s$^2$ 3 times each in X, Y, and Z directions | | | |
| Degree of protection [*6] | | IEC 60529, IP67 | | | |
| Connection method | | Pre-wired model (Standard cable length: 2 m, 5 m)<br>Pre-wired connector model (Standard cable length: 0.5 m) | | | |
| Weight (packed state/ sensor only) | Pre-wired models (2 m) | Approx. 240 g / Approx. 180 g | | Approx. 270 g / Approx. 210 g | |
| | Pre-wired models (5 m) | Approx. 450 g / Approx. 330 g | | Approx. 480 g / Approx. 360 g | |
| | Pre-wired connector models (0.5 m) | Approx. 170 g / Approx. 110 g | | Approx. 200 g / Approx. 140 g | |
| Materials | | Case and cover: PBT (polybutylene terephthalate), Optical window: Glass, Cable: PVC, Mounting hole part: SUS303 | | | |
| Accessories | | Instruction sheet and Laser warning label (English) | | | |

[*1] Classified as Class 2 by EN60825-1 criteria in accordance with the FDA standard previsions of Laser Notice No. 50. Notification to CDRH planned. (Center for Devices and Radiological Health)
[*2] Spot diameter: Defined as 1/e$^2$ (13.5%) of the central intensity at the measurement center distance.
False detections can occur in the case there is light leakage outside the defined region and the surroundings of the target object have a high reflectance in comparison to the target object.
Accurate measurements may not be possible for workpieces that are smaller than the spot diameter.
[*3] Temperature characteristic: Value for the case the space between the sensor and Omron's standard target object is secured by an aluminum jig. (Measured at the measurement center distance)
[*4] Linearity: Indicates the error with respect to the ideal straight line of the displacement output in the case of measuring Omron's standard target object (white ceramic) at a temperature of 25°C. Linearity and measured value may vary depending on target object.
[*5] Resolution: Defined in Standard Mode for Omron's standard target object (white ceramic) after executing Smart Tuning.
The resolution indicates the repetition accuracy for a still workpiece. Not an indication of the distance accuracy.
Resolution performance may not be satisfied in a strong electromagnetic field.
[*6] IP67 protection applies to the connector on pre-wired connector models if an extension cable is connected.

**Note:** False detection outside the measurement range can occur in the case of an object with high reflectance.

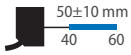
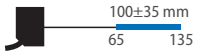
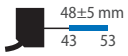

## Stable, easy & affordable laser measurement sensor

High accuracy and measurement stability, at an affordable price. The new ZX2 laser sensor offers best in class performance for accuracy and speed for all linear displacement applications. Utilising an advanced HSDR-CMOS image sensor, high measurement stability is achieved, even on the most challenging of surfaces.

- One touch setup
- Accurate: 1.5 to 5 µm
- Any surface
- High speed: 30 µs

## Ordering information

### Sensor heads

| Optical system | Beam shape | Sensing distance | Resolution | Order code |
|---|---|---|---|---|
| Diffuse-reflective | Line beam |   | 1.5 µm | ZX2-LD50L |
| | Spot beam | | | ZX2-LD50 |
| | Line beam |   | 5 µm | ZX2-LD100L |
| | Spot beam | | | ZX2-LD100 |
| Regular reflective | Spot beam |   | 1.5 µm | ZX2-LD50V |

### Amplifier units

| Power supply | Output type | Order code |
|---|---|---|
| DC | NPN | ZX2-LDA11 |
| | PNP | ZX2-LDA41 |

### Accessories (order separately)

These are not included with the sensor head or amplifier unit.
Please order as necessary.

#### Calculating unit

| | Order code |
|---|---|
| Calculating unit | ZX2-CAL |

#### Sensor head extension cables*1

| Cable length | Order code |
|---|---|
| 1 m | ZX2-XC1R |
| 4 m | ZX2-XC4R |
| 9 m | ZX2-XC9R |
| 20 m | ZX2-XC20R |

*1. Extension cables cannot be coupled and used together.

#### Mounting brackets

| Applicable Sensor Heads | Appearance | Contents | Order code |
|---|---|---|---|
| ZX2-LD50V<br>ZX2-LD50L<br>ZX2-LD50 |  | Mounting Bracket: 1<br>Nut plate: 1<br>Phillips screws (M3×30): 2 | E39-L178 |
| ZX2-LD100L<br>ZX2-LD100 |  | | E39-L179 |

## Specifications

### Diffuse reflective Sensor Heads

| Item Model | ZX2-LD50L | ZX2-LD50 | ZX2-LD100L | ZX2-LD100 |
|---|---|---|---|---|
| Optical system | Diffuse reflective | | | |
| Light source (wave length) | Visible-light semiconductor laser with a wavelength of 660 nm and an output of 1 mW max. | | | |
| | EN class 2,FDA class II *5 | | | |
| Measurement center point | 50 mm | | 100 mm | |
| Measurement range | ±10 mm | | ±35 mm | |
| Beam shape | Line | Spot | Line | Spot |
| Beam size *1 | Approx. 60 µm×2.6 mm | Approx. 60 µm dia. | Approx.110 µm×2.7 mm | Approx.110 µm dia. |
| Resolution *2 | 1.5 µm | | 5 µm | |
| Linearity *3 | ±0.05% F.S. (40 to 50 mm) | ±0.1% F.S. (40 to 50 mm) | ±0.05%F.S. (65 to 100 mm) | ±0.1%F.S. (65 to 100 mm) |
| | ±0.1% F.S. (entire range) | ±0.15% F.S. (entire range) | ±0.1% F.S. (entire range) | ±0.15% F.S. (entire range) |
| Temperature characteristic *4 | 0.02% F.S./°C | | | |
| Ambient illumination | Incandescent lamp: 10,000 lx max. (on light receiving side) | | | |
| Ambient temperature | Operating: 0 to 50°C, Storage: −15 to 70°C (with no icing or condensation) | | | |
| Ambient humidity | Operating and storage: 35% to 85% (with no condensation) | | | |
| Dielectric strength | 1,000 VAC, 50/60 Hz for 1 minute. | | | |
| Vibration resistance (destruction) | 10 to 150 Hz, 0.7-mm double amplitude, 80 minutes. each in X,Y,and Z directions | | | |
| Shock resistance (destruction) | 300 m/s$^2$ 3 times each in six directions (up/down,left/right,forward/backward) | | | |
| Degree of protection | IEC60529, IP67 | | | |
| Connection method | Connector connection (standard cable length: 500 mm) | | | |
| Weight (packed state) | Approx.160 g (Sensor Head only: Approx.75 g) | | | |
| Materials | Case and cover: PBT (polybutylene terephtahalate), Optical window: Glass, Cable: PVC | | | |
| Accessories | Instruction sheet, Ferrite core, Laser warning label (English), FDA certification label | | | |

### Regular-reflective Sensor Heads

| Item Model | ZX2-LD50V |
|---|---|
| Optical system | Regular reflective |
| Light source (wave length) | Visible-light semiconductor laser with a wavelength of 660 nm and an output of 0.24 mW max. EN class 1, FDA class I |
| Measurement center point | 48 mm |
| Measurement range | ±5 mm |
| Beam shape | Spot |
| Beam size *1 | Approx. 60 µm dia. |
| Resolution *2 | 1.5 µm |
| Linearity *3 | ±0.3% F.S. (entire range) |
| Temperature characteristic *4 | 0.06% F.S./°C |
| Ambient illumination | Incandescent lamp: 10,000 lx max. (on light receiving side) |
| Ambient temperature | Operating: 0 to 50°C, Storage: −15 to 70°C (with no icing or condensation) |
| Ambient humidity | Operating and storage: 35% to 85% (with no condensation) |
| Dielectric strength | 1,000 VAC, 50/60 Hz for 1 minute. |
| Vibration resistance (destruction) | 10 to 150 Hz, 0.7-mm double amplitude, 80 minutes. each in X,Y,and Z directions |
| Shock resistance (destruction) | 300 m/s$^2$ 3 times each in six directions (up/down,left/right,forward/backward) |
| Degree of protection | IEC 60529, IP67 |
| Connection method | Connector connection (standard cable length: 500 mm) |
| Weight (packed state) | Approx.160 g (Sensor Head only: Approx.75 g) |
| Materials | Case and cover: PBT (polybutylene terephtahalate), Optical window: Glass, Cable: PVC |
| Accessories | Instruction sheet, Ferrite core, Laser warning label (English) |

*1 Beam size: Defined as 1/e$^2$ (13.5%) of the central intensity at the smallest value of diameter for the measurement range (typical value) False detections can occur in the case there is light leakage outside the defined region and the surroundings of the target object have a high reflectance in comparison to the target object.

*2 Resolution: indicates the degree of fluctuation (±3σ) of analog output when connected to the ZX2-LDA. (The measured value is given for the center distance for OMRON's standard target object (diffuse-reflective models: white ceramic object, regular-reflective models: 1/4 λ flat mirror) when the response time of the ZX2-LDA is set to 128 ms.)
Indicates the repetition accuracy for when the workpiece is in a state of rest. Not an indication of distance accuracy. Resolution performance may not be satisfied in a strong electromagnetic field.

*3 Linearity: indicates the error with respect to the ideal straight line of the displacement output in the case of measuring Omron' s standard target object. Linearity and measured value may vary depending on target object. F.S. indicates the full scope of the measurement range. (ZX2-LD50 (L): 20mm)

*4 Temperature characteristic: Value for the case the space between the sensor head and Omron's standard target object is secured by an aluminum jig. (Measured at the measurement center distance)

*5 These Sensors are classified as Class 2 laser devices for diffuse-reflective models and Class 1 for regular-reflective models under EN 606825-1 and the regulations of Laser Notice No. 50 for FDA certification. CDRH registration has been completed for diffuse-reflective models and is scheduled for regular-reflective models.

**Note:** False detection outside the measurement range can occur in the case of an object with high reflectance.

## Amplifier units

| Item | ZX2-LDA11 | ZX2-LDA41 |
|---|---|---|
| Measurement period[*1] | Min 30 μs | |
| Response time | 60 μs, 120 μs, 240 μs, 500 μs, 1 ms, 2 ms, 4 ms, 8 ms, 12 ms, 20 ms, 36 ms, 66 ms, 128 ms, 250 ms, 500 ms | |
| Analog output[*2] | 4 to 20 mA, Max. load resistance: 300Ω, ±5VDC or 1 to 5 VDC, Output impedance: 100Ω | |
| Judgement outputs (HIGH/PASS/LOW: 3 outputs), error output | NPN open-collector outputs, 30 VDC, 50 mA max.(residual voltage: 1 V max. for load current 10 mA max.,2 V max. for load current above 10 mA) | PNP open-collector outputs, 30 VDC, 50 mA max.(residual voltage: 1 V max. for load current 10 mA max., 2 V max. for load current above 10 mA) |
| Laser OFF input, zero reset input, timing input, reset input, bank input | ON: Short-circuited with 0-V terminal or 1.5 V or less<br>OFF: Open (leakage current: 0.1 mA max.) | ON: Supply voltage short-circuited or supply voltage within 1.5 V<br>OFF: Open (leakage current: 0.1 mA max.) |
| Functions | Smart tuning, scaling, sample hold, peak hold, bottom hold, peak-to-peak hold, self-peak hold, self-bottom hold, average hold, zero reset, On-delay timer, OFF-delay timer, keep/clamp switch, (A-B)calculations[*3], thickness calculation[*3], mutual interference prevention[*3], laser deterioration detection, bank function (4 banks) | |
| Indications | Judgement indicators: HIGH (orange), PASS (green), LOW (orange), 11-segment main display (red), 11-segmentsub-display (orange), laser ON (green), zero reset (green), enable (green), menu (green), HIGH threshold (orange), LOW threshold (orange) | |
| Power supply voltage | 10 to 30 VDC, including 10% ripple(p-p) | |
| Power consumption | 3,000 mW max. with power supply voltage of 30 VDC and power supply current of 100 mA (with Sensor connected) | |
| Ambient temperature | Operating: 0 to 50°C, Storage: –15 to 70°C (with no icing or condensation) | |
| Ambient humidity | Operating and storage: 35% to 85% (with no condensation) | |
| Dielectric strength | 1,000 VAC, 50/60 Hz for 1 min. | |
| Vibration resistance (destruction) | 10 to 150 Hz, 0.7-mm double amplitude, 80 min. each in X,Y,and Z directions | |
| Shock resistance (destruction) | 300 $m/s^2$ 3 times each in six directions (up/down,left/right,forward/backward) | |
| Degree of protection | IEC60529, IP40P | |
| Connection method | Prewired (standard cable length: 2 m) | |
| Weight (packed state) | Approx. 200 g (unit only: Approx.135 g) | |
| Materials | Case: PBT(polybutylene terephtahalate), Cover: Polycarbonate, Display: Acrylic resin, Button: Polyacetal, Cable: PVC | |
| Accessories | Instruction sheet | |

[*1] In the case of Omron's standard target object (white ceramic)
[*2] Configure current output (4 to 20mA) and voltage output (±5 V or 1 to 5 V) by MENU mode.
[*3] Calculating unit (ZX2-CAL) is necessary.

## Calculating unit

| Item | ZX2-CAL |
|---|---|
| Applicable amplifier units | ZX2-LDA11/ZX2-LDA41 |
| Current consumption | 12 mA max. (supplied from the smart sensor amplifier unit) |
| Ambient temperature | Operating: 0 to 50°C, storage: –15 to 70°C (with no icing or condensation) |
| Ambient humidity | Operating and storage: 35% to 85% RH (with no condensation) |
| Connection method | Connector |
| Dielectric strength | 1,000 VAC, 50/60 Hz for 1 min |
| Insulation resistance | 100 MΩ (at 500 VDC) |
| Vibration resistance (destructive) | 10 to 150 Hz, 0.7-mm double amplitude 80 min each in X, Y, and Z directions |
| Shock resistance (destructive) | 300 $m/s^2$ 3 times each in six directions (up/down, left/right, forward/backward) |
| Materials | Case: PBT (polybutylene terephthalate), Display: Acrylic resin |
| Weight (packed state) | Approx. 50 g |
| Accessories | Instruction sheet |


## The scalable high-precision laser measurement sensor

The ZS laser sensor family provides outstanding measurement performance on all kind of materials. Its huge range of sensor heads and scalable concept makes it a versatile platform for all high precision sensing applications.

- Highest resolution and dynamic sensing range for all surfaces
- Modular and scalable platform concept for up to 9 sensors
- Easy to use, install and maintain for all user levels
- Fast response time of 110 µs
- Multi-tasking capability – manages up to 4 measurement tools in one controller

## Ordering information

### Sensors

#### ZS-HL-series sensor heads

| Optical system | Sensing distance | Beam shape | Beam diameter | Resolution*1 | Order code |
|---|---|---|---|---|---|
| Regular reflective models | 20±1 mm | Line beam | 1.0 mm × 20 µm | 0.25 µm | ZS-HLDS2T |
| | 25±2 mm | | 2.2 mm × 45 µm | 0.6 µm | ZS-HLDS2VT |
| Diffuse reflective models | 50±5 mm | | 1.0 mm × 30 µm | 0.25 µm | ZS-HLDS5T |
| | 100±20 mm | | 3.5 mm × 60 µm | 1 µm | ZS-HLDS10 |
| | 600±350 mm | | 16 mm × 0.3 mm | 8 µm | ZS-HLDS60 |
| | 1500±500 mm | | 40 mm × 1.5 mm | 500 µm | ZS-HLDS150 |

*1 Refer to the table of ratings and specifications for details.

#### ZS-HL-series sensor heads (for nozzle gaps) also compatible with ZS-L controller

| Optical system | Sensing distance | Beam shape | Beam diameter | Resolution*1 | Order code |
|---|---|---|---|---|---|
| Regular reflective models | 10±0.5 mm | Line beam | 900x25 µm | 0.25 µm | ZS-LD10GT |
| | 15±0.75 mm | | | | ZS-LD15GT |

*1 Refer to the table of ratings and specifications for details.

#### ZS-L-series sensor heads

| Optical system | Sensing distance | Beam shape | Beam diameter | Resolution*1 | Order code |
|---|---|---|---|---|---|
| Regular reflective models | 20±1 mm | Line beam | 900 × 25 µm | 0.25 µm | ZS-LD20T |
| | | Spot beam | 25 µm dia. | | ZS-LD20ST |
| | 40±2.5 mm | Line beam | 2000 × 35 µm | | ZS-LD40T |
| Diffuse reflective models | 50±5 mm | Line beam | 900 × 60 µm | 0.8 µm | ZS-LD50 |
| | | Spot beam | 50 µm dia. | | ZS-LD50S |
| | 80±15 mm | Line beam | 900 × 60 µm | 2 µm | ZS-LD80 |
| | 130±15 mm | Line beam | 600 × 70 µm | 3 µm | ZS-LD130 |
| | 200 ±50 mm | Line beam | 900 × 100 µm | 5 µm | ZS-LD200 |
| | 350 ±135 mm | Spot beam | 240 µm dia. | 20 µm | ZS-LD350S |

*1 This is the peak-to-peak displacement conversion value in the displacement output at the measuring center distance in high-precision mode when the number of samples to average is set to 128 and the measuring mode is set to the high-resolution mode. The standard workpiece is white aluminum ceramics in diffuse reflection mode and glass in the regular reflection mode.

#### ZS-HL-series sensor controllers

| Supply voltage | Control outputs | Order code |
|---|---|---|
| 24 VDC | NPN outputs | ZS-HLDC11 |
| | PNP outputs | ZS-HLDC41 |
| | | ZS-HLDC41A (incl. USB cable + Smart monitor) |

#### Multi-controllers

| Supply voltage | Control outputs | Order code |
|---|---|---|
| 24 VDC | NPN outputs | ZS-MDC11 |
| | PNP outputs | ZS-MDC41 |

#### Data storage units

| Supply voltage | Control outputs | Order code |
|---|---|---|
| 24 VDC | NPN outputs | ZS-DSU11 |
| | PNP outputs | ZS-DSU41 |

### Accessories (sold separately)

#### Controller link

| Item | Order code |
|---|---|
| Controller link | ZS-XCN |

#### Panel mount adapter

| Model | Order code |
|---|---|
| For 1st controller | ZS-XPM1 |
| For expansion (from 2nd controller on) | ZS-XPM2 |

#### Cables for connecting to a Personal Computer

| Type | Quantity | Order code |
|---|---|---|
| RS-232C | 1 | ZS-XRS2 |
| USB | 1 | ZS-XUSB2 |

#### Extension cables for sensor heads

| Cable length | Quantity | Order code |
|---|---|---|
| 1 m | 1 | ZS-XC1A |
| 4 m | 1 | ZS-XC4A |
| 5 m | 1 | ZS-XC5B*1,*2 |
| 8 m | 1 | ZS-XC8A |
| 10 m | 1 | ZS-XC10B*1 |

*1 Up to two ZS-XC_B cables can be connected (22 m max.).
*2 A robot cable (ZS-XC5BR) is also available.

### Logging software

| Item | Order code |
|---|---|
| Smart monitor zero professional | ZS-SW11E |

### Memory card

| Model | Order code |
|---|---|
| 64 MB | F160-N64S(S) |
| 128 MB | QM300-N128S |
| 256 MB | F160-N256S |

## Safety precautions for using laser equipment

**Laser Label Indications**

Attach the following warning label to the side of the ZS-L-series Sensor Head.


## Specifications

### Sensor heads

#### ZS-HL-series sensor heads

| Item | | ZS-HLDS2T | | ZS-HLDS2VT | ZS-HLDS5T | | ZS-HLDS10 | | ZS-HLDS60 | ZS-HLDS150 |
|---|---|---|---|---|---|---|---|---|---|---|
| Applicable controllers | | ZS-HLDC series | | | | | | | | |
| Optical system | | Regular reflection | Diffuse reflection | Regular reflection | Regular reflection | Diffuse reflection | Regular reflection | Diffuse reflection | Diffuse reflection | Diffuse reflection |
| Measuring center distance | | 20 mm | 5.2 mm | 25 mm | 44 mm | 50 mm | 94 mm | 100 mm | 600 mm | 1,500 mm |
| Measuring range | | ±1 mm | ±1 mm | ±2 mm | ±4 mm | ±5 mm | ±16 mm | ±20 mm | ±350 mm | ±500 mm |
| Light source | | Visible semiconductor laser (wavelength: 650 nm, 1 mW max., JIS Clas | | | | | | | Visible semiconductor laser (wavelength 658 nm, 1 mW max., Class 2) | |
| Beam shape | | Line beam | | | | | | | | |
| Beam diameter[*1] | | 1.0 mmx20 µm | | 2.2 mmx45 µm | 1.0 mmx30 µm | | 3.5 mmx60 µm | | 0.3 mmx16 mm | 1.5 mmx40 mm |
| Linearity[*2] | | ±0.05% F.S. | | ±0.2 %F.S. | ±0.1% F.S. | | | | ±0.07 %F.S. (250 mm to 750 mm) ±0.1% F.S. (750 mm to 950 mm) | ±0.2 %F.S. |
| Resolution[*3] | | 0.25 µm (No. of samples to average: 256) | | 0.5 µm (No. of samples to average: 128) | 0.25 µm (No. of samples to average: 512) | | 1 µm (No. of samples to average: 64) | | 8 µm (average 64) (at 250 mm) 40 µm (average 64) (at 600 mm) | 500 µm (average 64) |
| Temperature characteristic[*4] | | 0.01% F.S./°C | | 0.1% F.S./°C | 0.01% F.S./°C | | | | | |
| Sampling cycle | | 110 µs (high-speed mode), 500 µs (standard mode), 2.2 ms (high-precision mode), 4.4 ms (high-sensitivity mode) | | | | | | | | |
| Indicators | NEAR indicator | Lits near the measurement center, and nearer than the measurement center distance inside the measuring range. Flashes when the measurement target is outside of the measuring range or when the received light amount is insufficient. | | | | | | | | |
| | FAR indicator | Lits near the measurement center, and further than the measurement center distance inside the measuring range. Flashes when the measurement target is outside of the measuring range or when the received light amount is insufficient. | | | | | | | | |
| Operating ambient illumination | | Illumination on received light surface 3,000 lx or less (incandescent light) | | | | | | | Illumination on received light surface 1,000 lx or less (incandescent light) | Illumination on received light surface 500 lx or less (incandescent light) |
| Ambient temperature | | Operating: 0 to 50°C, storage: –15 to 60°C (with no icing or condensation) | | | | | | | | |
| Ambient humidity | | Operating and storage: 35% to 85% (with no condensation) | | | | | | | | |
| Degree of protection | | IP64 | | IP67 | Cable length 0.5 m: IP66, cable length 2 m: IP67 | | | | IP66 (IEC60529) | |
| Vibration resistance (destructive) | | 10 to 150 Hz, 0.7 mm double amplitude, 80 min each in X, Y, and Z directions | | | | | | | | |
| Shock resistance (destructive) | | 150 m/s$^2$ 3 times each in six directions (up/down, left/right, forward/backward) | | | | | | | | |
| Materials | | Case: aluminum die-cast, front cover: glass | | | | | | | | |
| Cable length | | 0.5 m, 2 m | | 2 m | 0.5 m, 2 m | | | | | |
| Weight | | Approx. 350 g | | | Approx. 600 g | | | | Approx. 800 g | |

[*1] Defined as 1/e$^2$ (13.5%) of the center optical intensity in the measurement center distance. The beam diameter is sometimes influenced by the ambient conditions of the workpiece such as leaked light from the main beam.

[*2] This is the error on the measured value with respect to an ideal straight line. Linear curve may change according to the workpiece. The following lists the workpieces

| Model | Diffusive reflection | Mirror reflection |
|---|---|---|
| ZS-HLDS2T | SUS block | Glass |
| ZS-HLDS5T/HLDS10 | White alumina ceramic | Glass |
| ZS-HLDS60/HLDS150 | White alumina ceramic | – |
| ZS-HLDS2VT | – | Glass |

[*3] This is the "peak-to-peak" displacement conversion value of the displacement output in the measurement center distance when high-resolution mode and the average number in the table are set (For ZS-HLDS60, the maximum resolution at 250 mm is also included). The following lists the workpieces.

| Model | Diffusive reflection | Mirror reflection |
|---|---|---|
| ZS-HLDS2T | SUS block | Glass |
| ZS-HLDS5T | White alumina ceramic | Glass |
| ZS-HLDS10 | White alumina ceramic | |
| ZS-HLDS60/HLDS150 | White alumina ceramic | – |
| ZS-HLDS2VT | – | Glass |

[*4] Value obtained when the sensor part and object part are fixed with an aluminum jig.

### ZS-L-series sensor heads

| Item | | ZS-LD20T | | ZS-LD20ST | | ZS-LD40T | | ZS-LD10GT | ZS-LD15GT |
|---|---|---|---|---|---|---|---|---|---|
| Applicable controllers | | ZS-HLDC/LDC series | | | | | | | |
| Optical system | | Regular reflection | Diffuse reflection | Regular reflection | Diffuse reflection | Regular reflection | Diffuse reflection | Regular reflection | |
| Measuring center distance | | 20 mm | 6.3 mm | 20 mm | 6.3 mm | 40 mm | 30 mm | 10 mm | 15 mm |
| Measuring range | | ±1 mm | ±1 mm | ±1 mm | ±1 mm | ±2.5 mm | ±2 mm | ±0.5 mm | ±0.75 mm |
| Light source | | Visible semiconductor laser (wavelength: 650 nm, 1 mW max., JIS Class 2) | | | | | | | |
| Beam shape | | Line beam | | Spot beam | | Line beam | | | |
| Beam diameter*1 | | 900 x 25 µm | | 25 µm dia. | | 2,000 x 35 µm | | Approx. 25 x 900 µm | |
| Linearity*2 | | ±0.1%F.S | | | | | | | |
| Resolution*3 | | 0.25 µm | | 0.25 µm | | 0.4 µm | | 0.25 µm | 0.25 µm |
| Temperature characteristic*4 | | 0.04% FS/°C | | 0.04% FS/°C | | 0.02% FS/°C | | 0.04% FS/°C | |
| Sampling cycle*5 | | 110 µs (high-speed mode), 500 µs (standard mode), 2.2 ms (high-precision mode), 4.4 ms (high-sensitivity mode) | | | | | | | |
| Indicators | NEAR indicator | Lights near the measuring center distance, and nearer than the measuring center distance inside the measuring range.<br>Flashes when the measurement target is outside of the measuring range or when the received light amount is insufficient. | | | | | | | |
| | FAR indicator | Lights near the measuring center distance, and further than the measuring center distance inside the measuring range.<br>Flashes when the measurement target is outside of the measuring range or when the received light amount is insufficient. | | | | | | | |
| Operating ambient illumination | | Illumination on received light surface: 3,000 lx or less (incandescent light) | | | | | | | |
| Ambient temperature | | Operating: 0 to 50°C, storage: -15 to 60°C (with no icing or condensation) | | | | | | | |
| Ambient humidity | | Operating and storage: 35% to 85% (with no condensation) | | | | | | | |
| Degree of protection | | Cable length 0.5 m: IP66, cable length 2 m: IP67 | | | | | | IP40 | |
| Materials | | Case: Aluminum die-cast, front cover: Glass | | | | | | | |
| Cable length | | 0.5 m, 2 m | | | | | | | |
| Weight | | Approx. 350 g | | | | | | Approx. 400 g | |
| Accessories | | Laser labels (1 each for JIS/EN, 3 for FDA), ferrite cores (2), insure Locks (2), instruction sheet | | | | | | Laser safety labels (1 each for JIS/EN),ferrite cores (2), insure locks (2) | |

*1 Defined as $1/e^2$ (13.5%) of the center optical intensity at the actual measurement center distance (effective value). The beam diameter is sometimes influenced by the ambient conditions of the workpiece, such as leaked light from the main beam.
*2 This is the error in the measured value with respect to an ideal straight line. The standard workpiece is white aluminum ceramics in diffuse reflection mode and glass in the regular reflection mode of the ZS-LD20T/40T/50. Linearity may change according to the workpiece.
*3 This is the peak-to-peak displacement conversion value in the displacement output at the measuring center distance in high-precision mode when the number of samples to average is set to 128 and the measuring mode is set to the high-resolution mode. The standard workpiece is white aluminum ceramics in diffuse reflection mode and glass in the regular reflection mode.
*4 This is the value obtained at the measuring center distance when the Sensor and workpiece are fixed by an aluminum jig.
*5 This value is obtained when the measuring mode is set to the high-speed mode.

### ZS-L-series sensor heads

| Item | | ZS-LD50 | | ZS-LD50S | | ZS-LD80 | | ZS-LD130 | | ZS-LD200 | | ZS-LD350S |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Applicable controllers | | ZS-HLDC/LDC series | | | | | | | | | | |
| Optical system (reflection) | | Diffuse | Regular | Diffuse | Regular | Diffuse | Regular | Diffuse | Regular | Diffuse | Regular | Diffuse |
| Measuring center distance | | 50 mm | 47 mm | 50 mm | 47 mm | 80 mm | 78 mm | 130 mm | 130 mm | 200 mm | 200 mm | 350 mm |
| Measuring range | | ±5 mm | ±4 mm | ±5 mm | ±4 mm | ±15 mm | ±14 mm | ±15 mm | ±12 mm | ±50 mm | ±48 mm | ±135 mm |
| Light source | | Visible semiconductor laser (wavelength: 650 nm, 1 mW max., JIS Class 2) | | | | | | | | | | |
| Beam shape | | Line beam | | Spot beam | | Line beam | | Line beam | | Line beam | | Spot beam |
| Beam diameter*1 | | 900 x 60 µm | | 50 µm dia. | | 900 x 60 µm | | 600 x 70 µm | | 900 x 100 µm | | 240 µm dia. |
| Linearity*2 | | ±0.1%F.S. | | | | | | | ±0.25%F.S. | ±0.1%F.S. | ±0.25%F.S. | ±0.04%F.S. |
| Resolution*3 | | 0.8 µm | | 0.8 µm | | 2 µm | | 3 µm | | 5 µm | | 20 µm |
| Temperature characteristic*4 | | 0.02% FS/°C | | 0.02% FS/°C | | 0.01% FS/°C | | 0.02% FS/°C | | 0.02% FS/°C | | 0.04% FS/°C |
| Sampling cycle*5 | | 110 µs (high-speed mode), 500 µs (standard mode), 2.2 ms (high-precision mode), 4.4 ms (high-sensitivity mode) | | | | | | | | | | |
| Indicators | NEAR indicator | Lights near the measuring center distance, and nearer than the measuring center distance inside the measuring range.<br>Flashes when the measurement target is outside of the measuring range or when the received light amount is insufficient. | | | | | | | | | | |
| | FAR indicator | Lights near the measuring center distance, and further than the measuring center distance inside the measuring range.<br>Flashes when the measurement target is outside of the measuring range or when the received light amount is insufficient. | | | | | | | | | | |
| Operating ambient illumination | | Illumination on received light surface: 3,000 lx or less (incandescent light) | | | | | | Illumination on received light surface: 2,000 lx or less (incandescent light) | | Illumination on received light surface: 3,000 lx or less (incandescent light) | | |
| Ambient temperature | | Operating: 0 to 50°C, storage: −15 to 60°C (with no icing or condensation) | | | | | | | | | | |
| Ambient humidity | | Operating and storage: 35% to 85% (with no condensation) | | | | | | | | | | |
| Degree of protection | | Cable length 0.5 m: IP66, cable length 2 m: IP67 | | | | | | | | | | |
| Materials | | Case: Aluminum die-cast, front cover: Glass | | | | | | | | | | |
| Cable length | | 0.5 m, 2 m | | | | | | | | | | |
| Weight | | Approx. 350 g | | | | | | | | | | |
| Accessories | | Laser labels (1 each for JIS/EN, 3 for FDA), ferrite cores (2), insure Locks (2), instruction sheet | | | | | | | | | | |

*1 Defined as $1/e^2$ (13.5%) of the center optical intensity at the actual measurement center distance (effective value). The beam diameter is sometimes influenced by the ambient conditions of the workpiece, such as leaked light from the main beam.
*2 This is the error in the measured value with respect to an ideal straight line. The standard workpiece is white aluminum ceramics in diffuse reflection mode and glass in the regular reflection mode of the ZS-LD20T/40T/50. Linearity may change according to the workpiece.
*3 This is the peak-to-peak displacement conversion value in the displacement output at the measuring center distance in high-precision mode when the number of samples to average is set to 128 and the measuring mode is set to the high-resolution mode. The standard workpiece is white aluminum ceramics in diffuse reflection mode and glass in the regular reflection mode.
*4 This is the value obtained at the measuring center distance when the sensor and workpiece are fixed by an aluminum jig.
*5 This value is obtained when the measuring mode is set to the high-speed mode.

## Sensor controllers

### ZS-HL-series sensor controllers

| Item | | | ZS-HLDC11 | ZS-HLDC41 |
|---|---|---|---|---|
| NPN/PNP | | | NPN | PNP |
| No. of samples to average | | | 1, 2, 4, 8, 16, 32, 64, 128, 256, 512, 1,024, 2,048, or 4,096 | |
| Number of mounted sensors | | | 1 per sensor controller | |
| External interface | Connection method | | Serial I/O: connector, other: pre-wired (standard cable length: 2 m) | |
| | Serial I/O | USB 2.0 | 1 port, full speed (12 Mbps max.), MINI-B | |
| | | RS-232C | 1 port, 115,200 bps. max. | |
| | Output | Judgement output | HIGH/PASS/LOW 3 outputs<br>NPN open collector, 30 VDC, 50 mA max.,<br>residual voltage 1.2 V max | HIGH/PASS/LOW: 3 outputs<br>PNP open collector, 50 mA max.,<br>residual voltage 1.2 V max |
| | | Linear output | Selectable from 2 types of output, voltage or current (selected by slide switch on bottom).<br>Voltage output: .10 to 10 V, output impedance: 40 Ω<br>Current output: 4 to 20 mA | |
| | Inputs | Laser OFF, ZERO reset timing, RESET | ON: Short-circuited with 0 V terminal or 1.5 V or less<br>OFF: Open (leakage current: 0.1 mA max.) | ON: Short-circuited to supply voltage or within 1.5 V of supply voltage.<br>OFF: Open (leakage current: 0.1 mA max.) |
| Functions | | | Display: Measured value, threshold value, voltage/current, received light amount, and resolution/terminal block output<br>Sensing: Mode, gain, measurement object, head installation<br>Measurement point: Average, peak, bottom, thickness, step, and calculations<br>Filter: Smooth, average, and differentiation<br>Outputs: Scaling, various hold values, and zero reset<br>I/O settings: Linear (focus/correction), judgments (hysteresis and timer), non-measurement, and bank (switching and clear)<br>System: Save, initialization, measurement information display, communications settings, key lock, language, and data load<br>Task: Single task or multitask (up to 4) | |
| Status indicators | | | HIGH (orange), PASS (green), LOW (orange), LDON (green), ZERO (green), and ENABLE (green) | |
| Segment display | | Main digital | 8-segment red LED, 6 digits | |
| | | Sub-digital | 8-segment green LEDs, 6 digits | |
| LCD | | | 16 digitsx2 rows, color of characters: green, resolution per character: 5x8 pixel matrix | |
| Setting inputs | | Setting keys | Direction keys (UP, DOWN, LEFT, and RIGHT), SET key, ESC key, MENU key, and function keys (1 to 4) | |
| | | Slide switch | Threshold switch (2 states: High/Low), mode switch (3 states: FUN, TEACH, and RUN) | |
| Power supply voltage | | | 21.6 V to 26.4 VDC (including ripple) | |
| Current consumption | | | 0.5 A max. (when sensor head is connected) | |
| Ambient temperature | | | Operating: 0 to 50°C, storage: –15 to 60°C (with no icing or condensation) | |
| Ambient humidity | | | Operating and storage: 35% to 85% (with no condensation) | |
| Degree of protection | | | IP20 | |
| Materials | | | Case: Polycarbonate (PC) | |
| Weight | | | Approx. 280 g (excluding packing materials and accessories) | |
| Accessories | | | Ferrite core (1), instruction sheet | |

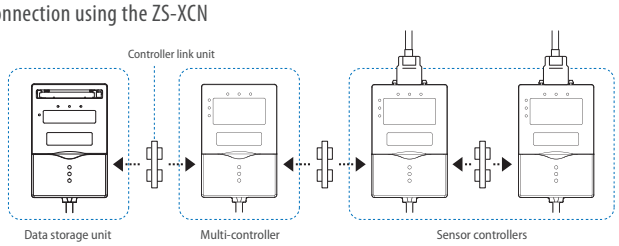
### ZS-MDC11/MDC41 multi controllers

Basic specifications are the same as those for the sensor controllers.
The following points, however, are different.

(1) Sensor heads cannot be connected.
(2) A maximum 9 of controllers can be connected. Control link units are required to connect controllers.
(3) Processing functions between controllers: Math functions

### Controller link unit

Connection using the ZS-XCN




### Data storage units

| Sensor controllers | Model | | ZS-DSU11 | ZS-DSU41 |
|---|---|---|---|---|
| Number of mounted censor heads | | | Cannot be connected | |
| Number of connectable controllers | | | 10 controllers max. (ZS-MDC: 1 controller, ZS-HLDC: 9 controllers max.)*1 | |
| Connectable controllers | | | ZS-HLDC_ _, ZS-MDC__ | |
| External interface | Connection method | | Serial I/O: connector, other: pre-wired (standard cable length: 2 m) | |
| | Serial I/O | USB 2.0 | 1 port, full speed (12 Mbps), MINI-B | |
| | | RS-232C | 1 port, 115,200 bps max. | |
| | Outputs | | 3 outputs: HIGH, PASS, and LOW<br>NPN open-collector, 30 VDC, 50 mA max.,<br>residual voltage: 1.2 V max. | 3 outputs: HIGH, PASS, and LOW<br>PNP open-collector, 50 mA max.,<br>residual voltage: 1.2 V max. |
| | Inputs | | ON: Short-circuited with 0V terminal or 1.5 V or less<br>OFF: Open (leakage current: 0.1 mA max.) | ON: Short-circuited to supply voltage or within 1.5 V of supply voltage<br>OFF: Open (leakage current: 0.1 mA max.) |
| Data resolution | | | 32 bits | |
| Functions | Logging trigger functions | | Start and stop triggers can be set separately; external triggers, data triggers (self-triggers), and time triggers | |
| | Other functions | | External banks, alarm outputs, saved data format customization, and clock | |
| Status indicators | | | OUT (orange), PWR (green), ACCESS (orange), and ERR (red) | |
| Segment display | | | 8-segment green LEDs, 6 digits | |
| LCD | | | 16 digitsx2 rows, color of characters: green, resolution per character: 5x8 pixel matrix | |
| Setting inputs | | Setting keys | Direction keys (UP, DOWN, LEFT, and RIGHT), SET key, ESC key, MENU key, and function keys (1 to 4) | |
| | | Slide switch | Threshold switch (2 states: High/Low), mode switch (3 states: FUN, TEACH, and RUN) | |

| Sensor controllers | Model | ZS-DSU11 | ZS-DSU41 |
|---|---|---|---|
| Power supply voltage | | 21.6 V to 26.4 VDC (including ripple) | |
| Current consumption | | 0.5 A max. | |
| Ambient temperature | | Operating: 0 to 50°C, storage: –15 to 60°C (with no icing or condensation) | |
| Ambient humidity | | Operating and storage: 35% to 85% (with no condensation) | |
| Materials | | Case: Polycarbonate (PC) | |
| Weight | | Approx. 280 g (excluding packing materials and accessories) | |
| Accessories | | Ferrite core (1) instruction sheet, tools for data storage unit: CSV file converter for data storage unit, smart analyzer macro edition (Excel macros for analysis of collected data) | |

*1 Control link units are required to connect controllers.

## Smart, fast and accurate laser measurement sensor

Smart ZX-L-N offers plug & measure technology for applications where high resolution and fast response time is required. A wide range of interchangeable sensor heads provides greater flexibility in solving most demanding applications.

- Small and light sensor heads for easy integration
- High speed response time of 150 µs
- Easy sensor head replacement
- Scalability through a modular platform concept
- Multipoint measurement with up to 5 sensors
- Wide range of sensor heads offering laser beam width from 1 mm to 30 mm

## Ordering information

### Sensors

#### Sensor head (reflection type)

| Optical method | Beam shape | Sensing distance | Resolution *1 | Size in mm (H × W × D) | Order code |
|---|---|---|---|---|---|
| Diffuse-reflective | Spot beam | 40±10 mm | 2 µm | 39 × 33 × 17 | ZX-LD40 |
| | | 100±40 mm | 16 µm | | ZX-LD100 |
| | | 300±200 mm | 300 µm | | ZX-LD300 |
| | Line beam | 40±10 mm | 2 µm | | ZX-LD40L |
| | | 100±40 mm | 16 µm | | ZX-LD100L |
| | | 300±200 mm | 300 µm | | ZX-LD300L |
| Regular reflection type | Spot beam | 30±2 mm | 0.25 µm | 45 × 55 × 25 | ZX-LD30V |
| | Line beam | | | | ZX-LD30VL |

*1 At average count of 4,096 times

#### Sensor head (through-beam)

| Optical method | Measurement width | Sensing distance | Resolution *1 | Size in mm (H × W × D) | | Order code |
|---|---|---|---|---|---|---|
| | | | | Transmitter | Receiver | |
| Through-beam | 1 mm dia. | 0 to 2,000 mm | 4 µm | 15 × 15 × 34 | 15 × 15 × 19 | ZX-LT001 |
| | 5 mm | 0 to 500 mm | | | | ZX-LT005 |
| | 10 mm | | | 20 × 20 × 42 | 20 × 20 × 25 | ZX-LT010 |
| | 30 mm | | 12 µm | 64.25 × 70 × 22.6 | 64.25 × 54 × 22.6 | ZX-LT030 |

*1 At average count of 64 times

#### Amplifier units

| Power supply | Output specifications | Order code |
|---|---|---|
| DC | NPN output | ZX-LDA11-N |
| | PNP output | ZX-LDA41-N |

**Note:** Compatible with sensor head connection.

### Accessories (order separately)

#### Calculating unit

| | Order code |
|---|---|
| Calculating unit | ZX-CAL2 |

#### Side-view attachments

| Applicable sensor head | Order code |
|---|---|
| ZX-LT1001/LT005 | ZX-XF12 |
| ZX-LT010 | ZX-XF22 |

#### SmartMonitor sensor setup tool for Personal Computer connection

| Name | Order code |
|---|---|
| ZX-series communications interface unit | ZX-SF11 |
| ZX-series communications interface unit + Setup Software (CD-ROM) | ZX-SFW11EV3 *1,*2 |
| ZX-series sensor setup and logging software (CD-ROM) | ZX-SW11EV3 *1 |

*1 When using the ZX-TDA11/41 with the SmartMonitor, either the ZX-SFW11EV3 or the ZX-SW11EV3 SmartMonitor must be used. Earlier versions cannot be used.
*2 The ZX-SFW11EV3 SmartMonitor can be used only to set functions and monitor waveforms.

#### Cables with connectors on both ends (for extension) *1

| Cable length | Order code |
|---|---|
| 1 m | ZX-XC1A |
| 4 m | ZX-XC4A |
| 8 m | ZX-XC8A |
| 9 m *2. | ZX-XC9A |

*1. Robot cable models are also available. The model numbers are ZX-XC_R.
*2. For use only with reflective sensors.

## Specifications

### Sensor head (reflection type)

| Item | ZX-LD40 | ZX-LD100 | ZX-LD300 | ZX-LD30V | ZX-LD40L | ZX-LD100L | ZX-LD300L | ZX-LD30VL |
|---|---|---|---|---|---|---|---|---|
| Optical method | Diffuse reflection | | | Regular reflection | Diffuse reflection | | | Regular reflection |
| Light source (wave length) | Visible-light semiconductor laser (wavelength 650 nm, 1 mW or less, Class 2) | | | | | | | |
| Measurement center distance | 40 mm | 100 mm | 300 mm | 30 mm | 40 mm | 100 mm | 300 mm | 30 mm |
| Measurement range | ±10 mm | ±40 mm | ±200 mm | ±2 mm | ±10 mm | ±40 mm | ±200 mm | ±2 mm |
| Beam shape | Spot | | | | Line | | | |
| Beam diameter*1 | 50 µm dia. | 100 µm dia. | 300 µm dia. | 75 µm dia. | 75 µmx2mm | 150 µmx2 mm | 450 µmx2 mm | 100 µmx1.8 mm |
| Resolution*2 | 2 µm | 16 µm | 300 µm | 0.25 µm | 2 µm | 16 µm | 300 µm | 0.25 µm |
| Linearity*3 | ±0.2% F.S. (entire range) | ±0.2% F.S. (80 to 121 mm) | ±2% F.S. (200 to 401 mm) | ±0.2% F.S. (entire range) | ±0.2% F.S. (32 to 49 mm) | ±0.2% F.S. (80 to 121 mm) | ±2% F.S. (200 to 401 mm) | ±0.2% F.S. (entire range) |
| Temperature characteristic*4 | ±0.03% FS/°C (except for ZX-LD300 and ZX-LD300L, which are ±0.1% FS/°C.) | | | | | | | |
| Ambient illumination | Incandescent lamp: 3,000 lx max. (on light receiving side) | | | | | | | |
| Ambient temperature | Operating: 0 to 50°C, storage: −15 to 60°C (with no icing or condensation) | | | | | | | |
| Ambient humidity | Operating and storage: 35% to 85% (with no condensation) | | | | | | | |
| Insulation resistance | 20 MΩ min. at 500 VDC | | | | | | | |
| Dielectric strength | 1,000 VAC, 50/60 Hz for 1 min | | | | | | | |
| Vibration resistance (destruction) | 10 to 150 Hz, 0.7-mm double amplitude 80 min each in X, Y, and Z directions | | | | | | | |
| Shock resistance (destruction) | 300 m/s$^2$ 3 times each in six directions (up/down, left/right, forward/backward) | | | | | | | |
| Protective structure | IEC 60529 IP50 | | | IEC standard IP40 | IEC 60529 IP50 | | | IEC standard IP40 |
| Connection method | Connector relay (standard cable length: 500 mm) | | | | | | | |
| Weight (packed state) | Approx. 150 g | | | Approx. 250 g | Approx. 150 g | | | Approx. 250 g |
| Materials | Case: PBT (polybutylene terephthalate), Cover: Aluminum, lens: Glass | | | Case and cover: Aluminum, lens: Glass | Case: PBT (polybutylene terephthalate), Cover: Aluminum, lens: Glass | | | Case and cover: Aluminum, lens: Glass |
| Accessories | Instruction sheet, Laser warning label (English) | | | | | | | |

*1 Beam diameter: This is the value of the measurement center distance (actual value), and is defined at 1/e$^2$ (13.5%) of the central light intensity. If there is stray light outside, the defined area and the area around the object has a higher reflectance than the object.
*2 Resolution: Indicates the amount of fluctuation (±3 δ) in the linear output when connected to the ZX-LDA. (The measured value when the average count of the ZX-LDA is set to 4,096 and our standard object (white ceramic) is used for the central distance.) This indicates the repeatability precision when the work is in a static state, and does indicate the distance precision. The resolution performance may not be satisfactory in a strong electromagnetic field.
*3 Linearity: This indicates the error with respect to the ideal straight line of the displacement output when measuring our standard object.
*4 Temperature characteristic: The temperature characteristic is measured at the measurement point with the sensor and reference object (Omron's standard reference object) secured with an aluminum jig.

**Note:** Highly reflective objects can result in incorrect detection by causing out-of-range measurements.

### Sensor head (through-beam)

| Item | | ZX-LT001 | | ZX-LT005 | ZX-LT010 | ZX-LT030 |
|---|---|---|---|---|---|---|
| Optical method | | Through-beam | | | | |
| Light source (wave length) | | Visible-light semiconductor laser (wavelength 650 nm, 1 mW or less, Class 1) | | | | |
| | Maximum output | 0.2 mW max. | | 0.35 mW max. | | 0.2 mW max. |
| Measurement width | | 1 mm dia. | 1 to 2.5 mm dia. | 5 mm | 10 mm | 30 mm |
| Sensing distance | | 0 to 500 mm | 500 to 2,000 mm | 0 to 500 mm | | |
| Min. sensing object | | 8 mm dia. opaque object | 8 to 50 µm opaque object | opaque: 0.05 mm dia. | opaque: 0.1 mm dia. | opaque: 0.3 mm dia. |
| Resolution*1 | | 4 µm*2 | – | 4 µm*3 | | 12 µm*4 |
| Temperature characteristic | | ±0.2% FS/°C | | | | ±0.3% FS/°C |
| Ambient illumination | | Incandescent lamp: 10,000 lx max. (on light-receiving side) | | | | |
| Ambient temperature | | Operating: 0 to 50°C, storage: −25 to 70°C (with no icing or condensation) | | | | |
| Ambient humidity | | Operating: 35% to 85% (with no condensation) | | | | |
| Protective structure | | IEC 60529 IP40 | | | | IP 40 |
| Connection method | | Connector relay (standard cable length: 500 mm) | | | | |
| Weight (packed state) | | Approx. 220 g | | | | Approx. 450 g |
| Cable length | | Extendable up to 10 m with special extension cable. | | | | |
| Materials | Case | Polyetherimide | | | | Zinc die-cast |
| | Cover | Polycarbonate | | | | |
| | Front filter | Glass | | | | |
| Tightening torque | | 0.3 Nm max. | | | | |
| Accessories | | Instruction sheet, sensor head-amplifier connection cable | | | | |
| | | Optical axis adjustment seal | | | | Mounting Bracket |

*1 The amount of fluctuation (±3 δ) of the linear output when connected to an amplifier unit, converted to a detection span.
*2 When the average count is 64. 5 µm when the count is 32. The value when the smallest detection object shades the vicinity of the center of the 1 mm dia. detection span.
*3 When the average count is 64. 5 µm when the count is 32.
*4 For an average count of 64. The value is 15 µm for an average count of 32.

### Amplifier units

| Item | ZX-LDA11-N | ZX-LDA41-N |
|---|---|---|
| Measurement period | 150 μs | |
| Possible average count settings[*1] | 1, 2, 4, 8, 16, 32, 64, 128, 256, 512, 1,024, 2,048, or 4,096 | |
| Temperature characteristic | When connected to a reflective sensor head: 0.01% FS/°C, when connected to a through-beam sensor head: 0.1% FS/°C | |
| Linear output[*2] | 4 to 20 mA/FS, max. load resistance: 300 Ω, ±4 V (± 5 V, 1 to 5 V [*3]), output impedance: 100 Ω | |
| Judgement outputs (3 outputs: HIGH/PASS/LOW)[*1] | NPN open-collector outputs, 30 VDC, 50 mA max.<br>Residual voltage: 1.2 V max. | PNP open-collector outputs, 30 VDC, 50 mA max.<br>Residual voltage: 2 V max. |
| Laser OFF input, zero reset input, timing input, reset input | ON: Short-circuited with 0-V terminal or 1.5 V or less<br>OFF: Open (leakage current: 0.1 mA max.) | ON: Supply voltage short-circuited or supply voltage within 1.5 V<br>OFF: Open (leakage current: 0.1 mA max.) |
| Functions | Measurement value display, present value/set value/light level/resolution display, scaling, display reverse, display OFF mode, ECO mode, number of display digit changes, sample hold, peak hold, bottom hold, peak-to-peak hold, self-peak hold, self-bottom hold, average hold, delay hold, intensity mode, zero reset, initial reset, ON-delay timer, OFF-delay timer, one-shot timer, deviation, previous value comparison, sensitivity adjustment, keep/clamp switch, direct threshold value setting, position teaching, 2-point teaching, automatic teaching, hysteresis width setting, timing inputs, reset input, monitor focus, linear output compensation, (A-B) calculations[*4], (A+B) calculations[*4], mutual interference[*4], laser deterioration detection, zero reset memory, zero reset display, key lock | |
| Indications | Operation indicators: High (orange), pass (green), low (yellow), 7-segment main display (red), 7-segment subdisplay (yellow), laser ON (green), zero reset (green), enable (green) | |
| Power supply voltage | 12 to 24 VDC±10%, Ripple (p-p): 10% max. | |
| Current consumption | 140 mA max. with power supply voltage of 24 VDC (with sensor connected) | |
| Ambient temperature | Operating: 0 to 50°C, storage: –15 to 60°C (with no icing or condensation) | |
| Ambient humidity | Operating and storage: 35% to 85% (with no condensation) | |
| Insulation resistance | 20 MΩ min. at 500 VDC | |
| Dielectric strength | 1,000 VAC, 50/60 Hz for 1 min | |
| Vibration resistance (destruction) | 10 to 150 Hz, 0.7-mm double amplitude 80 min each in X, Y, and Z directions | |
| Shock resistance (destruction) | 300 m/s$^2$ 3 times each in six directions (up/down, left/right, forward/backward) | |
| Connection method | Prewired (standard cable length: 2 m) | |
| Weight (packed state) | Approx. 350 g | |
| Materials | Case: PBT (polybutylene terephthalate), cover: Polycarbonate | |
| Accessories | Instruction sheet | |

[*1] The response speed of the linear output is calculated as the measurement period x (average count setting + 1) (with fixed sensitivity).
The response speed of the judgement outputs is calculated as the measurement period x (average count setting + 1) (with fixed sensitivity).
[*2] The output can be switched between a current output and voltage output using a switch on the bottom of the amplifier unit.
[*3] Setting is possible via the monitor focus function.
[*4] A calculating unit (ZX-CAL2) is required.

### Calculating unit

| Item | ZX-CAL2 |
|---|---|
| Applicable amplifier units | ZX-LDA11-N/41-N/ZX-EDA11/41/ZX-TDA11/41 |
| Current consumption | 12 mA max. (supplied from the smart sensor amplifier unit) |
| Ambient temperature | Operating: 0 to 50°C, storage: –15 to 60°C (with no icing or condensation) |
| Ambient humidity | Operating and storage: 35% to 85% (with no condensation) |
| Connection method | Connector |
| Dielectric strength | 1,000 VAC, 50/60 Hz for 1 min |
| Insulation resistance | 100 MΩ (at 500 VDC) |
| Vibration resistance (destructive) | 10 to 150 Hz, 0.7-mm double amplitude 80 min each in X, Y, and Z directions |
| Shock resistance (destructive) | 300 m/s$^2$ 3 times each in six directions (up/down, left/right, forward/backward) |
| Materials | Display: Acrylic, case: ABS resin |
| Weight (packed state) | Approx. 50 g |

### ZX-series Communications Interface Unit

| Item | | ZX-SF11 |
|---|---|---|
| Current consumption | | 60 mA max. (supplied by the amplifier unit) |
| Applicable amplifier units | | ZX series |
| Applicable amplifier unit versions | | ZX-LDA_1-N Ver. 1.000 or higher<br>ZX-EDA_1 Ver. 1.100 or higher<br>ZX-TDA_1 Ver. 1.000 or higher |
| Max. No. of amplifier units | | 5 |
| Communications functions | Communications port | RS-232C port (9-pin D-Sub connector) |
| | Communications protocol | CompoWay/F[*1] |
| | Baud rate | 38,400 bps |
| | Data configuration | Data bits: 8, parity: none, start bits: 1, stop bits: 1, flow control: none |
| Indicators | | Power supply: green, sensor communications: green, sensor communications error: red, external terminal communications: green, external terminal communications error: red |
| Protective circuits | | Reverse polarity protection |
| Ambient temperature | | Operating: 0 to 50°C, storage: –15 to 60°C (with no icing or condensation) |
| Ambient humidity | | Operating and storage: 35% to 85% (with no condensation) |
| Insulation resistance | | 20 MΩ min. (at 500 VDC) |
| Dielectric strength | | 1,000 VAC, 50/60 Hz for 1 min, Leakage current: 10 mA max. |
| Materials | | Case: PBT (polybutylene terephthalate), cover: Polycarbonate |
| Accessories | | Instruction sheet, 2 clamps |

[*1] Contact your Omron representative for CompoWay/F communications specifications.

## Ultra-compact, lightweight sensor measures any material

The ZW confocal fiber displacement sensor delivers stable, non-contact, in-line measurement of heights, thicknesses and other dimensions. It solves the problems of traditional laser triangulation sensors: deviation between different material and inclination tolerance. The compact sensing head has no electronic parts to eliminate problems of installation space and mutual interference, electrical/magnetic noise, temperature rise and mechanical positioning.

- Minimum resolution: 0.01 µm
- Ultra-compact sensing head: 24 × 24 mm; weighs only 105 g
- High flexibility robotic cable from sensor to controller, extends 32 m
- Mount sensing head one time: no need to re-tune for changing materials
- Separate amplifier provides white LED light source, spectroscope and processor to convert reflected color light to distance
- Automation Software Sysmac Studio simplifies system operation and setting

## Ordering information

### Sensor heads

| Type | Measuring range | Spot diameter | Static resolution | Order code[*1] |
|---|---|---|---|---|
| Straight type | 7±0.3 mm | 18 µm dia. | 0.01 µm[*2]/0.25 µm | ZW-S07 |
| | 20±1 mm | 40 µm dia. | 0.02 µm[*2]/0.25 µm | ZW-S20 |
| | 30±3 mm | 60 µm dia. | 0.06 µm[*2]/0.25 µm | ZW-S30 |
| | 40±6 mm | 80 µm dia. | 0.08 µm[*2]/0.25 µm | ZW-S40 |
| Right-angle type | 7±0.3 mm | 18 µm dia. | 0.25 µm | ZW-SR07 |
| | 20±1 mm | 40 µm dia. | 0.25 µm | ZW-SR20 |
| | 40±6 mm | 80 µm dia. | 0.25 µm | ZW-SR40 |

*1 When ordering, specify the cable length (0.3 m, 2.0 m).
*2 The high resolution types are subject to the export control restrictions

### Controller with EtherCAT

| Power supply | Output type | Order code |
|---|---|---|
| 24 VDC | NPN | ZW-CE10T/ZW-C10[*1] |
| | PNP | ZW-CE15T/ZW-C15[*1] |

*1 The high resolution types are subject to the export control restrictions

**Note:** Controllers with binary outputs are also available (ZW-C10T/-C15T). Please contact your OMRON sales representative for details.

### Cable

| Item | Cable length | Order code |
|---|---|---|
| Sensor Head - Controller Extension Fiber Cable (flexible cable) (Fiber Adapter ZW-XFC provided) | 2 m | ZW-XF02R |
| | 5 m | ZW-XF05R |
| | 10 m | ZW-XF10R |
| | 20 m | ZW-XF20R |
| | 30 m | ZW-XF30R |
| Fiber Adapter (between Sensor Head pre-wired cable and Extension Fiber Cable) | – | ZW-XFC |
| Parallel cable for ZW-CE1□ 32-pole[*1] | 2 m | ZW-XCP2E |
| RS-232C Cable for personal computer | 2 m | ZW-XRS2 |
| RS-232C Cable for PLC/programmable terminal | 2 m | ZW-XPT2 |

*1 A parallel cable for Controllers with binary outputs is also available (ZW-XCP2). Please contact your OMRON sales representative for details.

### Automation Software Sysmac Studio

Please purchase a DVD and required number of licenses the first time you purchase the Sysmac Studio. DVDs and licenses are available individually. Each model of licenses does not include any DVD.

| Product name | Specifications | Number of licenses | Media | Order code |
|---|---|---|---|---|
| Sysmac Studio Standard Edition Ver.1.□□ [*1] | The Sysmac Studio provides an integrated development environment to set up, program, debug, and maintain NJ-series controllers and other machine automation controllers, as well as EtherCAT slaves.<br><br>Sysmac Studio runs on the following OS.<br>Windows XP (Service Pack 3 or higher, 32-bit version)/Vista (32-bit version)/7 (32-bit/64-bit version)<br><br>This software provides functions of the Measurement Sensor Edition. Refer to Sysmac Catalog (P072) for details such as supported models and functions. | – (Media only) | DVD | SYSMAC-SE200D |
| | | 1 license[*2] | – | SYSMAC-SE201L |
| Sysmac Studio Measurement Sensor Edition Ver.1.□□ [*3] | Sysmac Studio Measurement Sensor Edition is a limited license that provides selected functions required for ZW-series Displacement Sensor settings. Because this product is a license only, you need the Sysmac Standard Edition DVD media to install it. | 1 license | – | SYSMAC-ME001L |
| | | 3 licenses | – | SYSMAC-ME003L |

*1 ZW-series is supported by Sysmac Studio version 1.05 or higher.
*2 Multi licenses are available for the Sysmac Studio (3, 10, 30, or 50 licenses).
*3 Setting Software Smart Monitor ZW is also available (ZW-SW101). Please contact your OMRON representative for details.

### Setting software

| Item | Order code |
|---|---|
| Smart Monitor ZW | ZW-SW101 |

### Accessories

| Item | Order code |
|---|---|
| Fiber Connector Cleaner | ZW-XCL |

### Recommended EtherCAT communications cables

Use Straight STP (shielded twisted-pair) cable of category 5 or higher with double shielding (braiding and aluminum foil tape) for EtherCAT.

### Cable with connectors

| Item | Recommended manufacturer | Cable length (m)*1 | Order code |
|---|---|---|---|
| Standard type<br>Cable with connectors on both ends (RJ45/RJ45)<br>Wire gauge and number of pairs:<br>AWG27, 4-pair Cable<br>Cable Sheath material: LSZH*2<br>Cable color: Yellow *3 | OMRON | 0.3 | XS6W-6LSZH8SS30CM-Y |
| | | 0.5 | XS6W-6LSZH8SS50CM-Y |
| | | 1 | XS6W-6LSZH8SS100CM-Y |
| | | 2 | XS6W-6LSZH8SS200CM-Y |
| | | 3 | XS6W-6LSZH8SS300CM-Y |
| | | 5 | XS6W-6LSZH8SS500CM-Y |
| Rugged type<br>Cable with connectors on both ends (RJ45/RJ45)<br>Wire gauge and number of pairs:<br>AWG22, 2-pair cable | OMRON | 0.3 | XS5W-T421-AMD-K |
| | | 0.5 | XS5W-T421-BMD-K |
| | | 1 | XS5W-T421-CMD-K |
| | | 2 | XS5W-T421-DMD-K |
| | | 5 | XS5W-T421-GMD-K |
| | | 10 | XS5W-T421-JMD-K |
| Rugged type<br>Cable with connectors on both ends (M12 Straight/RJ45)<br>Wire gauge and number of pairs:<br>AWG22, 2-pair cable | OMRON | 0.3 | XS5W-T421-AMC-K |
| | | 0.5 | XS5W-T421-BMC-K |
| | | 1 | XS5W-T421-CMC-K |
| | | 2 | XS5W-T421-DMC-K |
| | | 5 | XS5W-T421-GMC-K |
| | | 10 | XS5W-T421-JMC-K |
| Rugged type<br>Cable with connectors on both ends (M12 Right-angle/RJ45)<br>Wire gauge and number of pairs:<br>AWG22, 2-pair cable | OMRON | 0.3 | XS5W-T422-AMC-K |
| | | 0.5 | XS5W-T422-BMC-K |
| | | 1 | XS5W-T422-CMC-K |
| | | 2 | XS5W-T422-DMC-K |
| | | 5 | XS5W-T422-GMC-K |
| | | 10 | XS5W-T422-JMC-K |

*1 Standard type cables length 0.2, 0.3, 0.5, 1, 1.5, 2, 3, 5, 7.5, 10, 15 and 20m are available.
Rugged type cables length 0.3, 0.5, 1, 2, 3, 5, 10 and 15m are available.
*2 The lineup features Low Smoke Zero Halogen cables for in-cabinet use and PUR cables for out-of-cabinet use.
*3 Cables colors are available in blue, yellow, or Green

**Note:** For details, refer to Cat.No.G019.

## Cables/connectors

### Wire gauge and number of pairs: AWG24, 4-pair cable

| Item | Recommended manufacturer | Order code |
|---|---|---|
| Cables | Hitachi Cable, Ltd. | NETSTAR-C5E SAB 0.5 × 4P*1 |
| | Kuramo Electric Co. | KETH-SB*1 |
| | SWCC Showa Cable Systems Co. | FAE-5004*1 |
| RJ45 connectors | Panduit Corporation | MPS588-C*1 |

*1 We recommend you to use above cable and connector together.

### Wire gauge and number of pairs: AWG22, 2-pair cable

| Item | Recommended manufacturer | Order code |
|---|---|---|
| Cables | Kuramo Electric Co. | KETH-PSB-OMR*1 |
| | Nihon Electric Wire&Cable Co.,Ltd. | PNET/B*1 |
| RJ45 Assembly connector | OMRON | XS6G-T421-1*1 |

*1 We recommend you to use above cable and connector together.

**Note:** Connect both ends of cable shielded wires to the connector hoods.

## Industrial switching hubs for Ethernet

| Number of ports | Failure detection | Current consumption | Order code |
|---|---|---|---|
| 3 | None | 0.22 A | W4S1-03B |
| 5 | None | 0.22 A | W4S1-05B |
| | Supported | | W4S1-05C |

**Note:** Industrial switching hubs are cannot be used for EtherCAT.

## EtherCAT junction slaves

| Number of ports | Power supply voltage | Current consumption | Order code |
|---|---|---|---|
| 3 | 20.4 to 28.8 VDC (24 VDC −15 to 20%) | 0.08 A | GX-JC03 |
| 6 | | 0.17 A | GX-JC06 |

**Note:** 1 Please do not connect EtherCAT junction slave with OMRON position control unit, Model CJ1W-NC_81/_82.
2 EtherCAT junction slaves cannot be used for EtherNet/IP™ and Ethernet.

## Specifications

### Sensor head

| Item | | ZW-S07 | ZW-S20 | ZW-S30 | ZW-S40 | ZW-SR07 | ZW-SR20 | ZW-SR40 |
|---|---|---|---|---|---|---|---|---|
| Measuring center distance | | 7 mm | 20 mm | 30 mm | 40 mm | 7 mm | 20 mm | 40 mm |
| Measuring range | | ±0.3 mm | ±1 mm | ±3 mm | ±6 mm | ±0.3 mm | ±1 mm | ±6 mm |
| Static resolution *1 | | 0.25 µm | 0.25 µm | 0.25 µm | 0.25 µm | 0.25 µm | 0.25 µm | 0.25 µm |
| Linearity *2 | | ±0.8 µm | ±1.2 µm | ±4.5 µm | ±7.0 µm | ±1.1 µm | ±1.6 µm | ±9.3 µm |
| Spot diameter *3 | Near | 20 µm dia. | 45 µm dia. | 70 µm dia. | 90 µm dia. | 20 µm dia. | 45 µm dia. | 90 µm dia. |
| | Center | 18 µm dia. | 40 µm dia. | 60 µm dia. | 80 µm dia | 18 µm dia. | 40 µm dia. | 80 µm dia |
| | Far | 20 µm dia. | 45 µm dia. | 70 µm dia. | 90 µm dia | 20 µm dia. | 45 µm dia. | 90 µm dia |
| Measuring cycle | | 500 µs to 10 ms | | | | | | |
| Operating ambient illumination | | Illumination on object surface 10,000 lx or less: incandescent light | | | | | | |
| Ambient temperature range | | Operating: 0 to 50°C, Storage: −15 to 60°C<br>(with no icing or condensation) | | | | | | |
| Ambient humidity range | | Operating and storage: 35% to 85%<br>(with no condensation) | | | | | | |
| Degree of protection | | IP40 (IEC60529) | | | | | | |
| Vibration resistance (destructive) | | 10 to 150 Hz, 0.35 mm single amplitude, 80 min each in X, Y, and Z directions | | | | | | |
| Shock resistance (destructive) | | 150 m/s$^2$ 3 times each in six directions (up/down, left/right, forward/backward) | | | | | | |
| Temperature characteristic *4 | | 0.6 µm/°C<br>(0.45 µm/°C) | 1.5 µm/°C<br>(1.0 µm/°C) | 2.8 µm/°C<br>(2.0 µm/°C) | 4.8 µm/°C<br>(3.8 µm/°C) | 0.6 µm/°C<br>(0.45 µm/°C) | 1.5 µm/°C<br>(1.0 µm/°C) | 4.8 µm/°C<br>(3.8 µm/°C) |
| Materials | | Case: aluminum die-cast<br>Fiber cable sheat: PVC<br>Calibration ROM: PC | | | | | | |
| Fiber cable length | | 0.3 m, 2 m (Flex-resistant cable) | | | | | | |
| Fiber cable minimum bending radius | | 20 mm | | | | | | |
| Insulation resistance (Calibration ROM) | | Between case and all terminals: 20 MΩ (by 250 V megger) | | | | | | |
| Dielectric strength (Calibration ROM) | | Between case and all terminals: 1,000 VAC, 50/60 Hz, 1 min | | | | | | |
| Weight | | Approx. 105 g (Chassis, fiber cable total) | | | | | | |
| Accessories included with sensor head | | Instruction sheet, Fixing screw (M2) for Calibration ROM, Precautions for correct use | | | | | | |

*1. Capacity value when Omron standard mirror surface target is measured at the measurement center distance as the average of 4,096 times.
*2. Material setting for the Omron standard mirror surface target: Error from an ideal straight line when measuring on mirror surface.
The reference values for linearity when targets to measure other than the above are as in the table below

| Item | ZW-S07 | ZW-S20 | ZW-S30 | ZW-S40 | ZW-SR07 | ZW-SR20 | ZW-SR40 |
|---|---|---|---|---|---|---|---|
| Glass | ±1.0 µm | ±1.2 µm | ±4.5 µm | ±7.0 µm | ±1.1 µm | ±1.6 µm | ±9.3 µm |
| SUS BA | ±1.2 µm | ±1.4 µm | ±5.5 µm | ±8.5 µm | ±1.2 µm | ±1.8 µm | ±9.3 µm |
| White ceramic | ±1.6 µm | ±1.7 µm | ±6.4 µm | ±9.5 µm | ±1.6 µm | ±1.9 µm | ±11.0 µm |

*3. Capacity value defined by 1/e$^2$ (13.5%) of the center optical intensity in the measured area.
*4. Temperature characteristic at the measurement center distance when the sensor head and the target are fastened with an aluminum jig and the sensor head and the controller are set in the same temperature environment.
Figures in parentheses are converted value obtained by subtracting the effect of expansion or contraction of the aluminum jig itself.

### Automation software Sysmac Studio

#### System requirements

| Item | Condition |
|---|---|
| Operating system (OS) *1, *2 | Windows XP (Service Pack 3 or higher, 32-bit version)/Vista(32-bit version)/7(32-bit/64-bit version) |
| CPU | Windows computers with Celeron 540 (1.8 GHz) or faster CPU.<br>Core i5 M520 (2.4 GHz) or equivalent or faster recommended |
| Main memory | 2 GB min. |
| Recommended video memory/video card for using 3D motion trace | Video memory: 512 MB min.<br>Video card: Either of the following video cards:<br>• NVIDIA GeForce 200 Series or higher<br>• ATI RadeonHD5000 Series or higher |
| Hard disk | At least 1.6 GB of available space |
| Display | XGA 1024 × 768, 16 million colors.<br>WXGA 1280 × 800 min. recommended |
| Disk drive | DVD-ROM drive |
| Communication ports | USB port corresponded to USB 2.0, or Ethernet port *3 |
| Supported languages | Japanese, English, German, French, Italian, Spanish, simplified Chinese, traditional Chinese, Korean |

*1 Sysmac Studio operating system precaution: System requirements and hard disk space may vary with the system environment.
*2 The following restrictions apply when Sysmac Studio is used with Microsoft Windows Vista or Windows 7.
Some Help files cannot be accessed.
The Help files can be accessed if the Help program distributed by Microsoft for Windows (WinHlp32.exe) is installed. Refer to the Microsoft homepage listed below or contact Microsoft for details on installing the file. (The download page is automatically displayed if the Help files are opened while the user is connected to the Internet.)
http://support.microsoft.com/kb/917607/en-us
*3 Refer to the hardware manual for your Controller for hardware connection methods and cables to connect the computer and Controller.

## Setting software Smart Monitor ZW ZW-SW101

### System requirements

| Item | Condition |
|---|---|
| Operating System(OS) | Windows 7 (32 or 64-bit version)<br>Windows XP (Service Pack3 or more, 32-bit version) |
| CPU | Intel Pentium III, 850 MHz or more (2 GHz or more is recommended.) |
| Main memory | 1 GB or more |
| Hard disk | 50 MB or more |
| Display | 1024 × 768 dots or more, 16 million colors or more |
| Supported languages | Japanese/English |
| Communication port | Ethernet port |

### Controller

| Item | | | | ZW-CE10T | ZW-CE15T |
|---|---|---|---|---|---|
| Input/Output type | | | | NPN | PNP |
| Number of connected sensor heads | | | | 1 per Controller | |
| Sensor head compatibility | | | | Available | |
| Light source for measurement | | | | White LED | |
| Segment display | Main display | | | 11-segment red display, 6 digits | |
| | Sub-display | | | 11-segment green display, 6 digits | |
| LED display | Status indicators | | | HIGH (orange), PASS (green), LOW (orange), STABILITY (green), ZERO (green), ENABLE (green), THRESHOLD-H (orange), THRESHOLD-L (orange), RUN (green) | |
| | EtherCAT indicators | | | L/A IN (Link Activity IN) (green), L/O OUT (Link Activity OUT) (green), ECAT RUN (green), ECAT ERR (red) | |
| External interface | Ethernet | | | 100BASE-TX, 10BASE-T, No-protocol communications (TCP/UDP), EtherNet/IP™ | |
| | EtherCAT | | | EtherCAT-specific protocol 100BASE-TX | |
| | RS-232C | | | 115,200 bps max. | |
| | Analog output terminal block | Analog voltage output (OUT1V) | | –10 to 10 V, output impedance: 100 Ω | |
| | | Analog current output (OUT1A) | | 4 to 20 mA, maximum load resistance: 300 Ω | |
| | 32-pole extension connector | Judgment output (HIGH1/PASS1/LOW1) | | Transistor output system<br>Output voltage: 21.6 to 30 VDC<br>Load current: 50 mA or less<br>Residual voltage when turning ON: 1.2 V or less<br>Leakage voltage when turning OFF: 0.1 mA or les | |
| | | BUSY output (BUSY1) | | | |
| | | ALARM output (ALARM1) | | | |
| | | ENABLE output (ENABLE) | | | |
| | | LED OFF input (LED OFF1) | | DC input system<br>Input voltage: 24 VDC –10% (21.6 to 26.4 VDC)<br>Input current: 7 mA Typ. (24 VDC)<br>Voltage/Current when turning ON: 19 V/3 mA or more<br>Voltage/Current when turning OFF: 5 V/1 mA or less | |
| | | ZERO RESET input (ZERO) | | | |
| | | TIMING output (TIMING1) | | | |
| | | RESET output (RESET1) | | | |
| | | Bank | Selected bank output (BANK_OUT 1 to 3) | Transistor output system<br>Output voltage: 21.6 to 30 VDC<br>Load current: 50 mA or less<br>Residual voltage when turning ON: 1.2 V or less<br>Leakage voltage when turning OFF: 0.1 mA or less | |
| | | | Selected bank input (BANK_SEL 1 to 3) | DC input system<br>Input voltage: 21.6 to 26 VDC<br>Input current: 7 mA Typ. (24 VDC)<br>Voltage/Current when turning ON: 19 V/3 mA or more<br>Voltage/Current when turning OFF: 5 V/1 mA or less | |
| Main functions | Exposure time | | | Auto/Manual | |
| | Measuring cycle | | | 500 µs to 10 ms | |
| | Material setting | | | Standard/Mirror/Diffusion surfaces | |
| | Measurement Item | | | Height/Thickness/Calculation | |
| | Filtering | | | Median/Average/Differentiation/High pass/Low pass/Band pass | |
| | Outputs | | | Scaling/Different holds/Zero reset/Logging for a measured value | |
| | Display | | | Measured value/Threshold value/Analog output voltage or current value/Judgment result/Resolution/Exposure time | |
| | Number of configurable banks | | | Max. 8 banks | |
| | Task process | | | Multi-task (up to 4 tasks per bank) | |
| | System | | | Save/Initialization/Display measurement information/Communication settings/Sensor Head calibration/Key-lock/Trigger-key input | |
| Ratings | Power supply voltage | | | 21.6 to 26.4 VDC (including ripple) | |
| | Current consumption | | | 600 mA max. | |
| | Insulation resistance | | | Across all lead wires and controller case: 20 MΩ (by 250 V megger) | |
| | Dialectic strength | | | Across all lead wires and controller case: 1,000 VAC, 50/60 Hz, 1 min. | |
| Environmental | Degree of protection | | | IP20 (IEC60529) | |
| | Vibration resistance (destructive) | | | 10 to 55 Hz, 0.35-mm single amplitude, 50 min each in X, Y, and Z directions | |
| | Shock resistance (destructive) | | | 150 $m/s^2$, 3 times each in six directions (up/down, left/right, forward/backward) | |
| | Ambient temperature | | | Operating: 0 to 40°C<br>Storage: –15 to 60°C (with no icing or condensation) | |
| | Ambient humidity | | | Operating and storage: 35% to 85% (with no condensation) | |
| Grounding | | | | D-type grounding (Grounding resistance of 100 Ω or less)<br>Note: For conventional Class D grounding | |
| Materials | | | | Case: PC | |

| Item | ZW-CE10T | ZW-CE15T |
|---|---|---|
| Weight | Approx. 750 g (main unit only), approx. 150 g (Parallel cable) | |
| Accessories included with controller | Instruction sheet, Member registration sheet, Parallel cable ZW-XCP2E | |

**Note:** Controllers with binary outputs are also available (ZW-C10T/-C15T). Please contact your OMRON sales representative for details.

### ZW series EtherCAT communications specifications

| Item | Specification |
|---|---|
| Communications standard | IEC61158 Type12 |
| Physical layer | 100BASE-TX (IEEE802.3) |
| Connectors | RJ45 × 2<br>ECAT IN: EtherCAT input<br>ECAT OUT: EtherCAT output |
| Communications media | Category 5 or higher (cable with double, aluminum tape and braided shielding) is recommended. |
| Communications distance | Distance between nodes: 100 m max. |
| Process data | Variable PDO mapping |
| Mailbox (CoE) | Emergency messages, SDO requests, SDO responses, and SDO information |
| Distributed clock | Synchronization in DC mode. |
| LED display | L/A IN (Link/Activity IN) × 1, AL/A OUT (Link/Activity OUT) × 1, AECAT RUN × 1, AECAT ERR × 1 |

## Smart inductive measurement sensor

ZX-E offers the best solution for the accurate measurement of metallic objects. It is highly recommended in harsh environments such as automotive and metal working machines.

- High resolution of 1 µm
- High-speed response time of 150 µs
- Easy sensor head replacement
- Modular platform concept for different sensing technologies
- Easy linearity adjustment for any metal

## Ordering information

### Sensors

#### Sensor heads

| Shape | Dimensions | Sensing distance | Resolution*1 | Order code |
|---|---|---|---|---|
| Cylindrical | 3 dia. × 18 mm | 0.5 mm | 1 µm | ZX-EDR5T |
| | 5.4 dia. × 18 mm | 1 mm | | ZX-ED01T*2 |
| | 8 dia. × 22 mm | 2 mm | | ZX-ED02T*2 |
| Screw-shaped | M10×22 mm | 2 mm | | ZX-EM02T*2 |
| | M18×46.3 mm | 7 mm | | ZX-EM07MT*2 |
| Flat | 30×14×4.8 mm | 4 mm | | ZX-EV04T*2,*3 |
| Heat-resistant, cylindrical | M12×22 mm | 2 mm | | ZX-EM02HT*4 |

*1 For an average count of 4,096.
*2 Models with protective spiral tubes are also available. Add a suffix of "-S" to the above model numbers when ordering. (Example: ZX-ED01T-S)
*3 Be sure to use ZX-EDA amplifier unit version 1,200 or later with the ZX-EV04.
*4 Be sure to use ZX-EDA amplifier unit version 1,300 or later with the ZX-EM02H.

#### Amplifier units

| Power supply | Output type | Order code |
|---|---|---|
| DC | NPN | ZX-EDA11 |
| | PNP | ZX-EDA41 |

**Note:** Compatible connection with the sensor head.

### Accessories (order separately)

#### Calculating unit

| | Model |
|---|---|
| Calculating unit | ZX-CAL2 |

#### Amplifier mounting brackets

| Remarks | Model |
|---|---|
| Attached to each sensor head | ZX-XBE1 |
| For DIN track mounting | ZX-XBE2 |

#### SmartMonitor sensor setup tool for Personal Computer connection

| Name | Model |
|---|---|
| ZX-series communications interface unit | ZX-SF11 |
| ZX-series communications interface unit + setup software (CD-ROM) | ZX-SFW11EV3*1 |
| ZX-series sensor setup and logging software (CD-ROM) | ZX-SW11EV3 |

*1 The ZX-SFW11EV3 SmartMonitor can be used only to set functions and monitor waveforms.

#### Cables with connectors on both ends (for extension)*

| Cable length | Model |
|---|---|
| 1 m | ZX-XC1A |
| 4 m | ZX-XC4A |
| 8 m | ZX-XC8A |

* Robot cable models are also available. The model numbers are ZX-XC_R.

## Specifications

#### Sensor heads

| Item | | ZX-EDR5T | ZX-ED01T | ZX-ED02T/EM02T | ZX-EM07MT | ZX-EV04T | ZX-EM02HT |
|---|---|---|---|---|---|---|---|
| Measurement range | | 0 to 0.5 mm | 0 to 1 mm | 0 to 2 mm | 0 to 7 mm | 0 to 4 mm | 0 to 2 mm |
| Sensing object | | Magnetic metals (Measurement ranges and linearities are different for non-magnetic metals. Refer to engineering data on B-67.) | | | | | |
| Standard reference object | | 18 × 18 × 3 mm | | 30 × 30 × 3 mm | 60 × 60 × 3 mm | | 45 × 45 × 3 mm |
| | | Material: Ferrous (S50C) | | | | | |
| Resolution*1 | | 1 µm | | | | | |
| Linearity*2 | | ±0.5% F.S. | | | | | ±1% F.S.*3 |
| Linear output range | | Same as measurement range. | | | | | |
| Temperature characteristic*4 (including amplifier unit) | | 0.15% F.S./°C | 0.07% F.S./°C | | | | 0.1% F.S./°C |
| Ambient temperature | Operating*5 | 0 to 50°C (with no icing or condensation) | −10 to 60°C (with no icing or condensation) | | | | −10 to 200°C |
| | Storage*5 | | −20 to 70°C (with no icing or condensation) | | | | −20 to 200°C |

| Item | | | ZX-EDR5T | ZX-ED01T | ZX-ED02T/EM02T | ZX-EM07MT | ZX-EV04T | ZX-EM02HT |
|---|---|---|---|---|---|---|---|---|
| Ambient humidity | | | Operating and storage: 35% to 85% (with no condensation) | | | | | |
| Insulation resistance | | | 50 MΩ min. (at 500 DC) | | | | | |
| Dielectric strength | | | 1,000 VAC, 50/60 Hz for 1 min between charged parts and case | | | | | |
| Vibration resistance (destruction) | | | 10 to 55 Hz with 1.5-mm double amplitude for 2 h each in X, Y, and Z directions | | | | | |
| Shock resistance (destruction) | | | 500 m/s$^2$, 3 times each in X, Y, and Z directions | | | | | |
| Degree of protection (sensor head) | | | IEC60529, IP65 | IEC60529, IP67 | | | | IEC60529, IP60[*6] |
| Connection method | | | Connector relay (standard cable length: 2 m) | | | | | |
| Weight (packed state) | | | Approx. 120 g | Approx. 140 g | | Approx. 160 g | Approx. 130 g | Approx. 160 g |
| Materials | Sensor head | Case | Brass | Stainless steel | Brass | | Zinc (nickel-plated) | Brass |
| | | Sensing surface | Heat-resistant ABS | | | | | PEEK |
| | Preamplifier | | PES | | | | | |
| Accessories | | | Amplifier mounting brackets (ZX-XBE1), instruction manual | | | | | |

[*1] Accuracy: The resolution is the deviation (±3σ) in the linear output when connected to the ZX-EDA amplifier unit. The above values indicate the deviations observed 30 minutes after the power is turned ON.
(The resolution is measured with Omron's standard reference object at ½ of the measurement range with the ZX-EDA set for the maximum average count of 4,096 per period.)
The resolution is given at the repeat accuracy for a stationary workpiece, and is not an indication of the distance accuracy. The resolution may be adversely affected under strong electromagnetic fields.
[*2] Linearity: The linearity is given as the error in an ideal straight line displacement output when measuring the standard reference object. The linearity and measurement values vary with the object being measured.
[*3] The value given is for an ambient temperature of 25°C.
[*4] Temperature characteristic: The temperature characteristic is measured with Omron's standard reference object at ½ of the measurement range.
[*5] The ambient temperature given is only for the sensor head. It is -10 to 60°C for the preamp.
[*6] Do not use in moist environments because the case is not waterproof.

### Amplifier units

| Item | ZX-EDA11 | ZX-EDA41 |
|---|---|---|
| Measurement period | 150 µs | |
| Possible average count settings[*1] | 1, 2, 4, 8, 16, 32, 64, 128, 256, 512, 1,024, 2,048, or 4,096 | |
| Linear output[*2] | Current output: 4 to 20 mA/F.S., max. load resistance: 300 Ω<br>Voltage output: ±4 V (±5 V, 1 to 5 V [*3]), output impedance: 100 Ω | |
| Judgement outputs (3 outputs: HIGH/PASS/LOW) | NPN open-collector outputs, 30 VDC, 50 mA max.<br>Residual voltage: 1.2 V max. | PNP open-collector outputs, 30 VDC, 50 mA max.<br>Residual voltage: 2 V max. |
| Zero reset input, timing input, reset input, judgement output hold input | ON:Short-circuited with 0-V terminal or 1.5 V or less<br>OFF:Open (leakage current: 0.1 mA max.) | ON:Supply voltage short-circuited or supply voltage within 1.5 V<br>OFF:Open (leakage current: 0.1 mA max.) |
| Function | – Measurement value display<br>– Linearity adjustment (materials selection)<br>– Display reverse<br>– Number of display digit changes<br>– Bottom hold, peak-to-peak hold<br>– Average hold<br>– Initial reset<br>– OFF-delay timer<br>– Non-measurement setting<br>– Automatic teaching<br>– Reset input<br>– Linear output correction<br>– K-(A+B) calculation[*4]<br>– Sensor disconnection detection<br>– Key lock<br>– set value/output value/ resolution display<br>– display OFF mode<br>– sample hold<br>– self-peak hold<br>– delay hold<br>– linearity initialization<br>– one-shot timer<br>– direct threshold value setting<br>– hysteresis width setting<br>– judgement output hold input<br>– (A-B) calculations[*4]<br>– mutual interference prevention[*4]<br>– zero reset memory<br>– Scaling<br>– ECO mode<br>– peak hold<br>– self-bottom hold<br>– zero reset<br>– ON-delay timer<br>– previous value comparison<br>– position teaching<br>– timing inputs<br>– monitor focus<br>– (A+B) calculations[*4]<br>– zero reset indicator | |
| Indications | Judgement indicators: High (orange), pass (green), low (yellow), 7-segment main digital display (red), 7-segment sub-digital display (yellow), power ON (green), zero reset (green), enable (green) | |
| Voltage influence (including sensor) | 0.5% F.S. of linear output value at ±20% of power supply voltage | |
| Power supply voltage | 12 to 24 VDC±10%, ripple (p-p): 10% max. | |
| Current consumption | 140 mA max. with power supply voltage of 24 VDC (with sensor connected) | |
| Ambient temperature | Operating and storage: 0 to 50°C (with no icing or condensation) | |
| Ambient humidity | Operating and storage: 35% to 85% (with no condensation) | |
| Insulation resistance | 20 MΩ min. (at 500 DC) | |
| Dielectric strength | 1,000 VAC, 50/60 Hz for 1 min | |
| Vibration resistance (destruction) | 10 to 150 Hz with 0.7-mm double amplitude for 80 min each in X, Y, and Z directions | |
| Shock resistance (destruction) | 300 m/s$^2$, 3 times each in 6 directions (up, down, left, right, forward, backward) | |
| Connection method | Prewired (standard cable length: 2 m) | |
| Weight (packed state) | Approx. 350 g | |
| Materials | Case: PBT (polybutylene terephthalate), cover: Polycarbonate | |
| Accessories | Instruction manual | |

[*1] The response speed of the linear output is calculated as the measurement period x (average count setting + 1) (with fixed sensitivity).
The response speed of the judgement outputs is calculated as the measurement period x (average count setting + 1) (with fixed sensitivity).
[*2] The output can be switched between a current output and voltage output using a switch on the bottom of the amplifier unit.
[*3] Setting is possible via the monitor focus function.
[*4] A calculating unit (ZX-CAL or ZX-CAL2) is required.

## Smart contact measurement sensor

ZX-T is ideal for applications where the target object may contain oil deposits or other micro-structures. In this case contact measurement is the most reliable way.

- Modular platform concept for different sensing technologies
- Air-retracting types for automated inspection
- Multipoint measurement with up to 8 sensors
- Pressing force alarm prevents malfunction
- Strong ball bearing structure assures long life time

## Ordering information

### Sensors

#### Sensor heads

| Size | Type | Sensing distance | Resolution (See note.) | Order code |
|---|---|---|---|---|
| 6 dia. | Short type | 1 mm | 0.1 µm | ZX-TDS01T |
| | Standard type | 4 mm | | ZX-TDS04T |
| | Low-load type | | | ZX-TDS04T-L |
| 8 dia. | Standard type | 10 mm | 0.4 µm | ZX-TDS10T |
| | Ultra-low-load type | | | ZX-TDS10T-L |
| | Air lift type | | | ZX-TDS10T-V |
| | Air lift/air push type | | | ZX-TDS10T-VL |

**Note:** The resolution refers to the minimum value that can be read when a ZX-TDA_1 amplifier unit is connected.

#### Amplifier units

| Power supply | Output type | Order code |
|---|---|---|
| DC | NPN | ZX-TDA11 |
| | PNP | ZX-TDA41 |

### Accessories (order separately)

#### Calculating unit

| | Order code |
|---|---|
| Calculating unit | ZX-CAL2 |

#### SmartMonitor sensor setup tool for Personal Computer connection

| Name | Order code |
|---|---|
| ZX-series communications interface unit | ZX-SF11 |
| ZX-series communications interface unit + setup software (CD-ROM) | ZX-SFW11EV3*1,*2 |
| ZX-series sensor setup and logging software (CD-ROM) | ZX-SW11EV3*1 |

*1 When using the ZX-TDA11/41 with the SmartMonitor, either the ZX-SFW11EV3 or the ZX-SW11EV3 SmartMonitor must be used. Earlier versions cannot be used.

*2 The ZX-SFW11EV3 SmartMonitor can be used only to set functions and monitor waveforms.

#### ZX-series communications interface unit

| Name | Order code |
|---|---|
| ZX-series communications interface unit | ZX-SF11 |

#### Cables with connectors on both ends (for extension)*

| Cable length | Order code |
|---|---|
| 1 m | ZX-XC1A |
| 4 m | ZX-XC4A |
| 8 m | ZX-XC8A |

* Robot cable models are also available. The model numbers are ZX-XC_R.

#### Preamplifier mounting brackets

| Remarks | Order code |
|---|---|
| Attached to each sensor head | ZX-XBT1 |
| For DIN track mounting | ZX-XBT2 |

#### Actuators

| Type (material) | Screw section | Appearance | Application | Applicable sensor (see note.) | Order code |
|---|---|---|---|---|---|
| | | | | ZX-TDS_T | |
| Ball type (steel) | Female screw M2.5x0.45 |  | Measuring ordinary flat surfaces (standard actuator supplied with the ZX-TDS series) | ○ | D5SN-TB1 |
| Ball type (carbide steel) | Female screw M2.5x0.45 |  | Measurements where abrasion resistance is critical<br>Measured objects: Carbide (HR90) or lower. | ○ | D5SN-TB2 |
| Ball type (ruby) | Female screw M2.5x0.45 |  | Measurements where abrasion resistance is critical<br>Measured objects: Carbide (HR90) or higher. | ○ | D5SN-TB3 |
| Needle type (carbide steel) | Male screw M2.5x0.45 |  | Measuring the bottom of grooves and holes | △ | D5SN-TN1 |

| Type (material) | Screw section | Appearance | Application | Applicable sensor (see note.) | Order code |
|---|---|---|---|---|---|
| | | | | ZX-TDS_T | |
| Flat (carbide steel) | Male screw M2.5x0.45 |  | Measuring spherical objects | △ | D5SN-TF1 |
| Conversion adapter (stainless steel) | Through-hole female screw M2.5x0.45 |  | Mounting D5SN-TN1/-TF1 or commercially available actuators on ZX-TDS-series sensors | ○ | D5SN-TA |

**Note:** ○ Replacement possible △ Conversion adapter required

## Specifications

### Amplifier units

| Item | ZX-TDA11 | ZX-TDA41 |
|---|---|---|
| Measurement period | 1 ms | |
| Possible average count settings[*1] | 1, 16, 32, 64, 128, 256, 512, or 1,024 | |
| Linear output[*2] | Current output: 4 to 20 mA/F.S., max. load resistance: 300 Ω<br>Voltage output: ±4 V (±5 V, 1 to 5 V[*3]), output impedance: 100 Ω | |
| Judgement outputs (3 outputs: HIGH/PASS/LOW) | NPN open-collector outputs, 30 VDC, 30 mA max.<br>Residual voltage: 1.2 V max. | PNP open-collector outputs, 30 VDC, 30 mA max.<br>Residual voltage: 2 V max. |
| Zero reset input, timing input, reset input, judgement output hold input | ON: Short-circuited with 0-V terminal or 1.5 V or less<br>OFF: Open (leakage current: 0.1 mA max.) | ON: Supply voltage short-circuited or supply voltage of 1.5 V or less<br>OFF: Open (leakage current: 0.1 mA max.) |
| Function | – Measurement value display – present value/set value/output value display<br>– Display reverse – ECO mode – number of display digit changes<br>– Sample hold – peak hold – bottom hold, peak-to-peak hold<br>– Self-peak hold – self-bottom hold – zero reset<br>– Initial reset – direct threshold value setting – position teaching<br>– Hysteresis width setting – timing inputs – reset input<br>– Judgement output hold input – monitor focus – (A-B) calculations[*4]<br>– (A+B) calculations (see note 4.) – sensor disconnection detection<br>– Zero reset memory – function lock – non-measurement setting<br>– Clamp value setting – scale inversion – zero reset indicator<br>– Span adjustment – warming-up display – pressing force alarm | |
| Indicators | Judgement indicators: High (orange), pass (green), low (yellow), 7-segment main digital display (red), 7-segment sub-digital display (yellow), power ON (green), zero reset (green), enable (green) | |
| Power supply voltage | 12 to 24 VDC±10%, ripple (p-p): 10% max. | |
| Current consumption | 140 mA max. (with sensor connected), for 24-VDC power supply voltage: 140 mA max. (with sensor connected) | |
| Ambient temperature | Operating and storage: 0 to 50°C (with no icing or condensation) | |
| Temperature characteristic | 0.03% F.S./°C | |
| Connection method | Prewired (standard cable length: 2 m) | |
| Weight (packed state) | Approx. 350 g | |
| Materials | Case: PBT (polybutylene terephthalate), cover: Polycarbonate | |

[*1] The response speed of the linear output is calculated as the measurement period x (average count setting + 1).
The response speed of the judgement outputs is calculated as the measurement period x (average count setting + 1).
[*2] The output can be switched between a current output and voltage output using a switch on the bottom of the amplifier unit.
[*3] Setting is possible via the monitor focus function.
[*4] A calculating unit (ZX-CAL2) is required.

### Sensor heads

| Item | | ZX-TDS01T | ZX-TDS04T | ZX-TDS04T-L |
|---|---|---|---|---|
| Measurement range | | 1 mm | 4 mm | |
| Maximum actuator travel distance | | Approx. 1.5 mm | Approx. 5 mm | |
| Resolution[*1] | | 0.1 µm | | |
| Linearity[*2] | | ±0.3% F.S. | | |
| Operating force[*3] | | Approx. 0.7 N | | Approx. 0.25 N |
| Degree of protection (sensor head) | | IEC60529, IP67 | | IEC60529, IP54 |
| Mechanical durability | | 10,000,000 operations min. | | |
| Ambient temperature | | Operating: 0 to 50°C, storage: −15 to 60°C (with no icing or condensation) | | |
| Ambient humidity | | Operating and storage: 35% to 85% (with no icing or condensation) | | |
| Temperature characteristic[*4] | Sensor head | 0.03% F.S./°C | | |
| | Preamplifier | 0.01% F.S./°C | | |
| Weight (packed state) | | Approx. 100 g | | |
| Materials | Sensor head | Stainless steel | | |
| | Preamplifier | Polycarbonate | | |
| Accessories | | Instruction manual, preamplifier mounting brackets (ZX-XBT1) | | |

[*1] The resolution is given as the minimum value that can be read when a ZX-TDA_1 amplifier unit is connected. This value is taken 15 minutes after turning ON the power with the average number of operations set to 256.
[*2] The linearity is given as the error in an ideal straight line displacement output.
[*3] These figures are representative values that apply for the measurement mid-point, and are for when the provided actuator is used, with the actuator moving downwards. If the actuator moves horizontally or upwards, the operating force will be reduced. Also, if an actuator other than the standard one is used, the operating force will vary with the weight of the actuator itself.
[*4] These figures are representative values that apply for the mid-point of the measurement range.


## Easy profile measurement – "teach&go"

The ZG2 enables precise shape measurement on challenging materials and surfaces. An easy and intuitive user interface enables efficient installation, setup and operation. A built-in LCD monitor indicates the measurement result in real time.

- Easy to use – intuitive user interface
- Live – built-in LCD monitor for setup and immediate profile display
- Versatile – 18 measurement tools
- Accurate – 5 µm resolution (3 mm / 631 pixels)
- Wide profiles – up to 70 mm

## Ordering information

### Sensor heads

| Optical method | Sensing distance | | Resolution | | Order code |
|---|---|---|---|---|---|
| | Heigt direction | Width direction | Hight direction | Width direction | |
| Diffuse reflective | 210±48 mm | 70 mm | 6 µm | 111 µm | ZG2-WDS70 |
| Diffuse reflective | 100±12 mm | 22 mm | 2.5 µm | 35 µm | ZG2-WDS22 |
| Diffuse reflective | 50±3 mm | 8 mm | 1 µm | 13 µm | ZG2-WDS8T |
| Regular reflective | 22.3±0.5 mm | 3 mm | 0.25 µm | 5 µm | ZG2-WDS3VT |

**Note:** - For details, refer the ratings and specifications table.
- Designate the cable length (0.5 m, 2 m) when ordering.

### Sensor controllers

| Power supply | Output type | Order code |
|---|---|---|
| 24 VDC | NPN | ZG2-WDC11A*1 |
| | PNP | ZG2-WDC41A |

*1 Setup support software for PC is attached

### Accessories (order separately)

#### Real-time parallel output unit

| Output type | Order code |
|---|---|
| NPN | ZG-RPD11 |
| PNP | ZG-RPD41 |

#### RS-232C cable

| Connecting device | Order code |
|---|---|
| For personal computer connection (2 m) | ZS-XRS2 |
| For PLC/PT connection (2 m) | ZS-XPT2 |

#### Sensor head extension cable

| Name | Order code |
|---|---|
| 3 m extension cable | ZG2-XC3CR |
| 8 m extension cable | ZG2-XC8CR |
| 15 m extension cable | ZG2-XC15CR |
| 25 m extension cable | ZG2-XC25CR |
| Digital equalizer (relay device) | ZG2-XEQ |
| 0.2 m digital equalizer connection cable | ZG2-XC02D |

#### Parallel mounting adaptor

| | Order code |
|---|---|
| For 1 unit | ZS-XPM1 |
| For 2 units or more | ZS-XPM2 |

#### Controller link unit

| Item | Order code |
|---|---|
| Controller link unit | ZS-XCN |

#### Memory card

| Capacity | Order code |
|---|---|
| 128 MB | F160-N1285 |
| 256 MB | F160-N2565 |

## Specifications

### Sensor heads

| Item | | ZG2-WDS70 | ZG2-WDS22 | | ZG2-WDS8T | | ZG2-WDS3VT | |
|---|---|---|---|---|---|---|---|---|
| Optical system | | Diffuse reflective | Diffuse reflective | Regular reflective | Diffuse reflective | Regular reflective | Regular reflective | Diffuse reflective |
| Measurement range | Height direction | 210±48 mm (In the high-precision mode) | 100±12 mm | 94±10 mm | 50±3 mm | 44±2 mm | 22.3±0.5 mm | 10.6±0.4 mm |
| | Width direction (typical) | 70 mm | 22 mm | | 8 mm | | 3 mm | |
| Resolution | Height direction[*1] | 6 µm | 2.5 µm | | 1 µm | | 0.25 µm | |
| | Width direction | 111 µm (70 mm/631 pixels) | 35 µm (22 mm/631 pixels) | | 13 µm (8 mm/631 pixels) | | 5 µm (3 mm/631 pixels) | |
| Linearity (in the height direction)[*2] | | ±0.1% F.S. | | | | | | |
| Temperature characteristic[*3] | | 0.02% F.S./°C | | | 0.03% F.S./°C | | 0.08% F.S./°C | |
| Light source | Type | Visible semiconductor laser | | | | | | |
| | Wavelength | 658 nm | | | | | 650 nm | |
| | Output | 5 mW max. output, 1 mW max. exposure (without using optical instruments) | | | | | 1 mW max. | |
| | Laser class | Class 2M of EN60825-1 / IEC60825-1<br>Class IIIB of FDA (21CFR 1040.10 and 1040.11) | | | | | Class 2 of EN60825-1 / IEC60825-1<br>Class II of FDA (21CFR 1040.10 and 1040.11) | |
| Beam shape (at measurement center distance)[*4] | | 120 µm × 75 mm (typical) | 60 µm × 45 mm (typical) | | 30 µm × 24 mm (typical) | | 25 µm × 4 mm (typical) | |
| LED | | STANDBY: Lights when laser irradiation preparation is complete (indication color: green) | | | | | | |
| | | LD_ON: Lights when the laser is irradiating (indication color: green) | | | | | | |
| Measurement object | | Surface of non-transparent objects | Surface of non-transparent/transparent objects | | | | | |
| Environmental resistance | Ambient light intensity | Illumination on the photo-receiving face 7,000 lx max.: Incandescent lamp | | | | | | |
| | Ambient temperature | Operating: 0 to 50°C, Storage: –15 to 60°C (with no icing or condensation) | | | | | | |
| | Ambient humidity | Operating and storage: 35% to 85% (with no condensation) | | | | | | |
| | Degree of protection | IP66 (IEC60529) | | | | | IP67 (IEC60529) | |
| | Vibration resistance (destruction) | 10 to 150 Hz with 0.35 mm single amplitude for 80 min each in X, Y, and Z directions | | | | | | |
| | Shock resistance (destruction) | 150 m/s$^2$, 3 times each in 6 directions (up / down, right / left, forward / backward) | | | | | | |
| Materials | | Case: Aluminum diecast, Front cover: Glass, Cable insulation : Heat-resistive polyvinyl chloride (PVC), Connector: Zinc alloy or brass | | | | | | |
| Cable length | | 0.5 m, 2 m (flexible cable) | | | | | | |
| Weight | | Approx. 650 g | Approx. 500 g | | | | Approx. 300 g | |
| Accessories | | Laser labels (EN : 2 labels, FDA : 3 labels), Ferrite core (1), Instruction manual | | | | | | |

[*1] Obtained by setting an Omron standard measurement object at the measurement center distance and determing the average height of the beam line. The conditions are given in the table below. However, satisfactory resolution cannot be attained in strong electromagnetic fields.The minimum resolution of the ZG2-WDS8T/WDS3VT is 0.25 ƒÊm, even when the average number of operations is increased. Resolution does not go any lower.

| Model | CCD Mode | Average No. of operations | Measurement object | |
|---|---|---|---|---|
| | | | Regular reflective | Diffuse reflective |
| ZG2-WDS70/WDS22/WDS8T | Standard mode | 64 | Omron standard white alumina ceramic object | |
| ZG2-WDS3VT | Standard mode | | Omron standard mirrored object | Omron standard diffuse reflective object |

[*2] The tolerance for an ideal straight line obtained by determing the average height of an Omron standard measurement object for the beam line. The CCD high-resolution mode is used. Linearity varies depending on the measurement object.

| Model | Measurement object | |
|---|---|---|
| | Regular reflective | Diffuse reflective |
| ZG2-WDS70/WDS22/WDS8T | Omron standard white alumina ceramic object | |
| ZG2-WDS3VT | Omron standard mirrored object | Omron standard diffuse reflective object |

[*3] A value attained by using an aluminum jig to secure the distance between the Sensor head and the measurement object. The CCD standard mode is used.

[*4] Defined as 1/e$^2$ (13.5%) of the center light intensity. This may be influenced when light leakage also exists outside the defined area and the reflectivity of the light around the measurement object is higher than that of the measurement object.

### Sensor controllers

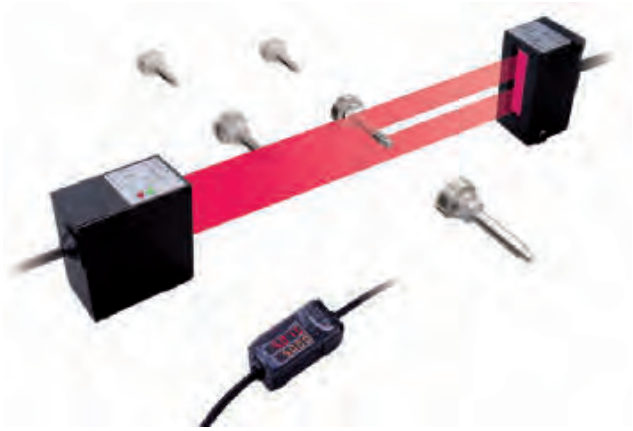
| Item | | | ZG2-WDC11/WDC11A | ZG2-WDC41/WDC41A |
|---|---|---|---|---|
| Input/output type | | | NPN | PNP |
| No. of connectable Sensor Heads | | | 1 per Controller | |
| No. of connectable Controllers | | | 2 | |
| Measurement cycle *1 | | | 16 ms (high-precision mode), 8 ms (standard mode), 5 ms (high-speed mode) | |
| Min. display unit | | | 10 nm | |
| Display range | | | –999.99999 to 999.99999 | |
| Display | | LCD monitor | 1.8-inch TFT color LCD (557x234 pixels) | |
| | | LEDs | • Judgment indicators for each task (indication color: orange): T1, T2, T3, T4<br>• Laser indicator (indication color: green): LD_ON<br>• Zero reset indicator (indication color: green): ZERO<br>• Trigger indicators (indication color: green): TRIG | |
| External interface | Input/output signal lines | Analog outputs | Select voltage or current (using the sliding switch on the bottom surface)<br>• Voltage output: 10 to 10 V, output impedance: 40 Ω<br>• Current output: 4 to 20 mA, maximum load resistance: 300 Ω | |
| | | Judgment output (ALL-PASSING/ERROR) | NPN open collector<br>30 VDC, 50 mA max.<br>Residual voltage: 1.2 V max. | PNP open collector<br>50 mA max.<br>Residual voltage: 1.2 V max. |
| | | Trigger auxiliary output (ENABLE/GATE) | | |
| | | Laser stop input (LD-OFF) | ON: O V short or 1.5 V max.<br>OFF: Open (leakage current: 0.1 mA max.) | ON: Power supply voltage short or power supply voltage –1.5 V max.<br>OFF: Open (leakage current: 0.1 mA max.) |
| | | Zero reset input (ZERO) | | |
| | | Measurement trigger input (TRIG) | | |
| | | Bank switching input (BANK A, B) | | |
| | Serial I/O | USB2.0 | 1 port, full speed (12 Mbps), MINI-B | |
| | | RS-232C | 1 port, 115,200 bps max. | |
| | Parall output *2 | Output | 18 - terminal | |
| Main functions | | No. of settings banks | 16 | |
| | | Sensitivity adjustment | Multi, High-speed multi, Auto, Fixed | |
| | | Measurement items | Height, 2-point Step, 3-point Step, Edge position, Edge width, Angle, Intersection coordinates, Intersection angle, Sectional area (up to eight items can be measured simultaneously) | |
| | | Auxiliary functions | Filter, Laser power adjustment, Position correction (height, position, lope), Linked operation, Point of inflection measurement | |
| | | Profiles saved | 16 profiles (1 profile per bank) | |
| | | Trigger modes | External trigger/continuous | |
| Ratings | | Power supply voltage | 21.6 to 26.4 VDC (including ripple current) | |
| | | Current consumption | 0.8 A max. (per sensor head) | |
| | | Insulation resistance | 20 MΩ at 250 V between lead wires and Controller case | |
| | | Dielectric strength | 1,000 VAC, 50 / 60 Hz for 1 min between lead wires and Controller case | |
| Environmental resistance | | Ambient temperature | Operating: 0 to 50°C, Storage: –15 to 60°C (with no icing or condensation) | |
| | | Ambient humidity | Operating and storage: 35% to 85% (with no condensation) | |
| | | Degree of protection | IP20 (IEC 60529) | |
| | | Vibration resistance (destruction) | Vibration frequency: 10 to 150 Hz, single amplitude: 0.35 mm, acceleration: 50 $m/s^2$ | |
| | | Shock resistance (destruction) | 150 $m/s^2$, 3 times each in 6 directions (up/down, right/left, forward/backward) | |
| Material | | | Case: Polycarbonate (PC),<br>Cable insulation : Heat-resistive polyvinyl chloride (PCV) | |
| Cable length | | | 2 m | |
| Weight | | | Approx. 300 g (including cable) (Packed state: Approx. 450 g) | |
| Accessories | | | ZG2-WDC_1: Large Ferrite Core (1 piece), Instruction Manual<br>ZG2-WDC_1A: Large Ferrite Core (1 piece), Small Ferrite Core (2 pieces), Instruction Manual, Setup Support Software (CD-ROM), USB cable (1 m) | |

*1 The image input periods listed here are for fixed/auto sensitivity. The image input period will be longer for multi-sensitivity, high-speed multi-sensitivity, or other settings. When the high-power mode is ON, the shortest image input period is 95 ms regardless of the setting of the CCD mode. Use the eco monitor in the RUN mode to determine the actual image input period.
*2 when ZG-RPD is mounted

### Data storage unit

| Item | | | ZG2-DSU11 | ZG2-DSU41 |
|---|---|---|---|---|
| Input/output type | | | NPN | PNP |
| No. of connectable Controllers | | | 2*1 | |
| Connectable controllers | | | ZG2-WDC11/WDC41 | |
| External interface | Input/output signal lines | Inputting starting/ terminating logging | ON: O V short or 1.5 V max.<br>OFF: Open (ileakage current : 0.1 mA max.) | ON: Power supply voltage short or power supply voltage –1.5 V max.<br>OFF: Open (leakage current: 0.1 mA max.) |
| | | Judgment output (HIGH/PASS/LOW/ERROR) | NPN open collector<br>30 VDC, 50 mA max.<br>Residual voltage : 1.2 V max. | PNP open collector<br>50 mA max.<br>Residual voltage: 1.2 V max. |
| | Serial I/O | USB2.0 | 1 port, full speed (12 Mbps), MINI-B | |
| | | RS-232C | 1 port, 115,200 bps max. | |
| Functions | No. of logged data*2 | Memory of the main unit | Profiles saved: 5,120 profiles<br>Measurement values saved: 65,000 values max.*3 | |
| | | Memory card (256 MB)*4 | Profiles saved: 35,328 profiles max. (256 profiles x 138 files)<br>Measurement values saved: 7,150,000 values max. (65,000 values x 110 files) | |
| | Logging trigger functions | | External triggers, data triggers (self-triggers), and time triggers | |
| | External banks functions | | 4096 | |
| | Other functions | | Alarm output functions | |
| Ratings | | Power supply voltage | 21.6 to 26.4 VDC (including ripple current) | |
| | | Current consumption | 0.5 A max. | |
| Environmental resistance | | Ambient temperature | Operating: 0 to 50°C, Storage: 0 to 60°C (with no icing or condensation) | |
| | | Ambient humidity | Operating and storage: 35% to 85% (with no condensation) | |
| Material | | | Case : Polycarbonate (PC) | |
| Cable length | | | 2 m | |
| Weight | | | Approx. 280 g | |
| Accessories | | | Ferrite Core (1 piece), Instruction Manual | |

*1 The controller link unit is necessary for linking.
*2 Data is saved in the memory of the main unit during logging. The data is automatically saved in a memory card after logging is completed. The maximum number of logging differs according to set conditions. For details, refer to the Users Manual.
*3 Measurement values for 65,000 measurements can be saved even when two sensor controllers are connected and each performs eight tasks.
*4 The value is the maximum number achieved in the following conditions:
- One sensor controller performs one measurement task.
- Either profiles or measurement values are logged.



## Smart laser micrometer

- High accuracy: 5 to 10 µm
- All surfaces
- Long sensing distance: < 500 mm
- Line width up to 28 mm
- Calculation unit for multiple heads
- Fast sampling time: 0.5 ms
- PC software for setup

## Ordering information

### Sensors

| Type | Optical system | Measuring width | Sensing distance | Resolution | Output type | Order code |
|---|---|---|---|---|---|---|
| Separate type | Through-beam | 28 mm | 0 to 500 mm | 10 µm | NPN | ZX-GT28S11 |
| | | | | | PNP | ZX-GT28S41 |
| Integrated type | | | 40 mm | | NPN | ZX-GT2840S11 |
| | | | | | PNP | ZX-GT2840S41 |

### Controller

| Power supply | Output type | Order code |
|---|---|---|
| DC | NPN | ZX-GTC11 |
| | PNP | ZX-GTC41 |

### Accessories (order separately)

#### Set of interface unit and setup software PCs

| Output type | Order code |
|---|---|
| NPN | ZX-GIF11A |
| PNP | ZX-GIF41A |

#### Interface unit(RS-232C/binary output)

| Power supply | Output type | Order code |
|---|---|---|
| DC | NPN | ZX-GIF11 |
| | PNP | ZX-GIF41 |

#### Setup software PCs

| Name | Order code |
|---|---|
| Smart monitor GT | ZX-GSW11 |

#### Calculating units

| | Order code |
|---|---|
| Calculating unit | ZX-CAL2 |

#### Receiver-controller extension cable

| Cable length | Quantity | Order code | |
|---|---|---|---|
| | | Standard cable | Flexible cable |
| 1 m | 1 m | ZX-XGC1A | ZX-XGC1R |
| 2 m | | ZX-XGC2A | ZX-XGC2R |
| 5 m | | ZX-XGC5A | ZX-XGC5R |
| 8 m | | ZX-XGC8A | ZX-XGC8R |
| 20 m | | ZX-XGC20A | ZX-XGC20R |

Up to two extension cables can be connected. However, be sure to limit the total extension cable length between the receiver and the controller to 30 meters (including the receiver cable).

## Specifications

### Sensor

| Item | ZX-GT28S11 | ZX-GT2840S11 | ZX-GT28S41 | ZX-GT2840S41 |
|---|---|---|---|---|
| Output type | NPN | | PNP | |
| Appearance | Separate type | Integrated type | Separate type | Integrated type |
| Light source | Visible semiconductor laser diode (wavelength 650 nm, CLASS 1 of EN60825-1/IEC60825-1, CLASS of FDA(21CFR 1040.10 and 1040.11) | | | |
| Measuring width | 28 mm | | | |
| Sensing distance | 0 to 500 mm | 40 mm | 0 to 500 mm | 40 mm |
| Minimum sensing object | 0.5 mm dia.*1 | 0.2 mm dia. | 0.5 mm dia.*1 | 0.2 mm dia. |
| Linearity | ±0.1% F.S.*2 | | | |
| Resolution | 10 µm (number of process values to average: 16)*3 | | | |
| Temperature characteristic | ±0.01% F.S/C*4 | | | |
| Indicators (emitter) | Laser ON indicator (green), laser alarm indicator (red) | | | |
| Indicator (receiver) | Optical axis setting indicator (green) | | | |
| Laser OFF input/sync input | ON: Short-circuited with 0 V or 1.5 V max.<br>OFF: Open (leakage current: 0.1 mA max.) | | ON: Short-circuited with power supply voltage or power supply voltage -1.5 V max.<br>OFF: Open (leakage current: 0.1 mA max.) | |
| Laser deterioration alarm output | NPN open-collector output<br>30 VDC 20 mA max.<br>Residual voltage 1.2 V max. | | PNP open-collector output<br>30 VDC 20 mA max.<br>Residual voltage 2 V max. | |
| Power consumption (emitter) | 30 mA max. | | | |
| Power supply voltage (emitter) | 24 VDC+10%, –15% ripple (p-p) 10% max. | | | |
| Dielectric strength | 1,000 VAC, 50/60 Hz for 1 min | | | |
| Insulation resistance | 20 MΩ (at 500 VDC megger) | | | |
| Operating ambient illumination (emitter) | 3,000 lx (incandescent light) | | | |
| Operating ambient illumination (receiver) | 1,000 lx (incandescent light)*5 | | | |
| Ambient temperature | Operating: 0 to 40°C, storage: –15 to 50°C (with no icing or condensation) | | | |
| Ambient humidity | Operating and storage: 35% to 85% (with no condensation) | | | |
| Vibration resistance (durability) | 10 to 150 Hz single-amplitude: 0.75 mm for 80 min each in X, Y and Z directions | | | |
| Degree of protection | IEC60529 IP40 | | | |
| Cable length | 2 m | | | |
| Material | Case: aluminum die-cast, Lens: glass | | | |
| Weight (packed state) | Approx. 550 g | Approx. 570 g | Approx. 550 g | Approx. 570 g |
| Accessories | Laser warning labels, instruction sheet | | | |

F.S.: 28 mm measuring range of receiver

*1 Distance between emitter and receiver: 500 mm, measurement object at 250 mm from receiver. Glass ends of chamfer 0.1 mm or more can be detected in glass edge measurement mode. (at binary level 70%)
*2 Linearity is given to be a typical error with respect to an ideal straight line when the distance between the emitter and receiver is 100 mm and light is blocked at a distance of 50 mm from the receiver. (On the ZX-GT2840_, the measurement object is measured at a distance of 20 mm from the receiver.)
*3 The amount of fluctuation (±3 σ) in the analog output when the distance between the emitter and receiver is 100 mm and a ZX-GTC_ is connected
*4 Change in the light cutoff value on one side when the distance between the emitter and receiver is 100 mm and the light is half-cutoff at a distance of 50 mm from the receiver (On the ZX-GT2840_, the measurement object is measured at a distance of 20 mm from the receiver.)
*5 Standard mode (NORM) used

### Controller

| Item | | ZX-GTC11 | ZX-GTC41 |
|---|---|---|---|
| Output type | | NPN | PNP |
| Measurement cycle*1 | | 1.5 ms (standard mode (NORM))<br>0.5 ms (high-speed mode (FAST))*2 | |
| Samples to average | | 1/2/4/8/16/32/64/128/256/512/1024/2048/4096 | |
| Analog output*3 | | For current output: 4 to 20 mA/F.S., max. load resistance 300 Ω<br>For voltage output: ±4 V, (±5 V, 1 to 5 V*4), output impedance 100 Ω | |
| Timing input, bank switching input, zero reset input, reset input | | ON: short-circuited with 0 V or 1.5 V max.<br>OFF: Open (leakage current: 0.1 mA max.) | ON: short-circuited with power supply voltage or power supply voltage -1.5 V max.<br>OFF: Open (leakage current: 0.1 mA max.) |
| HIGH/PASS/LOW Judgment output*5 Sync output*6 | | NPN open-collector output<br>30 VDC 50 mA max.<br>Residual voltage 1.2 V max. | PNP open-collector output<br>30 VDC 50 mA max.<br>Residual voltage 2 V max. |
| Indicator | | Judgment output indicator: HIGH (orange), PASS (green), LOW (orange)<br>Main display (red) sub-display (yellow) bank 1/2 (orange), zero reset (green) | |
| Main functions | Number of registered setups | 2 banks | |
| | Measurement mode | Interrupted beam width measurement, incident beam width measurement, outer diameter measurement, center position measurement, IC lead pitch,<br>IC lead width judgment, specified edge measurement, wire position measurement, glass edge position measurement | |
| | Display during measurement | Measured value, resolution, threshold, voltage output value, current output value (number of display digits can be changed) | |
| | Zero reset functions | Offset setting of zero reset value, zero reset value memory | |
| | Hold | Sample hold, peak hold, bottom hold, peak-to-peak hold, average hold, delay hold | |
| | Timer functions | ON-delay, OFF-delay, one-shot | |
| | Adjustment functions | Optical axis adjust mode/light intensityt writing mode, variable binary level, variable edge filter, analog output scaling | |
| | Calculation | 2 possible on up to two controllers (calculation Unit ZX-CAL2 is required for connecting controllers to each other.) A-B, A+B, width | |
| | Other | Measurement cycle setting, threshold setting, hysteresis setting, initialization, key lock | |

| Item | ZX-GTC11 | ZX-GTC41 |
|---|---|---|
| Temperature characteristic | ±0.005% F.S./°C | |
| Current consumption | 150 mA max. (including receiver) | |
| Power supply voltage | 24 VDC+10%, –15% ripple (p-p) 10% max. | |
| Dielectric strength | 1,000 VAC, 50/60 Hz for  min | |
| Insulation resistance | 20 MΩ (at 500 VDC megger) | |
| Ambient temperature | Operating: 0 to 50°C, storage: –15 to 60°C (with no icing or condensation) | |
| Ambient humidity | Operating and storage: 35% to 85% (with no condensation) | |
| Vibration resistance(durability) | 10 to 150 Hz single-amplitude: 0.35 mm for 80 min each in X, Y and Z directions | |
| Degree of protection | IEC60529 IP20 | |
| Cable length | 2 m | |
| Material | Case: PBT (polybutylene terephthalate), cover: Polycarbonate | |
| Weight (packed state) | Approx. 330 g | |
| Accessories | Instruction sheet | |

*1 The first response time is “measurement cycle x (number of samples to average setting + 1) + 1 ms” max. For the second response time onwards, the specified measurement cycle time is output.
*2 The response time in the high-speed mode (FAST) for the IC lead pitch and IC lead width judgment modes is 1 ms.
*3 Current/voltage can be switched using the switch provided on the rear of the Controller.
*4 Can be set by the analog output scaling function.
*5 The error (ERR) state is displayed when all HIGH/PASS/LOW outputs turn OFF.
*6 Normally, wire the sync output wire directly to the emitter's sync input wire and run the controller in the standard mode. On an NPN type controller, use an NPN type emitter, and on a PNP type controller, use a PNP type emitter. Wiring of the sync wires is not required when the controller is run in the high-speed mode.
(Note, however, that the controller becomes more susceptible to the influence of ambient light in this case.)

### Interface unit

| Item | ZX-GIF11/-GIF11A | ZX-GIF41/-GIF41A |
|---|---|---|
| Compatible controller | ZX-GTC11 | ZX-GTC41 |
| Indicator | Power ON (green), controller communications (orange), controller communications error (red), RS-232C communications (orange), RS-232C communications error (red), binary output (orange) | |
| Communications port | RS-232C (9-pin D-sub connector) | |
| 12-bit binary output (D11 toD0, GATE) | NPN open-collector output<br>30 VDC 20 mA max.<br>Residual voltage 1.2 V max. | PNP open-collector output<br>30 VDC 20 mA max.<br>Residual voltage 2 V max. |
| Power supply voltage | Supplied from controller (power consumption: 60 mA max.) | |
| Dielectric strength | 1,000 VAC, 50/60 Hz for 1 min | |
| Insulation resistance | 20 MΩ (at 500 VDC megger) | |
| Ambient temperature | Operating: 0 to 50°C, storage: –15 to 60°C (with no icing or condensation) | |
| Ambient humidity | Operating and storage: 35% to 85% (with no condensation) | |
| Vibration resistance(durability) | 10 to 150 Hz single-amplitude: 0.35 mm for 80 min each in X, Y and Z directions | |
| Degree of protection | IEC60529 IP20 | |
| Cable length | RS-232C 0.5 m, binary output 2 m | |
| Material | Case: PBT (polybutylene terephthalate), cover: Polycarbonate | |
| Weight (packed state) | ZX-GIF_1A: Approx. 550 g<br>ZX-GIF_1: Approx. 330 g | |
| Accessories | ZX-GIF_1A: Setup coftware (CD-ROM), 2 clamps, instruction sheet<br>ZX-GIF_1: 2 clamps, instruction sheet | |

# Safety

## Find information fast!

Quick Links shortens your search. Quick Links are unique codes assigned to Omron products listed in this guide. Enter Quick Link codes in the search box on industrial.omron.eu to access detailed information on products in this guide.

Content

# Safety

## Control- and Signalling devices



## Safety limit switches



## Safety door switches



## Safety sensors



## Safety control systems

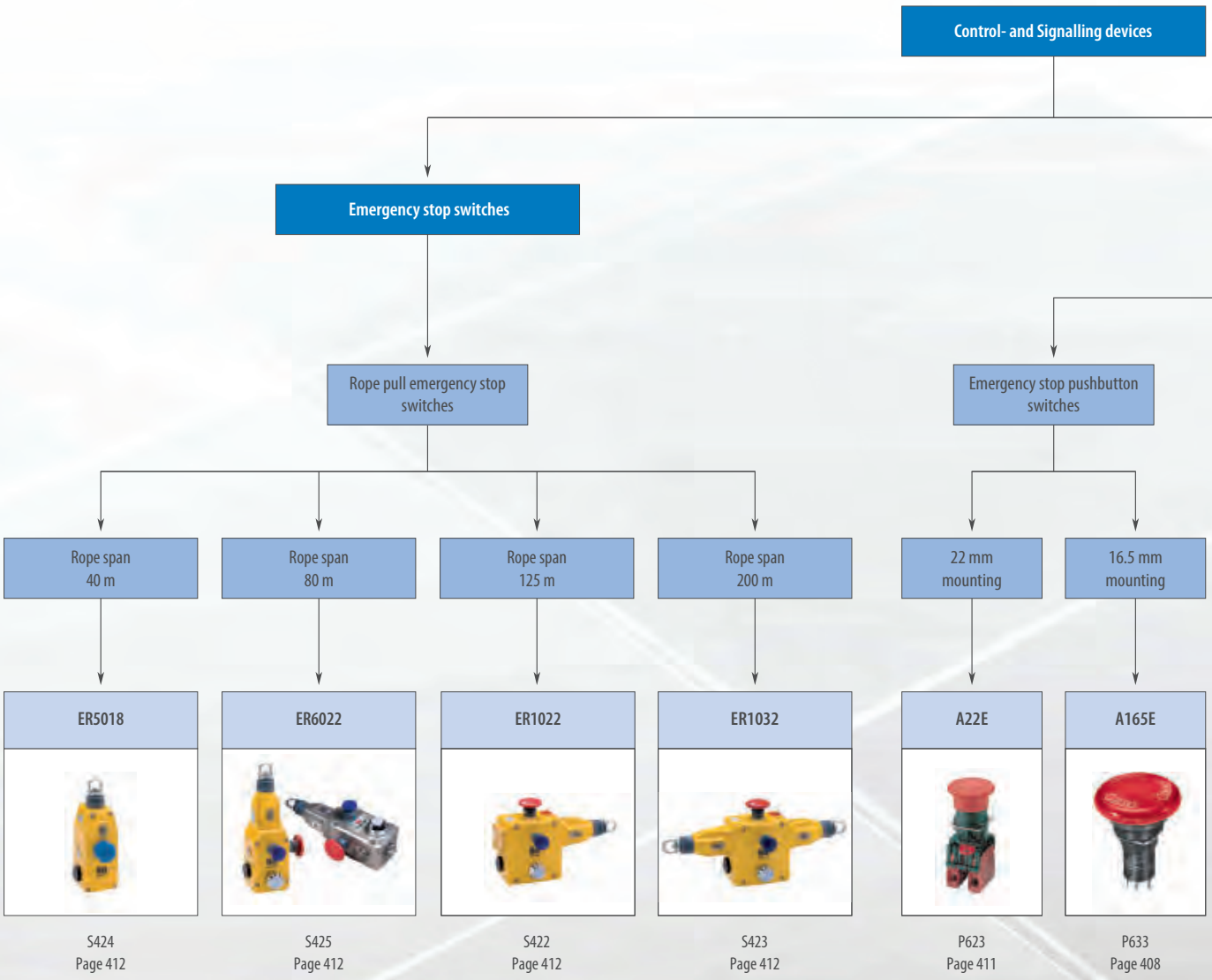
# INTERACT WITH YOUR MACHINE

## Patlite Signal towers

Machines that are stopped during production are creating extra cost, our signal towers are used to show this status and guide workers to service the machines efficiently, minimizing downtime and production loss.

- LED technology
- Optional sound system
- 30 mm, 50 mm, 60 mm and 70 mm diameter
- Modular and monolithic systems

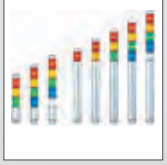
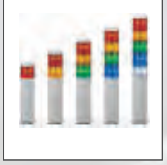
Select your signal tower in a split second:
**www.omron-industrial.com/safety**



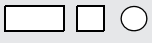
**Pushbutton switches**

- Standard pushbutton switches
  - 22 mm mounting
    - **A22**
      
      P622
      Page 409
  - 16.5 mm mounting
    - **A16**
      
      P632
      Page 406

**Signal towers**

- Monolithic system
  - 30 mm
    - **MP/MPS**
      
      Y342
      Page 422
  - 60 mm
    - **LME**
      
      Y325
      Page 424
- Modular system
  - 50 mm
    - **LU5**
      
      Y322
      Page 415
  - 70 mm
    - **LU7**
      
      Y323
      Page 419

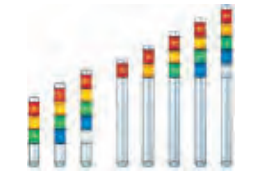
# Selection table

| Category | | | Pushbutton switch | |
|---|---|---|---|---|
| | | |  |  |
| Model | | | A16 | A22 |
| Selection criteria | | Mounting | Nut-mounting | |
| | | Size | 16 mm | 22 mm |
| | | Shape |  |  |
| Pushbutton color | Incandescent lamp-lighted | Red | ■ | ■ |
| | | Yellow | ■ | ■ |
| | | Pure yellow | ■ | |
| | | Green | ■ | ■ |
| | | White | ■ | ■ |
| | | Blue | ■ | ■ |
| | LED-lighted | Red | ■ | ■ |
| | | Yellow | ■ | ■ |
| | | Pure yellow | ■ | |
| | | Green | ■ | ■ |
| | | White | ■ | ■ |
| | | Blue | ■ | ■ |
| | Non-lighted | Red | ■ | ■ |
| | | Yellow | ■ | ■ |
| | | Green | ■ | ■ |
| | | White | ■ | ■ |
| | | Blue | ■ | ■ |
| | | Black | ■ | ■ |
| Features | | Momentary operation | ■ | ■ |
| | | Self-holding | ■ | ■ |
| | | Number of contacts | 2 | 6 |
| | | IP rating | IP65 | |
| | | Legend plate | ■ | ■ |
| Switch ratings [A] | | 125 VAC | 5 | 10 |
| | | 250 VAC | 3 | 6 |
| | | 30 VDC | 3 | 10 |
| | | Rated load | 5 A at 125 VAC,<br>3 A at 250 VAC,<br>3 A at 30 VDC | 10 A at 110 VAC,<br>6 A at 220 VAC |
| Terminals | | Solder | ■ | – |
| | | PCB | – | – |
| | | Screw-less Clamp | – | – |
| Operating voltage | | 5 VDC | ■ | ■ |
| | | 12 VDC | ■ | ■ |
| | | 24 VDC | ■ | ■ |
| Form | | SPDT | ■ | – |
| | | DPDT | ■ | – |
| | | SPST-NO | – | ■ |
| | | SPST-NC | – | ■ |
| | | SPST-NO + SPST-NC | – | ■ |
| | | DPST-NO | – | ■ |
| | | DPST-NC | – | ■ |
| | | Page/Quick Link | 406 | 409 |

| Category | | | Emergency stop pushbutton switches | |
|---|---|---|---|---|
| | | |  |  |
| Model | | | A165E | A22E |
| Selection criteria Features | | Housing | Plastic | |
| | | Protection class | IP65 | |
| | | Operating temperature range | –10 to 55°C | –20 to 70°C |
| | | Head size | 30 mm, 40 mm | 30 mm, 40 mm, 60 mm |
| | | Conformity | EN 60947-5-1 | |
| | | Max. rope span | – | |
| | | Conduit size M20 | – | |
| | | Additional E-Stop button | – | |
| | | LED indicator beacon | – | |
| | | Stainless steel housing | – | |
| | | Explosion proof housing | – | |
| | | Lighted head | ■ | |
| | | Push lock – pull reset | – | ■ |
| | | Push lock – turn reset | ■ | |
| Application | | E-Stop application | ■ | |
| | | General safety application | ■ | |
| Contact configuration | | SPST (NC) | ■ | |
| | | DPST (NC) | ■ | |
| | | SPST (NO) + SPST (NC) | – | ■ |
| | | TPST (NC) | ■ | – |
| | | Page/Quick Link | 408 | 411 |

■ Standard ☐ Available – No/not available

| Category | | Rope pull switches | | | |
|---|---|---|---|---|---|
| | |  |  |  |  |
| Model | | ER 5018 | ER 6022 | ER 1022 | ER 1032 |
| Selection criteria | Housing | Metal | | | |
| | Protection class | IP67 | | | |
| | Operating temperature range | –25 to 80°C | | | |
| | Head size | – | | | |
| | Conformity | EN60947-5-1:2004, EN60947-5-5:1997+A1:2005; EN60204-1; EN ISO 13850:2006 | | | |
| Features | Max. rope span | 40 m | 80 m | 125 m | 200 m |
| | Conduit size M20 | ■ | | | |
| | Additional E-Stop button | ■ | | | |
| | LED indicator beacon | – | ■ | ■ | ■ |
| | Stainless steel housing | – | Available | – | – |
| | Explosion proof housing | – | ■ | ■ | ■ |
| | Lighted head | – | | | |
| | Push lock – pull reset | – | | | |
| | Push lock, turn reset | – | | | |
| | Push lock, lock key reset | – | | | |
| Application | E-Stop application | ■ | | | |
| | General safety application | ■ | | | |
| Contact configuration | 2NC+1NO | ■ | ■ | – | – |
| | 3NC | ■ | ■ | – | – |
| | 4NC+2NO | – | – | ■ | ■ |
| | Page/Quick Link | 412 | | | |

| Category | Signalling devices | | | |
|---|---|---|---|---|
| |  |  |  |  |
| | MP/MPS | LME | LU5 | LU7 |
| System | monolithic | | modular | |
| Diameter | 30 mm | 60 mm | 50 mm | 70 mm |
| LED technology | ■ | ■ | ■ | ■ |
| Sound system | – | ■ | ■ | ■ |
| IP65 | ■ | ■ | ■ | ■ |
| Maximum modules | 5 | 5 | 5 | 5 |
| Input voltage 24 VDC | ■ | ■ | ■ | ■ |
| Unit color | silver | white or silver or black | white or silver | white or silver or black |
| Page/Quick Link | 422 | 424 | 415 | 419 |

## 16 mm pushbutton switch

These sub-assembled pushbutton switches have a modular construction: pushbutton + case + lamp (if applicable) + switch. A16 is a nut-mounted pushbutton switch with a short mounting depth of less than 28.5 mm below panel.

- Wide variety of control and signal devices: lighted, non-lighted and buzzer
- Quick and easy assembly, snap-in switch
- Wide range of switching capacity from standard load to micro load
- High reliability, IP65
- UL, cUL, CSA and VDE approved, conforms to EN60947-5-1 and IEC947-5-1

## Ordering information

| Type | Color | Order code | | |
|---|---|---|---|---|
| | | Degree of protection: Oil-resistant IP65 | | |
| | | Rectangular | Square | Round |
| Non-lighted<br>LED<br>Incandescent lamp | Red | A165L-JR | A165L-AR | A165L-TR |
| | Yellow | A165L-JY | A165L-AY | A165L-TY |
| | Pure yellow | A165L-JPY | A165L-APY | A165L-TPY |
| | White | A165L-JW | A165L-AW | A165L-TW |
| | Blue | A165L-JA | A165L-AA | A165L-TA |
| Non-lighted | Black | A165L-JB | A165L-AB | A165L-TB |
| LED | Green | A165L-TGY | A165L-AGY | A165L-TGY |
| Non-lighted/incandescent lamp | Green | A165L-JG | A165L-AG | A165L-TG |

### Cases

| Appearance | Classification | | Order code |
|---|---|---|---|
| | | | Oil-resistant IP65 |
|  | Momentary operation | Rectangular (2-way guard) | A165-CJM |
| | | Square | A165-CAM |
| | | Round | A165-CTM |
| | Alternate operation | Rectangular (2-way guard) | A165-CJA |
| | | Square | A165-CAA |
| | | Round | A165-CTA |

### Switches

| Appearance | Classification | | | | Order code |
|---|---|---|---|---|---|
|  | Lighted/ non-lighted (common use) | Standard load/ microload (common use) | SPDT | Solder terminal | A16-1 |
| | | | DPDT | | A16-2 |
|  | | | SPDT | PCB terminal | A16-1P |
| | | | DPDT | | A16-2P |
|  | | | DPDT | Screw-less clamp | A16-2S |

### Switches with reduced voltage lighting

| Appearance | Classification | | | | Order code |
|---|---|---|---|---|---|
|  | 100 V | Standard load/ microload (common use) | SPDT | Solder terminal | A16-T1-1 |
| | | | DPDT | | A16-T1-2 |
|  | 100 V | | DPDT | Screw-less clamp | A16-T1-2S |
| | 200 V | | | | A16-T2-2S |

### Lamps

| Type | Color | Order code | | |
|---|---|---|---|---|
| | | 5 VDC | 12 VDC | 24 VDC |
| LED | Red | A16-5DSR | A16-12DSR | A16-24DSR |
| | Yellow | A16-5DSY | A16-12DSY | A16-24DSY |
| | Green | A16-5DSG | A16-12DSG | A16-24DSG |
| | White *1 | A16-5DSW | A16-12DSW | A16-24DSW |
| | Blue | A16-5DA | A16-12DA | A16-24DA |
| Type | | 5 VAC/VDC | 12 VAC/VDC | 24 VAC/VDC |
| Incandescent lamp | | A16-5 | A16-12 | A16-24 |

*1 Use the white LED together with white or pure yellow pushbuttons.

## Accessories

| Name | Appearance | Classification | Remarks | Order code |
|---|---|---|---|---|
| Switch guards |  | For rectangular models | Cannot be used with the dust cover | A16ZJ-5050 |
| | | For square and round models | | A16ZA-5050 |
| Dust covers |  | For rectangular models | Cannot be used with the switch guard | A16ZJ-5060 |
| | | For square models | | A16ZA-5060 |
| | | For round models | | A16ZT-5060 |
| Panel plugs |  | For rectangular models | Used for covering the panel cutouts for future panel expansion | A16ZJ-3003 |
| | | For square models | | A16ZA-3003 |
| | | For round models | | A16ZT-3003 |

## Specifications

| | | |
|---|---|---|
| **Allowable operating frequency** | **Mechanical** | Momentary operation: 120 operations/minute max.<br>Alternate operation: 60 operations/minute max. |
| | **Electrical** | 20 operations/minute max. |
| **Durability** | **Mechanical** | Momentary operation: 2,000,000 operations min.<br>Alternate operation: 200,000 operations min. |
| | **Electrical** | 100,000 operations min. |
| **Ambient temperature** | | Operating: −10 to 55°C (with no icing or condensation)<br>Storage: −25 to 65°C (with no icing or condensation) |
| **Weight** | | Approx. 10 g (in the case of a lighted DPDT switch with solder terminals) |
| **Size in mm (H×W×D)** | | Round/square:18×18×28.5<br>rectangular:18×24×28.5 |

| **Operating characteristics** | **Pushbutton switch** | |
|---|---|---|
| | **Oil-resistant IP65** | |
| | **SPDT** | **DPDT** |
| **Operating force (OF) max.** | 2.94 N | 4.91 N |
| **Releasing force (RF) min.** | 0.29 N | |
| **Total travel (TT)** | Approx. 3 mm | |
| **Pretravel (PT) max.** | 2.5 mm | |
| **Lock stroke (LTA) min.** | 0.5 mm | |

| **Item** | | **Screw-less clamp** | | | |
|---|---|---|---|---|---|
| **Recommended wire size** | | 0.5 $mm^2$ twisted wire or 0.8 mm dia. solid wire | | | |
| **Usable wires and tensile strength** | **Twisted wire** | 0.3 $mm^2$ | 0.5 $mm^2$ | 0.75 $mm^2$ | 1.25 $mm^2$ |
| | **Solid wire** | 0.5 mm dia. | 0.8 mm dia. | 1.0 mm dia. | |
| | **Tensile strength** | 10 N | 20 N | 30 N | 40 N |
| **Length of exposed wire** | | 10 ±1 mm | | | |

## Emergency stop switch

The A165E line-up offers E-Stop switches with various head types. For flexible application, a wide range of accessories is provided. To set up easy installation and maintenance, various contact combinations are available.

- Direct opening mechanism with minimum contact separation of 3 mm
- Safety lock mechanism prevents misuse
- Short mounting depth
- Modular construction; easy installation using snap-in switch

## Ordering information

| Switches | Rated voltage | Pushbutton color | Pushbutton size | Terminal | Contact | Order code |
|---|---|---|---|---|---|---|
| | | | | | | Standard load (125 VAC at 5 A, 250 VAC at 3 A, 30 VDC at 3 A) |
| LED | 24 VDC | Red | 30 dia. | Solder terminal | SPST-NC | A165E-LS-24D-01 |
| | | | | | DPST-NC | A165E-LS-24D-02 |
| None | – | | | | SPST-NC | A165E-S-01 |
| | | | | | DPST-NC | A165E-S-02 |
| | | | | | TPST-NC | A165E-S-03U |
| LED | 24 VDC | | 40 dia. | | SPST-NC | A165E-LM-24D-01 |
| | | | | | DPST-NC | A165E-LM-24D-02 |
| None | – | | | | SPST-NC | A165E-M-01 |
| | | | | | DPST-NC | A165E-M-02 |
| | | | | | TPST-NC | A165E-M-03U |

**Note:** The above models have a surface indication of "RESET." Models with "STOP" indication are also available. For further information, contact your Omron representative.

### Accessories (order separately)

| Item | Type | Precautions | Order code |
|---|---|---|---|
| Yellow plate | Yellow, 45 dia. | Use this as an emergency stop nameplate. | A16Z-5070 |
| Panel plug | Round | Used for covering the panel cutouts for future panel expansion. | A16ZT-3003 |
| Tightening tool | – | Useful for repetitive mounting. Be careful not to tighten excessively. | A16Z-3004 |
| Extractor | – | Convenient for extracting the switch and lamp. | A16Z-5080 |

## Specifications

| Rated voltage | Resistive load | |
|---|---|---|
| | A165E series | A165E_-U series |
| 125 VAC | 5 A | 1 A |
| 250 VAC | 3 A | 0.5 A |
| 30 VDC | 3 A | 1 A |
| Minimum applicable load | 150 mA at 5 VDC | 1 mA at 5 VDC |

| Features | Characteristics |
|---|---|
| Operating force (OF) max. | 14.7 N |
| Releasing force (RF) min. | 0.1 N·m |
| Pretravel (PT) | 3.5±0.5 mm<br>(3±0.5 mm In case of A165E_U series) |

| Item | | Emergency stop switch |
|---|---|---|
| Allowable operating frequency | Mechanical | 20 operations/minute max. |
| | Electrical | 10 operations/minute max. |
| Insulation resistance | | 100 MΩ min. (at 500 VDC) |
| Dielectric strength | | 1,000 VAC, 50/60 Hz for 1 min between terminals of same polarity<br>2,000 VAC, 50/60 Hz for 1 min between terminals of different polarity and also between each terminal and ground<br>1,000 VAC, 50/60 Hz for 1 min between lamp terminals *1 |
| Durability | Mechanical | 100,000 operations min. |
| | Electrical | 100,000 operations min. |
| Ambient temperature | | Operating: –10 to 55°C (with no icing or condensation)<br>Storage: –25 to 65°C (with no icing or condensation) |
| Protection against electric shock | | Class II |

*1 LED not mounted. Test them with the LED removed.

## 22 mm pushbutton switch

A22 comes in a wide variety of shapes and colors and is installable in 22-dia. or 25-dia. panel cutouts. The switch unit can easily be mounted. A22 is mounted using either open-type (fork-type) or closed-type (round-type) crimp terminals.

- Finger-protection mechanism on switch unit provided as standard feature
- Increased wiring efficiency with three-row mounting of switch blocks
- IP65 oil-resistant (non-lighted models), IP65 (lighted models)
- Lighted and non-lighted, flat, projection and half- and full-guard versions
- EN60947-5-1, UL and cUL approved

## Ordering information

### Pushbutton

| Illumination | Color | Order code | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Flat type | Projection type | Full-guard type | Half-guard type | Square/ projection type | Square/ full-guard type | Round/ mushroom type (30-dia. head) | Round/ mushroom type (40-dia. head) |
| | |  |  |  |  |  |  |  |  |
| Non-lighted | Red | A22-FR | A22-TR | A22-GR | A22-HR | A22-CR | A22-DR | A22-SR | A22-MR |
| | Green | A22-FG | A22-TG | A22-TG | A22-HG | A22-CG | A22-DG | A22-SG | A22-MG |
| | Yellow | A22-FY | A22-TY | A22-GY | A22-HY | A22-CY | A22-DY | A22-SY | A22-MY |
| | White | A22-FW | A22-TW | A22-GW | A22-HW | A22-CW | A22-DW | A22-SW | A22-MW |
| | Blue | A22-FA | A22-TA | A22-GA | A22-HA | A22-CA | A22-DA | A22-SA | A22-MA |
| | Black | A22-FB | A22-TB | A22-GB | A22-HB | A22-CB | A22-DB | A22-SB | A22-MB |
| Lighted | Red | – | A22L-TR | A22L-GR | A22L-HR | A22L-CR | A22L-DR | – | – |
| | Green | – | A22L-TG | A22L-GG | A22L-HG | A22L-CG | A22L-DG | – | – |
| | Yellow | – | A22L-TY | A22L-GY | A22L-HY | A22L-CY | A22L-DY | – | – |
| | White | – | A22L-TW | A22L-GW | A22L-HW | A22L-CW | A22L-DW | – | – |
| | Blue | – | A22L-TA | A22L-GA | A22L-HA | A22L-CA | A22L-DA | – | – |
| Buttonsize in mm | | 29.7 dia. × 12D | 29.7 dia. × 19D | 29.7 dia. × 19D | 29.7 dia. × 12/18.5D | 29.8 $mm^2$ × 18D | 29.8 $mm^2$ × 18D | 30 dia. × 32D | 40 dia. × 32D |

### Switches

| Switch operation | Contacts | Oder code | | | |
|---|---|---|---|---|---|
| | | Non-lighted models | Lighted models | | |
| | | Without voltage reduction unit | | With voltage reduction unit | |
| | | | | 110 VAC | 220 VAC |
| | |  |  |  |  |
| Momentary | SPST-NO | A22-10M | A22L-10M | A22L-10M-T1 | A22L-10M-T2 |
| | SPST-NC | A22-01M | A22L-01M | A22L-01M-T1 | A22L-01M-T2 |
| | SPST-NO + SPST-NC | A22-11M | A22L-11M | A22L-11M-T1 | A22L-11M-T2 |
| | DPST-NO | A22-20M | A22L-20M | A22L-20M-T1 | A22L-20M-T2 |
| | DPST-NC | A22-02M | A22L-02M | A22L-02M-T1 | A22L-02M-T2 |
| Alternate | SPST-NO | A22-10A | A22L-10A | A22L-10A-T1 | A22L-10A-T2 |
| | SPST-NC | A22-01A | A22L-01A | A22L-01A-T1 | A22L-01A-T2 |
| | SPST-NO + SPST-NC | A22-11A | A22L-11A | A22L-11A-T1 | A22L-11A-T2 |
| | DPST-NO | A22-20A | A22L-20A | A22L-20A-T1 | A22L-20A-T2 |
| | DPST-NC | A22-02A | A22L-02A | A22L-02A-T1 | A22L-02A-T2 |

### Switch blocks

| | Standard load | Order code |
|---|---|---|
| Switch blocks | SPST-NO | A22-10 |
|  | SPST-NC | A22-01 |
| | DPST-NO | A22-20 |
| | DPST-NC | A22-02 |

### Lamp – LED

| AC/DC | LED light | Order code | | | |
|---|---|---|---|---|---|
| | | Operating voltage | | | |
| | | 6 V | 12 V | 24 V | 24 V superbright |
| DC | Red | A22-6DR | – | – | – |
| | Green | A22-6DG | – | – | – |
| | Yellow *1 | A22-6DY | – | – | – |
| | Blue | A22-6DA | – | – | – |
| AC | Red | A22-6AR | – | – | – |
| | Green | A22-6AG | – | – | – |
| | Yellow *1 | A22-6AY | – | – | – |
| | Blue | A22-6AA | – | – | – |
| AC and DC | Red | – | A22-12AR | A22-24AR | A22-24ASR |
| | Green | – | A22-12AG | A22-24AG | A22-24ASG |
| | Yellow *1 | – | A22-12AY | A22-24AY | A22-24ASY |
| | Blue | – | A22-12AA | A22-24AA | A22-24ASA |

*1 Used when the pushbutton color is yellow or white

### Lamp - incandescent lamp

| Order code | | |
|---|---|---|
| Operating voltage | | |
| 5 VAC/VDC | 12 VAC/VDC | 24 VAC/VDC |
| A22-5 | A22-12 | A22-24 |

## Accessories

| Item | | | | Remarks | Order code |
|---|---|---|---|---|---|
| Lamp sockets | Direct lighting | | | Used when changing the lighting method (LED only) | A22-TN |
| | Voltage-reduction lighting | | 220 VAC | | A22-T2 |
| Mounting latches | For momentary models | | | Order mounting latches only when mounting switch blocks or lamp sockets are purchased individually | A22-3200 |
| Legend plate frames | Large size | With snap-in legend plate, without text, black | | Snap-in legend plate is acrylic | A22Z-3333 |
| | | Without snap-in legend plate | | | A22Z-3330 |
| Sealing caps | For projection models | | | Used to prevent dust or water from entering the operation unit (pushbutton, etc.), color: Opaque, material: Silicon | A22Z-3600T |
| Three-throw spacer | | | | Used when mounting three non-lighted switches | A22Z-3003 |
| Control boxes (enclosures) | Exclusively for A22 | | One hole | Do not use DPST-NO or DPST-NC switches, material: Polycarbonate resin | A22Z-B101 |
| | | | Two holes | | A22Z-B102 |
| | | | Three holes | | A22Z-B103 |
| Snap-in legend plates | Standard size | Without text | White | Attached to the standard-size legend plate frame, material: Acrylic | A22Z-3443W |
| | | | Transparent | | A22Z-3443C |
| | | White text on black background | ON | | A22Z-3443B-5 |
| | | | OFF | | A22Z-3443B-6 |
| | | | DOWN | | A22Z-3443B-8 |
| | | | POWER ON | | A22Z-3443B-9 |
| | Large size | Without text | White | Attached to the large-size legend plate frame, material: Acrylic | A22Z-3453W |
| | | | Transparent | | A22Z-3453C |
| | For emergency stop switch | 60-dia. round plate with black letters on a yellow background | | "EMERGENCY STOP" is engraved on the plate. Used as an emergency stop switch legend plate | A22Z-3466-1 |
| | | 90-dia. round plate with black letters on a yellow background | | | A22Z-3476-1 |
| Lamp extractor | | | | Rubber tool used to easily replace lamps | A22Z-3901 |
| Tightening wrench | | | | Tool used to tighten nuts from the back of the panel | A22Z-3905 |

## Specifications

| Recognized organization | Standards | File number |
|---|---|---|
| UL, cUL | UL508 | E41515 |
| – | EN60947-5-1 | – |

### Contact ratings (standard load)

| Rated carry current (A) | Rated voltage | Rated current (A) | | | |
|---|---|---|---|---|---|
| | | AC15 (inductive load) | AC12 (resistive load) | DC13 (inductive load) | DC12 (resistive load) |
| 10 | 24 VAC | 10 | 10 | – | – |
| | 110 VAC | 5 | 10 | – | – |
| | 220 VAC | 3 | 6 | – | – |
| | 380 VAC | 2 | 3 | – | – |
| | 440 VAC | 1 | 2 | – | – |
| | 24 VDC | – | – | 1,5 | 10 |
| | 110 VDC | – | – | 0,5 | 2 |
| | 220 VDC | – | – | 0,2 | 0,6 |
| | 380 VDC | – | – | 0,1 | 0,2 |

### Contacts (microload)

| Rated applicable load | Minimum applicable load |
|---|---|
| 50 mA at 5 VDC (resistive load) | 1 mA at 5 VDC |

### LED indicators without voltage reduction unit

| Rated voltage | Rated current | Operating voltage |
|---|---|---|
| 6 VDC | 60 mA (20 mA) | 6 VDC ±5% |
| 6 VAC | 60 mA (20 mA) | 6 VAC/VDC ±5% |
| 12 VAC/VDC | 30 mA (10 mA) | 12 VAC/VDC ±5% |
| 24 VAC/VDC | 15 mA (10 mA) | 24 VAC/VDC ±5% |

### Super-bright LED indicator

| Rated voltage | Rated current | Operating voltage |
|---|---|---|
| 24 VAC/VDC | 15 mA | 24 VAC/VDC ±5% |

### Incandescent lamp

| Rated voltage | Rated current | Operating voltage |
|---|---|---|
| 6 VAC/VDC | 200 mA | 5 VAC/VDC |
| 14 VAC/VDC | 80 mA | 12 VAC/VDC |
| 28 VAC/VDC | 40 mA | 24 VAC/VDC |
| 130 VAC/VDC | 20 mA | 100 VAC/VDC |

### Voltage-reduction lighting

| Rated voltage | Operating voltage | Applicable lamp (BA8S/13_ gold) |
|---|---|---|
| 110 VAC | 95 to 115 VAC | LED Lamp (A22-24A_) |
| 220 VAC | 190 to 230 VAC | |

| Item | | Pushbutton switches | | Emergency stop switches | | Knob-type selector switches | | Key-type selector switch |
|---|---|---|---|---|---|---|---|---|
| | | Non-lighted | Lighted | Non-lighted | Lighted | Non-lighted | Lighted | Non-lighted |
| Allowable operating frequency | Mechanical | Momentary operation: 60 operations/minute max. | | 30 operations/minute max. | | Manual release: 30 operations/minute max., automatic release: 30 operations/minute max. | | |
| | Electrical | 30 operations/minute max. | | | | 30 operations/minute max. | | |
| Durability (number of operations min.) | Mechanical | Momentary operation: 5,000,000 | | Momentary operation: 300,000 | | 500,000 | 100,000 | 500,000 |
| | Electrical | 500,000 | | 300,000 | | 500,000 | 100,000 | 500,000 |
| Ambient temperature | Operating | –20 to 70°C | –20 to 55°C | –20 to 70°C | –20 to 55°C | –20 to 70°C | –20 to 55°C | –20 to 70°C |
| | Storage | –40 to 70°C | –40 to 70°C | –40 to 70°C | –40 to 70°C | –40 to 70°C | –40 to 70°C | –40 to 70°C |
| Degree of protection | | IP65 (oil-resistant) | IP65 | IP65 (oil-resistant) | IP65 | IP65 (oil-resistant) | IP65 | IP65 (oil-resistant) |
| Size in mm (in-panel only) | | 34H × 34W × 54.7D, 34H × 34W × 72.7D for DPST switches | | | | | | |

## Emergency stop switch

The A22E line-up of E-Stop switches offers various head types as well as lighted models. E-stop shrouds and control boxes as accessories provide flexibility in application.

- Direct opening mechanism with minimum contact separation of 3 mm
- Safety lock mechanism prevents misuse
- Easy mounting of switch block
- Lighted models for easy diagnosis and maintenance
- Modular design for flexibility in application

## Ordering information

### Non-lighted models

| Description | Output | Color of cap | Order code |
|---|---|---|---|
| 30-dia. head Push-lock Turn-reset | SPST-NC | Red | A22E-S-01 |
| | SPST-NO/SPST-NC | | A22E-S-11 |
| | DPST-NC | | A22E-S-02 |
| 40-dia. head Push-lock Turn-reset | SPST-NC | | A22E-M-01 |
| | SPST-NO/SPST-NC | | A22E-M-11 |
| | DPST-NC | | A22E-M-02 |
| 60-dia. head Push-lock Turn-reset | SPST-NC | | A22E-L-01 |
| | SPST-NO/SPST-NC | | A22E-L-11 |
| | DPST-NC | | A22E-L-02 |

### Lighted models

| Description | Output | Lighting | Rated voltage | Color of cap | Order code |
|---|---|---|---|---|---|
| 40-dia. head Push-lock Turn-reset | SPST-NC | LED | 24 VAC/VDC | Red | A22EL-M-24A-01 |
| | SPST-NO/SPST-NC | | 24 VAC/VDC | | A22EL-M-24A-11 |
| | DPST-NC | | 24 VAC/VDC | | A22EL-M-24A-02 |
| 40-dia. head Push-lock Turn-reset | SPST-NC | | 220 VAC | | A22EL-M-T2-01 |
| | SPST-NO/SPST-NC | | 220 VAC | | A22EL-M-T2-11 |
| | DPST-NC | | 220 VAC | | A22EL-M-T2-02 |

### Accessories (Order separately)

| Item | Classification | Remarks | Order code |
|---|---|---|---|
| Control boxes (enclosures) | One hole | Material: Polycarbonate resin | A22Z-B101 |
| | One hole, yellow box (for emergency stop) | | A22Z-B101Y |
| | Two holes | | A22Z-B102 |
| | Three holes | | A22Z-B103 |
| Legend plates for emergency stop | 60-dia. black letters on yellow back-ground | "EMERGENCY STOP" is indicated on the plate. | A22Z-3466-1 |
| | 90-dia. black letters on yellow back-ground | | A22Z-3476-1 |
| Lock plate | Locks the mounting latch of the switch assembly | – | A22Z-3380 |

## Specifications

### Contacts (standard load)

| Rated carry current | Rated voltage | Rated current (A) | | | |
|---|---|---|---|---|---|
| | | AC15 | AC12 | DC13 | DC12 |
| 10 | 24 VAC | 10 | 10 | – | – |
| | 220 VAC | 3 | 6 | | |
| | 24 VDC | – | – | 1.5 | 10 |
| | 220 VDC | | | 0.2 | 0.6 |

Note
1. Rated current values are determined according to the testing conditions. The above ratings were obtained by conducting tests under the following conditions.
(1) Ambient temperature: 20×±2°C
(2) Ambient humidity: 65%±5%
(3) Operating frequency: 20 operations/minute
2. Minimum applicable load: 10 mA at 5 VDC

### Contacts (microload)

| Rated applicable load | Minimum applicable load |
|---|---|
| 50 mA at 5 VDC (resistive load) | 1 mA at 5 VDC |

## Characteristics

| Item | | Emergency stop switches | |
|---|---|---|---|
| | | Non-lighted model: A22E | Lighted model: A22EL |
| Dielectric strength | | 2,500 VAC, 50/60 Hz for 1 min between terminals of same polarity<br>2,500 VAC, 50/60 Hz for 1 min between terminals of different polarity and also between each terminal and ground | |
| Durability | Mechanical | Momentary operation: 300,000 operations min. | |
| | Electrical | 300,000 operations min. | |
| Degree of protection | | IP65 (oil-resistant) | IP65 |

## Emergency stop switch

- Tension indicator – the tension indicator makes the system easy to set up and to maintain the proper rope tension
- Heavy-duty housing – the die-cast housing and stainless steel eye nut makes the ER-series rope pull switches suitable for demanding industrial applications
- Vibration tolerant – the snap-acting switch contacts protect against nuisance tripping due to vibration
- Integral E-stop – the E-stop button provides emergency stopping capability at the extreme end of the installation and is field serviceable
- ER6022 available in stainless steel housing
- ER6022, ER1022 and ER1032 available in explosion proof housing

## Ordering information

### Standard models

#### Aluminum die-cast housing

| E-Stop | Indicator beacon | Contacts | Wiring entry | Order code |
|---|---|---|---|---|
| Not included | – | 2 N/C + 1 N/O | 3 × M20 | 44506-4010 ER5018-021M |
| Not included | – | 3 N/C | 3 × M20 | 44506-4030 ER5018-030M |
| Included | – | 2 N/C + 1 N/O | 3 × M20 | 44506-4110 ER5018-021ME |
| Included | – | 3 N/C | 3 × M20 | 44506-4130 ER5018-030ME |
| Not included | Not included | 2 N/C + 1 N/O | 3 × M20 | 44506-5010 ER6022-021M |
| Not included | Not included | 3 N/C + 1 N/O | 3 × M20 | 44506-5050 ER6022-031M |
| Not included | Included (24 VDC) | 2 N/C + 1 N/O | 3 × M20 | 44506-5110 ER6022-021ML |
| Not included | Included (24 VDC) | 3 N/C + 1 N/O | 3 × M20 | 44506-5150 ER6022-031ML |
| Included | Not included | 2 N/C + 1 N/O | 3 × M20 | 44506-5210 ER6022-021ME |
| Included | Not included | 3 N/C + 1 N/O | 3 × M20 | 44506-5250 ER6022-031ME |
| Included | Included (24 VDC) | 2 N/C + 1 N/O | 3 × M20 | 44506-5410 ER6022-021MEL |
| Included | Included (24 VDC) | 3 N/C + 1 N/O | 3 × M20 | 44506-5450 ER6022-031MEL |
| Included | Included (24 VDC) | 4 N/C + 2 N/O | 4 × M20 | 44506-6410 ER1022-042MELL |
| Included | Included (24 VDC) | 4 N/C + 2 N/O | 4 × M20 | 44506-6510 ER1022-042MELR |
| Included | Included (24 VDC) | 4 N/C + 2 N/O | 4 × M20 | 44506-7410 ER1032-042MEL |

#### Stainless steel housing

| E-Stop | Indicator beacon | Contacts | Wiring entry | Order code |
|---|---|---|---|---|
| Not included | Not included | 2 N/C + 2 N/O | 3 × M20 | 44506-5810 ER6022-022MSS |
| Not included | Not included | 3 N/C + 1 N/O | 3 × M20 | 44506-5830 ER6022-031MSS |
| Not included | Included | 2 N/C + 2 N/O | 3 × M20 | 44506-5910 ER6022-022MLSS |
| Not included | Included | 3 N/C + 1 N/O | 3 × M20 | 44506-5930 ER6022-031MLSS |
| Included | Not included | 2 N/C + 2 N/O | 3 × M20 | 44506-5850 ER6022-022MESS |
| Included | Not included | 3 N/C + 1 N/O | 3 × M20 | 44506-5870 ER6022-031MESS |
| Included | Included | 2 N/C + 2 N/O | 3 × M20 | 44506-5950 ER6022-022MELSS |
| Included | Included | 3 N/C + 1 N/O | 3 × M20 | 44506-5970 ER6022-031MELSS |

### Explosion proof models

#### Aluminum die-cast housing

| E-Stop | Indicator beacon | Contacts | Wiring entry | Order code |
|---|---|---|---|---|
| Not included | Not included | 1 N/C + 1 N/O | pre-wired, 3 m | 44506-5600 XER6022-011C3 |
| Not included | Not included | 1 N/C + 1 N/O | pre-wired, 3 m | 44506-6600 XER1022-011C3L |
| Not included | Not included | 1 N/C + 1 N/O | pre-wired, 3 m | 44506-6610 XER1022-011C3R |
| Not included | Not included | 1 N/C + 1 N/O | pre-wired, 3 m | 44506-7600 XER1032-011C3 |

#### Stainless steel housing

| E-Stop | Indicator beacon | Contacts | Wiring entry | Order code |
|---|---|---|---|---|
| Not included | Not included | 1 N/C + 1 N/O | pre-wired, 3 m | 44506-5610 XER6022-011C3SS |
| Not included | Not included | 2 N/C | pre-wired, 3 m | 44506-5620 XER6022-020C3SS |

### Accessories

| Item | Applicable model | Order code |
|---|---|---|
| Replacement Lid | ER5018 | 44506-3700 SM06-SL400 |
| | ER6022 | 44506-5700 SM06-SL500 |
| | ER6022-SS stainless steel | 44506-5730 SM06-SLXER6022SS |
| Replacement Lid/LED, 24 VDC | ER1022 | 44506-6710 SM06-SL710 |
| | ER1032 | 44506-7710 SM06-SL711 |
| | ER6022-SS stainless steel | 44506-5740 SLER6022LSS |

| Item | Applicable model | Order code |
|---|---|---|
| Replacement Lid/LED | ER6022 | 44506-5710 SM06-SL510 |
| Rope kit, 5 m, stainless steel | ER5018, ER6022, ER1022, ER1032 | 44506-2705 RK5 |
| Rope kit, 10 m, stainless steel | ER5018, ER6022, ER1022, ER1032 | 44506-2710 RK10 |
| Rope kit, 20 m, stainless steel | ER5018, ER6022, ER1022, ER1032 | 44506-2720 RK20 |
| Rope kit, 50 m, stainless steel | ER5018, ER6022, ER1022, ER1032 | 44506-2750 RK50 |
| Rope kit, 80 m, stainless steel | ER6022, ER1022, ER1032 | 44506-2780 RK80 |
| Rope kit 100 m, stainless steel | ER6022, ER1022, ER1032 | 44506-2711 RK100 |
| Rope kit 126 m, stainless steel | ER1032 | 44506-2726 RK126 |
| Rope only, 5 m | ER5018, ER6022, ER1022, ER1032 | 44506-3705 R5M |
| Rope only, 10 m | ER5018, ER6022, ER1022, ER1032 | 44506-3710 R10M |
| Rope only, 20 m | ER5018, ER6022, ER1022, ER1032 | 44506-3720 R20M |
| Rope only, 50 m | ER5018, ER6022, ER1022, ER1032 | 44506-3750 R50M |
| Rope only, 100 m | ER5018, ER6022, ER1022, ER1032 | 44506-3711 R100M |
| Rope only, 126 m | ER5018, ER6022, ER1022, ER1032 | 44506-3726 R126M |
| Tensioner gripper, stainless steel | ER5018, ER6022, ER1022, ER1032 | 44506-4700 SM06-TG00 |
| Eye bolt stainless steel, 8 per pack | ER5018, ER6022, ER1022, ER1032 | 44506-4710 SM06-EB10 |
| Double loop clip, stainless steel, 4 per pack | ER5018, ER6022, ER1022, ER1032 | 44506-4720 SM06-DL20 |
| Thimble stainless steel, 4 per pack | ER5018, ER6022, ER1022, ER1032 | 44506-4770 SM06-THSS |
| Turnbuckle, stainless steel | ER5018, ER6022, ER1022, ER1032 | 44506-4730 SM06-TB30 |
| Spring, stainless steel | ER5018, ER6022, ER1022, ER1032 | 44506-4750 SM06-SP50 |
| Rope pulley, stainless steel | ER5018, ER6022, ER1022, ER1032 | 44506-4780 SM06-RPSS |
| E-Stop mechanism | ER5018, ER6022, ER1022, ER1032 | 44506-4760 SM06-ES60 |
| Yellow E-Stop Background Label | ER5018, ER6022, ER1022, ER1032 | 44506-4791 SM06-YLES |

## Specifications

### Standard models

| Item | | Applicable model | | | | |
|---|---|---|---|---|---|---|
| | | ER5018 | ER6022 | ER6022SS | ER1022 | ER1032 |
| Electrical | Contact configurations | 2 N/C + 1 N/O, 3 N/C | 2 N/C + 1 N/O, 3N/C + 1N/O | 3 N/C+1 N/O, 2 N/C+2 N/O | 4 N/C + 2 N/O | 4 N/C + 2 N/O |
| | Safety contacts | 2 N/C, 3 N/C | 2 N/C, 3 N/C | | 4 N/C | |
| | Switching ability | AC: 120 V–6 A, 240 V–3 A, inductive<br>DC: 24 V–2.5 A, inductive | | | | |
| | Auxiliary contacts | 1 N/O | | 1 N/O, 2 N/O | 2 N/O | |
| | Max. switching current/Volt/Amp | 240 V/720 VA | | | | |
| | Electrical life | 1,000,000 minimum | | | | |
| | LED indicator beacon | – | 24 VDC | | | |
| Mechanical | Max. rope span | 40 m | 80 m | 100 m | 125 m | 125 m each side |
| | Case material | Die-cast aluminum alloy | | Die-cast 316 stainless steel casing | Die-cast aluminum alloy | |
| | Eye nut material | Stainless steel | | | | |
| | Wiring entry | 3 × M20 | | | 4 × M20 | |
| | Mechanical life | 1,000,000 minimum | | | | |
| Environmental | Protection | IP67 (NEMA 6) | | | | |
| | Operating temperature | –25 to 80°C | | | | |
| | Cleaning | Water washdown | | | | |
| Compliance | Standards | EN60947-5-1:2004, EN60947-5-5:1997+A1:2005; EN60204-1; EN ISO 13850:2006 | | | | |
| | Approvals/listings | CE marked for all applicable directives, UL and C-UL | | | | |

### Explosion proof models

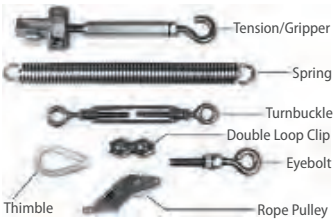
| Item | | | Applicable model | | |
|---|---|---|---|---|---|
| | | | XER6022 | XER1022 | XER1032 |
| Electrical | Contact configuration | | 1 N/C + 1 N/O, 2 N/C | | |
| | Safety contact | | 1 N/C, 2 N/C | | |
| | Auxiliary contact | | 1 N/O | | |
| | Rated voltage and current (AC15) | | 400 VAC/2 A AC, 250 VAC/4 A AC | | |
| | Rated voltage and current (DC) | | 250 VDC/0,15 A DC | | |
| | Switching ability AC ratings | Resistive load | 125 VAC/5 A, 250 VAC/5 A | | |
| | | Inductive load | 125 VAC/3 A, 250 VAC/3 A | | |
| | Switching ability DC ratings | Resistive load | 30 VDC/7 A, 250 VDC/0.15 A | | |
| | | Inductive load | 30 VDC/5 A, 250 VDC/0.03 A | | |
| Compliance | Ex-classification | | II 2 G EEx d II C T6 | | |
| | Certification | | PTB00 ATEX 1093X IBExU 01 ATEX 1007X | | |

## Accessories

### RK rope tension kit

The RK rope tension kit comes with all of the required hardware for most installations. A spring is required as shown in the installation example below.

### Installation Hardware




Individual hardware items may be purchased for specific installation requirements.

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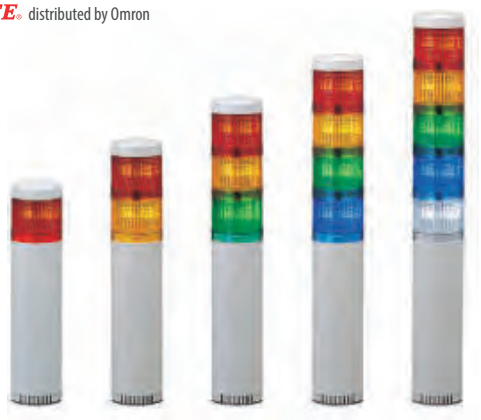


## Versatile modular signal tower featuring easy assembly and wiring designed for every need.

LU5 Series - Medium size modular system provides hybrid prism cut lens for enhanced visibility from any direction and distance and two selectable sound patterns up to 85 dB. Main features are the interchangeable LED modules and the color coordinated wiring for easy alignment.

- Diameter: 50 mm
- Base modules available in ivory white or in silver
- Up to 5 LED modules can be used on the light tower
- Modules of the same color operate from different terminals
- Two, user - selectable, alarms integrated in the base module with adjustable volume up to 85 dB at 1 m

## Ordering information

LED module

LU5-E-R
1 2

1. E: LED unit
2. Color of LED
   R: Red
   Y: Yellow
   G: Green
   B: Blue
   C : Clear/White

Base module

LU5-02UFB
1 2 3

1. Rated voltage
   02: 24 VDC
2. Unit color
   Blank: Ivory white
   U: Silver color
3. Type
   Blank: Continuous light
   FB: Continuous or flashing light with audible alarm

## Ordering information

### LED module

| Module color | Power consumption | Rated voltage | Operation voltage | Operation temperature range | Mass | Order code |
|---|---|---|---|---|---|---|
| Red | 52 mA/1.25 W | 24 VDC | Rated voltage ±10% (21.6~26.4 V) | –30°C~+60°C | 44 g ±10% | LU5-E-R |
| Yellow | | | | | | LU5-E-Y |
| Green | 42 mA/1.0 W | | | | | LU5-E-G |
| Blue | | | | | | LU5-E-B |
| Clear | | | | | | LU5-E-C |

### Base module

| Typ | Alarm/Flash | Power consumption | Rated voltage | Operation voltage | Operation temperature range | Mass | Open collector | Order code |
|---|---|---|---|---|---|---|---|---|
| Standard body | Continuous | 1.2 W | 24 VDC | Rated voltage ±10% (21.6 ~ 26.4 V) | -30°C~+60°C | 182g ±10% | PNP/ NPN | LU5-02*1 |
| | 2 Sounds/Flashlight | | | | | 200g ±10% | | LU5-02FB*1 |

*1 Ivory white: black, silver: add "U"

### Optional parts

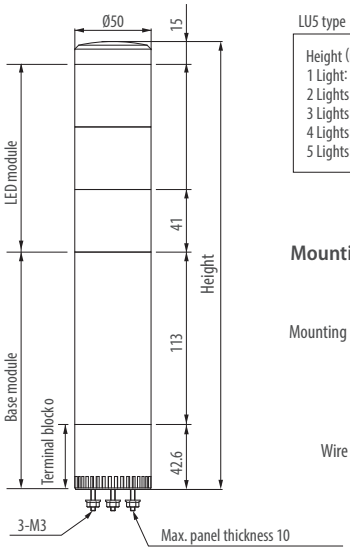
| Typ | Material | Order code |
|---|---|---|
| Wall mount bracket | Aluminum alloy die-cast | SZ-017 |
| | ABS resin | SZ-020 |
| Upper bracket | Metal | SZ-60NPT |
| | | SZ-60U |
| Mount bracket | Aluminum alloy die-cast | SZ-016A |
| | | SZ-70B |

| Typ | Height | Material | Order code |
|---|---|---|---|
| Pole | 100 mm | Aluminum | Pole-100A21 |
| | 300 mm | Aluminum | Pole-300A21 |
| | 800 mm | Aluminum | Pole-800A21 |

## Features

LED module is stackable and reconfigurable even after installation
IP 65: Implemented o rings seal out liquids so that the tower can be used in wet conditions.

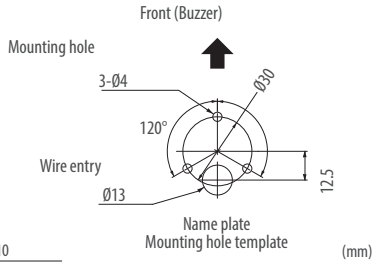
## Dimensions




LU5 type

| Height (mm) |
|---|
| 1 Light: 211 |
| 2 Lights: 252 |
| 3 Lights: 293 |
| 4 Lights: 334 |
| 5 Lights: 375 |

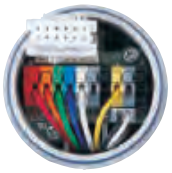
### Mounting dimension




(mm)

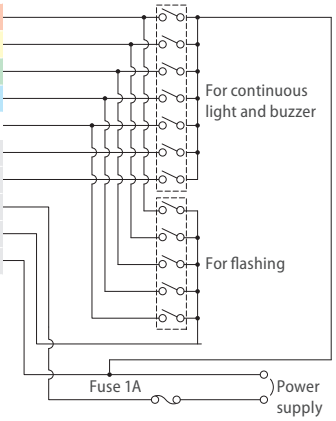
## Wiring diagram

LU5-02FB
24 VDC

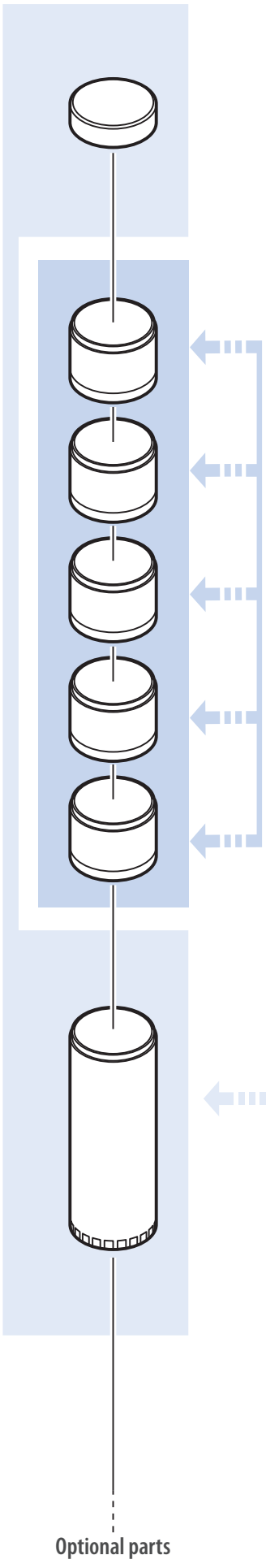


| | | |
|---|---|---|
| No.1 | Red | LED unit Red |
| No.2 | Orange | LED unit Yellow |
| No.3 | Green | LED unit Green |
| No.4 | Blue | LED unit Blue |
| No.5 | White | LED unit Clear/White |
| No.6 | Gray | Alarm 1 |
| No.7 | Black | Alarm 2 |
| No.8 | Yellow | COM |
| No.9 | Gray | Flashing COM |
| No.10 | Black | Power supply for flashing |

<Recommended electric wire>
Solid wire: 0.8-1.2 mm dia.
Stranded wire : 0.3-1.25 $mm^2$ (AWG 22-18)



## How to order




### LED units

| Model | LU5-E-R | LU5-E-Y | LU5-E-G | LU5-E-B | LU5-E-C |
|---|---|---|---|---|---|
| Unit color | | | | | |
| Rated voltage | 24 VDC | | | | |
| Operating voltage range | Rated voltage±10% (21.6~26.4 V) | | | | |
| Current/power consumption | 52 mA/1.25 W | | 42 mA/1.0 W | | |
| Operating temperature range | –30°C~+60°C | | | | |
| Mass | 44 g±10% | | | | |

RED YELLOW GREEN BLUE CLEAR/WHITE

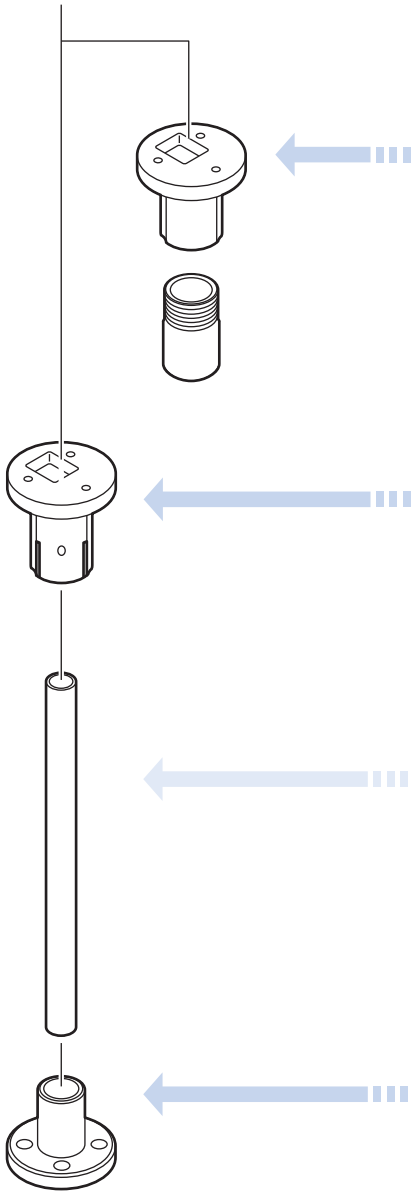
### BASE units

| Model | LU5-02 | LU5-02FB | |
|---|---|---|---|
| Color | | | |
| Standard body/short body | Standard | | |
| Rated voltage | 24 VDC | | |
| Operating voltage range | Rated voltage±10%(21.6~26.4 V) | | |
| Buzzer | – | *Buzzer 1 | **Buzzer 2 |
| Current consumption | – | 50±10 mA | 24±10 mA |
| Power consumption | – | 1.2±0.25 W | 0.58±0.25 W |
| Sound level | – | Max: 85±5 dB (at 1 m) | |
| Flashing cycle | – | 6±12 flashes per minutes | |
| Operating temperature Range | -30°C~+60°C | | |
| Mounting direction | Upright, indoor only | | |
| Protection rating | IP65 | | |
| Mass | 182 g±10% | 200 g±10% | |
| Open collector | PNP/NPN | | |

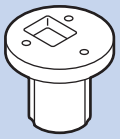
* Buzzer 1: Continuous sound **Buzzer 2: Intermittent sound

Ivory white Silver color (U)

## Optional parts

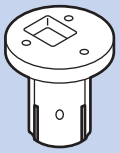


### Upper bracket



SZ-60NPT (for 1/2" NPT pole)

### Upper bracket



SZ-60-U

### Pole

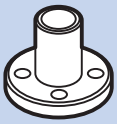

**Steel pole**

| Model | POLE-800S21 | POLE-300S21 | POLE-100S21 |
|---|---|---|---|
| Height | 800 mm | 300 mm | 100 mm |

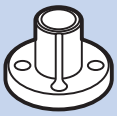
**Aluminum pole**

| Model | POLE-800A21 | POLE-300A21 | POLE-100A21 |
|---|---|---|---|
| Height | 800 mm | 300 mm | 100 mm |

### Mount bracket



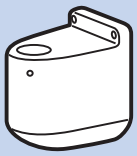
SZ-016A
(For Ø21.7 mm pole)



SZ-70-B
(For Ø21.7 mm aluminum pole only)

### Wall mount bracket

SZ-020
(For Ø21.7 mm pole)



SZ-017
(For Ø21.7 mm pole)

## Specifications

| | |
|---|---|
| **Size** | 50 mm diameter |
| **Input voltage options** | 24 VDC |
| **Functions available** | • Continuous only<br>• Continuous, flashing, alarms |
| **Mounting options** | Direct mount only, includes 3 mounting nuts |
| **Body styles** | • Component style, wiring terminals provided<br>• Interchangeable and stackable after purchase |
| **Body colors** | Beige |
| **Tiers** | 1-5 modules can be stacked |
| **Module colors** | Red / Yellow / Green / Blue / Clear |
| **Alarms (FB style only)** | • Alarm 1: selectable, single-tone, continuous alarm, 85 dB (at 1 m)<br>• Alarm 2: selectable, single tone, intermittent (slow beep) alarm, 85 dB (at 1 m) |
| **Ratings** | • CE<br>• UL listed (US)<br>• UL listed (Canada)<br>• RoHS |
| **Protection** | • IP-65<br>• Type 4 / 4X / 13 (indoor only) |
| **Control options** | • Dry contact closure such as switches or relay contacts<br>• Open-collector transistor (NPN or PNP) for 24 VDC<br>• Direct voltage control for 24 VDC, continuous and alarm functions only |

PATLITE distributed by Omron

## Versatile modular signal tower featuring easy assembly and wiring designed for every need.

LU7 presents ultra bright LEDs combined with an innovative prism lens design. 1 to 5 modules can be arranged in tiers.

- Diameter: 70 mm
- Base module in 2 sizes and 3 colors
- Different modules: standard LED, strobe LED and sound
- Two, user - selectable, alarms integrated in the base module with adjustable volume up to 90 dB at 1 m.
- Color-coordinated and spring-loaded terminal block

## Ordering information

### LED module

| Typ | Module color | Power consumption | Rated voltage | Operation voltage | Operation temperature range | Mass | Order code |
|---|---|---|---|---|---|---|---|
| Standard | Red | 52 mA/1.25 W | 24 VDC | Rated voltage ±10% (21.6~26.4 V) | -30°C~+60°C | 60 g ±10% | LU7-E-R |
| | Yellow | | | | | | LU7-E-Y |
| | Green | 42 mA/1.0 W | | | | | LU7-E-G |
| | Blue | | | | | | LU7-E-B |
| | Clear/White | | | | | | LU7-E-C |
| Strobe | Red | 290 mA | 24 VDC | Rated voltage ±10% (21.6~26.4 V) | -30°C~+60°C | 0,07 kg | LU7-XE-R |
| | Yellow | | | | | | LU7-XE-Y |
| | Green | 140 mA | | | | | LU7-XE-G |
| | Blue | 270 mA | | | | | LU7-XE-B |
| | Clear/White | 280 mA | | | | | LU7-XE-C |

### Base module

| Typ | Alarm/Flash | Power consumption | Rated voltage | Operation voltage | Operation temperature range | Mass | Open collector | Order code |
|---|---|---|---|---|---|---|---|---|
| Short body | Continuous | 1.2 W | 24 VDC | Rated voltage ± 10% (21.6~26.4 V) | -30°C~+60°C | 150 g ±10% | PNP/ NPN | LU7-02S*1 |
| Standard body | Continuous | | | | | 250 g ±10% | | LU7 - 02*1 |
| | 2 Sounds/Flashlight | | | | | 280 g ±10% | | LU7 -02FB*1 |

*1 Ivory white: blank, black: add "K", silver: add "U"

### Optional parts

| Typ | Material | Order code |
|---|---|---|
| Wall mount bracket | Aluminum alloy die-cast | SZ-017 |
| | PBT/ ABS resin | SZ-018 |
| | | SZ-018U |
| | | SZ-018K |
| | ABS resin | SZ-020 |
| Upper bracket | Metal | SZ - 50U |
| | | SZ - 50UU |
| | | SZ - 50KU |
| | | SZ - 50NPT |
| Mount bracket | Aluminum alloy die-cast | SZ-016A |
| | | SZ-70B |

| Typ | Height | Material | Order code |
|---|---|---|---|
| Pole | 100 mm | Aluminum | Pole-100A21 |
| | | Steel | Pole-100S21 |
| | 300 mm | Aluminum | Pole-300A21 |
| | | Steel | Pole-300S21 |
| | 800 mm | Aluminum | Pole-800A21 |
| | | Steel | Pole-800S21 |

### Voice and sound module (unique sound module in all directions)

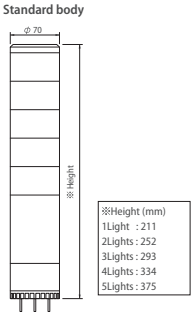
| Rated voltage | Power consumption | Mass | Order code |
|---|---|---|---|
| 24 VDC | 3.5 W | 0.17 kg | LU7-V1 |

## Features

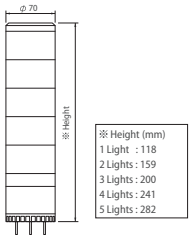
Easy alignment:
Color-coordinated terminal block:
Corresponds to the lens colors for quick wiring verification in the base unit.

LU7-02FB

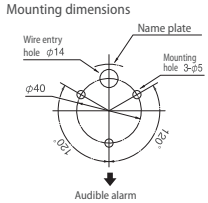
LU7
Standard body



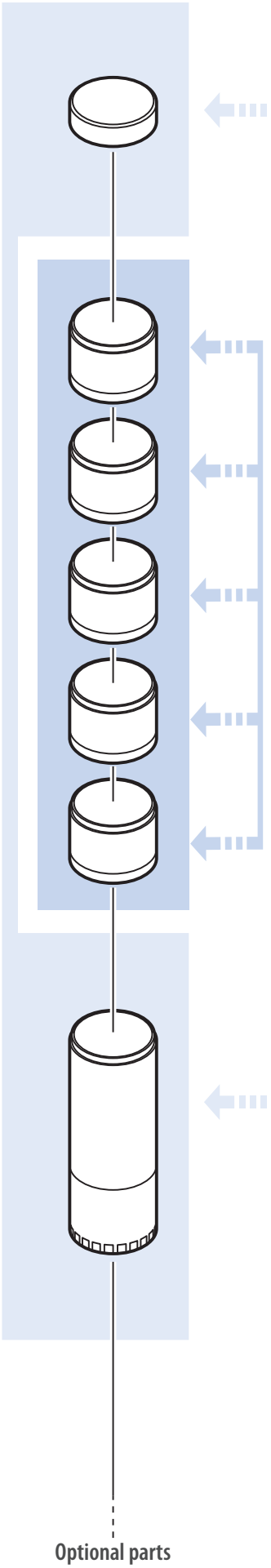

LU7-02S
Short body



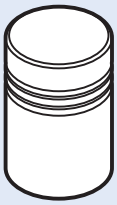

Mounting dimensions



## How to order




### Voice and sound module



| Model | LU7-V1 |
|---|---|
| Type | Voice synthesizer |
| Rated voltage | 24 VDC |
| Power consumption | 3.5 W |
| Weight | 0.17 kg |

### LED units

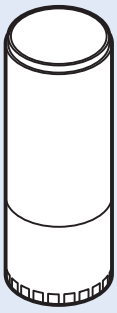
| Model | LU7-E-R | LU7-E-Y | LU7-E-G | LU7-E-B | LU7-E-C |
|---|---|---|---|---|---|
| Unit color | | | | | |
| Rated voltage | 24 VDC | | | | |
| Operating voltage range | Rated voltage±10% (21.6~26.4 V) | | | | |
| Current/power consumption | 52 mA/1.25 W | | 42 mA/1.0 W | | |
| Operating temperature range | –30°C~+60°C | | | | |
| Mass | 60 g±10% | | | | |

### LED strobe module

| Model | LU7-XE-R | LU7-XE-Y | LU7-XE-G | LU7-XE-B | LU7-XE-C |
|---|---|---|---|---|---|
| Unit color | | | | | |
| Rated voltage | 24 VDC | | | | |
| Power consumption | 290 mA | 290 mA | 140 mA | 270 mA | 280 mA |
| Mass | 0.07 kg | | | | |

RED YELLOW GREEN BLUE CLEAR/WHITE

### BASE units



Standard body

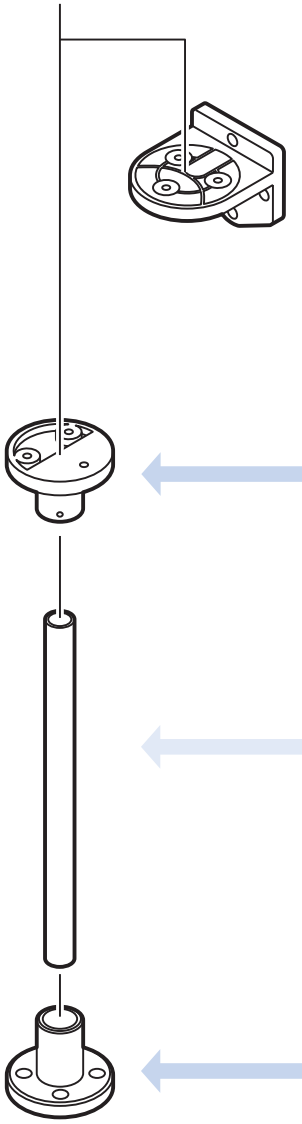
Short body

| Model | LU7-02S | LU7-02 | LU7-02FB | |
|---|---|---|---|---|
| Color | | | | |
| Standard body/short body | Short | Standard | | |
| Rated voltage | 24 VDC | | | |
| Operating voltage range | Rated voltage±10% (21.6~26.4 V) | | | |
| Buzzer | – | | *Buzzer 1 | **Buzzer 2 |
| Current consumption | – | | 50±10 mA | 24±10 mA |
| Power Ccnsumption | – | | 1.2±0.25 W | 0.58±0.25 W |
| Sound level | – | | Max: 90±5d B (at 1 m) | |
| | | | Min: 70 dB or Less ( at 1 m) | |
| Flashing cycle | – | | 60±12 flashes per minute | |
| Operating temperature Range | –30°C~+60°C | | | |
| Mounting direction | Upright, indoor only | | | |
| Protection rating | IP65 | | | |
| Mass | 150 g±10% | 250 g±10% | 280 g±10% | |
| Open collector | PNP/NPN | | | |

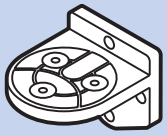
* Buzzer 1: Continuous sound **Buzzer 2: Intermittent sound

Ivory white Silver color (U) Black (K)

## Optional parts

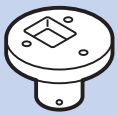


### Wall mount bracket



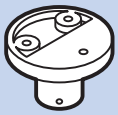
| Model | SZ-18 | SZ-18U | SZ-18K |
|---|---|---|---|
| Color | Ivory white | Silver color (U) | Black (K) |

### Upper bracket



SZ-50NPT(For 1/2" NPT pole)

### Upper bracket



| Model | SZ-50-U | SZ-50U-U | SZ-50K-U |
|---|---|---|---|
| Color | Ivory white | Silver color (U) | Black (K) |

### Pole

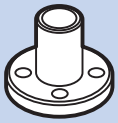

**Steel pole**

| Model | POLE-800S21 | POLE-300S21 | POLE-100S21 |
|---|---|---|---|
| Height | 800 mm | 300 mm | 100 mm |

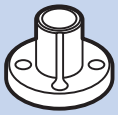
**Aluminum pole**

| Model | POLE-800A21 | POLE-300A21 | POLE-100A21 |
|---|---|---|---|
| Height | 800 mm | 300 mm | 100 mm |

### Mount bracket



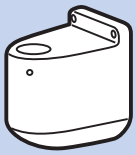
SZ-016A
(For Ø21.7 mm pole)



SZ-70-B
(For Ø21.7 mm Aluminum pole only)

### Wall mount bracket

SZ-020
(For Ø21.7 mm pole)

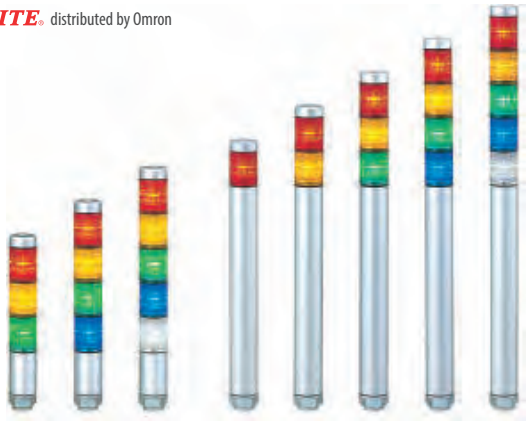


SZ-017
(For Ø21.7 mm pole)

## Specifications

| | |
|---|---|
| **Size** | 70 mm diameter |
| **Input voltage options** | • 24 VDC |
| **Functions available** | • Continuous only<br>• Continuous, flashing, alarms |
| **Mounting options** | Direct mount only: includes three mounting nuts |
| **Body style** | • Component style, wiring terminals provided<br>• Interchangeable and stackable after purchase |
| **Body color** | • Beige<br>• Black<br>• Silver |
| **Tiers** | 1-5 modules can be stacked |
| **Module colors** | • Red / Yellow / Green / Blue / Clear<br>• Standard LED modules<br>• Strobe-flash LED modules (24 V bases only) |
| **Alarms (FB style only)** | • Alarm 1: selectable, single-tone, continuous alarm, 90 dB (at 1 m)<br>• Alarm 2: selectable, single tone, intermittent (slow beep) alarm, 90 dB (at 1 m) |
| **Ratings** | • CE<br>• UL listed (US)<br>• UL listed (Canada)<br>• RoHS |
| **Protections** | • IP-65<br>• Type 4/4X/13 (indoor only) |
| **Control options** | • Dry contact closure such as switches or relay contacts<br>• Open-collector transistor (NPN or PNP for 24 VDC)<br>• Direct voltage control for 24 VDC, continuous and alarm functions only |

PATLITE distributed by Omron



## Super slim 30 mm silver body signal tower ideal for small devices

MP/MPS signal towers provide double insulation and superior UV and light translucent AS resin lenses for enhanced durability and reliability in the application environment. The 30mm diameter is ideal for small and mid-sized machines.
Up to 5 colored modules can be combined using a single mounting hole. Modules can be easily added without dismounting the whole signal tower to reduce installation effort.

- Special pre-wired versatile with 1 connection cable
- NPN/ PNP compactible
- IP65
- Each color of LED module corresponds to the lead wire color.
- Available colors are Red, Yellow, Green, Blue and Clear/White. All colors as clear-lens modules available

## Ordering information

MP-502-RYGBC-B0738
1 2 3 4 5

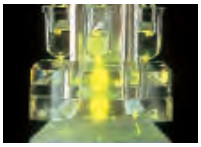
1. MP: Standard body
   MPS: Short body
2. Stack
   1~5
3. Rated voltage
   02: 24 V AC/DC
4. Color of LED
   R: Red
   Y: Yellow
   G: Green
   B: Blue
   C: Clear/White
   Top to bottom
5. Color of lense
   Blank: Colored lens
   B0738: Clear lens

## Ordering information

| Number of stacks | Rated voltage | Power consumption | Open collector | Order code |
|---|---|---|---|---|
| 1 | 24 VAC/VDC | 0.7 W | NPN/PNP | MP/MPS-102 |
| 2 | | 1.4 W | | MP/MPS-202 |
| 3 | | 2.0 W | | MP/MPS-302 |
| 4 | | 2.6 W | | MP/MPS-402 |
| 5 | | 3.2 W | | MP/MPS-502 |

## Features

Patented reflection system increases visibility.



High intensity LED

Good visibility from any direction

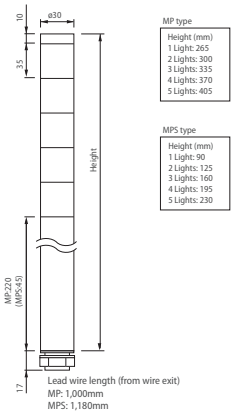
**Interchangeable LED modules**

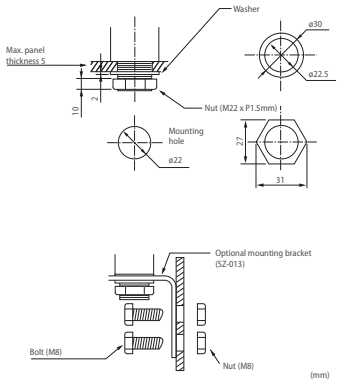
- Changeable color sequence: Easy to add/remove up to 5 colored modules even after installation.
- Note: LED modules of the same color will light up simultaneously.

**The wiring remains the same.**

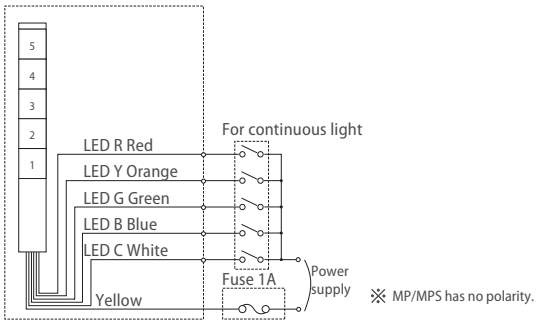
Each color of LED module corresponds to the lead wire color.

## Dimensions




## Wiring diagram




※ MP/MPS has no polarity.

## Specifications

| | |
|---|---|
| **Size** | 30 mm diameter |
| **Input voltage options** | 24 VAC/VDC |
| **Functions available** | Continuous only |
| **Mounting options** | Direct mount only: includes M22 mounting nut and sealing gasket |
| **Body style** | • pre-assembled, pre-wired<br>• Interchangeable and stackable after purchase |
| **Body color** | Silver |
| **Tiers** | 1-5 modules can be stacked |
| **Module colors** | Red / Yellow / Green / Blue / Clear-White (for sunlight applications: clear-lense modules in all colors available) |
| **Alarms (FB style only)** | • CE<br>• UL component recognition (US)<br>• UL component recognition (Canada)<br>• RoHS |
| **Protection** | IP-65 |
| **Control options** | • Dry contact closure such as switches or relay contacts<br>• Open-collector transistor (NPN or PNP) for 24 VDC<br>• Direct voltage control |

PATLITE® distributed by Omron

## Versatile, cost and energy efficient LED signal tower for every need

The LME series indicating light provides the latest in LED technology. 1 to 5 modules can be arranged in tiers. The original dual reflection system for enhanced light diffusion, creates bright distinctive illumination while saving energy (patent pending). LME signal towers provide double insulation and superior UV resistant and light translucent AS resin lenses for enhanced durability and reliability in application environment.
Available Colors are Red, Yellow, Green, Blue and Clear/White.
All colors as clear-lense modules are available

- Diameter: 60 mm
- 2 selectable built- in alarms with adjustable volume up to 90 dB at 1 m for FB type
- Special pre-wired versatile and flexible cable connection of 3 m
- NPN/ PNP compatible
- IP 65

## Ordering information

LME-502UFBW-C-RYGBC-Z
1 2 3 4 5 6 7 8

1. Stack
   1 ~ 5
2. Rated voltage
   02: 24V AC/DC
3. Body color
   Blank: Ivory white
   N: Black color
   U: Silver color
4. Type
   Blank: Continuous light
   FB: Continuous light or flashing light with audible alarm
5. Mount
   Blank: Pole mount
   K: Pole mount (with SZ-020)
   W: Direct mount
6. Connection
   C: pre-wired cable 3 m
7. Color of LED
   R: Red
   Y: Yellow
   G: Green
   B: Blue
   C: Clear/White
8. Color of Lens
   Blank: Colored lens
   Z: Clear lens

## Ordering information

| Number of stacks | Mount | Model | Rated voltage | Power consumption | Open collector | Order code | |
|---|---|---|---|---|---|---|---|
| | | | | | | Continuos light | Continuous light with audible alarm |
| 1 | Pole mount | LME-102 | 24 VAC/DC | 2.2 W | NPN/PNP | LME-102-C | LME-102-FB-C |
| | Direct mount | | 24 VAC/DC | | | LME-102W-C | LME-102-FBW-C |
| 2 | Pole mount | LME-202 | 24 VAC/DC | 3.4 W | | LME-202-C | LME-202-FB-C |
| | Direct mount | | 24 VAC/DC | | | LME-202W-C | LME-202-FBW-C |
| 3 | Pole mount | LME-302 | 24 VAC/DC | 3.8 W | | LME-302-C | LME-302-FB-C |
| | Direct mount | | 24 VAC/DC | | | LME-302W-C | LME-302-FBW-C |
| 4 | Pole mount | LME-402 | 24 VAC/DC | 4.2 W | | LME-402-C | LME-402-FB-C |
| | Direct mount | | 24 VAC/DC | | | LME-402W-C | LME-402-FBW-C |
| 5 | Pole mount | LME-502 | 24 VAC/DC | 4.6 W | | LME-502-C | LME-502-FB-C |
| | Direct mount | | 24 VAC/DC | | | LME-502W-C | LME-502-FBW-C |

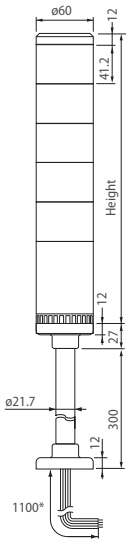
### Optional parts

| Typ | Material | Order code |
|---|---|---|
| Wall mount bracket | Aluminum alloy die-cast | SZ-017 |
| | ABS resin | SZ-020 |
| | PBT/ ABS resin | SZ-028 |
| Mount bracket | Aluminum alloy die-cast | SZ-016A |
| | Aluminum alloy die-cast | SZ-010 |

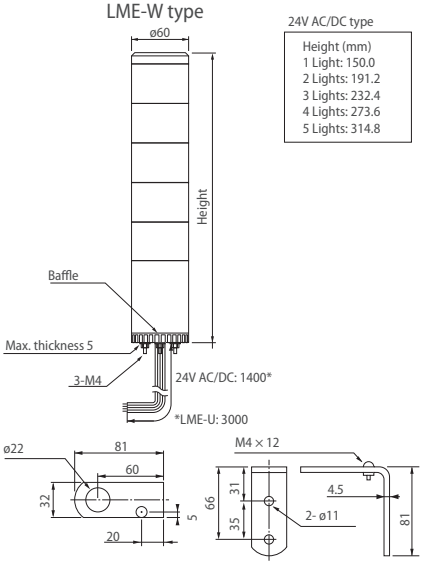
| Typ | Height | Material | Order code |
|---|---|---|---|
| Pole | 100 mm | Aluminum | Pole-100A21 |
| | | Steel | Pole-100S21 |
| | 300 mm | Aluminum | Pole-300A21 |
| | | Steel | Pole-300S21 |
| | 800 mm | Aluminum | Pole-800A21 |
| | | Steel | Pole-800S21 |

## Dimensions

LME type




LME-W type



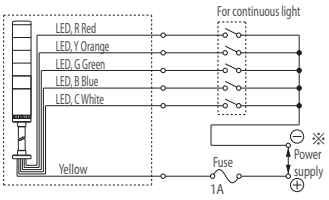

24V AC/DC type

| Height (mm) |
|---|
| 1 Light: 150.0 |
| 2 Lights: 191.2 |
| 3 Lights: 232.4 |
| 4 Lights: 273.6 |
| 5 Lights: 314.8 |

## Wiring diagram

LME(–W)/LME(–W)-S·Q/LMS [Continuous type]

■ 24V AC/DC




## Features

### Interchangeable LED modules

- Changeable color sequence: Easy to add / remove up to 5 colored modules even after installation.
- Note: LED modules of the same color within a signal tower will light up simultaneously.

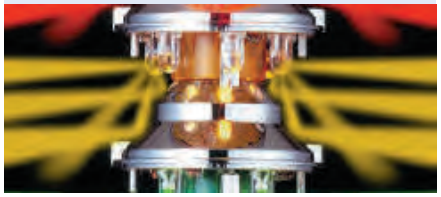
### The wiring remains the same

Each color of LED module corresponds to the lead wire color.

### Easy to add and remove

If the number of LED module is changed, center shaft must be purchased.

### Dual reflection system



PATLITE's original dual reflection system with its exclusive hybrid prism-cut lens and 5 color LED modules create bright, distinctive, even illumination.

To bring more attention to certain conditions, two, User-selectable, Alarms integrated in the Base module with adjustable volume up to 85 dB at 1m are available.

## Specifications

| | |
|---|---|
| **Size** | 60 mm diameter |
| **Input voltage options** | • 24 VAC/VDC |
| **Functions available** | • Continuous only<br>• Continuous, flashing, alarms |
| **Mounting options** | • Pole mount: with 300 mm aluminum pole, plastic circular bracket<br>• Direct mount: includes 3 mounting nuts |
| **Body style** | • Pre-assembled, pre-wired<br>• Interchangeable and stackable after purchase |
| **Body color** | Beige (optional: Black or silver) |
| **Tiers** | 1-5 modules can be stacked |
| **Module colors** | Red / Yellow / Green / Blue / Clear/White (for sunlight applications: clear-lense modules in all colors available) |
| **Alarms (FB style only)** | • Alarm 1: selectable, single-tone, intermittent (fast beep) alarm, 85 dB (at 1 m)<br>• Alarm 2: selectable, single tone, intermittent (slow beep) alarm, 85 dB (at 1 m) |
| **Ratings** | • CE<br>• UL component recognition (US)<br>• UL component recognition (Canada)<br>• RoHS |
| **Protection** | • IP-65 (LME, LME-W)<br>• IP-54 (LME-FB, LME-FBW)<br>• Type 4/4X/13 (indoor, direct-mount only) |
| **Control options** | • Dry contact closure such as switches or relay contacts<br>• Open-collector transistor (NPN or PNP for 24 VDC)<br>• Direct voltage control for 24 VDC, continuous and alarm functions only |

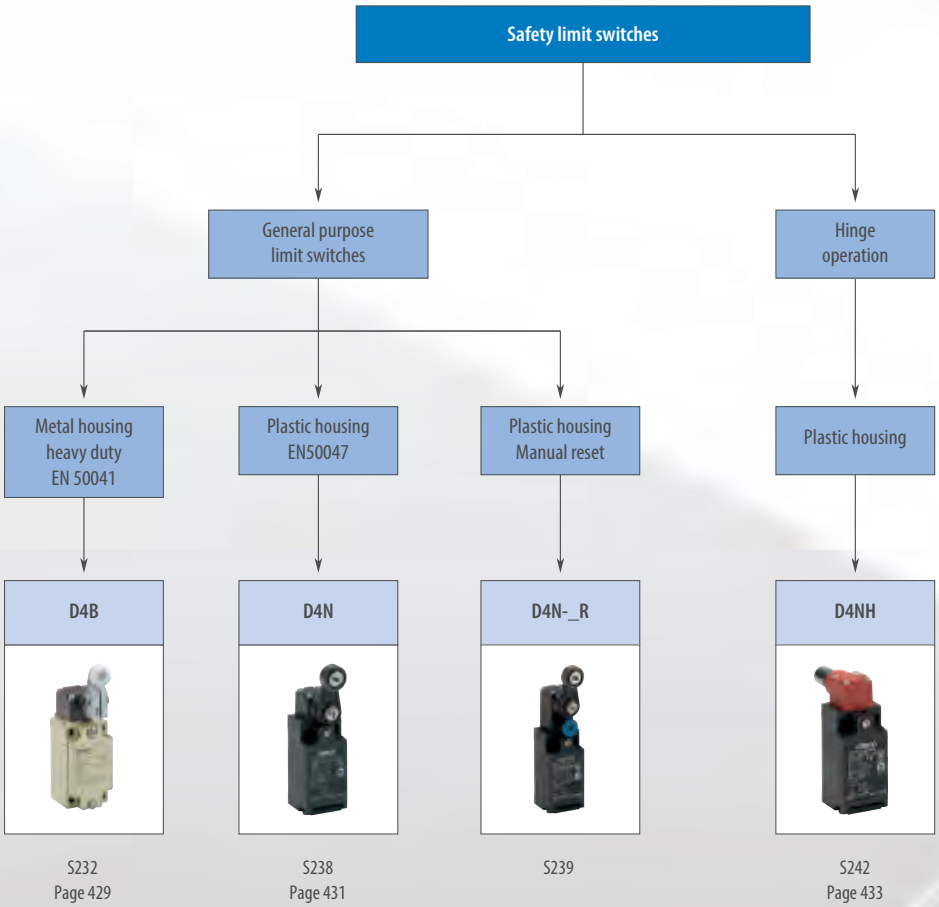
# PRECISE MONITORING OF GUARD POSITION

## Detect linear or rotational movement of guards: D4N

Guards and covers on machines protect workers. They limit access to the dangerous parts of the machine. Our safety limit switches guarantee that the guards and covers are in place before the machine is started.

- Wide variety of actuators to fit wide range of applications
- Gold-plated contacts for reliable operation with micro loads




Safety limit switches
General purpose limit switches
Hinge operation
Metal housing heavy duty EN 50041
Plastic housing EN50047
Plastic housing Manual reset
Plastic housing
D4B
D4N
D4N-_R
D4NH
S232
Page 429
S238
Page 431
S239
S242
Page 433

| | | Safety limit switches | | | |
|---|---|---|---|---|---|
| | |  |  |  |  |
| **Model** | | **D4B** | **D4N** | **D4NH** | **D4N-_R** |
| Selection criteria | Housing | Metal | Plastic | Plastic | Plastic |
| | M12 Plug connector | – | ■ | ■ | – |
| | Protection class | IP67 | | | |
| | Operating Temperature Range | –40 to 80°C | –30 to 70°C | –30 to 70°C | –30 to 70°C |
| | Conformity | EN50047, EN1088 | | | |
| Features | Conduit size M20 | ■ | ■ | ■ | ■ |
| | Gold clad contacts | ■ | ■ | ■ | ■ |
| | Actuators | | | | |
| | Resin roller, resin lever | – | ■ | – | ■ |
| | Resin roller, metal lever | ■ | ■ | – | – |
| | Metal roller, metal lever | – | ■ | – | – |
| | Bearing lever, metal lever | – | ■ | – | – |
| | Adj. resin roller, metal lever | ■ | ■ | – | ■ |
| | Adj. Rubber roller, metal lever | – | ■ | – | ■ |
| | Adj. Rod lever | ■ | – | – | – |
| | Top plunger | ■ | ■ | – | ■ |
| | Top roller plunger | ■ | ■ | – | ■ |
| | Horizontal roller arm lever | – | ■ | – | ■ |
| | Vertical roller arm lever | – | ■ | – | ■ |
| | Cat whisker | – | ■ | – | – |
| | Plastic Rod | ■ | ■ | – | – |
| | Fork lever lock (right operation) | – | ■ | – | – |
| | Fork lever lock (left operation) | – | ■ | – | – |
| | Hinge operation | ■ | – | ■ | – |
| Application | Position monitoring | ■ | ■ | ■ | ■ |
| Contact configuration | 1NC/1NO snap action | ■ | ■ | – | – |
| | 2NC snap action | – | ■ | – | – |
| | 1NC/1NO slow action | ■ | ■ | ■ | ■ |
| | 2NC slow action | ■ | ■ | ■ | ■ |
| | 2NC/1NO slow action | – | ■ | ■ | ■ |
| | 3NC slow action | – | ■ | ■ | ■ |
| | 1NC/1NO (MBB slow action) | – | ■ | ■ | – |
| | 2NC/1NO (MBB slow action) | – | ■ | ■ | – |
| | Page/Quick Link | 429 | 431 | 433 | S239 |

■ Standard – No/not available

## Limit switch with metal housing

The D4B series of limit switches in a rugged metal housing is suitable for both safety and non-safety applications due to its direct opening mechanism and TÜV approval. Furthermore with the increased temperature range and enhanced mechanical switching lifetime, the D4B is first choice for all applications from standard to demanding environments and for highest flexibility in mounting and connectivity preferences.

- Direct opening mechanism and approval by notified body
- Rugged metal housing and extended mechanical switching lifetime (snap action models)
- Terminal block for direct wiring

## Ordering information

| Actuator type | | Connection method | Order code*1 | | |
|---|---|---|---|---|---|
| | | | 1NC/1NO (snap-action) | 1NC/1NO (slow-action) | 2NC (slow-action) |
| | Roller lever*2 | Terminal block with M20 conduit | D4B-4111N | D4B-4511N | D4B-4A11N |
| | Adjustable roller lever | | D4B-4116N | D4B-4516N | D4B-4A16N |
| | Adjustable rod lever | | D4B-4117N | D4B-4517N | D4B-4A17N |
| | Plain | | D4B-4170N | D4B-4570N | D4B-4A70N |
| | Roller | | D4B-4171N | D4B-4571N | D4B-4A71N |
| | Coil spring | | D4B-4181N*3 | – | – |
| | Plastic rod | | D4B-4187N*3 | – | – |

*1 The NC contacts provide the approved direct opening mechanism.

*2 For models with stainless steel rollers and temperature resistance of –40°C refer to WL-_-TC.
*3 No direct opening mechanism

## Specifications

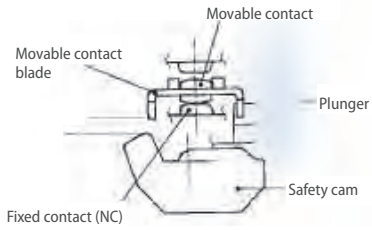
| Item | | Snap-action | Slow-action |
|---|---|---|---|
| Durability*1 | Mechanical | 30,000,000 operations min. | 10,000,000 operations min. |
| | Electrical | 500,000 operations min. (at a 250 VAC, 10 A resistive load) | |
| Operating speed | | 1 mm/s to 0.5 m/s | |
| Operating frequency | Mechanical | 120 operations/min | |
| | Electrical | 30 operations/min | |
| Rated frequency | | 50/60 Hz | |
| Contact resistance | | 25 mΩ max. (initial value) | |
| Pollution degree (operating environment) | | 3 (EN60947-5-1) | |
| Conditional short-circuit current | | 100 A (EN60947-5-1) | |
| Conventional enclosed thermal current ($I_{th}$) | | 20 A (EN60947-5-1) | |
| Protection against electric shock | | Class I (with ground terminal) | |
| Ambient temperature | Operating | –40 to 80°C (with no icing)*2 | |
| Degree of protection | | IP67 (EN60947-5-1) | |

*1 The values are acquired for an ambient temperature of 5 to 35°C and an ambient humidity of 40 to 70%.
*2 –25 to 80°C for the flexible-rod actuator.

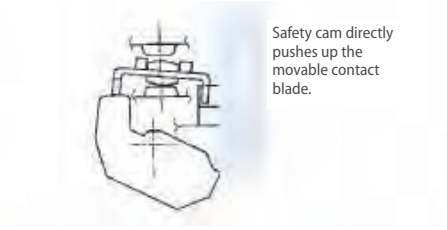
### 1NO/1NC Contact (Snap-action)

If metal deposition between mating contacts occurs on the NC contact side, they can be pulled apart by the shearing force and tensile force generated when part B of the safety cam or plunger engages part A of the movable contact blade. When the safety cam or plunger is moved in the direction of the arrow, the Limit Switch releases.

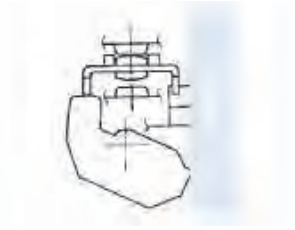
1. When metal deposition occurs.



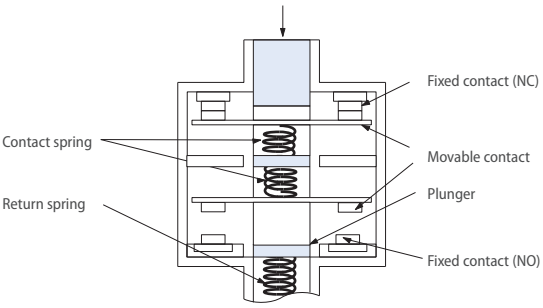

2. When contacts are being pulled apart.



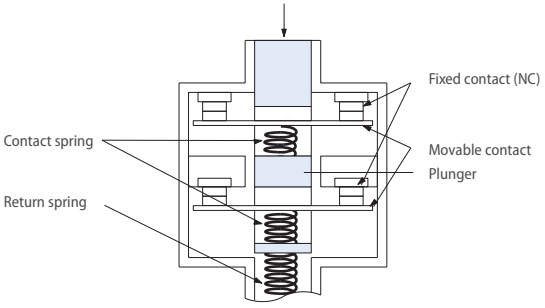

3. When contacts are completely pulled apart.



### 1NC/1NO Contact (Slow-action)




### 2NC Contact (Slow-action)




NC contacts conform to EN60947-5-1 Direct Opening

When metal deposition occurs, the contacts are separated from each other by the plunger being pushed in.

⊖ is marked on the product to indicate approval of direct opening.

## Limit switch with plastic housing

The D4N series of limit switches in plastic housing is the ideal switch for all standard mechanical position detection applications both for safety and non-safety applications.

- Direct opening mechanism and approval by notified body
- Rugged plastic housing with double insulation
- Wide range of actuators
- M12 connectors or terminal block with M20 conduit

## Ordering information

| Actuator type | | Connection method | Order code*1 | | | |
|---|---|---|---|---|---|---|
| | | | 1NC/1NO (snap-action) | 1NC/1NO (slow-action) | 2NC (slow-action) | 2NC/1NO (slow-action) |
|  | Roller lever (resin lever, resin roller) | M20 | D4N-4120 | D4N-4A20 | D4N-4B20 | D4N-4C20 |
| | | M12 connector | D4N-9120 | D4N-9A20 | D4N-9B20 | – |
|  | Plunger | M20 | D4N-4131 | D4N-4A31 | D4N-4B31 | – |
| | | M12 connector | D4N-9131 | D4N-9A31 | D4N-9B31 | – |
|  | Roller plunger | M20 | D4N-4132 | D4N-4A32 | D4N-4B32 | D4N-4C32 |
| | | M12 connector | D4N-9132 | D4N-9A32 | D4N-9B32 | – |
|  | One-way roller arm lever (horizontal) | M20 | D4N-4162 | D4N-4A62 | D4N-4B62 | D4N-4C62 |
| | | M12 connector | D4N-9162 | D4N-9A62 | D4N-9B62 | – |
|  | One-way roller arm lever (vertical) | M20 | D4N-4172 | D4N-4A72 | D4N-4B72 | – |
|  | Adjustable roller lever, form lock (metal lever, resin roller) | M20 | D4N-412G | D4N-4A2G | D4N-4B2G | – |
| | | M12 connector | D4N-912G | D4N-9A2G | D4N-9B2G | – |
|  | Adjustable roller lever, form lock (metal lever, rubber roller) | M20 | D4N-412H | D4N-4A2H | D4N-4B2H | – |
| | | M12 connector | D4N-912H | D4N-9A2H | D4N-9B2H | – |

### Switches with MBB contacts

MBB (Make Before Break) contacts have an overlapping structure, so that before the normally closed (NC) contact opens the normally open (NO) contact closes.

| Actuator type | | Connection method | Order code*1 | |
|---|---|---|---|---|
| | | | 1NC/1NO (slow-action) | 2NC/1NO (slow-action) |
|  | Roller lever (resin lever, resin roller) | M20 | D4N-4E20 | D4N-4F20 |
| | | M12 connector | D4N-9E20 | – |
|  | Roller plunger | M20 | D4N-4E32 | D4N-4F32 |
| | | M12 connector | D4N-9E32 | – |
|  | One-way roller arm lever (horizontal) | M20 | D4N-4E62 | D4N-4F62 |
| | | M12 connector | D4N-9E62 | – |

*1 The NC contacts provide the approved direct opening mechanism.

## Specifications

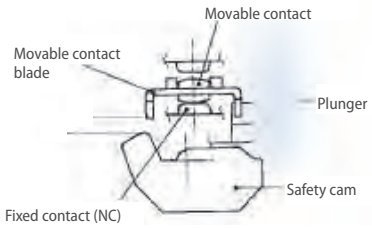
| | | |
|---|---|---|
| **Durability**[*1] | **Mechanical** | 15,000,000 operations min.[*2] |
| | **Electrical** | 500,000 operations min. for a resistive load of 3 A at 250 VAC<br>300,000 operations min. for a resistive load of 10 A at 250 VAC |
| **Operating speed** | **Roller lever** | 1 mm/s to 0.5 m/s |
| **Operating frequency** | | 30 operations/minute max. |
| **Minimum applicable load** | | Resistive load of 1 mA at 5 VDC (N-level reference value) |
| **Protection against electric shock** | | Class II (double insulation) |
| **Pollution degree (operating environment)** | | 3 (EN60947-5-1) |
| **Contact gap** | | Snap-action: 2x0.5 mm min<br>Slow-action: 2x2 mm min |
| **Conditional short-circuit current** | | 100 A (EN60947-5-1) |
| **Rated open thermal current ($I_{th}$)** | | 10 A (EN60947-5-1) |
| **Ambient temperature** | **Operating** | –30°C to 70°C with no icing |
| **Degree of protection** | | IP67 (EN60947-5-1) |

[*1] The durability is acquired for an ambient temperature of 5°C to 35°C and an ambient humidity of 40 to 70%.
[*2] 10,000,000 operations min. for fork lever actuator.

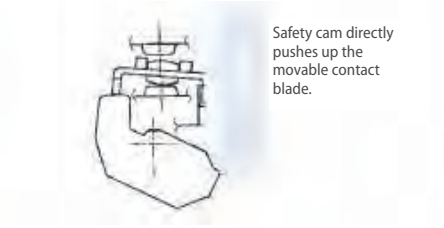
### 1NO/1NC Contact (Snap-action)

If metal deposition between mating contacts occurs on the NC contact side, they can be pulled apart by the shearing force and tensile force generated when part B of the safety cam or plunger engages part A of the movable contact blade. When the safety cam or plunger is moved in the direction of the arrow, the Limit Switch releases.

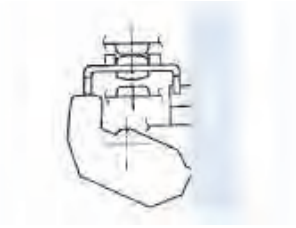
1. When metal deposition occurs.



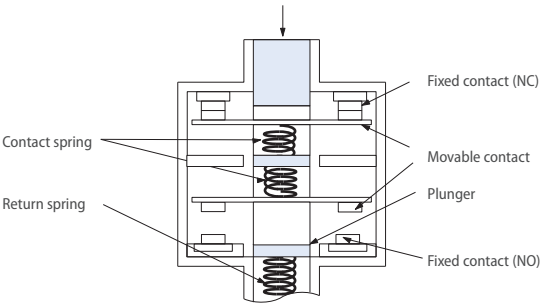

2. When contacts are being pulled apart.



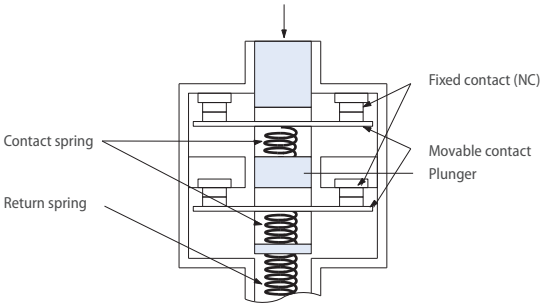

3. When contacts are completely pulled apart.



### 1NC/1NO Contact (Slow-action)




### 2NC Contact (Slow-action)




NC contacts conform to EN60947-5-1 Direct Opening

When metal deposition occurs, the contacts are separated from each other by the plunger being pushed in.

⊖ is marked on the product to indicate approval of direct opening.

## Safety door hinge switch

D4NH safety-door hinge switches are available with one or two built-in contacts, shaft or arm lever actuator and various conduit types, e.g. M20.

- Direct opening mechanism
- Shaft or arm lever actuator
- Wide temperature range
- Metric conduit and M12 connector types are available

## Ordering information

### Switches

| Actuator | Conduit size | | Built-in switch mechanism | | |
|---|---|---|---|---|---|
| | | | 1NC/1NO (slow-action) | 2NC (slow-action) | 2NC/1NO (slow-action) |
| Shaft | 1-conduit | M20 | D4NH-4AAS | D4NH-4BAS | D4NH-4CAS |
| | | M12 connector | D4NH-9AAS | D4NH-9BAS | – |
| Arm lever | 1-conduit | M20 | D4NH-4ABC | D4NH-4BBC | D4NH-4CBC |
| | | M12 connector | D4NH-9ABC | D4NH-9BBC | – |

| Actuator | Conduit size | | Built-in switch mechanism | | |
|---|---|---|---|---|---|
| | | | 3NC (slow-action) | 1NC/1NO MBB (slow-action) | 2NC/1NO MBB (slow-action) |
| Shaft | 1-conduit | M20 | D4NH-4DAS | D4NH-4EAS | D4NH-4FAS |
| | | M12 connector | – | D4NH-9EAS | – |
| Arm lever | 1-conduit | M20 | D4NH-4DBC | D4NH-4EBC | D4NH-4FBC |
| | | M12 connector | – | D4NH-9EBC | – |

## Specifications

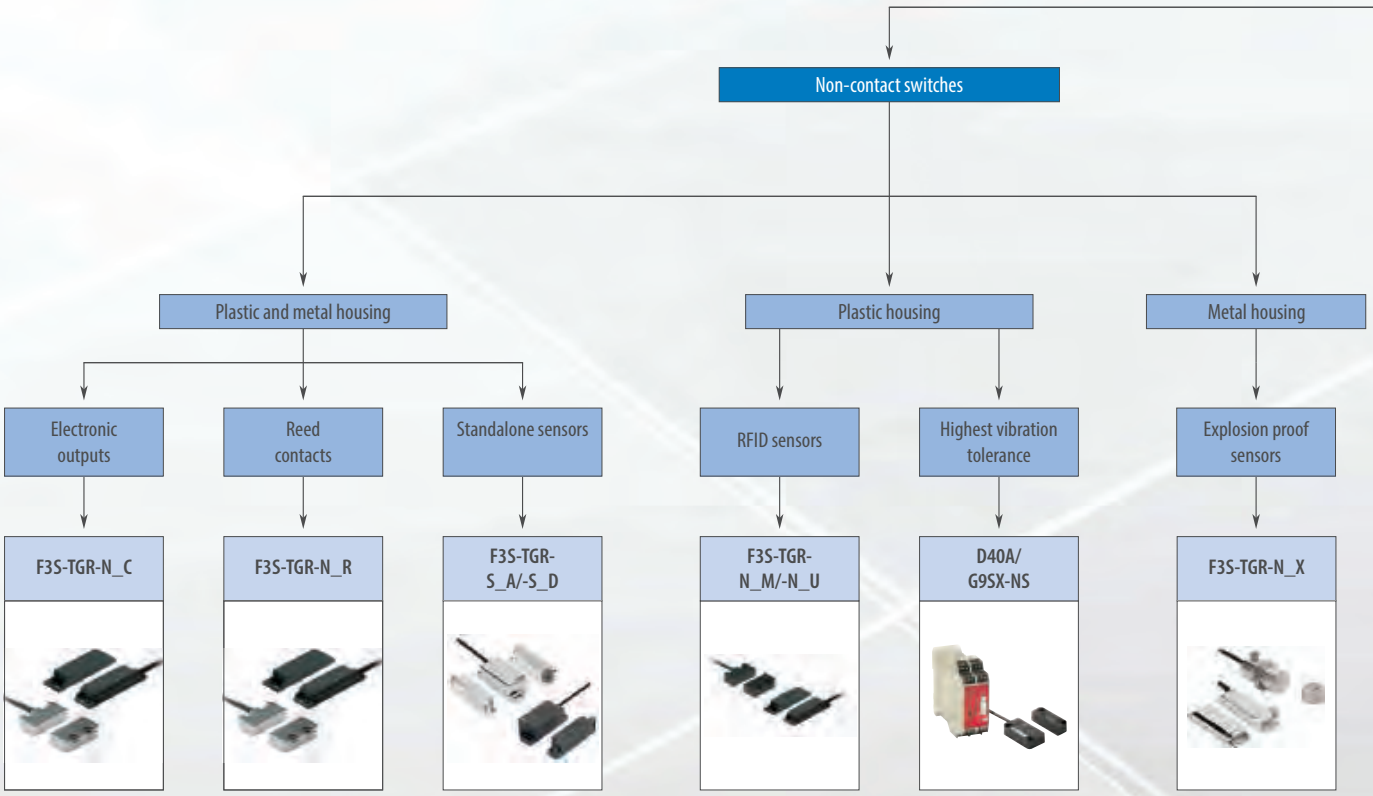
| | | |
|---|---|---|
| **Degree of protection** | | IP67 (EN60947-5-1) |
| **Durability** | **Mechanical** | 1,000,000 operations min. |
| | **Electrical** | 500,000 operations min. for a resistive load of 3 A at 250 VAC<br>300,000 operations min. for a resistive load of 10 A at 250 VAC |
| **Operating speed** | | 2 to 360°/s |
| **Operating frequency** | | 30 operations/minute max. |
| **Protection against electric shock** | | Class II (double insulation) |
| **Pollution degree (operating environment)** | | 3 (EN60947-5-1) |
| **Contact gap** | | Snap-action: 2 × 9.5 mm min<br>Slow-action: 2 × 2 mm min |
| **Conditional short-circuit current** | | 100 A (EN60947-5-1) |
| **Rated open thermal current ($I_{th}$)** | | 10 A (EN60947-5-1) |
| **Ambient temperature** | | Operating: –30°C to 70°C with no icing |

# BREAK CONVENTIONAL BARRIERS IN SAFETY DESIGN

## Flexibility selecting best fit control device for non-contact switch application: F3S-TGR-N

Omron has introduced a series of magnetic coded contactless switches for interlocking machine guard doors.
The switches feature a built-in control function, thus saving the cost and space required for an external controller.
The non-contact switches offer advantages in applications where a precise approach of the guard and lock is not possible. Applications with a large amount of dirt or high hygienic standards can also be addressed.

- Operates with all Omron safety relay units and safety bus interfaces
- Operates behind stainless steel fittings
- Non-contact – no abrasion – no particles
- Conforms to safety categories up to 4 acc. EN 954-1 and PLe acc. EN ISO 13849-1




S628 Page 439
S629 Page 442
S637 Page 447
S635 Page 445
S222, S362
S636 Page 450

**Safety door switches**

- **Key operated switches**
  - **Safety switch**
    - Plastic housing → D4NS — S244, Page 452
    - Stainless steel head → F3S-TGR-KM15, F3S-TGR-KM16 — S638, S639, Page 454
    - Metal housing → D4BS — S234, Page 453
    - Stainless steel housing → F3S-TGR-KH16 — S639, Page 454
  - **Safety guard lock switch**
    - Plastic housing
      - Square size 1300 N → D4NL — S243, Page 456
      - Slim size 1000 N → D4GL — S236, Page 457
    - Plastic housing Plastic or metal head
      - Slim size 1300 N → D4SL-N — S245, Page 458
    - Stainless steel housing
      - Standard size 1600 N → F3S-TGR-KHL1 — S649, Page 460
      - Slim size 2000 N → F3S-TGR-KHL3 — S652, Page 461

# Selection table

| | | Non-contact safety door switches | | | | | |
|---|---|---|---|---|---|---|---|
| | |  |  |  |  |  |  |
| **Model** | | **F3S-TGR-N_C** | **F3S-TGR-N_R** | **F3S-TGR-N_M/-N_U** | **F3S-TGR-S_A/-S_D** | **F3S-TGR-N_X** | **D40A/G9SX-NS** |
| Selection criteria | Housing | Plastic/Metal | Plastic/Metal | Plastic | Plastic/Metal | Metal | Plastic |
| | Protection class | IP67/IP69K | IP67/IP69K | IP67/IP69K | IP67/IP69K | IP67 | IP67 |
| | Conformity | EN ISO 13849-1, EN60947-5-3 | EN ISO 13849-1, EN60947-5-3 | EN ISO 13849-1, EN60947-5-3 | EN ISO 13849-1, EN60947-5-3 | EN ISO 13849-1, EN60947-5-3 | EN ISO 13849-1 |
| Features | Cable length 2 m | ■ | ■ | – | – | – | ■ |
| | Cable length 5 m | ■ | ■ | ■ | ■ | ■ | ■ |
| | Cable length 10 m | ■ | ■ | ■ | ■ | ■ | – |
| | Connector type M12 | ■ | ■ | ■ | ■ | ■ | – |
| | High temperature sensor | ■ | ■ | – | – | – | – |
| | Operates with G9SA, G9SB | ■ | ■ | ■ | ■ | ■ | – |
| | Operates with G9SX | ■ | ■ | ■ | ■ | ■ | ■ |
| | Operates with programmable safety units G9SP and NE1A | ■ | ■ | ■ | ■ | ■ | – |
| Application | Door monitoring | ■ | ■ | ■ | ■ | ■ | ■ |
| Contact configuration | 1NC/1NO | – | – | – | – | – | ■ |
| | 2NC | ■ | ■ | – | – | – | – |
| | 2NC/1NO | ■ | ■ | ■ | ■ | ■ | – |
| | Force guided relays | – | – | – | ■ | – | – |
| | Page/Quick Link | 439 | 442 | 445 | 447 | 450 | S222, S362 |

| | | Safety door switches | | | | | Safety door lock switches | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | |  |  |  |  |  |  |  |  |  |  |
| **Model** | | **D4NS** | **F3S-TGR-KM15** | **F3S-TGR-KM16** | **D4BS** | **F3S-TGR-KH16** | **D4NL** | **D4GL** | **D4SL-N** | **F3S-TGR-KHL1** | **F3S-TGR-KHL3** |
| Selection criteria | Housing | Plastic | Plastic body Metal head | Plastic body Metal head | Metal | Stainless steel | Plastic | Plastic | Plastic/metal head available | Stainless steel | Stainless steel |
| | Head mounting | 4 directions | 2 directions | 2 directions | 4 directions | 2 directions | 4 directions | 4 directions | 4 directions | 2 directions | 4 directions |
| | Actuation | Straight | Straight | Straight | Straight | Straight | Straight | Straight | Straight | Straight | Straight |
| | Key holding force | – | – | – | – | – | 1,300 N | 1,000 N | 1,300 N | 1,600 N | 2,000 N |
| | Protection class | IP67 | IP67 | IP67 | IP67 | IP69k | IP67 | IP67 | IP67 | IP69k | IP69k |
| | Conformity | EN50047, EN1088 | EN1088 | EN1088 | EN50047, EN1088 | EN1088 | EN1088 | EN1088 | EN1088 | EN1088 | EN1088 |
| Features | Conduit size M20 | ■ | ■ | ■ | PG 13.5 | ■ | ■ | ■ | ■ | ■ | ■ |
| | Screw terminal | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | Connector terminal | – | – | – | – | – | – | – | ■ | – | – |
| | Operation key horizontal | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | Operation key vertical | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | Operation key adjustable horizontal | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | Operation key adjustable horizontal and vertical | ■ | ■ | ■ | – | ■ | ■ | ■ | ■ | ■ | ■ |
| | Mechanical lock/ 24 VDC solenoid release | – | – | – | – | – | ■ | ■ | ■ | ■ | ■ |
| | Mechanical lock/ 110 VAC solenoid release | – | – | – | – | – | ■ | – | – | – | – |
| | Mechanical lock/ 230 VAC solenoid release | – | – | – | – | – | ■ | – | – | – | – |
| | 24 VDC solenoid lock/ mechanical release | – | – | – | – | – | ■ | ■ | ■ | – | – |
| | 110 VAC solenoid lock mechanical release | – | – | – | – | – | ■ | – | – | – | – |
| | 240 VAC solenoid lock mechanical release | – | – | – | – | – | ■ | – | – | – | – |
| | High temperature sensor | – | – | – | – | – | – | – | – | – | – |
| | Operates with G9SR | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | Operates with G9SA, G9SB | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | Operates with G9SX | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | Operates with programmable safety units G9SP and NE1A | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Application | Door monitoring | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | Door locking | – | – | – | – | – | ■ | ■ | ■ | ■ | ■ |
| Contact configuration | 2 contact models | ■ | – | – | ■ | – | – | – | – | – | – |
| | 3 contact models | ■ | ■ | ■ | – | ■ | – | – | – | – | – |
| | 4 contact models | – | – | – | – | – | – | ■ | ■ | ■ | ■ |
| | 5 contact models | – | – | – | – | – | ■ | ■ | ■ | – | – |
| | 6 contact models | – | – | – | – | – | – | – | ■ | – | – |
| | Slow action contacts | ■ | ■ | ■ | – | ■ | – | – | – | ■ | ■ |
| | Page/Quick Link | 452 | 454 | 454 | 453 | 454 | 456 | 457 | 458 | 460 | 461 |

■ Standard – No/not available

## Hall coded non-contact for monitoring the status of guarding doors

Hall coded non-contact switches monitor the status of guarding doors. Stainless steel housing for high hygiene demands in the food industry are available.

- Based on hall technology
- Connect up to 3 switches in series
- LED supports easy diagnosis
- Operates with all OMRON safety controllers
- Operates behind stainless steel fittings
- Non-contact – no abrasion – no particles
- Compensation of mechanical tolerances
- Suitable for high pressure cleaning, CIP/SIP processes due IP69K (pre-wired types)
- Conforms to safety categories up PLe acc. EN ISO13849-1

## Ordering information

### Polyester housing

| Type | Cable connection | Contact configuration | Order code |
|---|---|---|---|
| Elongated sensors  | 5 m pre-wired | 2NC/1NO | F3S-TGR-NLPC-21-05 |
| | 10 m pre-wired | | F3S-TGR-NLPC-21-10 |
| | M12, 8-pin | | F3S-TGR-NLPC-21-M1J8 |
| Small sensors  | 5 m pre-wired | | F3S-TGR-NSPC-21-05 |
| | 10 m pre-wired | | F3S-TGR-NSPC-21-10 |
| | M12, 8-pin | | F3S-TGR-NSPC-21-M1J8 |
| Miniature sensors  | 5 m pre-wired[*1] | | F3S-TGR-NMPC-21-05 |
| | 10 m pre-wired[*1] | | F3S-TGR-NMPC-21-10 |
| | M12, 8-pin[*1] | | F3S-TGR-NMPC-21-M1J8 |
| Barrel sensors  | 5 m pre-wired | | F3S-TGR-NBPC-21-05 |
| | 10 m pre-wired | | F3S-TGR-NBPC-21-10 |
| | M12, 8-pin | | F3S-TGR-NBPC-21-M1J8 |

[*1] Optional cable exit to the right side is available for F3S-TGR-NMPC-types. Please add "-R" to the order code (i.e. F3S-TGR-NMPC-21-05-R)

### Stainless steel housing

| Type | Cable connection | Contact configuration | Order code |
|---|---|---|---|
| Elongated sensors  | 5 m pre-wired | 2NC/1NO | F3S-TGR-NLMC-21-05 |
| | 10 m pre-wired | | F3S-TGR-NLMC-21-10 |
| | M12, 8-pin | | F3S-TGR-NLMC-21-M1J8 |
| Small sensors  | 5 m pre-wired | | F3S-TGR-NSMC-21-05 |
| | 10 m pre-wired | | F3S-TGR-NSMC-21-10 |
| | M12, 8-pin | | F3S-TGR-NSMC-21-M1J8 |
| Barrel sensors  | 5 m pre-wired | | F3S-TGR-NBMC-21-05 |
| | 10 m pre-wired | | F3S-TGR-NBMC-21-10 |
| | M12, 8-pin | | F3S-TGR-NBMC-21-M1J8 |

### Hygienic and food types

| Type | Cable connection | Contact configuration | Order code |
|---|---|---|---|
| Small sensors  | 5 m pre-wired | 2NC/1NO | F3S-TGR-NSHC-21-05 |
| | 10 m pre-wired | | F3S-TGR-NSHC-21-10 |
| | M12, 8-pin | | F3S-TGR-NSHC-21-M1J8 |
| Small sensors (Special food type)  | 5 m pre-wired | | F3S-TGR-NSFC-21-05 |
| | 10 m pre-wired | | F3S-TGR-NSFC-21-10 |
| | M12, 8-pin | | F3S-TGR-NSFC-21-M1J8 |
| Miniature sensors  | 5 m pre-wired*1 | | F3S-TGR-NMHC-21-05 |
| | 10 m pre-wired*1 | | F3S-TGR-NMHC-21-10 |
| | M12, 8-pin*1 | | F3S-TGR-NMHC-21-M1J8 |

*1 Optional cable exit to the right side is available forF3S-TGR-NMHC-types. Please add "-R" to the order code (i.e. F3S-TGR-NMHC-21-05-R)

## Specifications

### Mechanical data

| Item | Model | Polyester types | Stainless steel types |
|---|---|---|---|
| **Serial switching** | | up to 3 pcs. | |
| **Indicator LED** | – | LED green - Indication of safety circuit closed | |
| **Operating distance**[*1] | **OFF → ON (Sao)** | Min. 8 mm/max. 10 mm | |
| | **ON → OFF (Sar)** | Min. 12 mm/max. 22 mm | |
| **Actuator approach speed** | **Min.**<br>**Max.** | 4 mm/s<br>1,000 mm/s | |
| **Operating temperature** | – | –25 to 80°C | –25 to 105°C |
| **Enclosure protection** | **Flying lead**<br>**M12 connector** | IP69K<br>IP67 | |
| **Material cable** | **Flying lead** | PVC, Ø 6 mm o.d. | |
| | **M12 connector** | 250 mm, PVC, Ø 6 mm o.d. | |
| **Material housing** | – | Black polyester | Stainless steel 316 |

*1 Depends on type. Please see online data sheet.

### Electrical data

| Item | | Model | Polyester types | Stainless steel types |
|---|---|---|---|---|
| **Sensor technology** | | – | Hall | |
| **Power supply** | | – | 24 VDC±15% | |
| **Power consumption** | | **Max.** | 50 mA | |
| **Switching current** | | **Min.** | 10 mA, 10 VDC | |
| **Rated loads** | **NC contacts**<br>**NO contact** | **Max.** | 200 mA, 24 VDC<br>200 mA, 24 VDC | |
| **Output type** | | – | Electronic output (potential-free optocoupler output) | |

### Approved standards

| EN standards certified by TÜV Rheinland |
|---|
| EN ISO13849-1 |
| EN 62061 |
| EN ISO 14119 |
| EN 60204-1 |
| EN/IEC 60947-5-3 |
| UL 508, CSA C22.2 |
| BS 5304 |
| EN 1088-1 conformance |

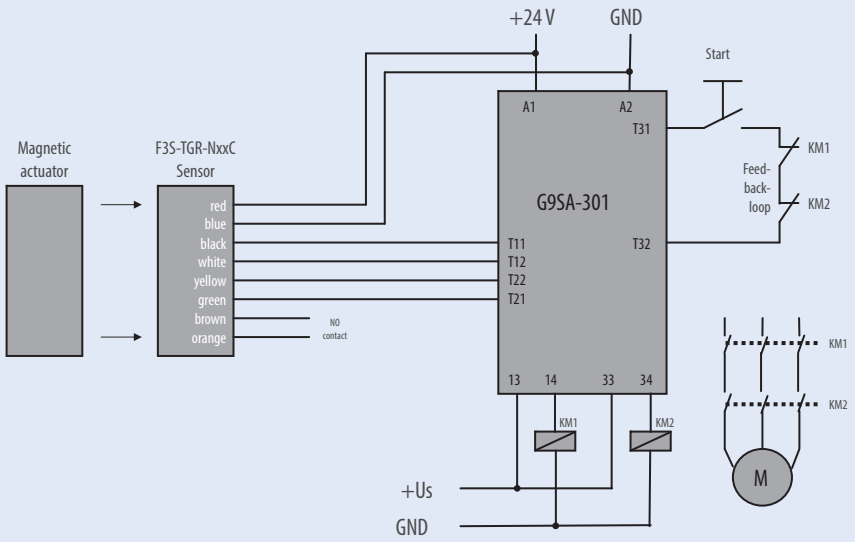
## Accessories

| | | Order code |
|---|---|---|
| Cables 8-pin | 2 m | Y92E-M12PURSH8S2M-L |
| | 5 m | Y92E-M12PURSH8S5M-L |
| | 10 m | Y92E-M12PURSH8S10M-L |
| | 25 m | Y92E-M12PURSH8S25M-L |
| T-connector connection cable | M12 T-connector for M12 connector-types | F39-TGR-NT |
| | 0.6 m, M12-8pin | Y92E-M12FSM12MSPURSH806M-L |
| | 2 m, M12-8pin | Y92E-M12FSM12MSPURSH82M-L |
| | 5 m, M12-8pin | Y92E-M12FSM12MSPURSH85M-L |
| | 10 m, M12-8pin | Y92E-M12FSM12MSPURSH810M-L |
| Actuators | for F3S-TGR-NLPC | F39-TGR-NLPC-A |
| | for F3S-TGR-NSPC | F39-TGR-NSPC-A |
| | for F3S-TGR-NMPC | F39-TGR-NMPC-A |
| | for F3S-TGR-NCPC | F39-TGR-NCPC-A |
| | for F3S-TGR-NWPC | F39-TGR-NWPC-A |
| | for F3S-TGR-NBPC | F39-TGR-NBPC-A |
| | for F3S-TGR-NLMC | F39-TGR-NLMC-A |
| | for F3S-TGR-NSMC | F39-TGR-NSMC-A |
| | for F3S-TGR-NBMC | F39-TGR-NBMC-A |
| | for F3S-TGR-NSHC | F39-TGR-NSHC-A |
| | for F3S-TGR-NSFC | F39-TGR-NSFC-A |
| | for F3S-TGR-NMHC | F39-TGR-NMHC-A |
| Mounting screws | Set of Torx safety screws (M4, 4 × 30 mm, 4 × 20 mm, 4 × 10 mm; incl. washers and Torx bit) | F39-TGR-N-SCREWS |

## Wiring examples (Single head connection)

### G9SA

Single sensor application with G9SA-301
(up to PLe acc. EN ISO 13849-1)



## Reed non-contact switches for monitoring the status of guarding doors

Reed non-contact switches monitor the status of guarding doors. Stainless steel housing for high hygiene demands in the food industry are available.

- Based on reed technology
- Connect up to 6 switches in series
- Operates with all Omron safety controllers
- Operates behind stainless steel fittings
- Non-contact – no abrasion – no particles
- Compensation of mechanical tolerances
- Suitable for high pressure cleaning, CIP/SIP processes due IP69K (pre-wired types)
- Conforms to safety categories up PLe acc. EN ISO13849-1

## Ordering information

### Polyester housing

| Type | Cable connection | Contact configuration | Order code |
|---|---|---|---|
| Elongated sensors  | 5 m pre-wired | 2NC/1NO[*1] | F3S-TGR-NLPR-21-05 |
| | 10 m pre-wired | | F3S-TGR-NLPR-21-10 |
| | M12, 8-pin | | F3S-TGR-NLPR-21-M1J8 |
| Small sensors  | 5 m pre-wired | | F3S-TGR-NSPR-21-05 |
| | 10 m pre-wired | | F3S-TGR-NSPR-21-10 |
| | M12, 8-pin | | F3S-TGR-NSPR-21-M1J8 |
| Miniature sensors  | 5 m pre-wired[*2] | 2NC/1NO[*3] | F3S-TGR-NMPR-21-05 |
| | 10 m pre-wired[*2] | | F3S-TGR-NMPR-21-10 |
| | M12, 8-pin[*2] | | F3S-TGR-NMPR-21-M1J8 |
| Barrel sensors  | 5 m pre-wired | | F3S-TGR-NBPR-21-05 |
| | 10 m pre-wired | | F3S-TGR-NBPR-21-10 |
| | M12, 8-pin | | F3S-TGR-NBPR-21-M1J8 |

[*1] 2NC: 1 A, 250 VAC/1NC: 0.2 A, 24 VDC
[*2] Optional cable exit to the right side is available for F3S-TGR-NMPR-types. Please add "-R" to the order code (i.e. F3S-TGR-NMPR-21-05-R)
[*3] 2NC: 0.5 A, 24 VDC/1NC: 0.2 A, 24 VDC

### Stainless steel housing

| Type | Cable connection | Contact configuration | Order code |
|---|---|---|---|
| Elongated sensors  | 5 m pre-wired | 2NC/1NO[*1] | F3S-TGR-NLMR-21-05 |
| | 10 m pre-wired | | F3S-TGR-NLMR-21-10 |
| | M12, 8-pin | | F3S-TGR-NLMR-21-M1J8 |
| Small sensors  | 5 m pre-wired | | F3S-TGR-NSMR-21-05 |
| | 10 m pre-wired | | F3S-TGR-NSMR-21-10 |
| | M12, 8-pin | | F3S-TGR-NSMR-21-M1J8 |
| Barrel sensors  | 5 m pre-wired | 2NC/1NO[*2] | F3S-TGR-NBMR-21-05 |
| | 10 m pre-wired | | F3S-TGR-NBMR-21-10 |
| | M12, 8-pin | | F3S-TGR-NBMR-21-M1J8 |

[*1] 2NC: 1 A, 250 VAC/1NC: 0.2 A, 24 VDC
[*2] 2NC: 0.5 A, 24 VDC/1NC: 0.2 A, 24 VDC

### Hygienic and food types

| Type | Cable connection | Contact configuration | Order code |
|---|---|---|---|
| Small sensors  | 5 m pre-wired | 2NC/1NO[*1] | F3S-TGR-NSHR-21-05 |
| | 10 m pre-wired | | F3S-TGR-NSHR-21-10 |
| | M12, 8-pin | | F3S-TGR-NSHR-21-M1J8 |
| Small sensors (Special food type)  | 5 m pre-wired | | F3S-TGR-NSFR-21-05 |
| | 10 m pre-wired | | F3S-TGR-NSFR-21-10 |
| | M12, 8-pin | | F3S-TGR-NSFR-21-M1J8 |
| Miniature sensors  | 5 m pre-wired[*2] | 2NC/1NO[*3] | F3S-TGR-NMHR-21-05 |
| | 10 m pre-wired[*2] | | F3S-TGR-NMHR-21-10 |
| | M12, 8-pin[*2] | | F3S-TGR-NMHR-21-M1J8 |

[*1] 2NC: 1 A, 250 VAC/1NC: 0.2 A, 24 VDC
[*2] Optional cable exit to the right side is available for F3S-TGR-NMHR-types. Please add "-R" to the order code (i.e. F3S-TGR-NMHR-21-05-R
[*3] 2NC: 0.5 A, 24 VDC/1NC: 0.2 A, 24 VDC

## Specifications

### Mechanical data

| Item | Model | Plastic housing | Stainless steel housing |
|---|---|---|---|
| **Serial switching** | | up to 6 pcs. | |
| **Operating distance** | **OFF → ON (Sao)** | 10 mm Close | |
| | **ON → OFF (Sar)** | 20 mm* Open | |
| **Actuator approach speed** | **Min.**<br>**Max.** | 4 mm/s<br>1,000 mm/s | |
| **Operating temperature** | – | –25 to 80°C | –25 to 105°C |
| **Enclosure protection** | **Flying lead**<br>**M12 connector** | IP69K<br>IP67 | |
| **Material cable** | **Flying lead** | PVC, Ø 6 mm o.d. | |
| | **M12 connector** | 250 mm, PVC, Ø 6 mm o.d. | |
| **Material housing** | – | Black polyester | Stainless steel 316 |

* max. 22 mm, depends on the type

### Electrical data

| Item | Model | Plastic housing | Stainless steel housing |
|---|---|---|---|
| **Indicator LED** | | none | |
| **Contact release time** | **Max.** | 2 ms | |
| **Initial contact resistance** | **Max.** | 500 mΩ | |
| **Switching current** | **Min.** | 1 mA, 10 VDC | |

### Approved standards

| EN standards certified by TÜV Rheinland |
|---|
| EN ISO13849-1 |
| EN 60204-1 |
| EN 62061 |
| EN/IEC 60947-5-3 |
| UL 508, CSA C22.2 |
| BS 5304 |
| EN 1088-1 conformance |

## Accessories

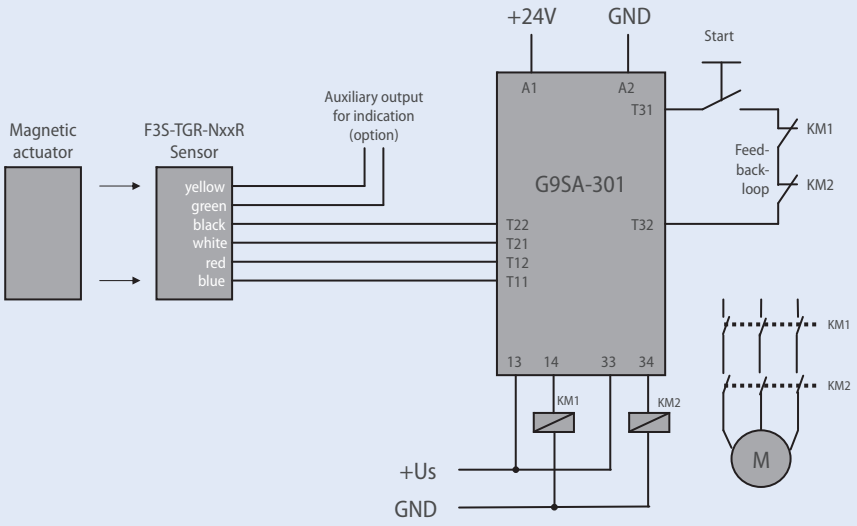
| | | Order code |
|---|---|---|
| Cables 8-pin | 2 m | Y92E-M12PURSH8S2M-L |
| | 5 m | Y92E-M12PURSH8S5M-L |
| | 10 m | Y92E-M12PURSH8S10M-L |
| | 25 m | Y92E-M12PURSH8S25M-L |
| Actuators | for F3S-TGR-NLPR | F39-TGR-NLPR-A |
| | for F3S-TGR-NSPR | F39-TGR-NSPR-A |
| | for F3S-TGR-NMPR | F39-TGR-NMPR-A |
| | for F3S-TGR-NCPR | F39-TGR-NCPR-A |
| | for F3S-TGR-NWPR | F39-TGR-NWPR-A |
| | for F3S-TGR-NBPR | F39-TGR-NBPR-A |
| | for F3S-TGR-NLMR | F39-TGR-NLMR-A |
| | for F3S-TGR-NSMR | F39-TGR-NSMR-A |
| | for F3S-TGR-NBMR | F39-TGR-NBMR-A |
| | for F3S-TGR-NSHR | F39-TGR-NSHR-A |
| | for F3S-TGR-NSFR | F39-TGR-NSFR-A |
| | for F3S-TGR-NMHR | F39-TGR-NMHR-A |
| Mounting screws | Set of Torx safety screws (M4, 4 × 30 mm, 4 × 20 mm, 4 × 10 mm; incl. washers and Torx bit) | F39-TGR-N-SCREWS |
| Spacer (8 mm, Set of 2pcs.)*1 | for elongated sensors | F39-TGR-NLR-SPACER |
| | for small sensors | F39-TGR-NSR-SPACER |
| | for miniature sensors | F39-TGR-NMR-SPACER |
| | for long sensors | F39-TGR-NLR-SPACER |
| | for wide sensors | F39-TGR-NWR-SPACER |

*1 Spacers are needed to prevent influences if switch is mounted on ferromagnetic background (e. g. reduced switching distance, EMC influences)

## Wiring examples (Single head connection)

**G9SA**

Single sensor application with G9SA-301
(up to PLe acc. EN ISO 13849-1)



## RFID non-contact switches

RFID Non-contact switches are designed to monitor hinge, sliding or removal guard doors.

- Based on RFID technology (code) and hall technology (distance check)
- The RFID-design covers two operation models with very high anti-tamper level:
- M-types (Master coded): Any sensor works with any actuator, like traditional switches
- U-types (Unique coded): Each sensor and actuator use a unique code. This is a solution for applications that requires even a higher anti-tamper level
- Connect up to 20 switches in series
- LED supports easy diagnosis
- Compensation of mechanical tolerances
- Non-contact – no abrasion – no particles
- Operates with all OMRON safety controllers
- Suitable for CIP/SIP processes and high pressure cleaning due IP69K (pre-wired types)
- Conforms to safety categories up to PLe acc. EN ISO 13849-1

## Ordering information

Master coded: Any actuator will operate with any sensor (Power down - power up re-teach needed if exchange of actuator)
Unique coded: Only one actuator fits to the code of the sensor

### Elongated sensors

| Type | Cable connection | Contact configuration | Order code | |
|---|---|---|---|---|
| | | | Master coded | Unique coded |
|  | 5 m pre-wired | 2NC/1NO | F3S-TGR-NLPM-21-05 | F3S-TGR-NLPU-21-05 |
| | 10 m pre-wired | | F3S-TGR-NLPM-21-10 | F3S-TGR-NLPU-21-10 |
| | M12, 8-pin | | F3S-TGR-NLPM-21-M1J8 | F3S-TGR-NLPU-21-M1J8 |

### Small sensors

| Type | Cable connection | Contact configuration | Order code | |
|---|---|---|---|---|
| | | | Master coded | Unique coded |
|  | 5 m pre-wired | 2NC/1NO | F3S-TGR-NSPM-21-05 | F3S-TGR-NSPU-21-05 |
| | 10 m pre-wired | | F3S-TGR-NSPM-21-10 | F3S-TGR-NSPU-21-10 |
| | M12, 8-pin | | F3S-TGR-NSPM-21-M1J8 | F3S-TGR-NSPU-21-M1J8 |

## Specifications

### Mechanical data

| Item | | |
|---|---|---|
| Serial switching | | up to 20 pcs. |
| Indicator LED | | LED green - Indication of safety circuit closed |
| Operating distance | OFF → ON (Sao) | 10 mm Close |
| | ON → OFF (Sar) | 20 mm Open |
| Actuator approach speed | Min. | 4 mm/s |
| | Max. | 1,000 mm/s |
| Operating temperature | | –25 to 80°C |
| Enclosure protection | Flying lead | IP69K |
| | M12 connector | IP67 |
| Material cable | Flying lead | PVC, Ø 6 mm o.d. |
| | M12 connector | 250 mm, PVC, Ø 6 mm o.d. |
| Material | | UL approved Polyester |

### Electrical data

| Item | | | F3S-TGR-N_M | F3S-TGR-N_U |
|---|---|---|---|---|
| Code | | | Master coded: Every switch same code (Power down - Power up re-teach needed, if actuator interchanged) | Unique coded: 32 x $16^6$ different codes |
| Technology | | | RFID (code) and Hall (distance check) | |
| Power supply | | | 24 VDC±15% | |
| Power consumption | | Max. | 0.2 A | |
| Switching current | | Min. | 1 mA, 10 VDC | |
| Rated loads | NC contacts | Max. | 0.2 A, 24 VDC | |
| | NO contact | Max. | 0.2 A, 24 VDC | |
| Output type | | | Electronic output (potential-free optocoupler output) | |

## Approved standards

| EN standards certified by TÜV Rheinland |
|---|
| EN 62061 |
| EN ISO 14119 |
| EN ISO13849-1 |
| EN 60204-1 |

| EN standards certified by TÜV Rheinland |
|---|
| EN/IEC 60947-5-3 |
| UL 508, CSA C22.2 |
| BS 5304 |
| EN 1088-1 conformance |

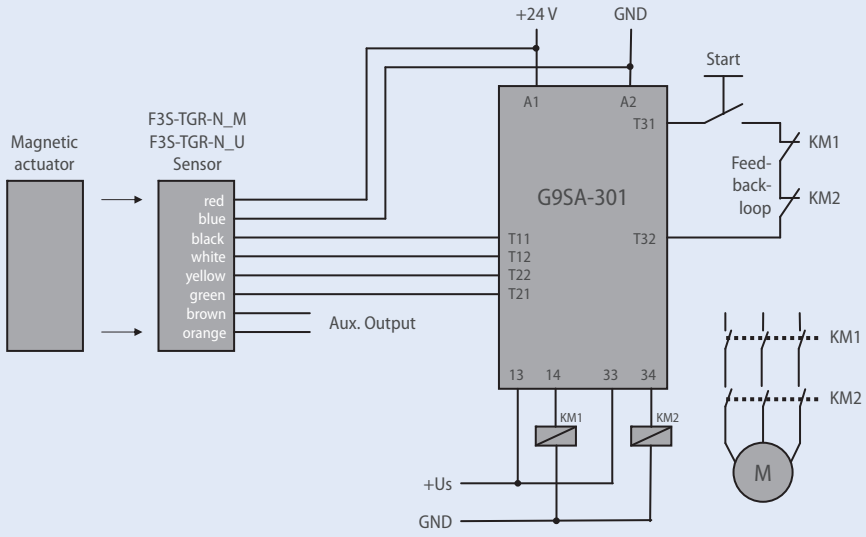
## Accessories

| | | Order code |
|---|---|---|
| **Cables 8-pin** | 2 m | Y92E-M12PURSH8S2M-L |
| | 5 m | Y92E-M12PURSH8S5M-L |
| | 10 m | Y92E-M12PURSH8S10M-L |
| | 25 m | Y92E-M12PURSH8S25M-L |
| **T-Connector connection cable** | T-Connector for M12 connector | F39-TGR-NT |
| | 0.6 m, M12-8pin | Y92E-M12FSM12MSPURSH806M-L |
| | 2 m, M12-8pin | Y92E-M12FSM12MSPURSH82M-L |
| | 5 m, M12-8pin | Y92E-M12FSM12MSPURSH85M-L |
| | 10 m, M12-8pin | Y92E-M12FSM12MSPURSH810M-L |
| **Actuators (only for master coded types)** | for F3S-TGR-NLPM | F39-TGR-NLPM-A |
| | for F3S-TGR-NSPM | F39-TGR-NSPM-A |
| **Mounting screws** | Set of Torx safety screws (M4, 4 × 30 mm, 4 × 20 mm, 4 × 10 mm; incl. washers and Torx bit) | F39-TGR-N-SCREWS |

## Wiring examples (Single head connection)

### G9SA

Single sensor application with G9SA-301
(up to PLe acc. EN ISO 13849-1)



## Standalone non-contact safety switches

Standalone non-contact switches support applications like guarding doors or position monitoring in machines. They are using the proven Omron non-contact technology allowing to cover mechanical tolerances and vibrations

- Models with single or dual actuator available (For one or two door systems in e.g.)
- Based on hall technology
- Connect up to 20 switches in series
- LED for easy diagnosis
- Operates behind stainless steel fittings
- Non-contact – no abrasion – no particles
- Compensation of mechanical tolerances
- Suitable for high pressure cleaning, CIP and SIP processes due IP69K (pre-wired types)
- Conforms to safety categories up to PLe acc. EN ISO 13849-1

## Ordering information

### Switches

#### Polyester housing

| Type | Cable connection | Order code |
|---|---|---|
| Single actuator sensing  | 5 m pre-wired | F3S-TGR-SPSA-05 |
| | 10 m pre-wired | F3S-TGR-SPSA-10 |
| | M12, 8-pin | F3S-TGR-SPSA-M1J8 |
| Dual actuator sensing  | 5 m pre-wired | F3S-TGR-SPSD-05 |
| | 10 m pre-wired | F3S-TGR-SPSD-10 |
| | M12, 8-pin | F3S-TGR-SPSD-M1J8 |

#### Stainless steel housing

| Type | Cable connection | Order code |
|---|---|---|
| Single actuator sensing  | 5 m pre-wired | F3S-TGR-SMSA-05 |
| | 10 m pre-wired | F3S-TGR-SMSA-10 |
| | M12, 8-pin | F3S-TGR-SMSA-M1J8 |
| Dual actuator sensing  | 5 m pre-wired | F3S-TGR-SMSD-05 |
| | 10 m pre-wired | F3S-TGR-SMSD-10 |
| | M12, 8-pin | F3S-TGR-SMSD-M1J8 |

### Accessories

| | | Order code |
|---|---|---|
| Cables 8-pin | 2 m | Y92E-M12PURSH8S2M-L |
| | 5 m | Y92E-M12PURSH8S5M-L |
| | 10 m | Y92E-M12PURSH8S10M-L |
| | 25 m | Y92E-M12PURSH8S25M-L |
| Actuators (only for master coded types) | for F3S-TGR-SPSA and -SPSD | F39-TGR-SPS-A |
| | for F3S-TGR-SMSA and -SMSD | F39-TGR-SMS-A |
| Mounting screws | Set of Torx safety screws (M4, 4 × 30 mm, 4 × 20 mm, 4 × 10 mm; incl. washers and Torx bit) | F39-TGR-N-SCREWS |

## Specifications

### Mechanical data

| Item | Model | Polyester Sensor | Stainless steel sensor |
|---|---|---|---|
| Indicator | – | Green LED: Indication of safety circuits closed (Guard closed, actuator present, feedback circuit checked) | |
| | | Yellow LED: Indication of safety circuits open (Actuator removed) | |
| Operating distance | OFF → ON (Sao) | 10 mm Close | |
| | ON → OFF (Sar) | 15 mm Open | |
| Actuator approach speed | Min. | 4 mm/s | |
| | Max. | 1,000 mm/s | |
| Operating temperature | | –25 to 45°C | |
| Enclosure protection | Flying lead | IP69K | |
| | M12 connector | IP67 | |
| Material cable | Flying lead | PVC, Ø 6 mm o.d. | |
| | M12 connector | 250 mm, PVC, Ø 6 mm o.d. | |
| Material housing | | UL approved Polyester | Stainless steel 316 |

### Electrical data

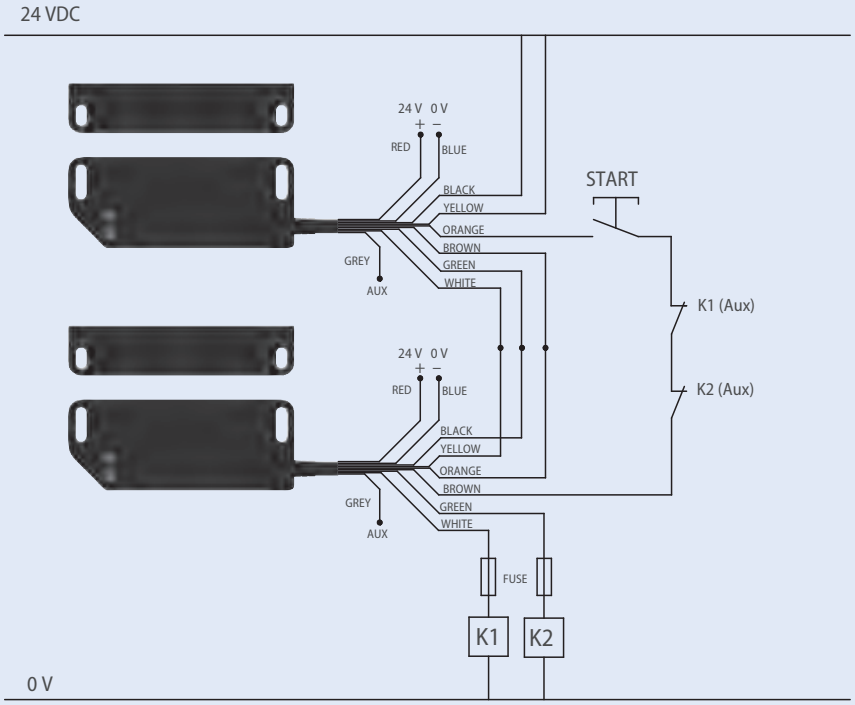
| Item | | Model | Polyester sensor | Stainless steel sensor |
|---|---|---|---|---|
| Sensing technology | | – | Hall | |
| Serial connection | | – | up to 20 switches | |
| Power supply | | | 24 VDC±10% | |
| Power consumption | | Max. | 0.1 A | |
| Switching current | | Min. | 10 mA, 5 VDC | |
| Rated loads | Safety outputs | Max. | 3 A, 250 VAC/3A, 24 VDC | |
| | Auxiliary output | Max. | 0.2 A, 24 VDC | |

### Approved standards

| EN standards certified by TÜV Rheinland |
|---|
| EN ISO13849-1 |
| EN 62061 |
| EN ISO 14119 |
| EN 60204-1 |
| EN/IEC 60947-5-3 |
| UL 508, CSA C22.2 |
| BS 5304 |
| EN 1088-1 conformance |

### Wiring example (serial connection with manual restart)

(up to PLe acc. EN ISO 13849-1)
Safety Circuit 1 (Black/White) utilises internally checked force guided relay contacts and is connected in series with the corresponding Safety Circuit 2 (Yellow/Green) of the next switch. Allows minimal wiring and higher current switching to K1 and K2 contactors.
A manual start and contactor feedback check is achieved by connecting K1(Aux) and K2(Aux) feedback contacts and momentary start button through the orange and brown feedback check.



## Explosion proof non-contact switches

Explosion proof reed non-contact switches monitor the status of guarding doors in petro-chemical and food applications with explosive atmospheres.

- Based on reed technology
- Connect up to 6 switches in series
- Operates with all Omron safety controllers
- Operates behind stainless steel fittings
- Non-contact – no abrasion – no particles
- Compensation of mechanical tolerances
- Suitable for high pressure cleaning, CIP/SIP processes
- Conforms to safety categories up PLe acc. EN ISO13849-1
- For use in hazardous areas IECEx and ATEX EExd IIC T6 (Gas and Dust). Designed for Petro-chemical and food applications where explosive atmospheres are present.

## Ordering information

### Elongated sensors

| Type | Cable connection | Contact configuration | Order code |
|---|---|---|---|
|  | 5 m pre-wired | 2NC/1NO | F3S-TGR-NLMX-21-05 |
| | 10 m pre-wired | 2NC/1NO | F3S-TGR-NLMX-21-10 |

### Barrel sensors

| Type | Cable connection | Contact configuration | Order code |
|---|---|---|---|
|  | 5 m pre-wired | 2NC/1NO | F3S-TGR-NBMX-21-05 |
| | 10 m pre-wired | 2NC/1NO | F3S-TGR-NBMX-21-10 |

## Specifications

### Mechanical data

| | | Elongated sensors | Barrel sensors |
|---|---|---|---|
| Serial switching | | up to 6 pcs. | |
| Indicator | – | None | |
| Operating distance | OFF → ON (Sao) | 10 mm close | |
| | ON → OFF (Sar) | 22 mm open | |
| Actuator approach speed | Min.<br>Max. | 4 mm/s<br>1000 mm/s | |
| Operating temperature | – | –20°C to +60°C | |
| Enclosure protection | Flying lead | IP 67 Certification for IP67 but can be used for SIP/CIP and high pressure cleaning like IP69K) | |
| Material | – | Stainless steel 316 | |

### Electrical data

| | | | Elongated sensors | Barrel sensors |
|---|---|---|---|---|
| Sensor technology | | – | Reed | |
| Power supply | | – | 24 VDC±15% | |
| Switching current | | Min. | 1 mA, 10 VDC | |
| Rated loads | NC contacts<br>NO contact | Max. | 0.6 A, 230 VAC/24 VDC (internally fused)<br>0.2 A, 230 VAC/24 VDC | |

## Ex specification

| |
|---|
| II 2G Ex mb IIC T6Gb, II 2D Ex mb IIC T80 Db IP67*<br>(*Product is fully encapsulated which is considered to provide Ingress Protection to at least IP67) |
| Zones 0, 1, 2 (Gas), Zones 20, 21, 22 (Dust)<br>(An area where Gas and Dust is likely to occur in use) |
| IEC/EN 60079-0, IEC/EN 60079-18 |

## Approved standards

| EN standards certified by TÜV Rheinland |
|---|
| EN ISO 13849-1 |
| EN 60204-1 |
| EN 62061 |
| EN ISO 14119 |
| EN/IEC 60947-5-3 |
| UL 508, CSA C22.2 |
| BS 5304 |
| EN 1088-1 |

## Accessories

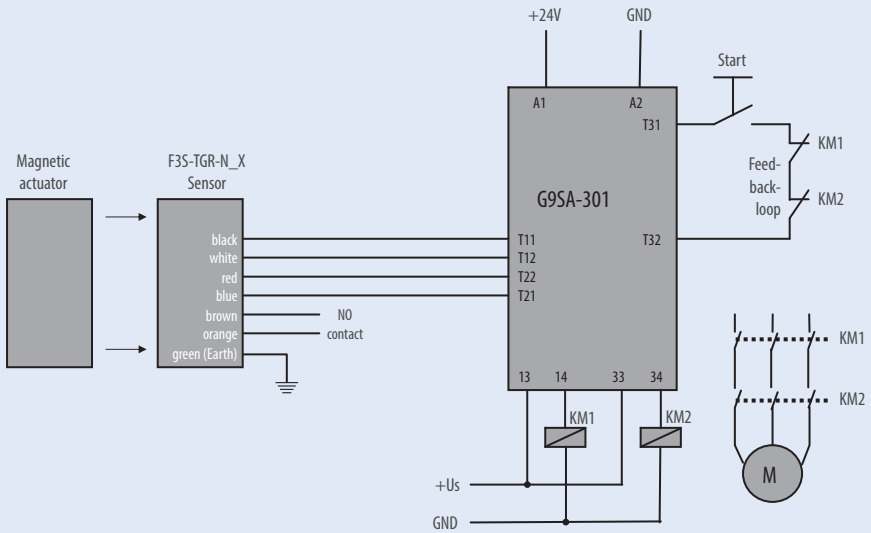
| | | Order code |
|---|---|---|
| Actuators | for F3S-TGR-NLMX | F39-TGR-NLMX-A |
| | for F3S-TGR-NBMX | F39-TGR-NBMX-A |
| Mounting screws | Set of Torx safety screws<br>(M4, 4 × 30 mm, 4 × 20 mm, 4 × 10 mm; incl. washers and Torx bit) | F39-TGR-N-Screws |
| Spacer (8 mm, Set of 2pcs.)*1 | for F3S-TGR-NLMX | F39-TGR-NLR-SPACER |

*1 Spacers are needed to prevent influences if switch is mounted on ferromagnetic background (e. g. reduced switching distance, EMC influences)

## Wiring examples (Single head connection)

### G9SA

Single sensor application with G9SA-301
(up to PLe acc. EN ISO 13849-1)



## Safety door switch with plastic housing

The D4NS line-up includes three-contact models with 2NC/1NC and 3NC contact forms in addition to the previous contact forms, 1NC/1NO and 2NC. All models have a M20 conduit opening.

- Line-up with three contacts: 2NC/1NC and 3NC contact forms
- Line-up with two contacts 1NC/1NO and 2NC
- Standardised gold-clad contacts for high contact reliability
- Applicable for standard loads and micro loads

## Ordering information

**Switches (with approved direct opening contacts)**

| Type | Contact configuration | | Conduit opening/connector | Order code |
|---|---|---|---|---|
| 1-conduit | Slow-action | 1NC/1NO | M20 | D4NS-4AF |
| | | 2NC | M20 | D4NS-4BF |
| | | 2NC/1NO | M20 | D4NS-4CF |
| | | 3NC | M20 | D4NS-4DF |
| | Slow-action MBB contact | 1NC/1NO | M20 | D4NS-4EF |
| | | 2NC/1NO | M20 | D4NS-4FF |

**Operation keys (order separately)**

| Type | | Order code |
|---|---|---|
| Horizontal mounting |  | D4DS-K1 |
| Vertical mounting |  | D4DS-K2 |

| Type | | Order code |
|---|---|---|
| Adjustable mounting (horizontal) |  | D4DS-K3 |
| Adjustable mounting (horizontal/vertical) |  | D4DS-K5 |

## Specifications

| | | |
|---|---|---|
| **Degree of protection** | | IP67 (EN60947-5-1) (This applies for the switch only. The degree of protection for the key hole is IP00.) |
| **Durability** *1 | **Mechanical** | 1,000,000 operations min. |
| | **Electrical** | 500,000 operations min. for a resistive load of 3 A at 250 VAC<br>300,000 operations min. for a resistive load of 10 A at 250 VAC |
| **Operating speed** | | 0.05 to 0.5 m/s |
| **Operating frequency** | | 30 operations/minute max. |
| **Direct opening force** *2 | | 60 N min. |
| **Direct opening travel** *2 | | 10 mm min. |
| **Minimum applicable load** | | Resistive load of 1 mA at 5 VDC (N-level reference value) |
| **Protection against electric shock** | | Class II (double insulation) |
| **Pollution degree (operating environment)** | | 3 (EN60947-5-1) |
| **Contact gap** | | 2×2 mm min |
| **Conditional short-circuit current** | | 100 A (EN60947-5-1) |
| **Rated open thermal current ($I_{th}$)** | | 10 A (EN60947-5-1) |
| **Ambient temperature** | | Operating: –30°C to 70°C with no icing |

*1 The durability is for an ambient temperature of 5°C to 35°C and an ambient humidity of 40 to 70%. For more details, consult your Omron representative.
*2 These figures are minimum requirements for safe operation.

**Note:** The above values are initial values.

## Safety door switch with metal housing

The D4BS line-up includes two-contact models with 1NC/1NO and 2NC in a robust metal housing with 1 PG 13.5 conduit opening.

- Robust metal housing
- Line-up with two contacts: 1NC/1NO and 2NC
- Standardised gold-clad contacts for high contact reliability
- Applicable for standard loads and micro loads

## Ordering information

### Switches

| Type | Mounting direction | Conduit size | Order code | |
|---|---|---|---|---|
| | | | 1NC/1NO (slow-action) | 2NC (slow-action) |
| 1-conduit | Front-side mounting | Pg13.5 | D4BS-15FS | D4BS-1AFS |

### Operation keys (order separately)

| Type | | Order code |
|---|---|---|
| Horizontal mounting |  | D4BS-K1 |
| Vertical mounting |  | D4BS-K2 |
| Adjustable mounting (horizontal) |  | D4BS-K3 |

## Specifications

| | |
|---|---|
| **Degree of protection**[*1] | IP67 (EN60947-5-1) |
| **Durability**[*2] | Mechanical: 1,000,000 operations min.<br>Electrical: 500,000 operations min. (10 A at 250 VAC, resistive load) |
| **Operating speed** | 0.1 m/s to 0.5 m/s |
| **Operating frequency** | 30 operations/min max. |
| **Rated frequency** | 50/60 Hz |
| **Contact gap** | 2×2 mm min. |
| **Direct opening force**[*3] | 19.61 N min. (EN60947-5-1) |
| **Direct opening travel**[*3] | 20 mm min. (EN60947-5-1) |
| **Full stroke** | 23 mm min. |
| **Conventional enclosed thermal current ($I_{th}$)** | 20 A (EN60947-5-1) |
| **Conditional short-circuit current** | 100 A (EN60947-5-1) |
| **Pollution degree (operating environment)** | 3 (EN60947-5-1) |
| **Protection against electric shock** | Class I (with ground terminal) |
| **Ambient temperature** | Operating: –40 to 80°C (with no icing) |

*1 Although the switch box is protected from dust, oil, or water penetration, do not use the D4BS in places where dust, oil, water, or chemicals may penetrate through the key hole on the head, otherwise switch damage or malfunctioning may occur.
*2 The durability is for an ambient temperature of 5°C to 35°C and an ambient humidity of 40 to 70%. Contact your Omron sales representative for more detailed information on other operating environments.
*3 These figures are minimum requirements for safe operation.

**Note:** The above values are initial values.

## Safety door switches with stainless steel head or full stainless steel body

This safety door switches use a stainless steel head or even a full stainless steel body to increase the robustness.

- 2NC/1NO or 3NC contacts
- Key entry turnable to back side
- 4 key insertion positions
- 3 M20 conduit entries
- Positive break contacts (to IEC 60947-5-1)

## Ordering information

**Switches**

| Type | Housing | Conduit | Contacts | Order code |
|---|---|---|---|---|
|  | Plastic body with metal head | M20 | 2NC/1NO<br>Slow action | F3S-TGR-KM15-21 |
| | | | 3NC<br>Slow action | F3S-TGR-KM15-30 |
|  | Plastic body with metal head | | 2NC/1NO<br>Slow action | F3S-TGR-KM16-21 |
| | | | 3NC<br>Slow action | F3S-TGR-KM16-30 |
|  | Full stainless steel body | | 2NC/1NO<br>Slow action | F3S-TGR-KH16-21 |
| | | | 3NC<br>Slow action | F3S-TGR-KH16-30 |

**Keys (order separately)**

| Type | Order code |
|---|---|
| for metal head  | F39-TGR-KAM |
| Horizontal mounting  | F39-TGR-KF |
| plastic flexible  | F39-TGR-KPF |
| heavy flexible  | F39-TGR-KHF |
| hygienic flexible  | F39-TGR-KHFH |

**Accessories**

| Item | Remarks | Order code |
|---|---|---|
| M20 Gland | Stainless steel 316 for F3S-TGR-KH16 types | F39-TGR-M20 |
| Mounting screws | Set of Torx safety screws (M4, 4 × 30 mm, 4 × 20 mm, 4 × 10 mm; incl. washers and Torx bit) | F39-TGR-N-SCREWS |

## Specifications

| Item | | F3S-TGR-KM15 | F3S-TGR-KM16 | F3S-TGR-KH16 |
|---|---|---|---|---|
| Standards | | EN1088, IEC 60947-5-1, EN 60204-1, UL508<br>EN ISO 13849-1: up to PLe *1<br>EN 62061: up to SIL3 *1 | | |
| Mechanical reliability B10d | | $2.5 \times 10^6$ operations at 100mA load | | |
| PFHd | | $3.44 \times 10^{-8}$ | | |
| Proof test interval (Life) | | 35 years | | |
| MTTFd | | 356 years | | |
| Utilization category | | AC15 A300 3 A | | |
| Thermal current (Ith) | | 5 A | | |
| Rated insulation/Withstand voltages | | 500 VAC/2,500 VAC | | |
| Rated travel for positive opening | | 8 mm | | |
| Actuator entry minimum radius | | 175 mm standard, 100mm flexible | | |
| Maximum approach/Withdrawal speed | | 600 mm/s | | |
| Body dimensions (W × H × D) | | 54 × 88.4 × 34.5 mm | 58 × 100.4 × 34.5 mm | 58 × 103.5 × 39.5 mm |
| Fixing | | 2 × M5, 40 mm distance | 4 × M5, 40 mm distance | |
| Conduit entry | | M20 | | |
| Material | Body | Polyester | | Stainless steel 316 |
| | Head | Stainless steel 316 | | |
| Enclosure Protection | | IP67 | | |
| Temperature Range | | –25 to 80°C | | |
| Vibration | | IEC 68-2-6, 10-55 Hz +1 Hz, Excursion: 0.35 mm, 1 octave/min | | |

*1 Depending upon system architecture

## Guard-lock safety door switch

The D4NL guard-lock safety-door switches are available with four or five built-in contacts. When locked, they have a key holding force of up to 1300 N. Mechanical lock/solenoid release types and vice versa set up the complete range.

- Safety-door switch with electromagnetic lock or unlock mechanism
- Models with four or five built-in contacts
- Strong key holding force: 1300 N
- For standard loads and micro loads
- Keys are compatible with D4GL and D4NS

## Ordering information

**Switches (with approved direct opening contacts)**
For 110 V and 230 V version ask your local Omron representative

| Lock and release types | Contact configuration | Conduit opening | Order code |
|---|---|---|---|
| Mechanical lock solenoid release | 1NC/1NO + 1NC/1NO | M20 | D4NL-4AFA-B |
| | 1NC/1NO + 2NC | M20 | D4NL-4BFA-B |
| | 2NC + 1NC/1NO | M20 | D4NL-4CFA-B |
| | 2NC + 2NC | M20 | D4NL-4DFA-B |
| | 2NC/1NO + 1NC/1NO | M20 | D4NL-4EFA-B |
| | 2NC/1NO + 2NC | M20 | D4NL-4FFA-B |
| | 3NC + 1NC/1NO | M20 | D4NL-4GFA-B |
| | 3NC + 2NC | M20 | D4NL-4HFA-B |

| Lock and release types | Contact configuration | Conduit opening | Order code |
|---|---|---|---|
| Solenoid lock mechanical release | 1NC/1NO + 1NC/1NO | M20 | D4NL-4AFG-B |
| | 1NC/1NO + 2NC | M20 | D4NL-4BFG-B |
| | 2NC + 1NC/1NO | M20 | D4NL-4CFG-B |
| | 2NC + 2NC | M20 | D4NL-4DFG-B |
| | 2NC/1NO + 1NC/1NO | M20 | D4NL-4EFG-B |
| | 2NC/1NO + 2NC | M20 | D4NL-4FFG-B |
| | 3NC + 1NC/1NO | M20 | D4NL-4GFG-B |
| | 3NC + 2NC | M20 | D4NL-4HFG-B |

**Note**
- Conduit sizes of G1/2 and Pg 13,5 are also available.
- Solenoid: 24 VDC, Orange LED: 10 to 115 VAC/VDC

**Operation keys (order separately)**

| Type | | Order code |
|---|---|---|
| Horizontal mounting |  | D4DS-K1 |
| Vertical mounting |  | D4DS-K2 |

| Type | | Order code |
|---|---|---|
| Adjustable mounting (horizontal) |  | D4DS-K3 |
| Adjustable mounting (horizontal/vertical) |  | D4DS-K5 |

## Specifications

| | | |
|---|---|---|
| **Degree of protection** | | IP67 (EN60947-5-1) (This applies for the switch only. The degree of protection for the key hole is IP00.) |
| **Durability**[*1] | **Mechanical** | 1,000,000 operations min. |
| | **Electrical** | 500,000 operations min. for a resistive load of 3 A at 250 VAC |
| **Operating speed** | | 0.05 to 0.5 m/s |
| **Operating frequency** | | 30 operations/minute max. |
| **Rated frequency** | | 50/60 Hz |
| **Contact gap** | | 2x2 mm min |
| **Direct opening force** [*2] | | 60 N min. (EN60947-5-1) |
| **Direct opening travel** [*2] | | 10 mm min. (EN60947-5-1) |
| **Holding force** | | 1,300 N min. |
| **Minimum applicable load** | | Resistive load of 1 mA at 5 VDC (N-level reference value) |
| **Thermal current ($I_{th}$)** | | 10 A (EN60947-5-1) |
| **Conditional short-circuit current** | | 100 A (EN60947-5-1) |
| **Pollution degree (operating environment)** | | 3 (EN60947-5-1) |
| **Protection against electric shock** | | Class II (double insulation) |
| **Ambient temperature** | | Operating: −10°C to 55°C (with no icing or condensation) |

[*1] The durability is for an ambient temperature of 5°C to 35°C and an ambient humidity of 40 to 70%. For more details, consult your Omron representative.
[*2] These figures are minimum requirements for safe operation.

**Note:** The above values are initial values.

## Guard-lock safety door switch

The D4GL guard-lock safety-door switches are available with four or five built-in contacts. When locked, they have a key holding force of up to 1000 N.
Mechanical lock/solenoid release types and vice versa set up the complete range.

- Slim safety-door switch with electromagnetic lock or unlock mechanism
- Models with four or five built-in contacts
- Strong key holding force: 1000 N
- For standard loads and micro loads
- Keys are compatible with D4NL and D4NS

## Ordering information

**Switches (with approved direct opening contacts)**

| Lock and release types | Contact configuration | Conduit size | Order code |
|---|---|---|---|
| Mechanical lock solenoid release | 1NC/1NO + 1NC/1NO | M20 | D4GL-4AFA-A |
| | 1NC/1NO + 2NC | M20 | D4GL-4BFA-A |
| | 2NC + 1NC/1NO | M20 | D4GL-4CFA-A |
| | 2NC + 2NC | M20 | D4GL-4DFA-A |
| | 2NC/1NO + 1NC/1NO | M20 | D4GL-4EFA-A |
| | 2NC/1NO + 2NC | M20 | D4GL-4FFA-A |
| | 3NC + 1NC/1NO | M20 | D4GL-4GFA-A |
| | 3NC + 2NC | M20 | D4GL-4HFA-A |

| Lock and release types | Contact configuration | Conduit size | Order code |
|---|---|---|---|
| Solenoid lock mechanical release | 1NC/1NO + 1NC/1NO | M20 | D4GL-4AFG-A |
| | 1NC/1NO + 2NC | M20 | D4GL-4BFG-A |
| | 2NC + 1NC/1NO | M20 | D4GL-4CFG-A |
| | 2NC + 2NC | M20 | D4GL-4DFG-A |
| | 2NC/1NO + 1NC/1NO | M20 | D4GL-4EFG-A |
| | 2NC/1NO + 2NC | M20 | D4GL-4FFG-A |
| | 3NC + 1NC/1NO | M20 | D4GL-4GFG-A |
| | 3NC + 2NC | M20 | D4GL-4HFG-A |

**Note**
- conduit sizes of G1/2 and Pg13,5 are also available.
- solenoid: 24 VDC, orange/green LED: 24 VDC

**Operation keys (order separately)**

| Type | | Order code |
|---|---|---|
| Horizontal mounting |  | D4DS-K1 |
| Vertical mounting |  | D4DS-K2 |

| Type | | Order code |
|---|---|---|
| Adjustable mounting (horizontal) |  | D4DS-K3 |
| Adjustable mounting (horizontal/vertical) |  | D4DS-K5 |

## Specifications

| | | |
|---|---|---|
| **Degree of protection** | | IP67 (EN60947-5-1)<br>(This applies for the switch only. The degree of protection for the key hole is IP00.) |
| **Durability** *1 | **Mechanical** | 1,000,000 operations min. |
| | **Electrical** | 500,000 operations min. for a resistive load of 4 mA at 24 VDC;<br>150,000 operations min. for a resistive load of 1 A at 125 VAC in 2 circuits and 4 mA at 24 VDC in 2 circuits |
| **Operating speed** | | 0.05 to 0.5 m/s |
| **Operating frequency** | | 30 operations/minute max. |
| **Rated frequency** | | 50/60 Hz |
| **Contact gap** | | 2x2 mm min. |
| **Direct opening force** *2 | | 60 N min. (EN60947-5-1) |
| **Direct opening travel** *3 | | 10 mm min. (EN60947-5-1) |
| **Holding force** | | 1,000 N min. |
| **Minimum applicable load** | | Resistive load of 4 mA at 24 VDC (N-level reference value) |
| **Thermal current ($I_{th}$)** | | 2.5 A (EN60947-5-1) |
| **Conditional short-circuit current** | | 100 A (EN60947-5-1) |
| **Pollution degree (operating environment)** | | 3 (EN60947-5-1) |
| **Protection against electric shock** | | Class II (double insulation) |
| **Ambient temperature** | | Operating: −10°C to 55°C with no icing |

*1 The durability is for an ambient temperature of 5°C to 35°C and an ambient humidity of 40 to 70%. For more details, consult your Omron representative.
*2 These figures are minimum requirements for safe operation.
*3 These figures are minimum requirements for safe operation.

**Note:** The above values are initial values.

## Guard-lock safety door switch

The D4SL-N guard-lock safety door switches safety door switches provides a wide range of models for the safe monitoring of entries and positions of guards.

- Key holding force 1,300 N
- 4, 5 and 6 contact types
- Terminal block type and connector type
- Drive solenoid directly from the controller
- Turning key insertion point without detaching head

## Ordering information

### Contact configuration

| Contact model | Built-in Switch |
|---|---|
| 4-contact model | Door monitor and Lock monitor are connected in series internally.<br>A: 1NC/1NO + 1NC/1NO<br>B: 1NC/1NO + 2NC<br>C: 2NC + 1NC/1NO<br>D: 2NC + 2NC<br><br>Door monitor and Lock monitor are NOT connected in series internally.<br>S: 1NC/1NO + 1NC/1NO<br>T: 1NC/1NO + 2NC<br>U: 2NC + 1NC/1NO<br>V: 2NC + 2NC |

| Contact model | Built-in Switch |
|---|---|
| 5-contact model | E: 2NC/1NO + 1NC/1NO<br>F: 2NC/1NO + 2NC<br>G: 3NC + 1NC/1NO<br>H: 3NC + 2NC |
| 6-contact model | N: 2NC/1NO + 2NC/1NO<br>P: 2NC/1NO + 3NC<br>Q: 3NC + 2NC/1NO<br>R: 3NC + 3NC |

### Models

| Housing | Release key type | Wiring method | Solenoid voltage/ Indicator | Lock and release type | Contact configuration (door open/closed detection switch and lock monitor switch contacts) | Conduit size *1 | Order code |
|---|---|---|---|---|---|---|---|
| Head Resin/ Body Resin *2 | Standard (metal) *3  | Connector | 24 VDC (Orange) | Mechanical lock Solenoid release | 6-contact Model Insert the built-in switch (N, P, Q or R) into the blank _. | M20 | D4SL-N4_FA-DN |
| | | | | | 5-contact Model Insert the built-in switch (E, F, G or H) into the blank _. | M20 | D4SL-N4_FA-DN |
| | | | 24 VDC (without indicator) | | 4-contact Model Insert the built-in switch (A, B, C, D, S, T, U or V) into the blank _. | M20 | D4SL-N4_FA-N |
| | | Terminal block | 24 VDC (Orange) | | 6-contact Model Insert the built-in switch (N, P, Q or R) into the blank _. | M20 | D4SL-N4_FA-D |
| | | | | | 5-contact Model Insert the built-in switch (E, F, G or H) into the blank _. | M20 | D4SL-N4_FA-D |
| | | | 24 VDC (without indicator) | | 4-contact Model Insert the built-in switch (A, B, C, D, S, T, U or V) into the blank _. | M20 | D4SL-N4_FA |
| | | Connector | 24 VDC (Orange) | Solenoid lock Mechanical release | 6-contact Model Insert the built-in switch (N, P, Q or R) into the blank _. | M20 | D4SL-N4_FG-DN |
| | | | | | 5-contact Model Insert the built-in switch (E, F, G or H) into the blank _. | M20 | D4SL-N4_FG-DN |
| | | | 24 VDC (without indicator) | | 4-contact Model Insert the built-in switch (A, B, C, D, S, T, U or V) into the blank _. | M20 | D4SL-N4_FG-N |
| | | Terminal block | 24 VDC (Orange) | | 6-contact Model Insert the built-in switch (N, P, Q or R) into the blank _. | M20 | D4SL-N4_FG-D |
| | | | | | 5-contact Model Insert the built-in switch (E, F, G or H) into the blank _. | M20 | D4SL-N4_FG-D |
| | | | 24 VDC (without indicator) | | 4-contact Model Insert the built-in switch (A, B, C, D, S, T, U or V) into the blank _. | M20 | D4SL-N4_FG |

*1 Types also with G1/2 and 1/2-14NPT available - see online data sheet
*2 'Head metal/Body resin' also available - see online data sheet
*3 Release key type also resin available - see online data sheet

### Operation keys (order separately)

| Type | | Order code |
|---|---|---|
| Horizontal mounting |  | D4SL-NK1 |
| Horizontal mounting (Short) |  | D4SL-NK1S |
| Horizontal mounting (Cushion rubber) |  | D4SL-NK1G |

| Type | | Order code |
|---|---|---|
| Vertical mounting |  | D4SL-NK2 |
| Vertical mounting (Cushion rubber) |  | D4SL-NK2G |
| Adjustable (Horizontal) |  | D4SL-NK3 |

### Connector cables for connector types

| Cable length | Order code |
|---|---|
| 1 m | D4SL-CN1 |
| 3 m | D4SL-CN3 |
| 5 m | D4SL-CN5 |

## Specifications

| | | |
|---|---|---|
| **Degree of protection**[*1] | | IP67 (EN60947-5-1) |
| **Durability**[*2] | **Mechanical** | 1,000,000 operations min. |
| | **Electrical** | 150,000 operations min. (1 A resistance at 125 VAC)[*3] |
| **Operating speed** | | 0.05 to 1 m/s |
| **Operating frequency** | | 5 operations minute max. |
| **Direct opening force**[*4] | | 60 N min. (EN60947-5-1) |
| **Direct opening travel**[*4] | | 15 mm min. (EN60947-5-1) |
| **Holding force** | | 1,300 N min. |
| **Minimum applicable load** | | 1 mA resistive load at 5 VDC (N-level reference value) |
| **Rated insulation voltage (Ui)** | | 150 V (EN60947-5-1) |
| **Rated frequency** | | 50/60 Hz |
| **Protection against electric shock** | | Class Ⅱ(double insulation) |
| **Pollution degree (operating environment)** | | 3 (EN60947-5-1) |
| **Conditional short-circuit current** | | 100 A (EN60947-5-1) |
| **Conventional free air thermal current (Ith)** | | 2.5 A (11-42, 21-52, 21-22)<br>1 A (Others) |
| **Ambient operating temperature** | | −10 to 55°C (with no icing) |
| **Ambient operations humidity** | | 95% max. |

[*1] This applies for the switch only. The degree of protection for the key hole is IP00.
[*2] The durability is for an ambient temperature of 5 to 35°C and an ambient humidity of 40% to 70%. For more details, consult your OMRON representative.
[*3] Do not pass the 1 A, 125 VAC load through more than 3 circuits.
[*4] These figures are minimum requirements for safe operation.

**Note** **1.** The above values are initial values.
**2.** The switch contacts can be used with either standard loads or microloads.

## Stainless steel guard-lock safety door switch

The F3S-TGR-KHL1 safety-door switch keeps medium to large guard doors closed until hazards have been removed. It has a stainless steel body and is designed to cope with the rigorous applications of the food processing and chemical industries.

- Safety-door switch with electromagnetic lock and unlock mechanism (mechanical lock/solenoid unlock)
- 2NC (safety), 1NO (Guard open), 1NO (Lock open)
- Strong key holding force: 1600 N
- LED for diagnosis
- IP69K suitable for SIP and CIP processes
- Positive break contacts to IEC 60947-5-1

## Ordering information

### Switches

| Type | Housing | Conduit | Contacts | Order code |
|---|---|---|---|---|
|  | Stainless steel 316 | M20 | 2NC safety contacts<br>2NO Auxiliary contact (guard open, lock status) | F3S-TGR-KHL1 |

### Keys (order separately)

| Type | Order code |
|---|---|
| for metal head  | F39-TGR-KAM |
| Horizontal mounting  | F39-TGR-KF |
| heavy flexible  | F39-TGR-KHF |
| hygienic flexible  | F39-TGR-KHFH |

### Accessories

| Item | Remarks | Order code |
|---|---|---|
| M20 Gland | Stainless steel 316 | F39-TGR-M20 |

## Specifications

| Item | F3S-TGR-KHL1 |
|---|---|
| Standards | EN1088, IEC 60947-5-1, EN 60204-1, UL508<br>EN ISO 13849-1: up to PLe[*1]<br>EN 62061: up to SIL3[*1] |
| Lock principle | Mechanical lock/solenoid unlock |
| Indicator LED | Status of solenoid |
| Utilization category | AC15 A300 3 A |
| Thermal current (Ith) | 5 A |
| Rated insulation/Withstand voltages | 500 VAC/2,500 VAC |
| Rated travel for positive opening | 10 mm |
| Actuator entry minimum radius | 175 mm standard, 100mm flexible |
| Maximum approach/Withdrawal speed | 600 mm/s |
| Body dimensions (W × H × D) | 63 × 143 × 41.5 mm |
| Fixing | 2 × M5, 40 mm distance |
| Conduit entry | M20 |
| Material | Stainless steel 316 |
| Enclosure Protection | IP69K |
| Temperature Range | –25 to 55°C |
| Vibration | IEC 68-2-6, 10 to 55 Hz +1 Hz, Excursion: 0.35 mm, 1 octave/min |

[*1] Depending upon system architecture

## Stainless steel guard-lock safety door switch

The F3S-TGR-KHL3 safety-door switch keeps medium to large guard doors closed until hazards have been removed. It has a stainless steel body and is designed to cope with the rigorous applications of the food processing and chemical industries.

- Safety-door switch with electromagnetic lock and unlock mechanism (mechanical lock/solenoid unlock)
- 4NC (safety), 1NO (Guard open), 1NO (Lock open)
- Strong key holding force: 2000 N
- LED for diagnosis
- IP69K suitable for SIP and CIP processes
- Positive break contacts to IEC 60947-5-1

## Ordering information

### Switches

| Type | Housing | Conduit | Contacts | Order code |
|---|---|---|---|---|
|  | Stainless steel 316 | M20 | 2NC safety contacts<br>2NO Auxillary contact (guard open, lock status)*1 | F3S-TGR-KHL3 |
|  | Stainless steel 316<br>with rear push button manual release | | | F3S-TGR-KHL3R |

*1 1NO lock status if LED2 Lock Status Indicator not used

### Keys (order separately)

| Type | Order code |
|---|---|
| for metal head  | F39-TGR-KAM |
| Horizontal mounting  | F39-TGR-KF |
| heavy flexible  | F39-TGR-KHF |
| hygienic flexible  | F39-TGR-KHFH |

### Accessories

| Item | Remarks | Order code |
|---|---|---|
| M20 Gland | Stainless steel 316 | F39-TGR-M20 |
| Key | Manual release key | F39-TGR-MRK |

## Specifications

| | F3S-TGR-KHL3 |
|---|---|
| **Standards** | EN1088, IEC 60947-5-1, EN 60204-1, UL508<br>EN ISO 13849-1: up to PLe*1<br>EN 62061: up to SIL3*1 |
| **Lock principle** | Mechanical lock/solenoid unlock |
| **Indicator LEDs** | LED1: Status of solenoid<br>LED2: Lock status indication (if 1NO Auxiliary contact not used) |
| **Utilization category** | AC15 A300 3 A |
| **Thermal current (Ith)** | 5 A |
| **Rated insulation/Withstand voltages** | 500 VAC/2,500 VAC |
| **Rated travel for positive opening** | 10 mm |
| **Actuator entry minimum radius** | 175 mm standard, 100 mm flexible |
| **Maximum approach/Withdrawal speed** | 600 mm/s |
| **Body dimensions (W × H × D)** | 48 × 177 × 47 mm |
| **Fixing** | 4 × M5, mounted from backside |
| **Conduit entry** | M20 |
| **Material** | Stainless steel 316 |
| **Enclosure Protection** | IP69K |
| **Temperature Range** | –25 to 55°C |
| **Vibration** | IEC 68-2-6, 10-55 Hz +1 Hz, Excursion: 0.35 mm, 1 octave/min |

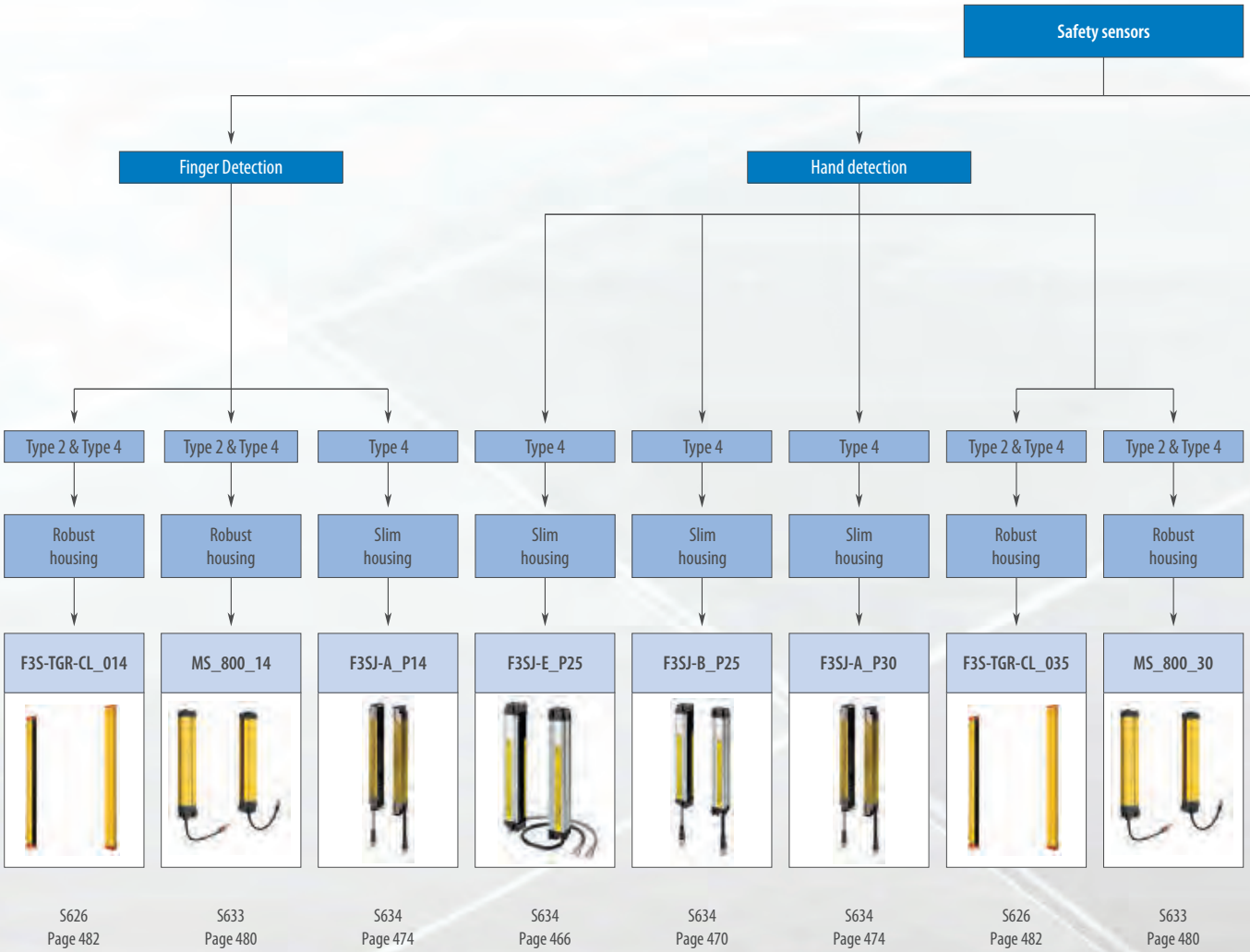
*1 Depending upon system architecture

# PROTECT OPERATORS AND PRODUCTION

## Total consistency across the board

Safety Sensors are the first choice in safeguarding workplaces where persons and machines cooperate. Built-in intelligence stops the machine in conditions that are dangerous for the worker. Our F3S-TGR-CL and F3SJ range offers safety light curtains with included safe control functions for finger-, hand- and body protection.

- Finger- and Hand and body protection models
- Control functions
  - X-, T- and L-muting
  - fixed and floating blanking
  - single and double break operation
  - pre-reset access control
- Easy mounting and common wiring for all types for simple design and installation
- Certified acc. EN61496 and EN ISO 13849-1.



## Human body detection and Muting applications

| Presence sensing | Sensing distance up to 50 m | Sensing distance up to 12 m active/passive system | Muting actuators (only for F3S-TGR-CL series) | Sensing distance up to 10 m | Sensing distance up to 4 m |
|---|---|---|---|---|---|
| Type 2 & Type 4 | Type 2 & Type 4 | Type 2 & Type 4 | Type 2 & Type 4 | Type 2 | Type 3 |
| Robust housing | Robust housing | Robust housing | Robust housing | M18 housing | Plastic head metal body |
| **F3S-TGR-CL_-070** | **F3S-TGR-CL_-K_** | **F3S-TGR-CL_-K_C** | **F39-TGR-MCL** | **E3FS + Controller** | **OS32C** |
|  |  |  |  |  |  |
| S626 Page 482 | S627 | S627 | S644 Page 487 | S223, S623 Page 488 | S224 Page 489 |

# Selection table

| | | Safety Sensors | | | |
|---|---|---|---|---|---|
| | |  |  |  |  |
| **Model** | | **F3SJ-E** | **F3SJ-B** | **F3SJ-A** | **MS2800 and MS4800** |
| Selection criteria | Safety category | Type 4 | Type 4 | Type 4 | Type 2 & 4 |
| | Safety integrity level (IEC 61508) | – | – | – | SIL 3 |
| | Protective height | 185 to 1,105 mm | 185 to 2,065 mm | 245 to 2,495 mm | 280 to 2,120 mm |
| | Resolution | 25 mm | 25 mm | 14, 30 mm | 14, 30 mm |
| | Reaction time | 15 ms | 15 ms | 10 to 25 ms | 14 to 59 ms |
| | Temperature range | –10 to 55°C | –10 to 55°C | –10 to 55°C | –10 to 55°C |
| | IP class | IP65 | IP65 | IP65 | IP65 |
| Features | Blanking function | – | – | internal | internal |
| | Muting function | – | ■ | – | option |
| | EDM function | internal | internal | internal | internal |
| | Interlock function | – | internal | internal | internal |
| | Series connection | – | up to 3 sets | up to 4 sets | up to 4 sets |
| | Mounting kits | option | option | inclusive | inclusive |
| | Parameter setting | – | – | option (software incl., console) | internal DIP switch |
| | External control unit | – | – | – | – |
| Application | Finger protection | – | – | ■ | ■ |
| | Hand protection | ■ | ■ | ■ | ■ |
| | Arm protection | ■ | ■ | ■ | ■ |
| | Body protection | ■ | ■ | ■ | ■ |
| | Presence detection | – | – | – | ■ |
| | Muting application | – | – | – | – |
| | Blanking application | – | – | ■ | ■ |
| Supply voltage | 24 VDC | ■ | ■ | ■ | ■ |
| In- and Outputs | Safety outputs | 2 PNP OSSD transistor outputs | 2 PNP OSSD transistor outputs | 2 PNP OSSD transistor outputs | 2 PNP OSSD transistor outputs |
| | Auxiliary output | – | 1 PNP (non safety) | 2 PNP (non safety) | 1 PNP (non safety) |
| | Test input | ■ | ■ | ■ | ■ |
| | EDM input | ■ | – | ■ | ■ |
| | Reset input | ■ | – | ■ | ■ |
| | Muting sensor input | – | – | – | – |
| | Page/Quick Link | 466 | 470 | 474 | 480 |

| | | Safety Sensors | | | |
|---|---|---|---|---|---|
| | |  |  |  |  |
| Model | | F3S-TGR-CL | F3S-TGR-CL_-K_ / -K_C | E3FS + F3SP-U3P | OS32C |
| Selection criteria | Safety category | Type 2 & 4 | Type 2 & 4 | Type 2 | Type 3 |
| | Safety integrity level (IEC 61508) | – | – | – | SIL 2 |
| | Protective height | 150 to 2,400 mm | 500 to 1,200 mm | – | Sensing range 4 m |
| | Resolution | 14, 35, 70 mm | – | – | – |
| | Beam pitch | – | 300, 400, 500 mm | – | – |
| | Reaction time | 13 to 103 ms | 13 ms | 32 ms | 80 ms |
| | Temperature range | –10 to 55°C | –10 to 55°C | –10 to 55°C | –10 to 50°C |
| | IP class | IP65 | IP65 | IP67 | IP65 |
| Features | Blanking function | internal | – | – | – |
| | Muting function | internal | internal | option | – |
| | EDM function | internal | internal | option | internal |
| | Interlock function | internal | internal | option | internal |
| | Series connection | option | – | – | – |
| | Mounting kits | inclusive | inclusive | – | option |
| | Parameter setting | internal DIP switch | internal DIP switch | – | Software (included) |
| | External control unit | – | – | ■ | – |
| Application | Finger protection | ■ | – | – | ■ |
| | Hand protection | ■ | – | – | ■ |
| | Arm protection | ■ | – | – | ■ |
| | Body protection | ■ | ■ | ■ | ■ |
| | Presence detection | ■ | – | – | ■ |
| | Muting application | ■ | ■ | ■ | – |
| | Blanking application | ■ | – | – | – |
| Supply voltage | 24 VDC | ■ | ■ | ■ | |
| In- and Outputs | Safety outputs | 2 PNP OSSD transistor outputs | 2 PNP OSSD transistor outputs | 2 PNP OSSD transistor outputs | 2 PNP OSSD transistor outputs |
| | Auxiliary output | – | – | – | ■ |
| | Test input | ■ | ■ | ■ | – |
| | EDM input | ■ | ■ | – | ■ |
| | Reset input | ■ | ■ | ■ | ■ |
| | Muting sensor input | ■ | ■ | ■ | – |
| | EtherNet/IP | – | – | – | ■ |
| | Page/Quick Link | 482 | S627 | 488 | 489 |

## Easy type for simple and affordable hand protection

The F3SJ-E-family is a type 4 safety light curtain with an optical resolution of 25 mm. An operation range of up to 7 m and a protective height up to 1,105 mm are provided with no dead zone

- Detection height = sensor height
- Small housing
- Simple and affordable hand protection
- Reduced wiring, quick mount brackets and easy-to-view-alignment beams reduce mounting time
- Type 4 sensor complying with EN 61496-1 and up to PLe according EN ISO 13849

## Ordering information

| Application | Detection capability | Beam gap | Operating range | Protective height (mm) | Order code |
|---|---|---|---|---|---|
| Hand protection | Dia. 25 mm | 20 mm | 0.2 to 7 m | 185 to 1,105 | F3SJ-E____P25 |

**Note:** F3SJ-E uses a 3 m prewired discrete cable.

| Number of beams | Protective height (mm)*1 | Order code |
|---|---|---|
| 8 | 185 | F3SJ-E0185P25 |
| 10 | 225 | F3SJ-E0225P25 |
| 14 | 305 | F3SJ-E0305P25 |
| 18 | 385 | F3SJ-E0385P25 |
| 22 | 465 | F3SJ-E0465P25 |
| 26 | 545 | F3SJ-E0545P25 |
| 30 | 625 | F3SJ-E0625P25 |
| 34 | 705 | F3SJ-E0705P25 |
| 38 | 785 | F3SJ-E0785P25 |
| 42 | 865 | F3SJ-E0865P25 |
| 46 | 945 | F3SJ-E0945P25 |
| 50 | 1,025 | F3SJ-E1025P25 |
| 54 | 1,105 | F3SJ-E1105P25 |

*1 Protective height (mm) = Total sensor length

## Accessories (sold separately)

### Sensor mounting bracket

| Appearance | Specifications | Application | Remarks | Order code |
|---|---|---|---|---|
|  | Top/bottom bracket | Top/bottom bracket for F3SJ-E/B | 2 for an emitter, 2 for a receiver, total of 4 per set | F39-LJB1 |
|  | Intermediate bracket | In combination use with top/bottom bracket for F3SJ-E/B<br>Can be used as free-location bracket. | 1 set with 2 pieces | F39-LJB2*1 *2 |
|  | Quick mount bracket | Quick mount bracket for F3SJ-E/B<br>Supports M6 slide nut for aluminum frame. | 1 set with 2 pieces | F39-LJB3-M6*1 |
| | | Quick mount bracket for F3SJ-E/B<br>Supports M8 slide nut for aluminum frame. | | F39-LJB3-M8*2 |
|  | Quick mount M6 bracket<br>Quick mount M8 bracket | Bracket to mount an intermediate bracket to the aluminum frame with a single touch. | Hexagon socket head cap screws (M6 × 10) are included. | F39-LJB3-M6K*1 |
| | | | Hexagon socket head cap screws (M8 × 14) are included. | F39-LJB3-M8K*2 |
|  | Compatible mounting bracket | Mounting bracket used when replacing existing area sensors (F3SJ-A or F3SN) with the F3SJ-E/B. | 2 for an emitter, 2 for a receiver, total of 4 per set | F39-LJB4 |
|  | Contact mount bracket | Bracket to closely contact the back side of the sensor. | 2 for an emitter, 2 for a receiver, total of 4 per set | F39-LJB5 |

*1 Combining F39-LJB2 and F39-LJB3-M6K makes F39-LJB3-M6.
*2 Combining F39-LJB2 and F39-LJB3-M8K makes F39-LJB3-M8.

### Laser pointer

| Appearance | Output | Order code |
|---|---|---|
|  | Laser pointer for F3SJ | F39-PTJ |

## Specifications

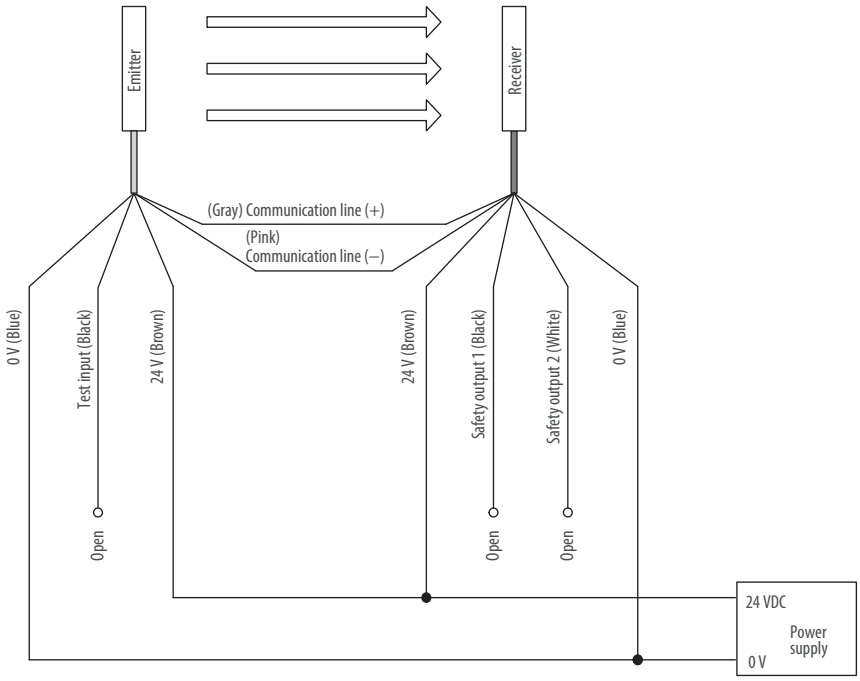
| Model | | F3SJ-E____P25 |
|---|---|---|
| Sensor type | | Type 4 safety light curtain |
| Setting tool connection[*1] | | Parameter settings: Not available |
| Safety category | | Safety purpose of category 4, 3, 2, 1, or B |
| Detection capability | | Opaque objects 25 mm in diameter |
| Beam gap (P) | | 20 mm |
| Number of beams (n) | | 8 to 54 |
| Protective height (PH) | | 185 to 1,105 mm |
| Lens diameter | | Diameter 5 mm |
| Operating range[*2] | | 0.2 to 7 m |
| Response time (under stable light incident condition) | ON to OFF | 15 ms max. |
| | OFF to ON | 70 ms max. |
| Startup waiting time | | 2 s max. |
| Power supply voltage (Vs) | | SELV/PELV 24 VDC±20% (ripple p-p 10% max.) |
| Consumption current (no load) | | Emitter: Up to 22 beams: 41 mA max., 26 to 42 beams: 57 mA max., 46 to 54 beams: 63 mA max.<br>Receiver: Up to 22 beams: 42 mA max., 26 to 42 beams: 47 mA max., 46 to 54 beams: 51 mA max. |
| Light source (emitted wavelength) | | Infrared LED (870 nm) |
| Effective aperture angle (EAA) | | Based on IEC 61496-2. Within ±2.5° for both emitter and receiver when the detection distance is 3 m or over |
| Safety outputs (OSSD) | | Two PNP transistor outputs, load current 200 mA max., residual voltage 2 V max. (except for voltage drop due to cable extension), Leakage current 1 mA max., load inductance 2.2 H max.[*3], Maximum capacity load 1 μF[*4] |
| Output operation mode | | Safety output: On when receiving light |
| Input voltage | | ON voltage: Vs-3 V to Vs, OFF voltage: 0 V to 1/2 Vs or open[*5] |
| Mutual interference prevention function | | Mutual interference prevention algorithm prevents interference in up to 3 sets. |
| Test function | | Self test (at power-ON and at power distribution)<br>External test (emission stop function by test input) |
| Protection circuit | | Output short-circuit protection, and power supply reverse polarity protection |
| Ambient temperature | | Operating: –10 to 55°C (non-freezing), Storage: –25 to 70°C |
| Ambient humidity | | Operating: 35% to 85% (no condensation), Storage: 35% to 95% RH |
| Operating ambient light intensity | | Incandescent lamp: 3,000 lx max., Sunlight: 10,000 lx max. |
| Insulation resistance | | 20 MΩ min. (at 500 VDC) |
| Dielectric strength | | 1,000 VAC 50/60 Hz, 1 min |
| Degree of protection | | IP65 (IEC 60529) |
| Vibration resistance | | Malfunction: 10 to 55 Hz, Multiple amplitude of 0.7 mm, 20 sweeps in X, Y, and Z directions |
| Shock resistance | | Malfunction: 100 $m/s^2$, 1,000 times each in X, Y, and Z directions |
| Pollution degree | | Pollution degree 3 (IEC 60664-1) |
| Power cable | | Connection method: Pull-out type, cable length 3 m<br>Number of wires: Emitter: 5 wires, receiver: 6 wires<br>Cable diameter: Dia. 6 mm<br>Allowable bending radius: R5 mm |
| Extension cable | | 30 m max.[*6] |
| Material | | Case: Aluminum<br>Cap: ABS resin, PBT<br>Optical cover: PMMA resin (acrylic)<br>Cable: Oil resistant PVC |
| Weight (packed state) | | Weight (g) = (protective height) × 2.6 + 800 |
| Accessories | | Test rod, Instruction Manual, User's Manual (CD-ROM)[*7] |
| Applicable standards | | IEC 61496-1, EN 61496-1 UL 61496-1, Type 4 ESPE (Electro-Sensitive Protective Equipment)<br>IEC 61496-2, CLC/TS 61496-2, UL 61496-2, Type 4 AOPD (Active Opto-electronic Protective Devices)<br>IEC 61508-1 to -3, EN 61508-1 to -3 SIL3<br>IEC 13849-1: 2006, EN ISO 13849-1: 2008 (PLe, Cat.4)<br>UL 508, UL 1998, CAN/CSA C22.2 No.14, CAN/CSA C22.2 No.0.8 |

[*1] Do not use the support software and setting console for F3SJ-A. Operation cannot be guaranteed.
[*2] Use of the spatter protection cover causes a 10% maximum sensing distance attenuation.
[*3] The load inductance is the maximum value when the safety output frequently repeats ON and OFF. When you use the safety output at 4 Hz or less, the usable load inductance becomes larger.
[*4] These values must be taken into consideration when connecting elements including a capacitive load such as capacitor.
[*5] The Vs indicates a voltage value in your environment.
[*6] To extend a cable of the F3SJ-E, refer to the user's manual (SCHG-733/732).
[*7] Mounting brackets are sold separately.

## Connections

### Basic wiring diagram

**Minimum wiring required to check the operation of the F3SJ-E**



## Basic type with a combination of performance and functionality

The F3SJ-B-family is a type 4 safety light curtain with an optical resolution of 25 mm. An operation range of up to 7 m and a protective height up to 2,065 mm are provided with no dead zone

- Detection height = sensor height
- Simple hand protection
- Muting function available
- Series connection up to three sets
- Type 4 sensor complying with EN 61496-1 and up to PLe according EN ISO 13849

## Ordering information

| Application | Detection capability | Beam gap | Operating range | Protective height (mm) | Order code |
|---|---|---|---|---|---|
| Hand protection | Dia. 25 mm | 20 mm | 0.2 to 7 m | 185 to 2,065 | F3SJ-B____P25 |

| Number of beams | Protective height (mm)*1 | Order code |
|---|---|---|
| 8 | 185 | F3SJ-B0185P25 |
| 10 | 225 | F3SJ-B0225P25 |
| 14 | 305 | F3SJ-B0305P25 |
| 18 | 385 | F3SJ-B0385P25 |
| 22 | 465 | F3SJ-B0465P25 |
| 26 | 545 | F3SJ-B0545P25 |
| 30 | 625 | F3SJ-B0625P25 |
| 34 | 705 | F3SJ-B0705P25 |
| 38 | 785 | F3SJ-B0785P25 |
| 42 | 865 | F3SJ-B0865P25 |
| 46 | 945 | F3SJ-B0945P25 |
| 50 | 1,025 | F3SJ-B1025P25 |
| 54 | 1,105 | F3SJ-B1105P25 |
| 58 | 1,185 | F3SJ-B1185P25 |
| 62 | 1,265 | F3SJ-B1265P25 |
| 66 | 1,345 | F3SJ-B1345P25 |
| 70 | 1,425 | F3SJ-B1425P25 |
| 74 | 1,505 | F3SJ-B1505P25 |
| 78 | 1,585 | F3SJ-B1585P25 |
| 82 | 1,665 | F3SJ-B1665P25 |
| 86 | 1,745 | F3SJ-B1745P25 |
| 90 | 1,825 | F3SJ-B1825P25 |
| 94 | 1,905 | F3SJ-B1905P25 |
| 98 | 1,985 | F3SJ-B1985P25 |
| 102 | 2,065 | F3SJ-B2065P25 |

*1 Protective height (mm) = Total sensor length

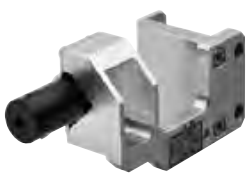
## Accessories (sold separately)

### Sensor mounting bracket

| Appearance | Specifications | Application | Remarks | Order code |
|---|---|---|---|---|
|  | Top/bottom bracket | Top/bottom bracket for F3SJ-E/B | 2 for an emitter, 2 for a receiver, total of 4 per set | F39-LJB1 |
|  | Intermediate bracket | In combination use with top/bottom bracket for F3SJ-E/B<br>Can be used as free-location bracket. | 1 set with 2 pieces | F39-LJB2*1 *2 |
|  | Quick mount bracket | Quick mount bracket for F3SJ-E/B<br>Supports M6 slide nut for aluminum frame. | 1 set with 2 pieces | F39-LJB3-M6*1 |
| | | Quick mount bracket for F3SJ-E/B<br>Supports M8 slide nut for aluminum frame. | | F39-LJB3-M8*2 |
|  | Quick mount M6 bracket<br>Quick mount M8 bracket | Bracket to mount an intermediate bracket to the aluminum frame with a single touch. | Hexagon socket head cap screws (M6 × 10) are included. | F39-LJB3-M6K*1 |
| | | | Hexagon socket head cap screws (M8 × 14) are included. | F39-LJB3-M8K*2 |
|  | Compatible mounting bracket | Mounting bracket used when replacing existing area sensors (F3SJ-A or F3SN) with the F3SJ-E/B. | 2 for an emitter, 2 for a receiver, total of 4 per set | F39-LJB4 |
|  | Contact mount bracket | Bracket to closely contact the back side of the sensor. | 2 for an emitter, 2 for a receiver, total of 4 per set | F39-LJB5 |

*1 Combining F39-LJB2 and F39-LJB3-M6K makes F39-LJB3-M6.
*2 Combining F39-LJB2 and F39-LJB3-M8K makes F39-LJB3-M8.

### Laser pointer

| Appearance | Output | Order code |
|---|---|---|
|  | Laser pointer for F3SJ | F39-PTJ |

## Specifications

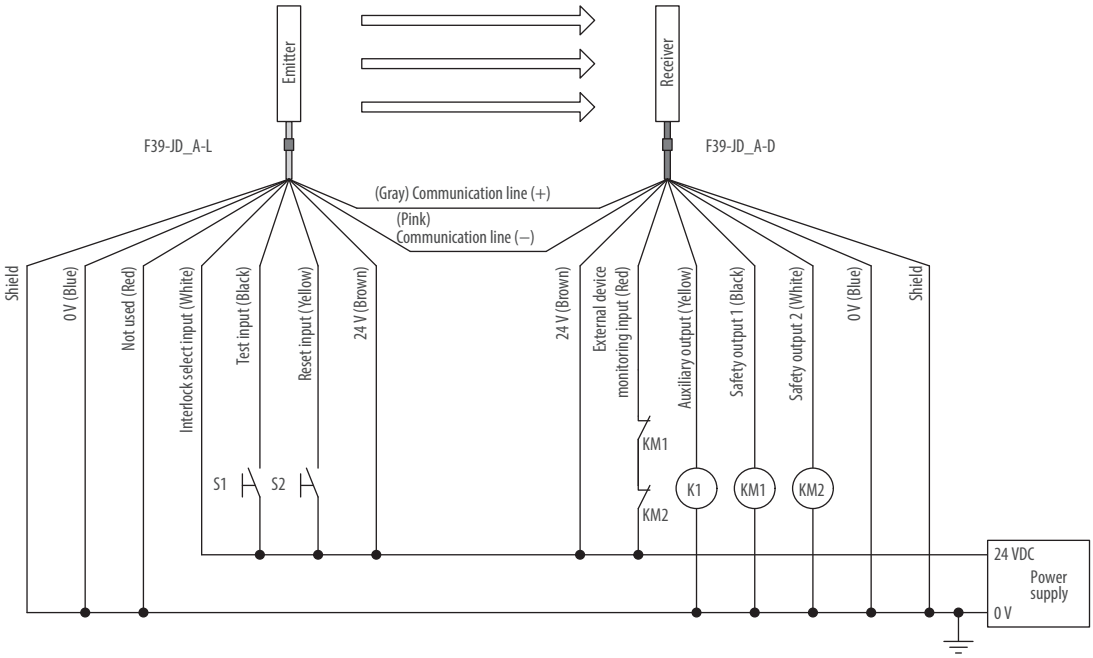
| Model | | F3SJ-B____P25 |
|---|---|---|
| Sensor type | | Type 4 safety light curtain |
| Setting tool connection[*1] | | Parameter settings: Not available |
| Safety category | | Safety purpose of category 4, 3, 2, 1, or B |
| Detection capability | | Opaque objects 25 mm in diameter |
| Beam gap (P) | | 20 mm |
| Number of beams (n) | | 8 to 102 |
| Protective height (PH) | | 185 to 2,065 mm |
| Lens diameter | | Diameter 5 mm |
| Operating range[*2] | | 0.2 to 7 m |
| Response time (under stable light incident condition) | ON to OFF | 15 ms max. (response time at 1 set connection, series connection of 2 sets or 3 sets) |
| | OFF to ON | 70 ms max. (response time at 1 set connection, series connection of 2 sets or 3 sets) |
| Startup waiting time | | 2 s max. |
| Power supply voltage (Vs) | | SELV/PELV 24 VDC±20% (ripple p-p 10% max.) |
| Consumption current (no load) | | Emitter: Up to 22 beams: 52 mA max., 26 to 42 beams: 68 mA max., 46 to 62 beams: 75 mA max.,<br>66 to 82 beams: 88 mA max., 86 to 102 beams: 101 mA max.<br>Receiver: Up to 22 beams: 45 mA max., 26 to 42 beams: 50 mA max., 46 to 62 beams: 56 mA max.,<br>66 to 82 beams: 61 mA max., 86 to 102 beams: 67 mA max. |
| Light source (emitted wavelength) | | Infrared LED (870 nm) |
| Effective aperture angle (EAA) | | Based on IEC 61496-2. Within ±2.5° for both emitter and receiver when the detection distance is 3 m or over |
| Safety outputs (OSSD) | | Two PNP transistor outputs, load current 200 mA max., residual voltage 2 V max. (except for voltage drop due to cable extension), Leakage current 1 mA max., load inductance 2.2 H max.[*3], Maximum capacity load 1 μF[*4] |
| Auxiliary output 1 | | One PNP transistor outputs, load current 100 mA max., residual voltage 2 V max. (except for voltage drop due to cable extension), leak current 1 mA max. |
| Output operation mode | | Safety output: On when receiving light<br>Auxiliary output:<br>– Reverse output of safety output for a basic system<br>– ON when muting/override for a muting system |
| Input voltage | | ON voltage: Vs-3 V to Vs, OFF voltage: 0 V to 1/2 Vs or open[*5] |
| Mutual interference prevention function | | Mutual interference prevention algorithm prevents interference in up to 3 sets. |
| Series connection | | Time division emission by series connection<br>Number of connections: up to 3 sets (between F3SJ-Bs only)Other models cannot be connected.<br>Total number of beams: up to 192 beams<br>Maximum cable length for 2 sets: no longer than 7 m |
| Test function | | Self test (at power-ON and at power distribution)<br>External test (emission stop function by test input) |
| Safety-related functions | | Interlock (basic system)<br>External device monitoring (basic system)<br>Muting (muting system)<br>Override (muting system) |
| Connection type | | Connector method (M12, 8-pin) |
| Protection circuit | | Output short-circuit protection, and power supply reverse polarity protection |
| Ambient temperature | | Operating: –10 to 55°C (non-freezing), Storage: –25 to 70°C |
| Ambient humidity | | Operating: 35% to 85% (no condensation), Storage: 35% to 95% RH |
| Operating ambient light intensity | | Incandescent lamp: 3,000 lx max., Sunlight: 10,000 lx max. |
| Insulation resistance | | 20 MΩ min. (at 500 VDC) |
| Dielectric strength | | 1,000 VAC 50/60 Hz, 1 min |
| Degree of protection | | IP65 (IEC 60529) |
| Vibration resistance | | Malfunction: 10 to 55 Hz, Multiple amplitude of 0.7 mm, 20 sweeps in X, Y, and Z directions |
| Shock resistance | | Malfunction: 100 $m/s^2$, 1,000 times each in X, Y, and Z directions |
| Pollution degree | | Pollution degree 3 (IEC 60664-1) |
| Power cable | | Connection method: Prewired connector cable, cable length 0.3 m, connector type (M12, 8-pin), connector: IP67 rated (when mated)<br>Number of wires: 8 wires<br>Cable diameter: Dia. 6 mm<br>Allowable bending radius: R5 mm |
| Extension cable | | 30 m max. |
| Material | | Case: Aluminum<br>Cap: ABS resin, PBT<br>Optical cover: PMMA resin (acrylic)<br>Cable: Oil resistant PVC |
| Weight (packed state) | | Weight (g) = (protective height) × 2.7 + 500 |
| Accessories | | Test rod, Instruction manual, User's manual (CD-ROM)[*6] |
| Applicable standards | | IEC 61496-1, EN 61496-1 UL 61496-1, Type 4 ESPE (Electro-sensitive protective equipment)<br>IEC 61496-2, CLC/TS 61496-2, UL 61496-2, Type 4 AOPD (Active opto-electronic protective devices)<br>IEC 61508-1 to -3, EN 61508-1 to -3 SIL3<br>IEC 13849-1: 2006, EN ISO 13849-1: 2008 (PLe, Cat.4)<br>UL 508, UL 1998, CAN/CSA C22.2 No.14, CAN/CSA C22.2 No.0.8 |

[*1] Do not use the support software and setting console for F3SJ-A. Operation cannot be guaranteed.
[*2] Use of the spatter protection cover causes a 10% maximum sensing distance attenuation.
[*3] The load inductance is the maximum value when the safety output frequently repeats ON and OFF. When you use the safety output at 4 Hz or less, the usable load inductance becomes larger.
[*4] These values must be taken into consideration when connecting elements including a capacitive load such as capacitor.
[*5] The Vs indicates a voltage value in your environment.
[*6] Mounting brackets are sold separately.

## Connections

### Basic Wiring Diagram

**Wiring when using manual reset mode, external device monitoring (F3SJ-B____P25) (PNP output)**




S1 : External test switch (connect to 0 V if a switch is not required)
S2 : Interlock/lockout reset switch
KM1, KM2 : Safety relay with force-guided contact (G7SA) or magnetic contactor
K1 : Load or PLC, etc. (for monitoring)

## Advanced type for complex safety solutions

The F3SJ-A-family is a type 4 safety light curtain with a optical resolution of 14 mm and 30 mm. An operating range of up to 9 m and protective heights up to 2,495 mm are provided with no dead zone.

- Detection heigth = sensor height
- Muting and blanking function available
- Series connection up to 4 Sets
- LED bar for easy alignment and diagnosis
- Type 4 sensor complying with EN 61496-1 and up to PLe according EN ISO 13849-1

## Ordering information

| Application | Detection capability | Beam gap | Operating range | Protective height (mm) | Order code |
|---|---|---|---|---|---|
| Finger protection | Dia. 14 mm | 9 mm | 0.2 to 9 m | 245 to 1,631 | F3SJ-A____P14 |
| Hand/arm protection | Dia. 30 mm | 25 mm | 0.2 to 9 m | 245 to 1,620 | F3SJ-A____P30 |
| | | | 0.2 to 7 m | 1,745 to 2,495 | |

### Safety light curtain model list

**F3SJ-A14 series (9 mm gap), F3SJ-A14 TS series (9 mm gap)**

| Number of beams | Protective height (mm)*1 | Order code |
|---|---|---|
| 26 | 245 | F3SJ-A0245P14 |
| 28 | 263 | F3SJ-A0263P14 |
| 34 | 317 | F3SJ-A0317P14 |
| 42 | 389 | F3SJ-A0389P14 |
| 50 | 461 | F3SJ-A0461P14 |
| 60 | 551 | F3SJ-A0551P14 |
| 68 | 623 | F3SJ-A0623P14 |
| 76 | 695 | F3SJ-A0695P14 |
| 80 | 731 | F3SJ-A0731P14 |
| 88 | 803 | F3SJ-A0803P14 |
| 96 | 875 | F3SJ-A0875P14 |
| 108 | 983 | F3SJ-A0983P14 |
| 116 | 1,055 | F3SJ-A1055P14 |
| 124 | 1,127 | F3SJ-A1127P14 |
| 132 | 1,199 | F3SJ-A1199P14 |
| 140 | 1,271 | F3SJ-A1271P14 |

*1 Protective height (mm) = Total sensor length

**F3SJ-A30 series (25 mm gap)**

| Number of beams | Protective height (mm)*1 | Order code |
|---|---|---|
| 10 | 245 | F3SJ-A0245P30 |
| 12 | 295 | F3SJ-A0295P30 |
| 16 | 395 | F3SJ-A0395P30 |
| 19 | 470 | F3SJ-A0470P30 |
| 21 | 520 | F3SJ-A0520P30 |
| 22 | 545 | F3SJ-A0545P30 |
| 23 | 570 | F3SJ-A0570P30 |
| 25 | 620 | F3SJ-A0620P30 |
| 29 | 720 | F3SJ-A0720P30 |
| 32 | 795 | F3SJ-A0795P30 |
| 35 | 870 | F3SJ-A0870P30 |
| 37 | 920 | F3SJ-A0920P30 |
| 38 | 945 | F3SJ-A0945P30 |
| 41 | 1,020 | F3SJ-A1020P30 |
| 44 | 1,095 | F3SJ-A1095P30 |
| 45 | 1,120 | F3SJ-A1120P30 |
| 48 | 1,195 | F3SJ-A1195P30 |
| 51 | 1,270 | F3SJ-A1270P30 |
| 56 | 1,395 | F3SJ-A1395P30 |
| 65 | 1,620 | F3SJ-A1620P30 |
| 70 | 1,745 | F3SJ-A1745P30 |
| 75 | 1,870 | F3SJ-A1870P30 |
| 80 | 1,995 | F3SJ-A1995P30 |
| 90 | 2,245 | F3SJ-A2245P30 |
| 95 | 2,370 | F3SJ-A2370P30 |
| 100 | 2,495 | F3SJ-A2495P30 |

*1 Protective height (mm) = Total sensor length

## Accessories (sold separately)

**Single-end connector cable (2 cables per set, for emitter and receiver)**

For wiring with safety circuit such as single safety relay, safety relay unit, and safety controller.

| Appearance | Cable length | Specifications | Order code |
|---|---|---|---|
|  | 0.5 m | M12 connector (8-pin) | F39-JCR5A |
| | 3 m | | F39-JC3A |
| | 7 m | | F39-JC7A |
| | 10 m | | F39-JC10A |
| | 15 m | | F39-JC15A |
| | 20 m | | F39-JC20A |

### Setting Tools

| Appearance | Type | Remarks | Order code |
|---|---|---|---|
|  | "SD Manager"<br>Setting support software for the F3SJ | Accessories:<br>SD Manager CD-ROM (1),<br>F39-CN1 branch connector (1),<br>Connector cap (1),<br>2-m Dedicated cable (1),<br>0.3-m Dedicated cable with plug (1),<br>Instruction manual | F39-GWUM |

### Sensor Mounting Brackets (Sold separately)

| Appearance | Specifications | Application | Remarks | Order code |
|---|---|---|---|---|
|  | Standard mounting bracket (for top/bottom) | (provided with the F3SJ) | 2 for an emitter,<br>2 for a receiver,<br>total of 4 per set | F39-LJ1 |
|  | Flat side mounting bracket | Use these small-sized brackets when performing side mounting with standard mounting brackets, so that they do not protrude from the detection surface. | 2 for an emitter,<br>2 for a receiver,<br>total of 4 per set | F39-LJ2 |
|  | Free-location mounting bracket<br>(also used as standard intermediate bracket) | Use these brackets for mounting on any place without using standard bracket. | Two brackets per set | F39-LJ3 |
|  | F3SN Intermediate bracket Replacement spacers | When replacing the F3SN with the F3SJ, the mounting hole pitches in the Intermediate Brackets are not the same. This Spacer is placed between the mounting holes to mount the F3SJ. | 1 set with 2 pieces | F39-LJ3-SN |
|  | Top/bottom bracket B (mounting hole pitch 19 mm) | Mounting bracket used when replacing existing area sensors (other than F3SN or F3WN) with the F3SJ.<br>For front mounting.<br>Suitable for mounting hole pitch of 18 to 20 mm. | 2 for an emitter,<br>2 for a receiver,<br>total of 4 per set | F39-LJ4 |
|  | Bracket for replacing short-length F3SN | Mounting bracket used when an F3SN with protective height of 300 mm or less is replaced by an F3SJ. | 2 for an emitter,<br>2 for a receiver,<br>total of 4 per set | F39-LJ5 |
|  | Space-saving mounting bracket | Use these brackets to mount facing inward. Length is 12 mm shorter than the standard F39-LJ1 bracket. | 2 for an emitter,<br>2 for a receiver,<br>total of 4 per set | F39-LJ8 |
|  | Top/bottom bracket C (mounting hole pitch 13 mm) | Mounting bracket used when replacing existing area sensors having a mounting pitch of 13 mm with the F3SJ. | 2 for an emitter,<br>2 for a receiver,<br>total of 4 per set | F39-LJ11 |

### Laser pointer

| Appearance | Output | Order code |
|---|---|---|
|  | Laser pointer for F3SJ | F39-PTJ |

## Specifications

### F3SJ-A____P14/P30

| Model | | F3SJ-A____P14 | F3SJ-A____P30 |
|---|---|---|---|
| Sensor type | | Type 4 safety light curtain | |
| Version | | Ver. 2 | |
| Setting tool connection | | Connectable | |
| Safety category | | Safety purpose of category 4, 3, 2, 1, or B | |
| Detection capability | | Opaque objects 14 mm in diameter | Opaque objects 30 mm in diameter |
| Beam gap (P) | | 9 mm | 25 mm |
| Number of beams (n) | | 26 to 180 | 10 to 100 |
| Protective height (PH) | | 245 to 1,631 mm | 245 to 2,495 mm |
| Lens diameter | | Diameter 5 mm | |
| Operating range | | 0.2 to 9 m (protective height 1,640 mm max.), 0.2 to 7 m (protective height 1,655 mm min.)<br>(Depending on the setting tool, the detection distance can be shortened to 0.5 m.) | |
| Response time (under stable light incident condition) | ON to OFF | 1 set, 0245 to 983: 11 ms to 17.5 ms max.<br>1,055 or higher: 20 ms to 25 ms max. | 1 set: 10 ms to 17.5 ms max. |
| | OFF to ON | 1 set, 0245 to 983: 44 ms to 70 ms max.<br>1,055 or higher: 80 ms to 100 ms max. | 1 set: 40 ms to 70 ms max. |
| Startup waiting time | | 2 s max. (2.2 s max. for series connection) | |
| Power supply voltage (Vs) | | 24 VDC±20% (ripple p-p10% max.) | |
| Current consumption (no load) | Emitter | To 50 beams: 76 mA max., 51 to 100 beams: 106 mA max., 101 to 150 beams: 130 mA max.,<br>151 to 180 beams: 153 mA max., 201 to 234 beams: 165 mA max. | |
| | Receiver | To 50 beams: 68 mA max., 51 to 100 beams: 90 mA max., 101 to 150 beams: 111 mA max.,<br>151 to 180 beams: 128 mA max., 201 to 234 beams: 142 mA max. | |
| Light source (emitted wavelength) | | Infrared LED (870 nm) | |
| Effective aperture angle (EAA) | | Based on IEC 61496-2.Within±2.5° for both emitter and receiver when the detection distance is 3 m or over | |
| Safety outputs (OSSD) | | Two PNP transistor outputs, load current 300 mA max., residual voltage 2 V max. (except for voltage drop due to cable extension), allowable capacity load 2.2 μF, leak current 1 mA max.<br>(This can be different from traditional logic (ON/OFF) because safety circuit is used.) | |
| Auxiliary output 1 (Non-safety output) | | One PNP transistor output, load current 300 mA max., residual voltage 2 V max. (except for voltage drop due to cable extension), leak current 1 mA max. | |
| Auxiliary output 2 (Non-safety output. Function for Basic System.) | | One PNP transistor output, load current 50 mA max., residual voltage 2 V max. (except for voltage drop due to cable extension), leak current 1 mA max. | |
| External indicator output (Non-safety output) | | Available indicators<br>Incandescent lamp: 24 VDC, 3 to 7 W<br>LED lamp: Load current 10 mA to 300 mA max., leak current 1 mA max.<br>(To use an external indicator, an F39-JJ3N universal indicator cable or an F39-A01P-PAC dedicated external indicator kit is required.) | |
| Output operation mode | Receiver | Safety output 1, 2: ON when receiving light<br>Auxiliary output 1: Inverse of safety output signals (Operation mode can be changed with the setting tool.)<br>External indicator output 1: Inverse of safety output signals for a basic system (Operation mode can be changed with the setting tool.),<br>ON when muting/override for a muting system (Operation mode can be changed with the setting tool.) | |
| | Emitter | Auxiliary output 2: Turns ON when the point of 30,000 operating hours is reached (Operation mode can be changed with the setting tool.)<br>External indicator output 2: ON when lock-out for a basic system (Operation mode can be changed with the setting tool.)<br>ON when muting/override for a muting system (Operation mode can be changed with the setting tool.) | |

| Model | | F3SJ-A____P14 | F3SJ-A____P30 |
|---|---|---|---|
| Input voltage | | Test input, interlock selection input, reset input, and muting input are all<br>ON voltage: 9 to 24 V (Vs) (sink current: 3 mA max.), OFF voltage: 0 to 1.5 V, or open<br>External device monitoring input<br>ON voltage: 9 to 24 V (Vs) (sink current: 5 mA max.), OFF voltage: 0 to 1.5 V, or open | |
| Indicator | Emitter | Light intensity level indicators (green LED × 2, orange LED × 3): ON based on the light intensity<br>Error mode indicators (red LED × 3): Blink to indicate error details<br>Power indicator (green LED × 1): ON while power is on<br>Interlock indicator (yellow LED × 1): ON while under interlock, blinks at lockout.<br>External device monitoring indicator (muting input 1 indicator), Blanking/test indicator (muting input 2 indicator) (green LED × 2): ON/flash according to function | |
| | Receiver | Light intensity level indicators (green LED × 2, orange LED × 3): ON based on the light intensity<br>Error mode indicators (red LED × 3): Blink to indicate error details<br>OFF output indicator (red LED × 1): ON when safety output is OFF, blinks at lockout.<br>ON output indicator (green LED × 1): ON while safety output is ON<br>Muting error indicator, Blanking/test indicator (green LED × 2): ON/flash according to function | |
| Mutual interference prevention function | | Interference light prevention algorithm, sensing distance change function | |
| Series connection | | Time division emission by series connection<br>Number of connections: up to 4 sets (F3SJ-A only) F3SJ-E, F3SJ-B and F3SJ-TS cannot be connected.<br>Total number of beams: up to 400 beams<br>Maximum cable length for 2 sets: no longer than 15 m | |
| Test function | | Self test (at power-ON and at power distribution)<br>External test (emission stop function by test input) | |
| Safety-related functions | | Start interlock, restart interlock (Must be set with a setting tool when the muting function is used.)<br>External device monitor<br>Muting (Lamp burnout detection, override function included. F39-CN6 key cap for muting is required.)<br>Fixed blanking (must be set by a setting tool)<br>Floating blanking (must be set by a setting tool) | |
| Connection method | | Connector method (M12, 8-pin) | |
| Protection circuit | | Output short-circuit protection, and power supply reverse polarity protection | |
| Ambient temperature | | Operating: –10 to 55°C (no icing), Storage: –30 to 70°C | |
| Ambient humidity | | Operating: 35% to 85% (no condensation), Storage: 35% to 95% | |
| Operating ambient light intensity | | Incandescent lamp: receiving-surface light intensity of 3,000 lx max., Sunlight: receiving-surface light intensity of 10,000 lx max. | |
| Insulation resistance | | 20 MΩ min. (at 500 VDC) | |
| Withstand voltage | | 1,000 VAC 50/60 Hz, 1 min | |
| Degree of protection | | IP65 (IEC 60529) | |
| Vibration resistance | | Malfunction: 10 to 55 Hz, Multiple amplitude of 0.7 mm, 20 sweeps in X, Y, and Z directions | |
| Shock resistance | | Malfunction: 100 $m/s^2$, 1,000 times each in X, Y, and Z directions | |
| Material | | Casing (including metal parts on both ends): Aluminum, zinc die-cast<br>Cap: ABS resin, Optical cover: PMMA resin (acrylic), Cable: Oil resistant PVC | |
| Weight (packaged) | | Calculate using the following expressions:<br>(1) For F3SJ-A____14, weight (g) = (protective height) x 1.7 + α<br>(2) F3SJ-A____30, weight (g) = (protective height) x 1.5 + α<br>The values for α are as follows:<br>Protected height 245 to 596 mm: = 1,100 protected height 1,660 to 2,180 mm: = 2,400<br>Protected height 600 to 1,130 mm: = 1,500 protected height 2,195 to 2,500 mm: = 2,600<br>Protected height 1,136 to 1,658 mm: = 2,000 | |
| Accessories | | Test rod (*1), instruction manual, standard mounting bracket (F39-LJ1 bracket for top/bottom mounting), mounting brackets (intermediate) (*2), error mode label, User's Manual (CD-ROM)<br>*1. The F3SJ-A□□□□55 is not included.<br>*2. Number of intermediate brackets depends on protective height of F3SJ.<br>For protective height from 600 to 1,130 mm: 1 set for each of the emitter and receiver is included<br>For protective height from 1,136 to 1,658 mm: 2 sets for each of the emitter and receiver are included<br>For protective height from 1,660 to 2,180 mm: 3 sets for each of the emitter and receiver are included<br>For protective height from 2,195 to 2,500 mm: 4 sets for each of the emitter and receiver are included | |
| Applicable standards | | IEC 61496-1, EN 61496-1 UL 61496-1, Type 4 ESPE (Electro-Sensitive Protective Equipment)<br>IEC 61496-2, CLC/TS 61496-2, UL 61496-2, Type 4 AOPD (Active Opto-electronic Protective Devices)<br>IEC 61508-1 to -3, EN 61508-1 to -3 SIL3<br>IEC 13849-1: 2006, EN ISO 13849-1: 2008 (PLe, Cat.4)<br>UL 508, UL 1998, CAN/CSA C22.2 No.14, CAN/CSA C22.2 No.0.8 | |

## Response Time

| Model | Protected height (mm) | Number of beams | Response time ms (ON to OFF) | Response time ms (OFF to ON) |
|---|---|---|---|---|
| F3SJ-A_____14 Series | 245 to 263 | 26 to 28 | 11 | 44 |
| | 281 to 389 | 30 to 42 | 12 | 48 |
| | 407 to 497 | 44 to 54 | 13 | 52 |
| | 515 to 605 | 56 to 66 | 14 | 56 |
| | 623 to 731 | 68 to 80 | 15 | 60 |
| | 767 to 983 | 84 to 108 | 17.5 | 70 |
| | 1,055 to 1,271 | 116 to 140 | 20 | 80 |
| | 1,343 to 1,559 | 148 to 172 | 22.5 | 90 |
| | 1,631 | 180 | 25 | 100 |
| F3SJ-A_____30 Series | 245 to 395 | 10 to 16 | 10 | 40 |
| | 420 to 720 | 17 to 29 | 11 | 44 |
| | 745 to 1,045 | 30 to 42 | 12 | 48 |
| | 1,070 to 1,295 | 43 to 52 | 13 | 52 |
| | 1,395 to 1,620 | 56 to 65 | 14 | 56 |
| | 1,745 to 1,995 | 70 to 80 | 15 | 60 |
| | 2,120 to 2,495 | 85 to 100 | 17.5 | 70 |

**Note:** Use the following expressions for series connection.

- For 2-set series connection:
  Response time (ON to OFF): Response time of the 1st unit + Response time of the 2nd unit – 1 (ms), Response time (OFF to ON): Response time calculated by the above × 4 (ms)
- For 3-set series connection:
  Response time (ON to OFF):
  Response time of the 1st unit + Response time of the 2nd unit + Response time of 3rd unit – 5 (ms), Response time (OFF to ON): Response time calculated by the above × 5 (ms)
  For models with the "-TS" suffix, multiply the response time obtained by the above × 5 (ms), or use 200 ms, whichever is less.)
- For 4-set series connection:
  Response time (ON to OFF): Response time of the 1st unit + Response time of the 2nd unit + Response time of the 3rd unit + Response time of the 4th unit – 8 (ms)
  Response time (OFF to ON): Response time calculated by the above × 5 (ms)

## Cable extension length

Total cable extension length must be no greater than the lengths described below.

**When the F3SJ and an external power supply are directly connected, or when the F3SJ is connected to a G9SA-300-SC.**

| Condition | 1 set | 2 sets | 3 sets | 4 sets |
|---|---|---|---|---|
| **Using incandescent lamp for auxiliary output and external indicator output** | 45 m | 40 m | 30 m | 20 m |
| **Not using incandescent lamp** | 100 m | 60 m | 45 m | 30 m |

**When connected to the F3SP-B1P**

| Condition | 1 set | 2 sets | 3 sets | 4 sets |
|---|---|---|---|---|
| **Using incandescent lamp for external indicator output 2** | 40 m | 30 m | 25 m | 20 m |
| **Using incandescent lamp for external indicator output 1** | 60 m | 45 m | 30 m | 20 m |
| **Using incandescent lamp for auxiliary output 1** | | | | |
| **Not using incandescent lamp** | 100 m | 60 m | 45 m | 30 m |

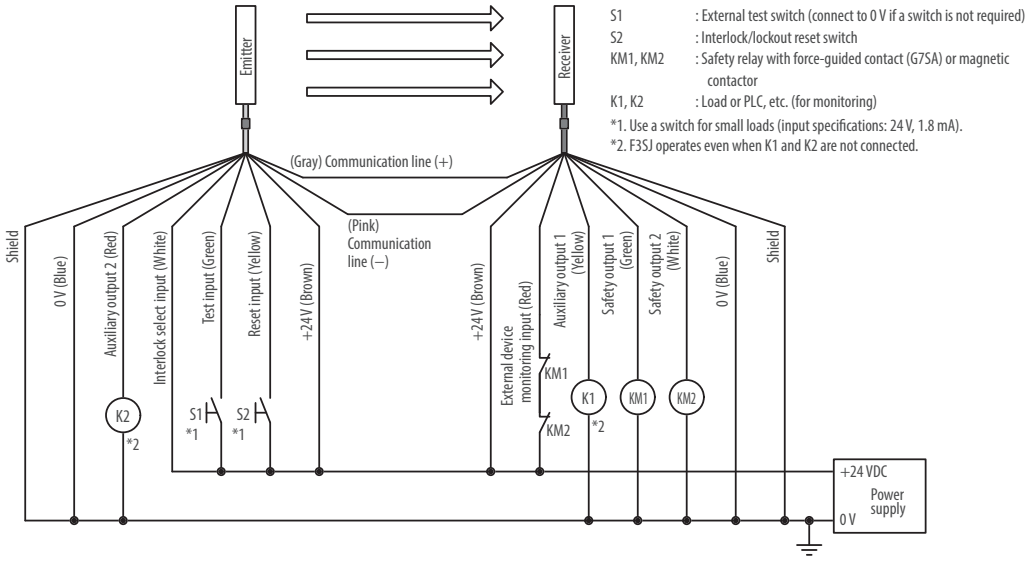
**Note:** Keep the cable length within the rated length. Failure to do so is dangerous as it may prevent safety functions from operating normally.

## Connections

### Basic Wiring Diagram

**PNP Output**

Wiring when using manual reset mode, external device monitoring.



## Category 4 / 2 safety light curtain

The MS4800 and MS2800 family of safety light curtain provides simplicity in mounting, configuring, daily use and maintenance by providing a:

- Sensing distance up to 20m for 30mm resolution and 7 m for 14mm resolution
- LED bar for easy alignment and diagnosis
- DIP-switch setup for blanking, muting and optical coding
- Category 4 / 2 sensor complying with EN 61496-1
- All-in-one M12 connection and mounting concept with robust housing
- Multicascadable up to 3 sets

## Ordering information

### MS2800 Safety Category 2

| **Connection features** | Standard | | | | Master | | | | Slave | |
|---|---|---|---|---|---|---|---|---|---|---|
| Standard<br>Standalone operation | | | | | | | | | | |
| Master<br>Series connection, muting | | | | | | | | | | |
| Slave<br>Series connection only | | | | | | | | | | |
| | MS2800S- | | | | MS2800FS- | | | | MS2800F- | |
| **Function Set** | Basic | | Advanced | | Basic | | Advanced | | | |
| Basic<br>Interlock, restart, EDM, 2 optical channels, integrated alignment tool | | | | | | | | | | |
| Advanced<br>Muting, blanking (fixed/floating) | | | | | | | | | | |
| | MS2800S-EB- | | MS2800S-EA- | | MS2800FS-EB- | | MS2800FS-EA- | | MS2800F-E- | |
| **Resolution** | 14 mm | 30 mm | 14 mm | 30 mm | 14 mm | 30 mm | 14 mm | 30 mm | 14 mm | 30 mm |
| 14 mm finger protection | MS2800S-EB-014- | MS2800S-EB-030- | MS2800S-EA-014- | MS2800S-EA-030- | MS2800FS-EB-014- | MS2800FS-EB-030- | MS2800FS-EA-014- | MS2800FS-EA-030- | MS2800F-E-014- | MS2800F-E-030- |
| 30 mm hand protection | | | | | | | | | | |
| **Length** | | | | | | | | | | |
| 240 mm … 2120 mm in | 280 … 1800 | 280 … 2120 | 280 … 1800 | 280 … 2120 | 280 … 1800 | 280 … 2120 | 280 … 1800 | 280 … 2120 | 240 … 1280 | 280 … 2120 |
| 40 mm increments | | | | | | | | | | |

### MS4800 Safety Category 4

| **Connection features** | Standard | | | | Master | | | | Slave | |
|---|---|---|---|---|---|---|---|---|---|---|
| Standard<br>Standalone operation | | | | | | | | | | |
| Master<br>Series connection, muting | | | | | | | | | | |
| Slave<br>Series connection only | | | | | | | | | | |
| | MS4800S- | | | | MS4800FS- | | | | MS4800F- | |
| **Function Set** | Basic | | Advanced | | Basic | | Advanced | | | |
| Basic<br>Interlock, restart, EDM, 2 optical channels, integrated alignment tool | | | | | | | | | | |
| Advanced Muting, blanking (fixed/floating) | | | | | | | | | | |
| | MS4800S-EB- | | MS4800S-EA- | | MS4800FS-EB- | | MS4800FS-EA- | | MS4800F-E- | |
| **Resolution** | 14mm | 30mm | 14mm | 30mm | 14mm | 30mm | 14mm | 30mm | 14mm | 30mm |
| 14 mm finger protection | MS4800S-EB-014- | MS4800S-EB-030- | MS4800S-EA-014- | MS4800S-EA-030- | MS4800FS-EB-014- | MS4800FS-EB-030- | MS4800FS-EA-014- | MS4800FS-EA-030- | MS4800F-E-014- | MS4800F-E-030- |
| 30 mm hand protection | | | | | | | | | | |
| **Length** | | | | | | | | | | |
| 240 mm … 2120 mm in | 280 ... 1800 | 280 ... 2120 | 280 ... 1800 | 280 ... 2120 | 280 ... 1800 | 280 ... 2120 | 280 ... 1800 | 280 ... 2120 | 240 ... 1280 | 280 ... 2120 |
| 40 mm increments | | | | | | | | | | |

**Examples**

**MS2800S-EB-030-1000**
Standalone operation
Basic function set
30 mm resolution
1000 mm protective height

**MS4800FS-EA-014-1200**
Series connection model
Advanced function set
14 mm resolution
1200 mm protective height

**MS4800F-E-014-600**
Slave operation

14 mm resolution
600 mm protective height

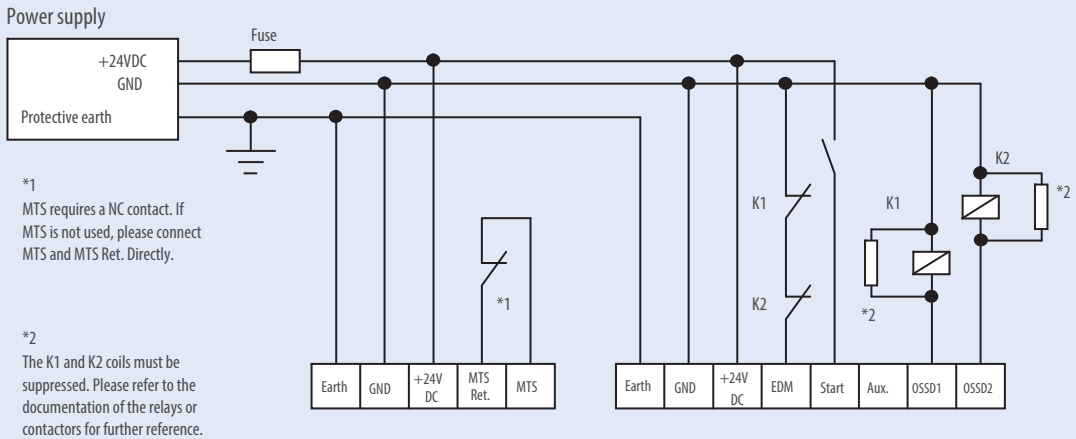
## Specifications

| Model | MS4800_-E_-_ _ _-_ _ _ _ | MS2800_-E_-_ _ _-_ _ _ _ |
|---|---|---|
| Sensor type | Type 4 | Type2 |
| Normal operating range<br>Reduced range (DIP-switch 6) | 14 mm resolution: 0.3 - 7 m, 30 mm resolution: 0.3 - 20 m<br>14 mm resolution: 0.3 - 3 m, 30 mm resolution: 0.3 - 8 m | |
| Beam pitch | 14 mm resolution: 10 mm; 30 mm resolution: 20 mm | |
| Protective height | 14 mm resolution: 280 - 1800 mm; 30 mm resolution: 240 - 2120 mm | |
| Detection capability | 14 mm resolution: 14 mm non-transparent; 30 mm resolution: 30 mm non-transparent | |
| Effective aperture angle (EAA) | Within ±2,5° | Within ±5,0° |
| | for the emitter and receiver at a detection distance of at least 3m according to IEC61496-2 | |
| Light source | Infrared LED's (880 nm), Power dissipation: 180 mW, Class 1 per EN60825-1 | |
| Supply voltage (Vs) | 24 VDC ±20%, according EN/IEC60204, able to cover a drop of voltage of at least 20 msec | |
| OSSD | Two safety related PNP transistor output, load current 625 mA max.*1, short circuit protection | |
| Auxiliary output (non safety output) | One PNP output sourcing 100mA @ 24VDC. This output follows the OSSD's | |
| Output operation mode | OSSD output: Light-ON | |
| Test functions | Self-test (after power ON and during operation) | |
| Safety-related functions | All versions: Auto reset/interlock with manual reset, EDM (external device monitoring) advanced versions only: fixed blanking, floating blanking, muting | |
| Response time | ON to OFF: 14 to 59 ms | |
| Ambient light intensity | Incandescent lamp: 3000 lx max. (light intensity on the receiver surface) | |
| Ambient temperature | Operating: -10°C to +55°C, storage: -25°C to +70°C (without icing or condensation) | |
| Degree of protection | IP65 (IEC60529) | |
| Connection method | Flexible cable with M 12 connection: receiver: 8 pins, transmitter: 5 pins | |
| Materials | Case: Polyurethane powder painted aluminum, cap: polycarbonate, front window: acrylic, mounting brackets: cold rolled steel | |
| Size (cross section) | 39 x 50 mm | |
| Receiver indicator lights | Individual Beam Indicator (IBI), interlock, blanking activ, RUN and STOP state, error codes | |
| Transmitter indicator lights | ON, OFF, failure | |
| AOPD (ESPE) | Type4 acc. IEC 61496-1 | Type2 acc. IEC 61496-1 |
| Suitable for safety control systems | Cat. 4 acc. EN954-1, PLe acc. EN ISO 13849-1 | Cat. 2 acc. EN954-1, PLc acc. EN ISO 13849-1 |
| Safety Integrity Level | SIL 3 according IEC 61508 | |
| PFH | 5,9 x $10^{-8}$ | |

*1 Up to 12 m we recommend to use the F39-JMR cables, to use longer cables and a current of 625 mA the F39-JMR cables are necessary.

### Connection example

Using a manual restart and an external device monitoring




MS4800/MS2800 Transmitter

MS4800/MS2800 Receiver

K1 and K2 forcibly guided relay's expected

## Multi-beam, finger- and hand protection safety sensor

The F3S-TGR-CL multi-beam, finger- and hand protection safety sensors satisfying with integrated safety control functions selectable via built-in dip-switches.

- Type 2 or type 4 acc. EN61496-1
- PL c or PL e acc. ISO13849
- Family concept in wiring and mounting
- All models with dip-switch setup for external device monitoring, interlock function, range setting (short and long range) and optical or wired coding
- Advanced models with pre-reset function, T-, L-or X- muting function and muting lamp integrated

## Ordering information

### Multi-beam safety sensors

**F3S-TGR-CL2_-K_ (Type 2)**

| System | Sensing distance | Detection capability | Order code | |
|---|---|---|---|---|
| | | | Basic feature set*1 | Advanced feature set*2 |
| Active/passive | 0.5 m to 12 m | 500 | F3S-TGR-CL2B-K2C-500 | F3S-TGR-CL2A-K2C-500 |
| | 0.5 m to 8 m | 400 | F3S-TGR-CL2B-K3C-800 | F3S-TGR-CL2A-K3C-800 |
| | 0.5 m to 7 m | 300 | F3S-TGR-CL2B-K4C-900 | F3S-TGR-CL2A-K4C-900 |
| | | 400 | F3S-TGR-CL2B-K4C-1200 | F3S-TGR-CL2A-K4C-1200 |
| Active/active | 0.5 m to 40 m | 500 | F3S-TGR-CL2B-K2-500 | F3S-TGR-CL2A-K2-500 |
| | | 400 | F3S-TGR-CL2B-K3-800 | F3S-TGR-CL2A-K3-800 |
| | | 300 | F3S-TGR-CL2B-K4-900 | F3S-TGR-CL2A-K4-900 |
| | | 400 | F3S-TGR-CL2B-K4-1200 | F3S-TGR-CL2A-K4-1200 |
| Active/active, long distance | 25 m to 50 m | 500 | F3S-TGR-CL2B-K2-500-LD | F3S-TGR-CL2A-K2-500-LD |
| | | 400 | F3S-TGR-CL2B-K3-800-LD | F3S-TGR-CL2A-K3-800-LD |
| | | 300 | F3S-TGR-CL2B-K4-900-LD | F3S-TGR-CL2A-K4-900-LD |
| | | 400 | F3S-TGR-CL2B-K4-1200-LD | F3S-TGR-CL2A-K4-1200-LD |

**F3S-TGR-CL4_-K_ (Type 4)**

| System | Sensing distance | Detection capability | Order code | |
|---|---|---|---|---|
| | | | Basic feature set*1 | Advanced feature set*2 |
| Active/passive | 0.5 m to 12 m | 500 | F3S-TGR-CL4B-K2C-500 | F3S-TGR-CL4A-K2C-500 |
| | 0.5 m to 8 m | 400 | F3S-TGR-CL4B-K3C-800 | F3S-TGR-CL4A-K3C-800 |
| | 0.5 m to 7 m | 300 | F3S-TGR-CL4B-K4C-900 | F3S-TGR-CL4A-K4C-900 |
| | | 400 | F3S-TGR-CL4B-K4C-1200 | F3S-TGR-CL4A-K4C-1200 |
| Active/active | 0.5 m to 40 m | 500 | F3S-TGR-CL4B-K2-500 | F3S-TGR-CL4A-K2-500 |
| | | 400 | F3S-TGR-CL4B-K3-800 | F3S-TGR-CL4A-K3-800 |
| | | 300 | F3S-TGR-CL4B-K4-900 | F3S-TGR-CL4A-K4-900 |
| | | 400 | F3S-TGR-CL4B-K4-1200 | F3S-TGR-CL4A-K4-1200 |
| Active/active, long distance | 25 m to 50 m | 500 | F3S-TGR-CL4B-K2-500-LD | F3S-TGR-CL4A-K2-500-LD |
| | | 400 | F3S-TGR-CL4B-K3-800-LD | F3S-TGR-CL4A-K3-800-LD |
| | | 300 | F3S-TGR-CL4B-K4-900-LD | F3S-TGR-CL4A-K4-900-LD |
| | | 400 | F3S-TGR-CL4B-K4-1200-LD | F3S-TGR-CL4A-K4-1200-LD |

*1 Basic feature set: Manual/automatic restart, coding
*2 Advanced feature set: Basic + Muting + integrated Muting lamp + Pre-reset

## Safety sensors

### F3S-TGR-CL2_ (Type 2)

| Feature set | Master/Slave | Sensing distance | Detection capability | Length | Order code |
|---|---|---|---|---|---|
| Basic*1 | Standalone | 0.2 m to 6 m | 14 mm | 150 mm to 2,400 mm*3 | F3S-TGR-CL2B-014-_ |
| | | 0.2 m to 14 m | 35 mm | | F3S-TGR-CL2B-035-_ |
| Advanced*2 | Standalone | 0.2 m to 6 m | 14 mm | | F3S-TGR-CL2A-014-_ |
| | | 0.2 m to 14 m | 35 mm | | F3S-TGR-CL2A-035-_ |
| | Master | 0.2 m to 6 m | 14 mm | 150 mm to 2,250 mm*3 | F3S-TGR-CL2A-014-_M |
| | | 0.2 m to 14 m | 35 mm | | F3S-TGR-CL2A-035-_M |
| | Slave | 0.2 m to 6 m | 14 mm | | F3S-TGR-CL2A-014-_S |
| | | 0.2 m to 14 m | 35 mm | | F3S-TGR-CL2A-035-_S |
| | | | 70 mm | 300 mm to 2,100 mm | F3S-TGR-CL2A-070-_S |

### F3S-TGR-CL4_ (Type 4)

| Feature set | Master/Slave | Sensing distance | Detection capability | Length | Order code |
|---|---|---|---|---|---|
| Basic*1 | Standalone | 0.2 m to 6 m | 14 mm | 150 mm to 2,400 mm*3 | F3S-TGR-CL4B-014-_ |
| | | 0.2 m to 14 m | 35 mm | | F3S-TGR-CL4B-035-_ |
| Advanced*2 | Standalone | 0.2 m to 6 m | 14 mm | | F3S-TGR-CL4A-014-_ |
| | | 0.2 m to 14 m | 35 mm | | F3S-TGR-CL4A-035-_ |
| | Master*4 | 0.2 m to 6 m | 14 mm | 150 mm to 2,250 mm*3 | F3S-TGR-CL4A-014-_M |
| | | 0.2 m to 14 m | 35 mm | | F3S-TGR-CL4A-035-_M |
| | Slave*4 | 0.2 m to 6 m | 14 mm | | F3S-TGR-CL4A-014-_S |
| | | 0.2 m to 14 m | 35 mm | | F3S-TGR-CL4A-035-_S |
| | | | 70 mm | 300 mm to 2,100 mm | F3S-TGR-CL4A-070-_S |

*1 Basic feature set:Manual/automatic restart, coding
*2 Advanced feature set:Basic + Muting + integrated Muting lamp + Pre-reset
*3 Available length (in mm):150, 300, 450, 600, 750, 900, 1,050, 1,200, 1,350, 1,500, 1,650, 1,800, 1,950, 2,100, 2,250, (2,400 mm, only standalone versions)
*4 Master/slave system:A master/slave system cannot exceed the total length of 2,400 mm

### F3S-TGR-CL-_-_M/S Master-Slave Series

- A Master-Slave cascade system is made of one master segment and one slave segment.
- The length of the total protective field can vary from minimum 300 mm till maximum 2,400 mm.
- The interconnect cable length limitation between master and slave segment is in total max. 0,9 m.

Possible combinations of master and slave are in this table:

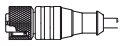
| | | Slave models | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 14 mm or 35 mm resolution | | | | | | | | | | | | | | | 70 mm resolution | | | | | | |
| | | 150 | 300 | 450 | 600 | 750 | 900 | 1,050 | 1,200 | 1,350 | 1,500 | 1,650 | 1,800 | 1,950 | 2,150 | 2,250 | 300 | 600 | 900 | 1,200 | 1,500 | 1,800 | 2,100 |
| Master models (14 mm or 35 mm resolution) | 150 | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK |
| | 300 | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | | OK | OK | OK | OK | OK | OK | OK |
| | 450 | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | | | OK | OK | OK | OK | OK | OK | |
| | 600 | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | | | | OK | OK | OK | OK | OK | OK | |
| | 750 | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | | | | | OK | OK | OK | OK | OK | | |
| | 900 | OK | OK | OK | OK | OK | OK | OK | OK | OK | OK | | | | | | OK | OK | OK | OK | OK | | |
| | 1,050 | OK | OK | OK | OK | OK | OK | OK | OK | OK | | | | | | | OK | OK | OK | OK | | | |
| | 1,200 | OK | OK | OK | OK | OK | OK | OK | OK | | | | | | | | OK | OK | OK | OK | | | |
| | 1,350 | OK | OK | OK | OK | OK | OK | OK | | | | | | | | | OK | OK | OK | | | | |
| | 1,500 | OK | OK | OK | OK | OK | OK | | | | | | | | | | OK | OK | OK | | | | |
| | 1,650 | OK | OK | OK | OK | OK | | | | | | | | | | | OK | OK | | | | | |
| | 1,800 | OK | OK | OK | OK | | | | | | | | | | | | OK | OK | | | | | |
| | 1,950 | OK | OK | OK | | | | | | | | | | | | | OK | | | | | | |
| | 2,100 | OK | OK | | | | | | | | | | | | | | OK | | | | | | |
| | 2,250 | OK | | | | | | | | | | | | | | | | | | | | | |

## Accessories

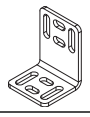
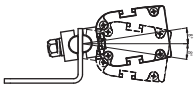
### Receiver cables (M12-8pin, shielded, flying leads)

| Shape | Description | Remark | Order code |
|---|---|---|---|
|  | Sensor connector with open cable end M12-8pin, outer shielding layer | Receiver cable, 2 m length | Y92E-M12PURSH8S2M-L |
| | | Receiver cable, 5 m length | Y92E-M12PURSH8S5M-L |
| | | Receiver cable, 10 m length | Y92E-M12PURSH8S10M-L |
| | | Receiver cable, 25 m length | Y92E-M12PURSH8S25M-L |

### Transmitter cables (M12-4pin, shielded, flying leads)

| Shape | Description | Remark | Order code |
|---|---|---|---|
|  | Sensor connector with open cable end M12-4pin, outer shielding layer | Transmitter cable, 2 m length | Y92E-M12PURSH4S2M-L |
| | | Transmitter cable, 5 m length | Y92E-M12PURSH4S5M-L |
| | | Transmitter cable, 10 m length | Y92E-M12PURSH4S10M-L |
| | | Transmitter cable, 25 m length | Y92E-M12PURSH4S25M-L |

### Mounting brackets

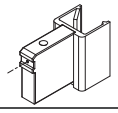
| Shape | Description | Remark | Order code |
|---|---|---|---|
|  | Mounting bracket | Mounting bracket × 1,<br>SLC mounting screws × 1 set | F39-TGR-ST-SB[*1] |
|  | Adjustable bracket | Adjustable bracket × 1,<br>Bracket mounting screws × 1 set | F39-TGR-ST-ADJ |

[*1] Brackets amount included in shipment is shown in table of Dimensions

### Master-Slave accessories

| Shape | Description | Remark | Order code |
|---|---|---|---|
|  | Male-male extension connector M12-8pin, outer shielding layer | Connection cable, 0.3 m length | Y92E-M12MSM12MSPURSH80.3M-L |
| | | Connection cable, 0.9 m length | Y92E-M12MSM12MSPURSH80.9M-L<br>(included in slave system) |
|  | Alignment kit – end cap | To support alignment of a Master-Slave system | F39-TGR-CL-MSA<br>(included in slave system) |

### Laser alignment kit

| Shape | Description | Remark | Order code |
|---|---|---|---|
|  | Laser alignment kit | Scanning range: ≤ 60 m<br>Batteries: 2 × 1.5 V Micro/AAA<br>Laser Class 2 (IEC 60825) | F39-TGR-CL-LLK |

## Mounting systems and mirrors

### Adjustable stands

| | | Order code |
|---|---|---|
| Adjustable stand, 1,200 mm high | Safety sensors, Mirror systems | F39-TGR-AS-B1200 |
| Adjustable stand, 1,600 mm high | Safety sensors, Mirror systems, Muting applications | F39-TGR-AS-B1600 |

### Mirror system for multi-beam safety sensors (F3S-TGR-CL_-K_)

| | | Order code |
|---|---|---|
| Mirror mounting plate | 2-, 3- and 4-beam systems ≤900 mm | F39-TGR-AS-MM1 |
| | 4-beam system 1,200 mm | F39-TGR-AS-MM2 |
| Adjustable mirror kit | Use 1 pcs F39-TGR-AS-AM1 for each beam of the safety sensor | F39-TGR-AS-AM1 |

### Muting accessories

| | | Order code |
|---|---|---|
| Mounting system for muting sensors | For L-muting | F39-TGR-AS-MA-MBL |
| | For X- and T-muting | F39-TGR-AS-MA-MBXT |
| Mounting bracket for muting sensors | For OMRON E3Z and E3G-family | F39-TGR-AS-MA-MSM |
| Mounting bracket for reflectors | For OMRON E39-R1S | F39-TGR-AS-MA-MRM |

### Cable cover

| | | Order code |
|---|---|---|
| Cable cover | For 1,200 mm stand | F39-TGR-AS-MA-CC12 |
| | For 1,600 mm stand | F39-TGR-AS-MA-CC16 |

## Specifications

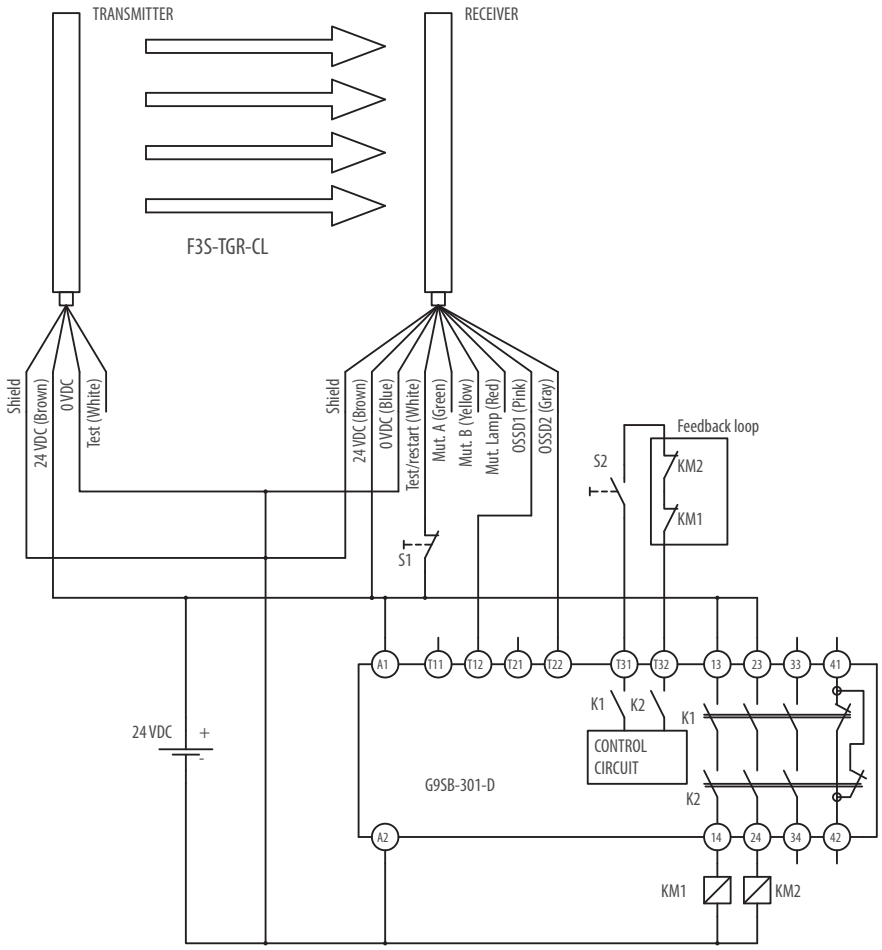
### Multi-beam safety sensors

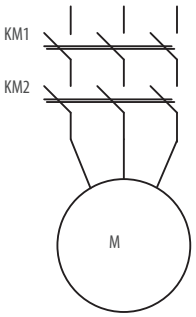
| Item | F3S-TGR-CL2_-0__ | F3S-TGR-CL4_-0__ |
|---|---|---|
| Sensor type | Type 2 | Type 4 |
| Protective height | 500 mm, 800 mm, 900 mm or 1,200 mm | |
| Operating range | F3S-TGR-CL__-K_ 0.5 to 20 m or 20 to 40 m (Dip switch option)<br>F3S-TGR-CL__-K_-___-LD 25 to 50 m<br>F3S-TGR-CL__-K2C-500 0.5 to 12 m<br>F3S-TGR-CL__-K3C-800 0.5 to 8 m<br>F3S-TGR-CL__-K4C-____ 0.5 to 7 m | |
| Beam pitch | F3S-TGR-CL__-K2_-500: 2 beams, 500 mm<br>F3S-TGR-CL__-K3_-800: 3 beams, 400 mm<br>F3S-TGR-CL__-K4_-900: 4 beams, 300 mm<br>F3S-TGR-CL__-K4_-1200: 4 beams, 400 mm | |
| Effective aperture angle (EAA) | Within ±5° | Within ±2.5° |
| | for the emitter and receiver at a detection distance of at least 3 m according to IEC 61496-2 | |
| Light source | Infrared LED (880 nm), power dissipation <3 mW, Class 1 per EN 60825-1 | |
| Supply voltage | 24 VDC±20%, according EN 60204-1 able to cover a drop of voltage of at least 20 ms | |
| OSSD | 2 PNP transistor outputs, load current 2 × 250 mA max | |
| Test functions | Self test (after power ON and during operation) | |
| Safety-related functions | All models with dip-switch setup for external device monitoring, interlock function, range setting (short and long range) and optical or wired sync.<br>Advanced models with selectable pre-reset function, T-, L-or X- muting function (timeout or infinite muting dip switch option) and muting lamp integrated (only for the non master-slave systems) | |
| Response time | ON to OFF: Maximum: 13 ms | |
| Ambient temperature | Operating: –10 to 55°C, Storage: –25 to 70°C (no icing, no condensation) | |
| Ambient humidity | 95% not condensing | |
| Degree of protection | IP 65 (IEC 60529) | |
| Materials | Housing: Painted aluminum, Yellow, RAL 1018<br>Front Window: Acrylic Lexan<br>Red end cap: PA6 (Standalone models),<br>Transparent end cap: PC (Advanced standalone models),<br>Sealing Gasket: EPDM<br>Mounting Bracket: Cold rolled Steel | |
| Suitable for safety control systems | PLc (ISO 13849-1) | PLe (ISO 13849-1) |
| Category | Categorie 2 | Categorie 4 |
| PFHd | $2.5 \times 10^{-9}$ | |
| Proof test interval | every 20 years | |

### Finger- and hand safety protection sensors

| Item | F3S-TGR-CL2_-0__ | F3S-TGR-CL4_-0__ |
|---|---|---|
| Sensor type | Type 2 | Type 4 |
| Protective height | 150 mm to 2,400 mm | |
| Operating range (short setting or long setting) | F3S-TGR-CL__-014: 0.2 m to 3 m or 3 m to 6 m (Dip switch option)<br>F3S-TGR-CL__-035: 0.2 m to 7 m or 7 m to 14 m (Dip switch option)<br>F3S-TGR-CL__-070: 0,2 m to 7 m or 7 m to 14 m (Dip switch option) | |
| Detection capability | F3S-TGR-CL__-014: Opaque objects 14 mm in diameter<br>F3S-TGR-CL__-035: Opaque objects 35 mm in diameter<br>F3S-TGR-CL__-070: Opaque objects 70 mm in diameter | |
| Effective aperture angle (EAA) | Within ±5° | Within ±2.5° |
| | for the emitter and receiver at a detection distance of at least 3 m according to IEC 61496-2 | |
| Light source | Infrared LED (880 nm), power dissipation <3 mW, Class 1 per EN 60825-1 | |
| Supply voltage | 24 VDC±20%, according EN 60204-1 able to cover a drop of voltage of at least 20 ms | |
| OSSD | 2 PNP transistor outputs, load current 2 × 250 mA max | |
| Series connection | Number of connections: One master and one slave safety light curtain<br>Total number of beams ≤ 336<br>Maximum interconnect cable length: 900 mm | |
| Test functions | Self test (after power ON and during operation) | |
| Safety-related functions | All models with dip-switch setup for external device monitoring, interlock function, range setting (short and long range) and optical or wired sync.<br>Advanced models with selectable pre-reset function, T-, L-or X- muting function (timeout muting), blanking, single / double brake function and muting lamp integrated (only for the non master-slave systems) | |
| Response time | ON to OFF: 14 ms to 103 ms | |
| Ambient temperature | Operating: –10 to 55°C, Storage: –25 to 70°C (no icing, no condensation) | |
| Ambient humidity | 95% not condensing | |
| Degree of protection | IP 65 (IEC 60529) | |
| Materials | Housing: Painted aluminum, Yellow, RAL 1018<br>Front Window: Acrylic Lexan<br>Red end cap: PA6 (Standalone models),<br>Transparent end cap: PC (Advanced standalone models),<br>Die cast aluminum (Master-, Slave models)<br>Sealing Gasket: EPDM<br>Mounting Bracket: Cold rolled Steel | |
| Suitable for safety control systems | PLc (ISO 13849-1) | PLe (ISO 13849-1) |
| Category | Categorie 2 | Categorie 4 |
| PFHd | $2,5 \times 10^{-9}$ | |
| Proof test interval | every 20 years | |

**F3S-TGR-CL and GSB-301-D in manual reset**




**Note:** This circuit achieves up to PLe according to EN ISO 13849-1 with F3S-TGR-CL4 and up to PLc according to EN ISO 13849-1 with F3S-TGR-CL2.

## Muting actuators

The F39-TGR-MCL-_ muting actuators are plug-and-play accessories for the F3S-TGR-CL Safety Sensors. Easy wiring of the entire muting system is provided by connection boxes managing all connections needed.

- Active/active and active/passive systems supported
- T- and L- shape muting by using same parts
- Selectable muting sensor sequence
- Pre-installed mounting brackets
- Pre-wired connection cables
- Supporting Type 2 and Type 4 applications

## Ordering information

**Muting actuators (mounting brackets are included)**

| | | Order code |
|---|---|---|
| Transmitter + Receiver set | active/active | F39-TGR-MCL |
| Receiver only | active/active | F39-TGR-MCL-D |
| Transmitter only | active/active | F39-TGR-MCL-L |
| Transceiver + Reflector set | active/passive | F39-TGR-MCL-R |
| Transceiver only | active/passive | F39-TGR-MCL-R-A |
| Reflector only | active/passive | F39-TGR-MCL-R-P |

**Connection boxes**

| | Order code |
|---|---|
| Connection box for Receivers and Transceivers | F39-TGR-MCL-CMD |
| Connection box for Transmitters | F39-TGR-MCL-CML |

**Mounting brackets**

| | Order code |
|---|---|
| Mounting bracket for one muting actuator | F39-TGR-MCL-ST |

## Specifications

| | | |
|---|---|---|
| **Power supply** | | 24 VDC±20% |
| **Consumption** | | 5 W max (F39-TGR-MCL-_ only) |
| **Ambient temperature** | | During operation; -10 to + 55°C (with no dew condensation) |
| **Cable connector** | **Length** | 30 cm pre-wired |
| | **RX** | M12 5-pin female |
| | **TX** | M12 5-pin female |
| **Degree of protection** | | IP65 |
| **Distance between muting beams** | | 250mm |
| **F39-TGR-MCL** | **Optical data** | Through-beam system |
| | **Operating distance** | 0 … 7 m; max. 0 … 8,4 m |
| | **Light source** | Red emitting LEDs, Wavelength 630 nm |
| **F39-TGR-MCL-R** | **Optical data** | Polarized retro-reflective system |
| | **Operating distance** | 0 … 4 m; max. 0 … 4,8 m |
| | **Light source** | Red emitting LEDs, Wavelength 660 nm |

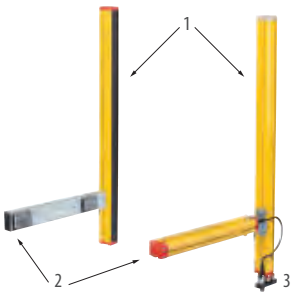
## Configuration examples

**L-muting, active/active**

1) Safety sensor (e.g. F3S-TGR-CL4A-K2-500)
2) Muting actuators F39-TGR-MCL
3) Connector box F39-TGR-MCL-CML
4) Connector box F39-TGR-MCL-CMD


**L-muting, active/passive**

1) Safety Sensor (e.g. F3S-TGR-CL4A-K2C-500)
2) Muting actuators F39-TGR-MCL-R
3) Connection box F39-TGR-MCL-CMD



## Single-beam safety sensor in compact housing

The slender M18-sized E3FS is a type 2 safety single beam with an operating range of up to 10 m. Plastic and metal housing, cable and M12-connector offer flexibility in application together with a control unit such as F3SP-U3P or F3SP-U5P.

- Sensing distance up to 10 m
- LEDs for easy alignment and diagnosis
- Cable and M12 plug categories
- Plastic and metal housing
- Type 2 sensor complying with EN 61496-1

## Ordering information

### Safety single beam sensors (Type 2)

| Case material | Operation distance | Order code | |
|---|---|---|---|
| Plastic | 0 to 10 m | Cable type | E3FS-10B4 |
| | | Plug type | E3FS-10B4-P1 |
| Nickel brass | | Cable type | E3FS-10B4-M |
| | | Plug type | E3FS-10B4-M1-M |

### Controller for safety single beam sensors

| Sensors | Output contacts | Width | Order code |
|---|---|---|---|
| 1 to 2<br>Safety single beam sensors | 2 NO 2.5 A | 22.5 mm | F3SP-U3P-TGR |
| 1 to 4<br>Safety single beam sensors | | 45 mm | F3SP-U5P-TGR |

## Specifications

### Sensors

| | |
|---|---|
| **Sensing method** | Through-beam |
| **Controller** | F3SP-U3P-TGR, F3SP-U5P-TGR |
| **Supply voltage (Vs)** | 24 VDC ± 10% (ripple p-p 10% max.) |
| **Effective aperture angle (EAA)** | ±5° (at 3 m) |
| **Current consumption** | Emitter:50 mA max.<br>Receiver:25 mA max. |
| **Sensing distance** | 10 m |
| **Standard sensing object** | Opaque object: 11 mm min. in diameter |
| **Response time** | 2.0 ms (E3FS only) |
| **Control output** | PNP transistor output, load current: 100 mA max. |
| **Test input (emitter)** | 21.5 to 24 VDC: Emitter OFF (source current: 3 mA max.)<br>Open or 0 to 2.5 V: Emitter ON (leakage current: 0.1 mA max.) |
| **Ambient light intensity** | Incandescent lamp: 3.000 lx max. (light intensity on the receiver surface)<br>Sunlight: 10,000 lx max. (light intensity on the receiver surface) |
| **Ambient temperature** | Operating: -20°C +55°C, storage: -30°C +70°C (with no icing or condensation) |
| **Degree of protection** | IP67 (IEC 60529) |
| **Light source** | Infrared LED |
| **Protection** | Output short-circuit protection, reverse polarity protection |

### Controllers

| Item | F3SP-U3P | F3SP-U5P |
|---|---|---|
| **Number of sensors** | 1 to 2 safety single beam sensor | 1 to 4 safety single beam sensor |
| **Width** | 22.5 mm | 45 mm |
| **Muting input** | 2 Inputs | 4 Inputs |
| **Safety related function** | Override function<br>Muting lamp connection<br>Interlock system (automatic and manual reset) | |
| **Power supply voltage** | 24 VDC ±10% | |
| **Power consumption** | 420 mA max. | |
| **Output contacts** | 2 NO 2.5 A (protected by fuse), 115 VAC max. | 2 NO 2.5 A (protected by fuse), 250 VAC max. |
| **Indicators** | 6 LED for status and diagnostics | |
| **Degree of protection** | IP20 (IEC 60529) | |
| **Terminal** | 16 screw terminals,<br>detachable blocks with '4pin' | 32 screw terminals,<br>detachable blocks with '4pin' |
| **Response time** | ≤ 30 ms | |
| **Ambient temperature** | Operation: –10°C +55°C | |
| **Housing material** | Plastic; DIN rail mounting | |

## OS32C Safety laser scanner

- Type 3 safety laser scanner complies with IEC61496-1/-3
- 70 sets of safety zone and warning zone combinations are available, supporting complicated changes in working environments
- A safety radius up to 4 m and warning zone(s) radius up to 10 m can be set
- 8 Individual sector indicators and various LED indications allow the user to determine scanner status at a glance
- Reference boundary monitoring function prevents unauthorized changes in the scanner position
- Configurable minimum object resolution of 30, 40, 50 or 70 mm, for hand and arm detection applications

## Ordering information

| Description | Max. operating range | Order code |
|---|---|---|
| OS32C with back location cable entry | 3 m | OS32C-BP |
| | 4 m | OS32C-BP-4M |
| OS32C with side location cable entry*1 | 3 m | OS32C-SP1 |
| | 4 m | OS32C-SP1-4M |
| OS32C with back location cable entry EtherNet/IP capable for status measurement data reporting | 3 m | OS32C-BP-DM |
| | 4 m | OS32C-BP-DM-4M |
| OS32C with side location cable entry*1 EtherNet/IP capable for status measurement data reporting | 3 m | OS32C-SP1-DM |
| | 4 m | OS32C-SP1-DM-4M |

*1 Each connector is located on the left as viewed from the back of the I/O block.

| Description | Remarks | Order code |
|---|---|---|
| Configuration tool | CD-ROM<br>OS supported:<br>Windows 2000, XP, Vista, Windows 7 | included |

## Specifications

### Sensors

| | | |
|---|---|---|
| Sensor type | | Type 3 safety laser scanner |
| Safety category | | Category 3, performance level d (ISO13849-1: 2006) |
| Detection capability | | Configurable; Non-transparent with a diameter of 30, 40, 50 or 70 mm (1.8% reflectivity or greater) |
| Monitoring zone | | Monitoring zone set count: (Safety zone + 2 warning zones) × 70 sets |
| Operating range | | Safety Zone: 4.0 m (min. obj. resolution of 70mm, only OS32C-_-4M types)<br>3.0 m (min. obj. resolution of 50 mm or 70 mm)<br>2.5 m (min. obj. resolution of 40 mm)<br>1.75 m (min. obj. resolution of 30 mm)<br>Warning Zone: 10.0 m (15.0 m for OS32C-_-4M types) |
| Detection angle | | 270° |
| Response time | | Response time from ON to OFF: From 80 ms (2 scans) to 680 ms (up to 17 scans)*1<br>Response time from OFF to ON: Response time from ON to OFF + 100 ms to 60 s (configurable) |
| Line voltage | | 24 VDC +25%/–30% (ripple p-p 2.5 V max.) |
| Power consumption | | Normal operation: 5 W max., 4 W typical (without output load)*2<br>Standby mode: 3.75 W (without output load) |
| Safety output (OSSD) | | PNP transistor × 2, load current of 250mA max., residual voltage of 2 V max., load capacity of 2.2 µf max., leak current of 1 mA max.*2,*3,*4 |
| Auxiliary output (Non-safety) | | NPN/PNP transistor × 1, load current of 100 mA max., residual voltage of 2 V max., leak current of 1 mA max.*3,*4,*5 |
| Warning output (Non-safety) | | NPN/PNP transistor × 1, load current of 100 mA max., residual voltage of 2 V max., leak current of 1 mA max.*3,*4,*5 |
| Output operation mode | | Auto start, start interlock, start/restart interlock |
| Input | External Device Monitoring (EDM) | ON: 0 V short (input current of 50 mA), OFF: Open |
| | Start | ON: 0 V short (input current of 20 mA), OFF: Open |
| | Zone select | ON: 24 V short (input current of 5 mA), OFF: Open |
| | Stand-by | ON: 24 V short (input current of 5 mA), OFF: Open |
| Connection type | | Power cable: 18-pin mini-connector (pigtail)<br>Communication cable: M12, 4-pin connector |
| Connection with PC | | Communication: EtherNet/IP |
| Indicators | | RUN indicator: Green, STOP indicator: Red, Interlock indicator: Yellow, Warning output indicator: Orange,<br>Status/diagnostic display: 2 × 7-segment LEDs, Intrusion indicators: Red LED × 8 |
| Enclosure rating | | IP65 (IEC60529) |
| Dimensions (W × H × D) | | 133.0 × 104.5 × 142.7 mm (except cable) |
| Weight (Main Unit only) | | 1.3 kg |
| Approvals | | Certified by: TÜV Rheinland, UL<br>Major standards: IEC61496-1/-3 (Type 3), IEC61508 (SIL2), ISO13849-1:2008 (Category 3, performance level d), UL508, UL1998 |

*1 Pollution Tolerance will add 6 ms to each scan time.
*2 Rated current of OS32C is 1.025 A max. (OS32C 210 mA + OSSD A load + OSSD B load + auxiliary output load + warning output load + functional Inputs). Where functional inputs are: EDM input ... 50 mA, Start input ... 20 mA, Standby input ... 5 mA, Zone X input ... 5 mA × 8 (eight zone set select inputs).
*3 Output voltage is input voltage – 2.0 VDC.
*4 Total consumption current of 2 OSSDs, auxiliary output, and warning output must not exceed 700 mA.
*5 Output polarity (NPN/PNP) is configurable via the configuration tool.

## Accessories (sold separately)

### Power cable

| Appearance | Description | Remarks | Order code |
|---|---|---|---|
|  | Cable length: 3 m | One cable is required per sensor | OS32C-CBL-03M |
| | Cable length: 10 m | | OS32C-CBL-10M |
| | Cable length: 20 m | | OS32C-CBL-20M |
| | Cable length: 30 m | | OS32C-CBL-30M |

### Ethernet cable

| Appearance | Description | Remarks | Order code |
|---|---|---|---|
|  | Cable length: 2 m | Required for configuration and monitoring | OS32C-ECBL-02M |
| | Cable length: 5 m | | OS32C-ECBL-05M |
| | Cable length: 15 m | | OS32C-ECBL-15M |

**Note:** An ethernet cable with an M12, 4-pin connector is required.

### Mounting brackets

| Appearance | Description | Remarks | Order code |
|---|---|---|---|
|  | Bottom/side mounting bracket | Bottom/side mounting bracket × 1,<br>unit mounting screws × 4 sets | OS32C-BKT1 |
|  | XY axis rotation mounting bracket | XY axis rotation mounting bracket × 1,<br>unit mounting screws × 6 sets,<br>bracket mounting screws × 1 set<br><br>(must be used with OS32C-BKT1) | OS32C-BKT2 |
|  | Simple mounting bracket | Simple mounting brackets × 2,<br>unit mounting screws × 4 sets[*1] | OS32C-BKT3 |
|  | Protective cover for window | | OS32C-BKT4 |
|  | Mounting stand | When using a mounting stand, use an OS32C<br>with side location cable entry (OS32C-SP1).<br><br>The OS32C with back location cable entry (OS32C-BP)<br>cannot be mounted.<br><br>Use with mounting brackets (OS32C-BKT1 and OS32C-BKT2). | OS32C-MT |
|  | Hardware kit for mounting stand | Mounting screws × 3 sets<br><br>Use this when mounting a bracket to the mounting stand. | OS32C-HDT |

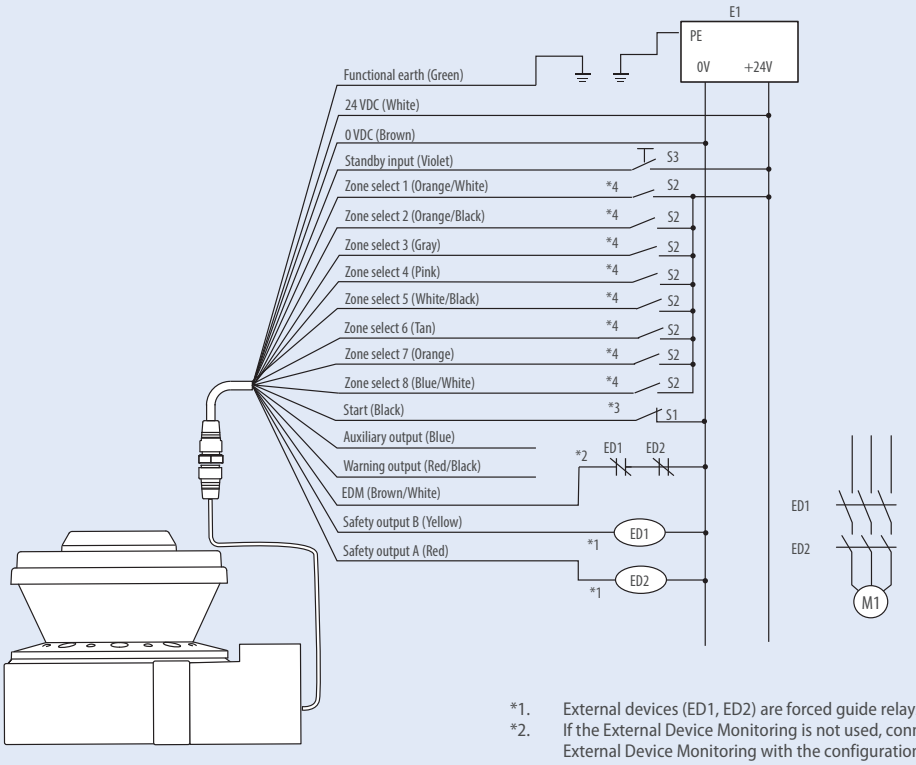
[*1] There are eight OS32C mounting screws: four screws for singular use, and four screws for protective cover for window.

### Miscellaneous

| Appearance | Description | | Remarks | Order code |
|---|---|---|---|---|
|  | Scan window | | Spare for replacement | OS32C-WIN-KT |
|  | Sensor block without I/O block<br>Max. operating range: 3 m | | Spare for replacement | OS32C-SN |
| | Sensor block without I/O block<br>Max. operating range: 4 m | | | OS32C-SN-4M |
|  | Sensor block without I/O block for EtherNet/IP<br>Max. operating range: 3 m | | Spare replacement for EtherNet/IP | OS32C-SN-DM |
| | Sensor block without I/O block for EtherNet/IP<br>Max. operating range: 4 m | | | OS32C-SN-DM-4M |
|  | I/O block | With cable access from the back | Spare for replacement | OS32C-CBBP |
|  | | With cable access from the left side | Spare for replacement | OS32C-CBSP1 |
|  | Window cleaning kit, anti-static cleaner | | Accessory | WIN-CLN-KT |

## Connection

**Basic connection with single OS32C unit**
**Category 3, performance level d (ISO13849-1)**




S1 : Start input
S2 : Zone select switch
S3 : Standby switch
ED1, ED2: Forced guided relay
M1 : 3-Phase motor
E1 : 24 VDC Power

OS32C configuration
– External Device Monitoring enabled
– Start/restart interlock

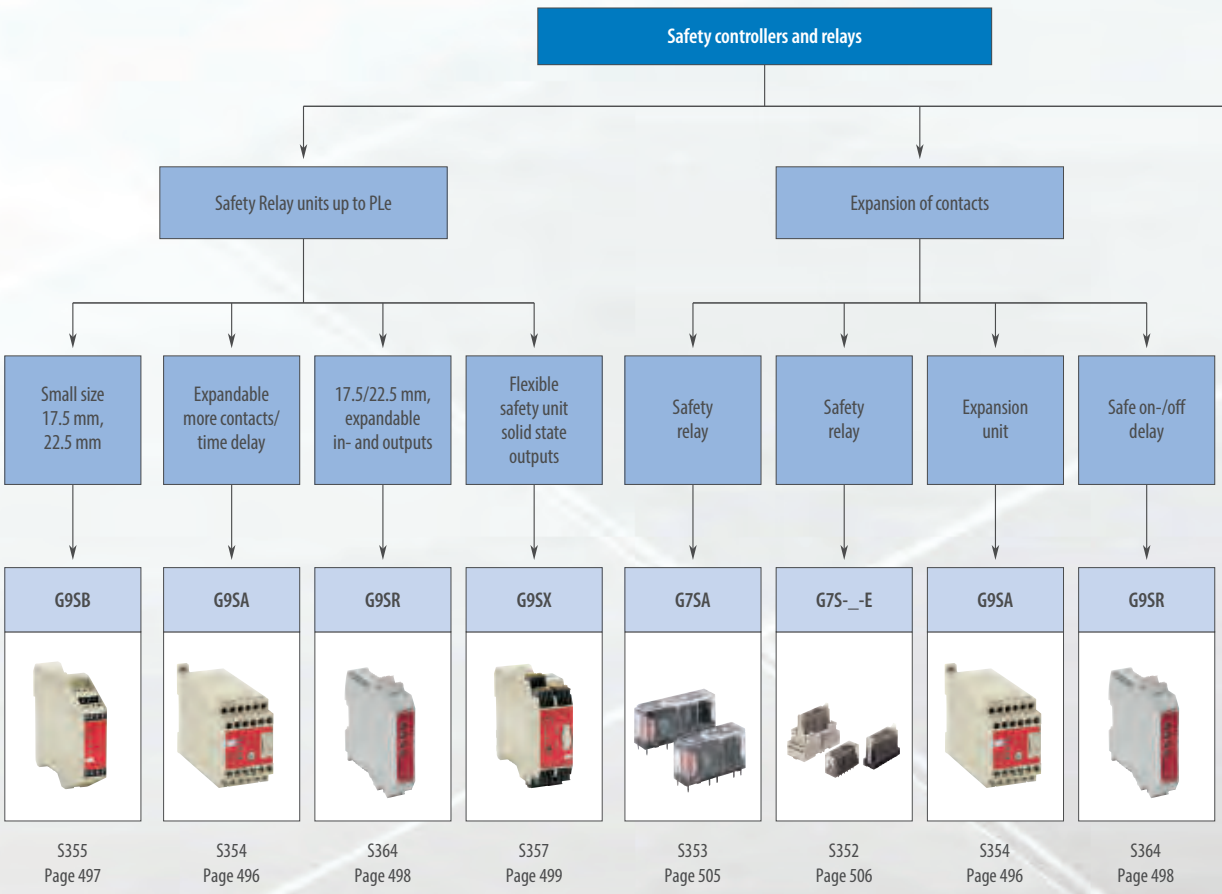
*1. External devices (ED1, ED2) are forced guide relays. (G7Z, G7SA, G7S, etc)
*2. If the External Device Monitoring is not used, connect brown/white wires to 0 V, and then turn OFF the External Device Monitoring with the configuration software.
*3. Use NC-contact for a start input.
*4. For zone select switch setting, refer to OS32C Series user's manual.
**Note:** This wiring example is for category 3.

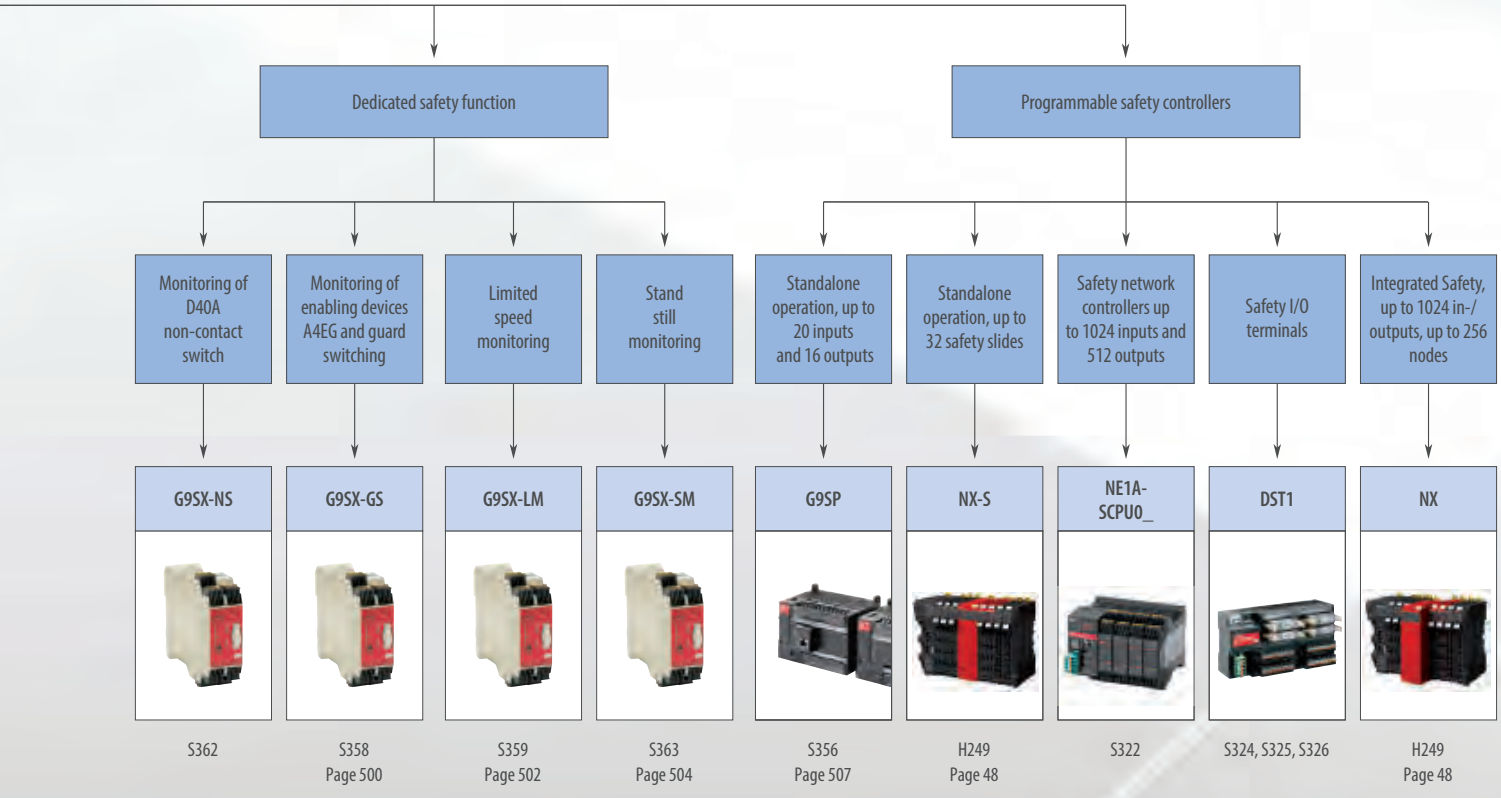
# BREAK THROUGH BARRIERS IN SAFETY DESIGN

## Configurable, flexible and simple

Omron safety controllers offer transparent standalone operation and scalability in safety networking applications for all sizes of machine safety control systems. The G9SP safety controller is simple to configure and setup and overcomes limitations of hard-wired solutions by adding flexibility of a software - based solution. Total cost of ownership is reduced by having user-defined function blocks and an integrated simulation tool for debugging or the application program.

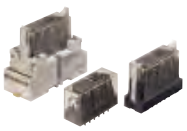
- EN ISO 13849-1 (PLe) and IEC 61508 (SIL3) certification for future-proof design of the safety system
- Predefined function blocks for simple configuration and self-explanatory validation
- Equipped with Ethernet and serial interface for transparent diagnosis




Dedicated safety function
Programmable safety controllers
Monitoring of D40A non-contact switch
Monitoring of enabling devices A4EG and guard switching
Limited speed monitoring
Stand still monitoring
Standalone operation, up to 20 inputs and 16 outputs
Standalone operation, up to 32 safety slides
Safety network controllers up to 1024 inputs and 512 outputs
Safety I/O terminals
Integrated Safety, up to 1024 in-/ outputs, up to 256 nodes
G9SX-NS
G9SX-GS
G9SX-LM
G9SX-SM
G9SP
NX-S
NE1A-SCPU0_
DST1
NX
S362
S358 Page 500
S359 Page 502
S363 Page 504
S356 Page 507
H249 Page 48
S322
S324, S325, S326
H249 Page 48

# Selection table

| | | Safety relay units | | Safety relays | Flexible safety unit |
|---|---|---|---|---|---|
| | |  |  |  |  |
| **Model** | | **G9SA** | **G9SB** | **G9SR** | **G9SX** |
| Selection criteria | Performance level | up to PLe acc. EN ISO 13849-1 depending on application | | | |
| | Safety integrity level (IEC 61508) | – | – | SIL 3 | SIL 3 |
| | Reaction time | max. 10 ms | max. 10 ms | depend on safety application | 15 ms |
| | DeviceNet safety Bus interface | – | – | – | – |
| | Standard DeviceNet Bus interface | – | – | – | – |
| | EDM function | ■ | ■ | ■ | ■ |
| | Interlock function | ■ | ■ | ■ | ■ |
| | Logical 'AND' connection | – | – | ■ | ■ |
| | Relay expansion units | ■ | – | – | ■ |
| | Housing | Plastic | Plastic | Plastic | Plastic |
| | Operating temperature | –25 to 55°C | –25 to 55°C | –10 to 55°C | –10 to 55°C |
| | Flux-tight | – | – | – | – |
| | Number of poles | – | – | – | – |
| Features | Gold clad contacts | – | – | – | – |
| | Relay socket | – | – | – | – |
| | Detachable cage clamp terminals | – | – | ■ | ■ |
| | Screw terminals | ■ | ■ | optional | ■ |
| | Safe timing functions | ■ | – | on-delay and off-delay | ■ |
| | USB-interface | – | – | – | – |
| | Programming software | – | – | – | – |
| Application | E-Stop application | ■ | ■ | ■ | ■ |
| | Door switch monitoring | ■ | ■ | ■ | ■ |
| | Safety light curtain monitoring | ■ | ■ | ■ | ■ |
| | EDM monitoring | ■ | ■ | ■ | ■ |
| | Interlock function | ■ | ■ | ■ | ■ |
| | Logic function blocks | – | – | ■ | – |
| | Safe ON delay timer | – | – | ■ | – |
| | Safe OFF delay timer | ■ | – | ■ | ■ |
| | Two-Hand control | ■ | – | ■ | – |
| | Manual/ automatic reset | ■ | ■ | ■ | ■ |
| | Non-contact switches monitoring | – | – | ■ | ■ |
| | Guard switching/ enabling function | – | – | ■ | ■ |
| | limited speed monitoring | – | – | – | ■ |
| | standstill monitoring | – | – | – | ■ |
| | General safety application | ■ | ■ | ■ | ■ |
| Supply voltage | 24 VDC | ■ | ■ | ■ | ■ |
| | 100 VAC to 240 VAC | ■ | – | – | – |
| In- and outputs | Safety inputs | ■ | ■ | ■ | ■ |
| | Test signal output | – | – | ■ | ■ |
| | Solid state safety outputs | – | – | ■ | ■ |
| | Safety relay outputs | 3PST-NO, 5PST-NO | DPST-NO, 3PST-NO | DPST-NO, 3PST-NO | ■ |
| | Auxiliary outputs | SPST-NC | SPST-NC | Solid state, SPST-NO | ■ |
| | 4PST-NO + DPST-NC | – | – | – | – |
| | 3PST-NO + 3PST-NC | – | – | – | – |
| | 3PST-NO + SPST-NC | – | – | – | – |
| | DPST-NO + DPST-NC | – | – | – | – |
| | 5PST-NO + SPST-NC | – | – | – | – |
| | Page/Quick Link | 496 | 497 | 498 | 499 |

| | | Safety relays | | Programmable safety system | | |
|---|---|---|---|---|---|---|
| | |  |  |  |  |  |
| **Model** | | **G7SA** | **G7S-_-E** | **G9SP** | **NE1A-SCPU0_** | **DST1** |
| Selection criteria | Performance level | – | – | up to PLe acc. EN ISO 13849-1 depending on application | | |
| | Safety integrity level (IEC 61508) | – | – | SIL 3 | | |
| | Reaction time | – | – | dependent on safety application program | | |
| | DeviceNet safety Bus interface | – | – | – | ■ | ■ |
| | Standard DeviceNet Bus interface | – | – | Diagnosis via Ethernet and Serial interface (option) | ■ | ■ |
| | EDM function | – | – | ■ | ■ | ■ |
| | Interlock function | – | – | ■ | ■ | ■ |
| | Logical 'AND' connection | – | – | – | – | – |
| | Relay expansion units | – | – | – | – | – |
| | Housing | Plastic | Plastic | Plastic | Plastic | Plastic |
| | Operating temperature | –40 to 85°C | –25 to 70°C | –10 to 55°C | –10 to 55°C | –10 to 55°C |
| | Flux-tight | ■ | ■ | – | – | – |
| | Number of poles | 4 pole and 6 pole | 6 pole | – | – | – |
| Features | Gold clad contacts | ■ | – | – | – | – |
| | Relay socket | ■ | ■ | – | – | – |
| | Detachable cage clamp terminals | – | – | – | ■ | ■ |
| | Screw terminals | – | – | ■ | – | – |
| | Safe timing functions | – | – | ■ | ■ | ■ |
| | USB-interface | – | – | ■ | ■ | – |
| | Programming software | – | – | ■ | ■ | – |
| Application | E-Stop application | – | – | ■ | ■ | ■ |
| | Door switch monitoring | – | – | ■ | ■ | ■ |
| | Safety light curtain monitoring | – | – | ■ | ■ | ■ |
| | EDM monitoring | – | – | ■ | ■ | ■ |
| | Interlock function | – | – | ■ | ■ | ■ |
| | Logic function blocks | – | – | ■ | ■ | ■ |
| | Safe ON delay timer | – | – | ■ | ■ | ■ |
| | Safe OFF delay timer | – | – | ■ | ■ | ■ |
| | Two-Hand control | – | – | ■ | ■ | ■ |
| | Manual/ automatic reset | – | – | ■ | ■ | ■ |
| | Non-contact switches monitoring | – | – | ■ | ■ | ■ |
| | Guard switching/ enabling function | – | – | ■ | ■ | ■ |
| | limited speed monitoring | – | – | – | – | ■ |
| | standstill monitoring | – | – | – | – | ■ |
| | General safety application | ■ | ■ | ■ | ■ | ■ |
| Supply voltage | 24 VDC | ■ | ■ | ■ | ■ | ■ |
| | 100 VAC to 240 VAC | – | – | – | – | – |
| In- and outputs | Safety inputs | – | – | ■ | ■ | ■ |
| | Test signal output | – | – | ■ | ■ | ■ |
| | Solid state safety outputs | – | – | ■ | ■ | ■ |
| | Safety relay outputs | – | – | – | – | ■ |
| | Auxiliary outputs | – | – | ■ | ■ | ■ |
| | 4PST-NO + DPST-NC | ■ | ■ | – | – | – |
| | 3PST-NO + 3PST-NC | ■ | ■ | – | – | – |
| | 3PST-NO + SPST-NC | ■ | – | – | – | – |
| | DPST-NO + DPST-NC | ■ | – | – | – | – |
| | 5PST-NO + SPST-NC | ■ | – | – | – | – |
| | Page/Quick Link | 505 | 506 | 507 | S322 | S324, S325, S326 |

■ Standard – No/not available

## Expandable safety relay unit

G9SA-family offers a complete line-up of compact and expandable safety relay units. Modules with safe OFF-delay timing are available as well as a two-hand controller. Simple multiplication of safety contacts is possible by using the connection on the front.

- 45 mm-wide housing, expansion units are 17.5 mm wide
- Safe OFF-delay timer
- Simple expansion connection
- Certification up to PLe according to EN ISO 13849-1 depending on the application

## Ordering information

### Emergency-stop units

| Main contacts | Auxiliary contact | Number of input channels | Rated voltage | Order code |
|---|---|---|---|---|
| 3PST-NO | SPST-NC | 1 channel or 2 channels possible | 24 VAC/VDC | G9SA-301 |
| | | | 100 to 240 VAC | |
| 5PST-NO | SPST-NC | 1 channel or 2 channels possible | 24 VAC/VDC | G9SA-501 |
| | | | 100 to 240 VAC | |

### Emergency-stop OFF-delay units

| Main contacts | OFF-delay contacts | Auxiliary contact | Number of input channels | OFF-delay time | Rated voltage | Order code |
|---|---|---|---|---|---|---|
| 3PST-NO | DPST-NO | SPST-NC | 1 channel or 2 channels possible | 7.5 s | 24 VAC/VDC | G9SA-321-T075 |
| | | | | | 100 to 240 VAC | |
| | | | | 15 s | 24 VAC/VDC | G9SA-321-T15 |
| | | | | | 100 to 240 VAC | |
| | | | | 30 s | 24 VAC/VDC | G9SA-321-T30 |
| | | | | | 100 to 240 VAC | |

### Two-hand controller

| Main contacts | Auxiliary contact | Number of input channels | Rated voltage | Order code |
|---|---|---|---|---|
| 3PST-NO | SPST-NC | 2 channels | 24 VAC/VDC | G9SA-TH301 |
| | | | 100 to 240 VAC | |

### Expansion unit

The expansion unit connects to a G9SA-301, G9SA-501, G9SA-321, or G9SA-TH301.

| Main contacts | Auxiliary contact | Category | Order code |
|---|---|---|---|
| 3PST-NO | SPST-NC | 4 | G9SA-EX301 |

### Expansion units with OFF-delay outputs

The expansion unit connects to a G9SA-301, G9SA-501, G9SA-321, or G9SA-TH301.

| Main contact form | Auxiliary contact | OFF-delay time | Order code |
|---|---|---|---|
| 3PST-NO | SPST-NC | 7.5 s | G9SA-EX031-T075 |
| | | 15 s | G9SA-EX031-T15 |
| | | 30 s | G9SA-EX031-T30 |

## Specifications

### Power input

| Item | G9SA-301/TH301 / G9SA-501 / G9SA-321-T_ |
|---|---|
| Power supply voltage | 24 VAC/VDC: 24 VAC, 50/60 Hz, or 24 VDC<br>100 to 240 VAC:100 to 240 VAC, 50/60 Hz |
| Operating voltage range | 85 to 110% of rated power supply voltage |

### Inputs

| Item | G9SA-301/321-T_/TH301 | G9SA-501 |
|---|---|---|
| Input current | 40 mA max. | 60 mA max. |

### Contacts

| Item | G9SA-301/501/321-T_/TH301/EX301/EX031-T_ |
|---|---|
| | Resistive load (cosϕ= 1) |
| Rated load | 250 VAC, 5 A |
| Rated carry current | 5 A |

### Characteristics

| Item | | G9SA-301/TH301 / G9SA-501/321-T_ / G9SA-EX301/EX031-T_ |
|---|---|---|
| Operating time | | 30 ms max. (not including bounce time) |
| Response time *1 | | 10 ms max. (not including bounce time) |
| Durability | Mechanical | 5,000,000 operations min. (at approx. 7,200 operations/hr) |
| | Electrical | 100,000 operations min. (at approx. 1,800 operations/hr) |
| Minimum permissible load (reference value) | | 5 VDC, 1 mA |
| Ambient temperature | | Operating: –25 to 55°C (with no icing or condensation)<br>Storage: –25 to 85°C (with no icing or condensation) |

*1 The response time is the time it takes for the main contact to open after the input is turned OFF.

## Slim-size safety unit

G9SB is a family of slender safety relay units, providing two safety contacts in a 17.5 mm- and three safety contacts in a 22.5mm-wide housing.

- 17.5 mm- and 22.5 mm-wide housing
- 1- and 2-input channel units
- Manual and automatic reset units
- Certification up to PLe according to EN ISO 13849-1 depending on the application

## Ordering information

| Main contacts | Auxiliary contact | Number of input channels | Reset mode | Input type | Rated voltage | Size (H×W×D) | Order code |
|---|---|---|---|---|---|---|---|
| DPST-NO 2 safety contacts | None | 2 channels | Auto-reset | Inverse | 24 VAC/VDC | 100 mm × 17.5 mm × 112 mm | G9SB-2002-A |
| | | 1 channel or 2 channels | | + common | | | G9SB-200-B |
| | | 2 channels | Manual-reset | Inverse | | | G9SB-2002-C |
| | | 1 channel or 2 channels | | + common | | | G9SB-200-D |
| 3PST-NO 3 safety contacts | SPST-NC | None (direct breaking) | Auto-reset | – | 24 VDC | 100 mm × 17.5 mm × 112 mm | G9SB-3010 |
| | | 2 channels | | Inverse | 24 VAC/VDC | 100 mm × 22.5 mm × 112 mm | G9SB-3012-A |
| | | 1 channel or 2 channels | | + common | | | G9SB-301-B |
| | | 2 channels | Manual-reset | Inverse | | | G9SB-3012-C |
| | | 1 channel or 2 channels | | + common | | | G9SB-301-D |

## Specifications

### Power input

| Item | G9SB-200_-_ | G9SB-3010 | G9SB-301_-_ |
|---|---|---|---|
| Power supply voltage | 24 VAC/VDC: 24 VAC, 50/60 Hz, or 24VDC<br>24 VDC: 24 VDC | | |
| Operating voltage range | 85 to 110% of rated power supply voltage | | |
| Power consumption | 1.4 VA/1.4 W max. | 1.7 W max. | 1.7 VA/1.7 W max. |

### Inputs

| Item | G9SB-200_-_ | G9SB-3010 | G9SB-301_-_ |
|---|---|---|---|
| Input current | 25 mA max. | 60 mA max. (See note.) | 30 mA max. |

**Note:** Indicates the current between terminals A1 and A2.

### Contacts

| Item | G9SB-200_-_ | G9SB-3010 | G9SB-301_-_ |
|---|---|---|---|
| | Resistive load (cosϕ= 1) | | |
| Rated load | 250 VAC, 5 A | | |
| Rated carry current | 5 A | | |

### Characteristics

| Item | | G9SB-200_-_ | G9SB-3010 | G9SB-301_-_ |
|---|---|---|---|---|
| Response time *1 | | 10 ms max. | | |
| Durability | Mechanical | 5,000,000 operations min. (at approx. 7,200 operations/hr) | | |
| | Electrical | 100,000 operations min. (at approx. 1,800 operations/hr) | | |
| Minimum permissable load (reference value) | | 5 VDC, 1 mA | | |
| Ambient operating temperature | | –25°C +55°C (with no icing or condensation) | | |

*1 The response time is the time it takes for the main contact to open after the input is turned OFF.

## Compact safety relay unit family

G9SR family modules operate standalone and as a system with input and output extension. All modules are simple to set up using DIP-switches and provide clear diagnosis via LEDs on the front.

- Three modules for all safety relay unit applications
- Solid-state outputs for long life and high current safety relay outputs
- Detailed LED indications enable easy diagnosis
- Safe on- and off-delay function up to PLe
- Up to PLe according to EN ISO 13949-1 and SIL 3 according to EN 61508

## Ordering information

### Advanced unit

| Safety outputs | Auxiliary outputs | No. of input channels | Rated voltage | Terminal block type | Order code |
|---|---|---|---|---|---|
| Instantaneous | | | | | |
| 2 PST-NO (contact) | 1 PNP transistor outputs | 1 or 2 channels | 24 VDC | removable cage clamp terminals | G9SR-AD201-RC |

### Basic unit

| Safety outputs | Auxiliary outputs | No. of input channels | Rated voltage | Terminal block type | Order code |
|---|---|---|---|---|---|
| Instantaneous | | | | | |
| 2 P channel MOS FET transistor output | 1 PNP transistor output | 1 or 2 channels | 24 VDC | removable cage clamp terminals | G9SR-BC201-RC |

### Expansion unit

| Safety outputs | | Auxiliary outputs | Rated voltage | Terminal block type | Order code |
|---|---|---|---|---|---|
| Instantaneous | ON/OFF-delayed | | | | |
| – | 3 PST-NO (contact)*1 | 1 (solid state) PNP transistor outputs | 24 VDC | removable cage clamp terminals | G9SR-EX031-T90-RC |

*1 The ON/OFF delay time can be set in 16 steps as follows: 0/0.1/0.2/0.5/1/1.5/2/2.5/5/10/20/30/45/60/75/90 s

## Specifications

### Power input

| Item | G9SR-AD_ | G9SR-BC_ | G9SR-EX_ |
|---|---|---|---|
| Rated supply voltage | 19.2 to 28.8 VDC (24 VDC ±20%) | | |

### Inputs

| Item | G9SR-AD_ | G9SR-BC_ | G9SR-EX_ |
|---|---|---|---|
| Safety input | Operating voltage: 19.2 VDC to 28.8 VDC, internal impedance: Approx. 3 kΩ | | |
| Feedback/reset input | | | |

### Outputs

| Item | G9SR-BC_ | G9SR-AD_ | G9SR-EX_ |
|---|---|---|---|
| Instantaneous safety output | P channel MOS FET transistor output<br>Load current (Using 2 outputs): 2 A DC max. | – | |
| Auxiliary output | PNP transistor output<br>Load current: 500 mA max. | | |
| Rated load | – | 250 VAC, 5 A AC15 (inductive load) | |
| Rated carry current | – | 5 A | |
| Maximum switching voltage | – | 250 VAC | |

### Characteristics

| Item | | G9SR-BC_ | G9SR-AD_ | G9SR-EX_ |
|---|---|---|---|---|
| Operating time (OFF to ON) | | 150 ms max. | | |
| Response time (ON to OFF) | | 50 ms max. | | |
| Durability | Electrical | – | 100,000 cycles min. | |
| | Mechanical | – | 10,000,000 cycles min. | |
| Ambient temperature | | –10 to 55°C (with no icing or condensation) | | |

## Flexible safety unit

G9SX-family modules can be connected by a logical "AND" function to implement partial/global stopping of a machine. Solid-state outputs, detailed LED diagnosis and clever feedback signals help to keep maintenance easy. The line-up is completed by expansion units with safe timing functions.

- Clear and transparent segmentation of safety functions by use of unique "AND" connection
- Solid-state outputs for long life and relay outputs in extension box available
- Detailed LED indications enable easy diagnosis
- Clever feedback signals for easy maintenance
- PLe according to EN ISO 13849-1 and SIL 3 according to EN 61508

## Ordering information

### Advanced unit

| Safety outputs | | Auxiliary outputs | No. of input channels | Max. OFF-delay time *1 | Rated voltage | Terminal block type | Order code |
|---|---|---|---|---|---|---|---|
| Instantaneous | OFF-delayed | | | | | | |
| 3 P channel MOS-FET transistor output | 2 P channel MOS-FET transistor output | 2 PNP transistor outputs | 1 or 2 channels | 0 to 15 sec in 16 steps | 24 VDC | Screw terminals | G9SX-AD322-T15-RT |
| | | | | | | Cage clamp terminals | G9SX-AD322-T15-RC |
| 2 P channel MOS-FET transistor output | 2 P channel MOS-FET transistor output | 2 PNP transistor outputs | 1 or 2 channels | 0 to 150 sec in 16 steps | 24 VDC | Screw terminals | G9SX-AD-322-T150-RT |
| | | | | | | Cage clamp terminals | G9SX-AD-322-T150-RC |
| | | | | 0 to 15 sec in 16 steps | 24 VDC | Screw terminals | G9SX-ADA-222-T15-RT |
| | | | | | | Cage clamp terminals | G9SX-ADA-222-T15-RC |
| | | | | 0 to 150 sec in 16 steps | 24 VDC | Screw terminals | G9SX-ADA-222-T150-RT |
| | | | | | | Cage clamp terminals | G9SX-ADA-222-T150-RC |

*1 The OFF-delay time can be set in 16 steps as follows: T15: 0/0.2/0.3/0.4/0.5/0.6/0.7/1/1.5/2/3/4/5/7/10/15 s, T150: 0/10/20/30/40/50/60/70/80/90/100/110/120/130/140/150 s.

### Basic unit

| Safety outputs | | Auxiliary outputs | No. of input channels | Rated voltage | Terminal block type | Order code |
|---|---|---|---|---|---|---|
| Instantaneous | OFF-delayed | | | | | |
| 2 P channel MOS FET transistor output | – | 2 PNP transistor output | 1 or 2 channels | 24 VDC | Screw terminals | G9SX-BC202-RT |
| | | | | | Cage clamp terminals | G9SX-BC202-RC |

### Expansion unit

| Safety outputs | | Auxiliary outputs | OFF-delay time | Rated voltage | Terminal block type | Order code |
|---|---|---|---|---|---|---|
| Instantaneous | OFF-delayed | | | | | |
| 4 PST-NO (contact) | – | 2 (solid state) PNP transistor outputs | – | 24 VDC | Screw terminals | G9SX-EX401-RT |
| | | | | | Cage clamp terminals | G9SX-EX401-RC |
| – | 4 PST-NO (contact) | | Synchronized with G9S-X-AD - unit | | Screw terminals | G9SX-EX041-T-RT |
| | | | | | Cage clamp terminals | G9SX-EX041-T-RC |

## Specifications

### Power input

| Item | G9SX-AD_ | G9SX-BC202-_ | G9SX-EX-_ |
|---|---|---|---|
| Rated supply voltage | 20.4 to 26.4 VDC (24 VDC -15% +10%) | | |

### Inputs

| Item | G9SX-AD_ | G9SX-BC202-_ |
|---|---|---|
| Safety input | Operating voltage: 20.4 VDC to 26.4 VDC, internal impedance: Approx. 2.8 kΩ | |
| Feedback/reset input | | |

### Outputs

| Item | G9SX-AD_ | G9SX-BC202-_ |
|---|---|---|
| Instantaneous safety output<br>OFF-delayed safety output | P channel MOS FET transistor output<br>Load current:Using 2 outputs or less: 1 A DC max.<br>Using 3 outputs or more: 0.8 A DC max. | P channel MOS FET transistor output<br>Load current:Using 1 output: 1 A DC max.<br>Using 2 outputs: 0.8 A DC max. |
| Auxiliary output | PNP transistor output<br>Load current: 100 mA max. | |

### Expansion unit

| Item | G9SX-EX-_ |
|---|---|
| Rated load | 250 VAC, 3A/30 VDC, 3A (resistive load) |
| Rated carry current | 3 A |
| Maximum switching voltage | 250 VAC, 125 VDC |

### Characteristics

| Item | | G9SX-AD_ | G9SX-BC202-_ | G9SX-EX-_ |
|---|---|---|---|---|
| Operating time (OFF to ON state) | | 50 ms max. (Safety input: ON)<br>100 ms max. (Logical AND connection input: ON) | 50 ms max. (Safety input: ON) | 30 ms max. |
| Response time (ON to OFF state) | | 15 ms max. | | 10 ms max. |
| Durability | Electrical | – | | 100,000 cycles min. |
| | Mechanical | – | | 5,000,000 cycles min. |
| Ambient temperature | | –10°C +55°C (with no icing or condensation) | | |

## Safety guard switchting unit

The safety controller to support maintenance mode of machinery in the safe way.

- Two operation modes to support:
  - Auto switching for applications where machine and worker co-operate.
  - Manual switching for applications with limitation in operation like maintenance.
- Clear and transparent segmentation of safety functions by use of unique "AND" connection
- Clear LED diagnosis of all in- and output signals for easy maintenance
- PLe according to EN ISO 13849-1 and SIL 3 according to EN 61508.

## Ordering information

### Enabling grip switches

| Contact form | | | Order code |
|---|---|---|---|
| Enabling switch | Monitor switch | Pushbutton switch | |
| Two contacts | 1NC (grip output) | None | A4EG-C000041 |
| Two contacts | None | Emergency stop switch (2NC) | A4EG-BE2R041 |
| Two contacts | None | Momentary operation switch (2NO) | A4EG-BM2B041 |

### Safety guard switching units

| Safety outputs *1 | | Auxiliary outputs *2 | Logical AND connection input | Logical AND connection output | Max. OFF delay time *3 | Rated voltage | Terminal block type | Order code |
|---|---|---|---|---|---|---|---|---|
| Instantaneous | OFF-delayed *4 | | | | | | | |
| 2 (Semi-conductors) | 2 (Semi-conductors) | 6 (Semi-conductors) | 1 | 1 | 15 s | 24 VDC | Screw terminals | G9SX-GS226-T15-RT |
| | | | | | | | Spring-cage terminals | G9SX-GS226-T15-RC |

*1 P channel MOS FET transistor output
*2 PNP transistor output
*3 The OFF-delay time can be set in 16 steps as follows:
T15: 0, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 1, 1.5, 2, 3, 4, 5, 7, 10 or 15 s
*4 The OFF-delayed output becomes an instantaneous output by setting the OFF-delay time to 0 s.

## Specifications

### Ratings of guard switching unit

#### Power input

| Item | G9SX-GS226-T15-_ | G9SX-EX-_ |
|---|---|---|
| Rated supply voltage | 24 VDC | |

#### Inputs

| Item | G9SX-GS226-T15-_ |
|---|---|
| Safety input | Operating voltage: 20.4 VDC to 26.4 VDC, internal impedance: approx. 2.8 kΩ |
| Feedback/reset input | |
| Mode selector input | |

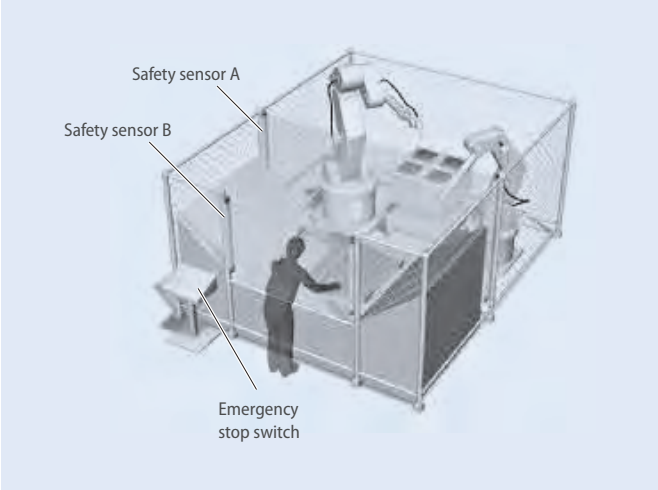
#### Outputs

| Item | G9SX-G9SX-GS226-T15-_ |
|---|---|
| Instantaneous safety output<br>OFF-delayed safety output | P channel MOS FET transistor output<br>Load current: 0.8 A DC max. |
| Auxiliary output | PNP transistor output<br>Load current: 100 mA max. |
| External indicator outputs | P channel MOS FET transistor outputs<br>Connectable indicators<br>• Incandescent lamp: 24 VDC, 3 W to 7 W<br>• LED lamp: 10 to 300 mA DC |

## Application example

### Automatic switching mode

Worker is loading and unloading the machine manually. When loading is finished, robot cycle is started manually by the worker. When robots return to their home position, loading cycle is selected automatically.
Loading condition: Safety sensor B is not active, safety sensor A is active because the robots are not allowed to move to the loading area while the worker loads the machine. So the worker is safe because safety sensor A is active.
Robot work condition: Safety sensor B is active, safety sensor A is not active because the worker is not allowed to move to the loading area when the robots work. So the worker is safe because safety sensor B stops the machine if he moves to the loading area.




### Manual switching mode

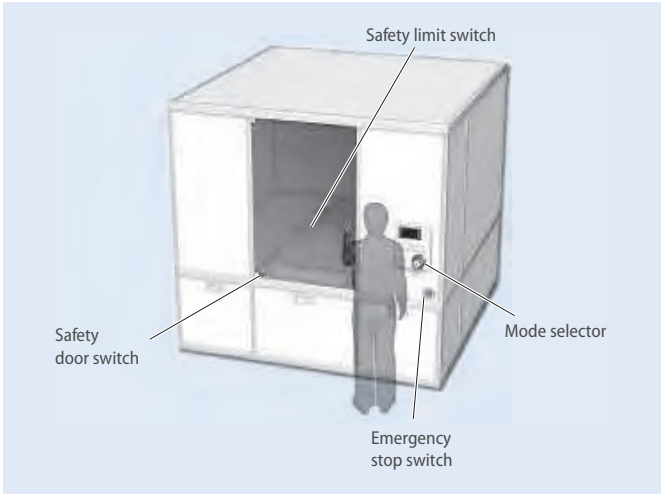
Worker has to do maintenance in this machine. While maintenance, it is necessary to move the machine in a limited way. The worker has to select automatic mode or manual mode manually by using the mode selector switch.

**Operation steps:**

1) Select maintenance mode by using the mode selector
2) Open the door to do the maintenance while the machine still is able to operate in a limited way (monitoring of limited movement by using the safety limit switch).
3) Close the cover after finishing maintenance
4) Select automatic mode by using the mode selector

**E-Stop conditions:**

a) open the door while not in maintenance mode
b) the machine actuates the limit switch (breaks the limit).
c) the Enabling grip switch A4EG is actuated to stop the machine in emergency condition.



## Limited speed monitoring unit

Safe limited speed monitoring unit for complete support of maintenance mode in machinery.

- Preset of limited speed frequency by using integrated preset switches
- Easy integration in G9SX-Systems by using unique logical "AND" connection
- Clear LED diagnosis of all in- and output signals for easy maintenance
- Applicable up to PLd according to EN ISO 13849-1 using Omron proximity sensors

## Ordering information

### Proximity sensors

| Classification | | | Order code |
|---|---|---|---|
| Proximity sensor | Shielded | M8 | E2E-X1R5F1 |
| | | M12 | E2E-X2F1 |
| | | M18 | E2E-X5F1 |
| | Unshielded | M8 | E2E-X2MF1 |
| | | M12 | E2E-X5MF1 |
| | | M18 | E2E-X10MF1 |

### Ratings of limited speed monitoring unit

| Safety outputs *1 Instantaneous | Auxiliary outputs *2 | Logical AND connection input | Rated voltage | Sensor power supply terminals | Terminal block type | Order code |
|---|---|---|---|---|---|---|
| 4 (Semi-conductors) | 4 (Semi-conductors) | 1 | 24 VDC | 2 | Screw terminals | G9SX-LM224-F10-RT |
| | | | | | Spring-cage terminals | G9SX-LM224-F10-RC |

*1 P channel MOS FET output
*2 PNP transistor output

## Specifications

### Ratings of limited speed monitoring unit

#### Power input

| Item | G9SX-LM224-F10-_ |
|---|---|
| Rated supply voltage | 24 VDC |

#### Inputs

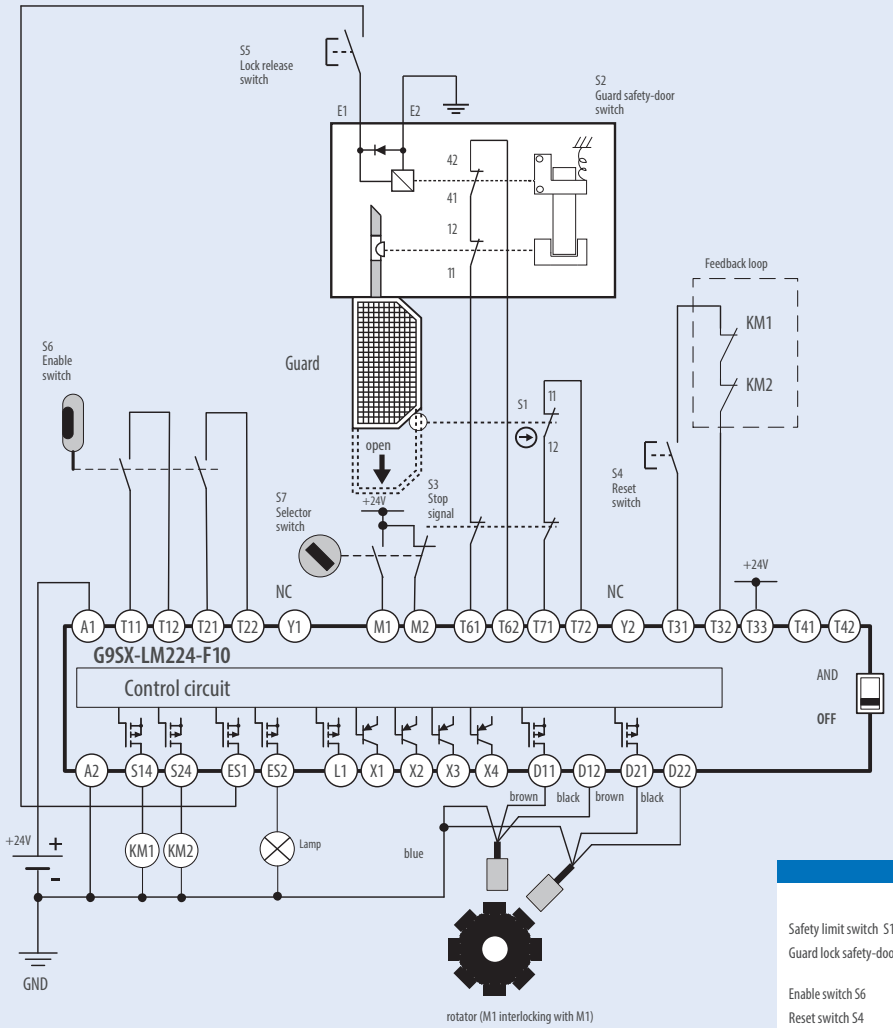
| Item | G9SX-LM224-F10-_ |
|---|---|
| Safety input | Operating voltage: 20.4 VDC to 26.4 VDC<br>Internal impedance: approx. 2.8 kΩ |
| Feedback/reset input | |
| Mode selector input | |
| Rotation detection input | Operating voltage 20.4 VDC to 26.4 VDC<br>Internal impedance: approx. 2.8 kΩ<br>Input frequency: 1 kHz max. |

#### Outputs

| Item | G9SX-LM224-F10-_ |
|---|---|
| Safety solid state output | P channel MOS FET transistor output<br>Load current: 0.8 A DC max. |
| Safety speed detection output | P channel MOS FET transistor output<br>Load current: 0.3 A DC max. |
| External indicator output | PNP transistor output<br>Load current: 100 mA max. |

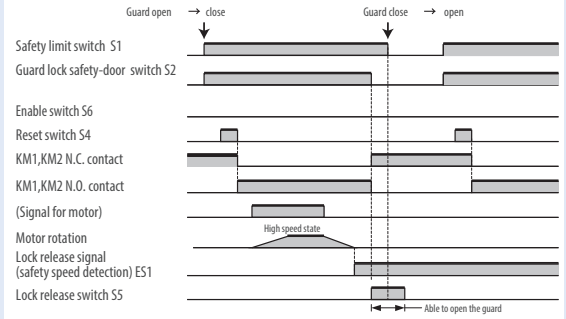
## Application example

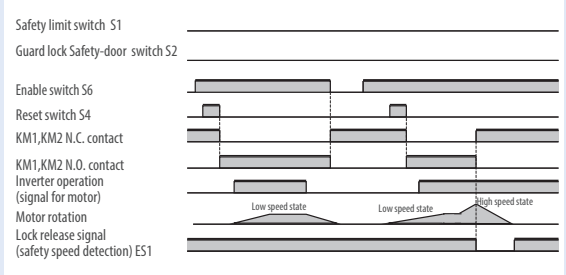
### Safe limited speed




| | |
|---|---|
| S1 | : Safety limit switch |
| S2 | :Guard lock safety-door switch |
| S3 | :Stop signal |
| S4 | :Reset switch |
| S5 | :Lock release switch |
| S6 | :Enable switch |
| S7 | :Selector switch |
| KM1, KM2 | :Contactor |
| M1 | :3-phase motor |

This example is corresponding to category 3 (EN954-1 or PL=d (EN ISO13849-1)



## Standstill monitoring unit

Safe standstill monitoring unit based on Back-EMF operation for two- and three-phase systems.

- Ready to use – covering all standard applications without additional setup
- Easy integration in star- and delta wiring
- Clear LED diagnosis of all in- and output signals for easy maintenance
- Applicable up to PLe according to EN ISO 13849-1

## Ordering information

### Safety standstill monitoring unit

| Safety outputs *1<br>Instantaneous | Auxiliary outputs *1 | Power input<br>Rated supply voltage | Terminal block type | Order code |
|---|---|---|---|---|
| 3 (Semi-conductors) | 2 (Semi-conductors) | 24 VDC | Screw terminals | G9SX-SM032-RT |
| | | | Spring-cage terminals | G9SX-SM032-RC |

*1 PNP transistor output

## Specifications

### Ratings of standstill monitoring unit

#### Power input

| Item | G9SX-SM032-_ |
|---|---|
| Rated supply voltage | 24 VDC |

#### Inputs

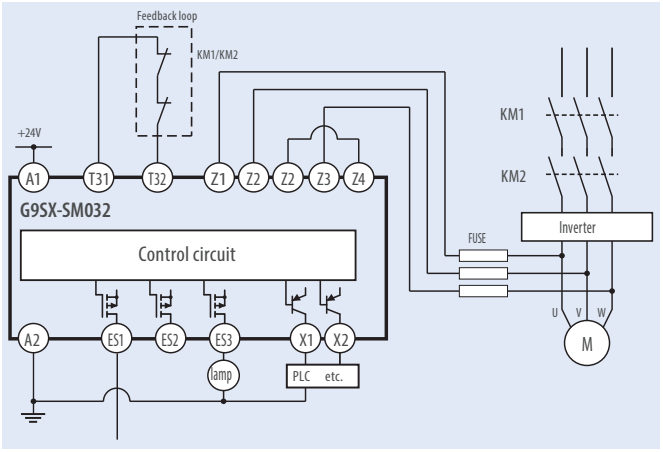
| Item | G9SX-SM032-__ |
|---|---|
| Input voltage | Standstill detection input (Z1-Z2/Z3-Z4) AC 415 Vrms + 10% max. |
| Maximum power supply frequency for AC induction motor | 60 Hz max. |
| Internal impedance | Standstill detection input: approx, 660 kΩ<br>EDM input: approx. 2.8 kΩ |

#### Outputs

| Item | G9SX-SM032-_ |
|---|---|
| Safety standstill detection output | Sourcing output (PNP)<br>Load current: 300 mA DC max. |
| Auxiliary output | Sourcing output (PNP)<br>Load current: 100 mA DC max. |

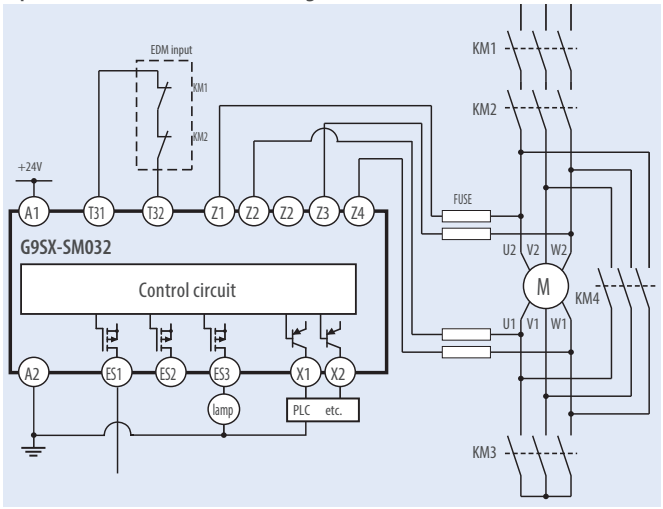
## Application example

### 3-phase motor




Standstill detected

### 3-phase motor with star-delta wiring




Standstill detected

## Relays with forcibly guided contacts

The slim G7SA relay family with forcibly guided contacts is available as a four- or six-pole type in various contact combinations and offers reinforced insulation. Terminals are arranged for easy PCB layout. It can be soldered directly to a PCB or used together with the P7SA sockets.

- Forcibly guided contacts
- Conforms to EN 50205
- 6 A at 240 VAC and 6A at 24 VDC for resistive loads
- Reinforced insulation between inputs and outputs and poles
- 4- and 6-pole relays available

## Ordering information

### Relays with forcibly guided contacts

| Type | Sealing | Poles | Contacts | Rated voltage | Order code |
|---|---|---|---|---|---|
| Standard | Flux-tight | 4 poles | 3PST-NO, SPST-NC | 24 VDC*1 | G7SA-3A1B |
| | | | DPST-NO, DPST-NC | | G7SA-2A2B |
| | | 6 poles | 5PST-NO, SPST-NC | | G7SA-5A1B |
| | | | 4PST-NO, DPST-NC | | G7SA-4A2B |
| | | | 3PST-NO, 3PST-NC | | G7SA-3A3B |

*1 12 VDC, 21 VDC, 48 VDC are available on request.

### Sockets

| Type | | LED indicator | Poles | Rated voltage | Order code |
|---|---|---|---|---|---|
| Track-mounting | Track mounting and screw mounting possible | Yes | 4 poles | 24 VDC | P7SA-10F-ND |
| | | | 6 poles | | P7SA-14F-ND |
| Back-mounting | PCB terminals | No | 4 poles | – | P7SA-10P |
| | | | 6 poles | | P7SA-14P |

## Specifications

### Coil

| Rated voltage | Rated current | Coil resistance | Must-operate voltage | Must-release voltage | Max. voltage | Power consumption |
|---|---|---|---|---|---|---|
| 24 VDC | 4 poles: 15 mA<br>6 poles: 20.8 mA | 4 poles: 1,600 Ω<br>6 poles: 1,152 Ω | 75% max. (V) | 10% min. (V) | 110% (V) | 4 poles: Approx. 360 mW<br>6 poles: Approx. 500 mW |

**Note:** Refer to datasheet for details

### Contacts

| Load | Resistive load (cosϕ = 1) |
|---|---|
| Rated load | 6 A at 250 VAC, 6 A at 30 VDC |
| Rated carry current | 6 A |
| Max. switching voltage | 250 VAC, 125 VDC |

| Load | Resistive load (cosϕ = 1) |
|---|---|
| Max. switching current | 6 A |
| Max. switching capacity (reference value) | 1,500 VA, 180 W |

### Relays with forcibly guided contacts

| | | |
|---|---|---|
| Contact resistance | | 100 mΩ max. (The contact resistance was measured with 1 A at 5 VDC using the voltage-drop method.) |
| Operating time *1 | | 20 ms max. |
| Response time *1 | | 10 ms max.<br>(The response time is the time it takes for the normally open contacts to open after the coil voltage is turned OFF.) |
| Release time *1 | | 20 ms max. |
| Insulation resistance | | 100 MΩ min. (at 500 VDC) (The insulation resistance was measured with a 500 VDC megger at the same places that the dielectric strength was measured.) |
| Dielectric strength *2 *3 | | Between coil contacts/different poles: 4,000 VAC, 50/60 Hz for 1 min<br>(2,500 VAC between poles 3-4 in 4-pole Relays or poles 3-5, 4-6, and 5-6 in 6-pole Relays.)<br>Between contacts of same polarity: 1,500 VAC, 50/60 Hz for 1 min |
| Durability | Mechanical | 10,000,000 operations min. (at approx. 36,000 operations/hr) |
| | Electrical | 100,000 operations min. (at the rated load and approx. 1,800 operations/hr) |
| Min. permissible load *4 | | 5 VDC, 1 mA (reference value) |
| Ambient temperature *5 | | Operating: –40 to 85°C (with no icing or condensation) |
| Ambient humidity | | Operating: 35 to 85% |
| Approved standards | | EN61810-1 (IEC61810-1), EN50205, UL508, CSA22.2 No. 14 |

*1 These times were measured at the rated voltage and an ambient temperature of 23°C. Contact bounce time is not included.
*2 Pole 3 refers to terminals 31-32 or 33-34, pole 4 refers to terminals 43-44, pole 5 refers to terminals 53-54, and pole 6 refers to terminals 63-64.
*3 When using a P7SA socket, the dielectric strength between coil contacts/different poles is 2,500 VAC, 50/60 Hz for 1 min.
*4 Min. permissible load is for a switching frequency of 300 operations/min.
*5 When operating at a temperature between 70°C and 85°C, reduce the rated carry current (6 A at 70°C or less) by 0.1 A for each degree above 70°C.

**Note:** The values listed above are initial values.

Please check Omron in the Internet for updated information on product reliability data and the SISTEMA libraries: http://industrial.omron.eu/safety

## Relays with forcibly guided contacts

The slim G7S-_-E relay family with forcibly guided contacts is available as a six-pole type in two different contact combinations. Terminals are arranged for easy PCB layout. It can be soldered directly to a PCB or used together with the P7SA sockets.

- Forcibly guided contacts
- Conforms to EN 50205
- NO contacts: 10 A at 250 VAC and 10 A at 30 VDC
  NC contacts: 6 A at 250 VAC and 6 A at 30 VDC
  (for resistive loads)
- Reinforced insulation between inputs and outputs and poles
- 4- and 6-pole relays available

## Ordering information

### Relays with forcibly guided contacts

| Type | Sealing | Poles | Contacts | Rated voltage | Order code |
|---|---|---|---|---|---|
| Standard | Flux-tight | 6 poles | 4PST-NO, DPST-NC | 24 VDC | G7S-4A2B-E |
| | | | 3PST-NO, 3PST-NC | | G7S-3A3B-E |

### Sockets

| Type | | LED indicator | Rated voltage | Order code |
|---|---|---|---|---|
| Track-mounting | Track mounting and screw mounting possible | Yes | 24 VDC | P7S-14F-END |
| Back-mounting | PCB terminals | No | – | P7S-14P-E |

## Specifications

### Ratings

#### Coil

| Rated voltage | Rated current (mA)*1 | Coil resistance (Ω)*1 | Max. voltage (V)*2 | Power consumption (W) |
|---|---|---|---|---|
| 24 VDC | 30 | 800 | 110% | Approx. 0.8 |

*1 The rated current and coil resistance are measured at a coil temperature of 23°C with tolerances of ±15%.
*2 The maximum voltage is based on an ambient operating temperature of 23°C maximum.

#### Contacts

| Item | | Resistive load |
|---|---|---|
| Rated load | NO contact | 10 A at 250 VAC, 10 A at 30 VDC |
| | NC contact | 6 A at 250 VAC, 6 A at 30 VDC |
| Rated carry current | NO contact | 10 A |
| | NC contact | 6 A |

| Item | | Resistive load |
|---|---|---|
| Maximum switching voltage | | 250 VAC, 30 VDC |
| Maximum switching current | NO contact | 10 A |
| | NC contact | 6 A |

### G7S-_-E Characteristics of Sockets

| Model | P7S-14F-END | P7S-14P-E |
|---|---|---|
| Continuous current | 10 A | |
| Dielectric strength | 2000 VAC for 1 min. between terminals | |
| Insulation resistance | 1000 MW min. *1 | |
| Ambient operating humidity | 25 to 85% | 5 to 85% |

*1 Measurement conditions: Measurement of the same points as for the dielectric strength at 500 VDC.

### Characteristics

| | | |
|---|---|---|
| Contact resistance*1 | | 100 mΩ max. |
| Operating time*2 | | 50 ms max. |
| Release time*2 | | 50 ms max. |
| Maximum operating frequency | Mechanical | 18,000 operations/h |
| | Rated load | 1,800 operations/h |
| Insulation resistance | | 100 MΩ min. |
| Durability*3 | Mechanical | 10,000,000 operations min. (at approx. 18,000 operations/h) |
| | Electrical | 100,000 operations min. (at the rated load and approx. 1,800 operations/h) |
| Inductive load switching capability*4 (IEC60947-5-1) | NO Contact | AC15 AC240V 5A, DC13 DC24V 2A |
| | NC Contact | AC15 AC240V 3A, DC13 DC24V 2A |
| Ambient operating temperature | | –25 to 70°C (with no icing or condensation) |
| Ambient operating humidity | | 5% to 85% |

*1 Measurement conditions: 5 VDC, 10 mA, voltage drop method.
*2 Measurement conditions: Rated voltage operation, ambient operating temperature: 23°C, contact bounce time is not included.
*3 The durability is for an ambient temperature of 15 to 35°C and an ambient humidity of 25% to 75%.
*4 AC15: cosϕ = 0.3, DC13: L/R = 96-ms

**Note:** The values listed above are initial values.

Please check Omron in the Internet for updated information on product reliability data and the SISTEMA libraries: http://industrial.omron.eu/safety

## Standalone safety controller

The G9SP safety controller provides all local safety based in- and outputs and controls the safety application.

- Three CPU-types to suit different applications
- Clear diagnosis and monitring via Ethernet or serial connection
- Memory cassette for easy duplication of configuration
- Unique programming software to support easy design, verfication, standardization and reusage of the program.
- Certified according to PLe (EN ISO 13849-1) and SIL 3 (IEC 61508)

## Ordering information

| Appearance | Appearance description | Order code |
|---|---|---|
| Standalone safety controller | 10 PNP safety inputs<br>4 PNP safety outputs<br>4 test outputs<br>4 PNP standard outputs | G9SP-N10S |
| | 10 PNP safety inputs<br>16 PNP safety outputs<br>6 test outputs | G9SP-N10D |
| | 20 PNP safety inputs<br>8 PNP safety outputs<br>6 test outputs | G9SP-N20S |

### Software

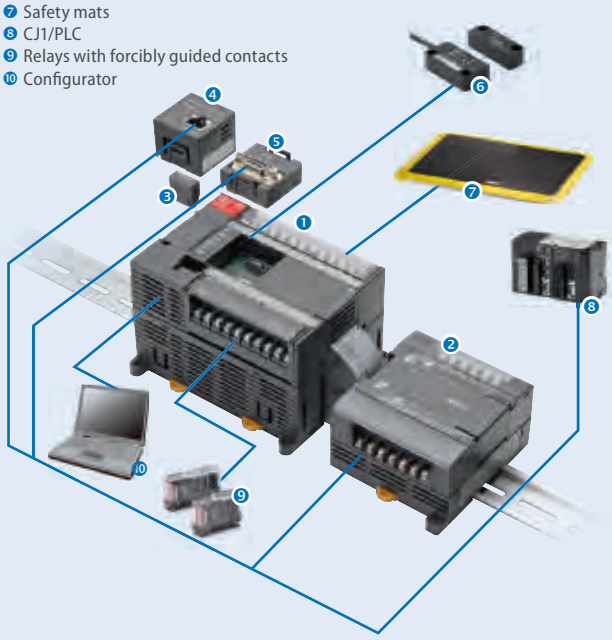
| Appearance | Media | Applicable OS | Order code |
|---|---|---|---|
| G9SP configurator | Setup disk 1 license | Windows 2000<br>Windows XP<br>Windows Vista<br>Windows 7 | WS02-G9SP01-V1 |
| | Setup disk 10 licenses | | WS02-G9SP10-V1 |
| | Setup disk 50 licenses | | WS02-G9SP50-V1 |
| | Setup disk Site license | | WS02-G9SPXX-V1 |

### Expansion units (standard I/O)

| Appearance | Type | Number of I/O | | Model |
|---|---|---|---|---|
| | | In | Out | |
| Expansion I/O unit | Sinking | 12 | 8 (solid state) | CP1W-20EDT |
| | Sourcing | 12 | 8 (solid state) | CP1W-20EDT1 |
| | Sinking | – | 32 (solid state) | CP1W-32ET |
| | Sourcing | – | 32 (solid state) | CP1W-32ET1 |
| I/O Connecting cable, 80 cm long | | | | CP1W-CN811 |

### G9SP configuration

❶ Safety controller G9SP
❷ Expansion I/O Units
❸ Memory cassette
❹ Ethernet option board
❺ RS-232C option board
❻ Compact non-contact door switch
❼ Safety mats
❽ CJ1/PLC
❾ Relays with forcibly guided contacts
❿ Configurator




### Option units

| Appearance | Order code |
|---|---|
| RS-232 option board | CP1W-CIF01 |
| Ethernet option board (Ver. 2.0 or later) | CP1W-CIF41 |
| Memory cassette | CP1W-ME05M |
| G9SP Status Display Touchscreen with 1.8 m cable | 82614-0010 H-T40M-P |
| G9SP-N10S Display Kit (G9SP, Touchscreen, cable, CP1W-CIF01) | 82612-0010 G9SP-N10S-SDK |
| G9SP-N10D Display Kit (G9SP, Touchscreen, cable, CP1W-CIF01) | 82612-0020 G9SP-N10D-SDK |
| G9SP-N20S Display Kit (G9SP, Touchscreen, cable, CP1W-CIF01) | 82612-0030 G9SP-N20S-SDK |
| G9SP-N10S kit with EtherNet/IP module | 82608-0010 G9SP-N10S-EIP |
| G9SP-N10D kit with EtherNet/IP module | 82608-0020 G9SP-N10D-EIP |
| G9SP-N20S kit with EtherNet/IP module | 82608-0030 G9SP-N20S-EIP |

## Specifications

### General specifications

| | | |
|---|---|---|
| Power supply voltage | | 20.4 to 26.4 VDC (24 VDC -15% +10%) |
| Consumption current | G9SP-N10S | 400 mA (V1: 300 mA, V2: 100 mA) |
| | G9SP-N10D | 500 mA (V1: 300 mA, V2: 200 mA) |
| | G9SP-N20S | 500 mA (V1: 400 mA, V2: 100 mA) |
| Mounting method | | 35-mm DIN track |
| Ambient operating temperature | | 0°C to 55°C |
| Ambient storage temperature | | –20°C to 75°C |
| Degree of protection | | IP20 (IEC 60529) |

### Safety input specifications

| Input type | Sinking inputs (PNP) |
|---|---|
| ON voltage | 11 VDC min. between each input terminal and G1 |
| OFF voltage | 5 VDC max. between each input terminal and G1 |
| OFF current | 1 mA max. |
| Input current | 6 mA |

### Safety output specifications

| Output type | Sourcing outputs (PNP) |
|---|---|
| Rated output current | 0.8 A max. per output* |
| Residual voltage | 1.2 V max. between each output terminal and V2 |

### Test output specifications

| Output type | Sourcing outputs (PNP) |
|---|---|
| Rated output current | 0.3 A max. per output* |
| Residual voltage | 1.2 V max. between each output terminal and V1 |

### Standard output specifications (G9SP-N10S)

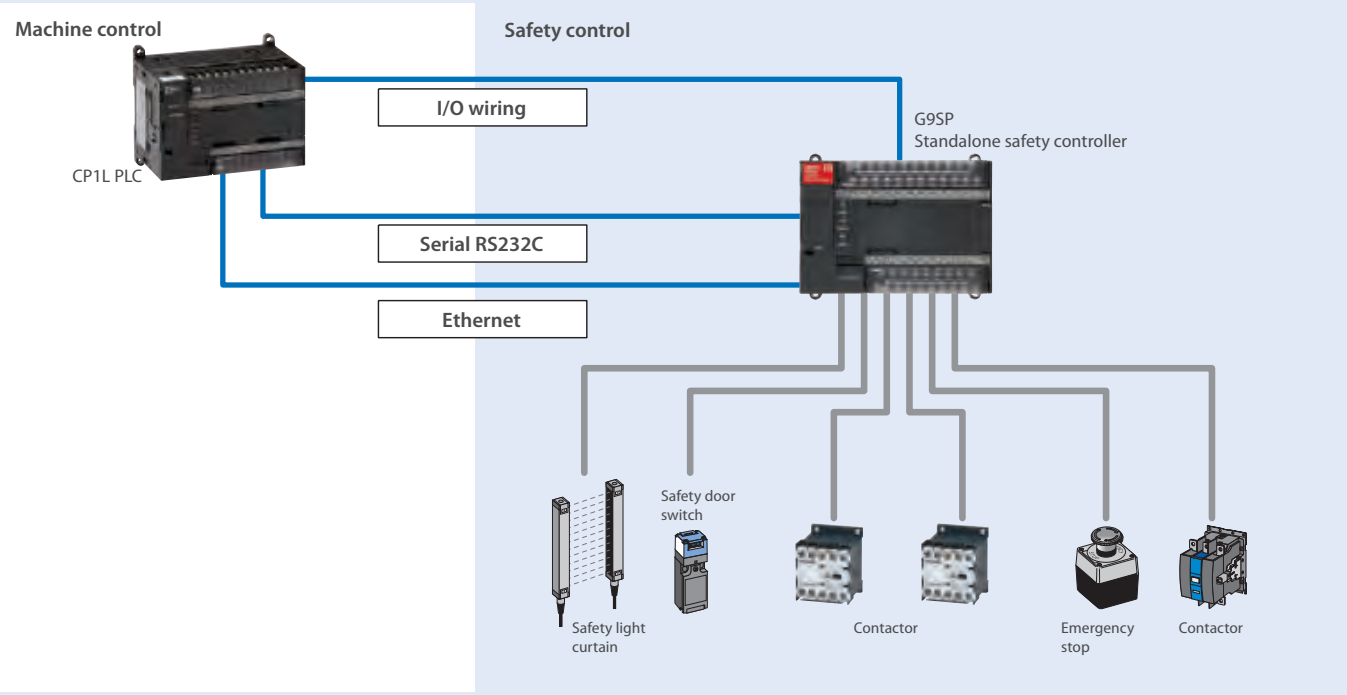
| Output type | Sourcing outputs (PNP) |
|---|---|
| ON Residual voltage | 1.5 V max. (between each output terminal and V2) |
| Rated output current | 100 mA max.* |

*For details on the rated output current, please refer to the user manual of G9SP.

### Control system integration

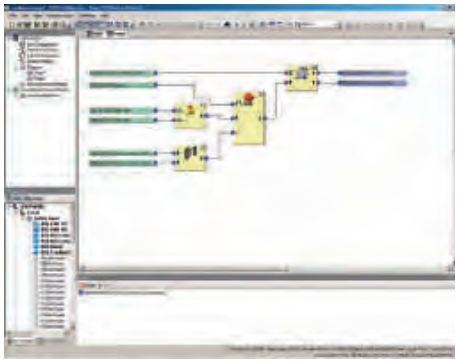
**Safety - I/O-status becomes transparent**

The standalone safety controller offers diagnosis information in 3 ways:
1) via parallel wiring
2) via serial RS232C interface (option)
3) via Ethernet interface (option).
Information of all safety in- and outputs on the standard control system ensure minimum downtime of the machine.

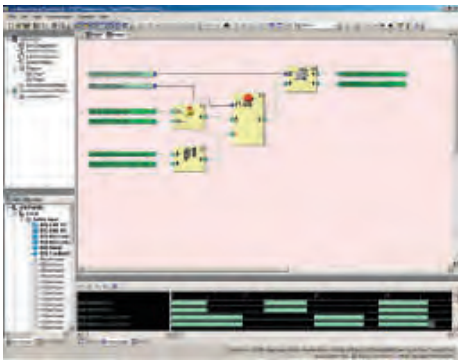


### G9SP configuration tool

Easy setup and configuration is provided by a setup wizard supporting the hardware selection.

**User-defined function blocks**
Approved configuration elements such as a tested door monitoring solution can be easily stored as a user defined function block and re-used in future projects. This minimises the time it takes to create a new system configuration.



**Integrated Simulator**
All functions can be tested and simulated in the Configuration Tool, so there's no unnecessary additional workload for the engineer. In addition, on-line diagnosis reduces debug time to a minimum during implementation in the machine control system.

**Knowledge-building**
Existing configurations are the basis for new projects. The G9SP Configuration Tool supports re-use of existing and proven know-how in safety control, as well as user-defined function blocks. Which means no more repetition of effort, instead a growing library of safety solutions.

# Control components

## Find information fast!

Quick Links shortens your search. Quick Links are unique codes assigned to Omron products listed in this guide. Enter Quick Link codes in the search box on industrial.omron.eu to access detailed information on products in this guide.

Content

# Control components

## Temperature controllers



## Power supplies



## Timers



## Counters



## Programmable relays



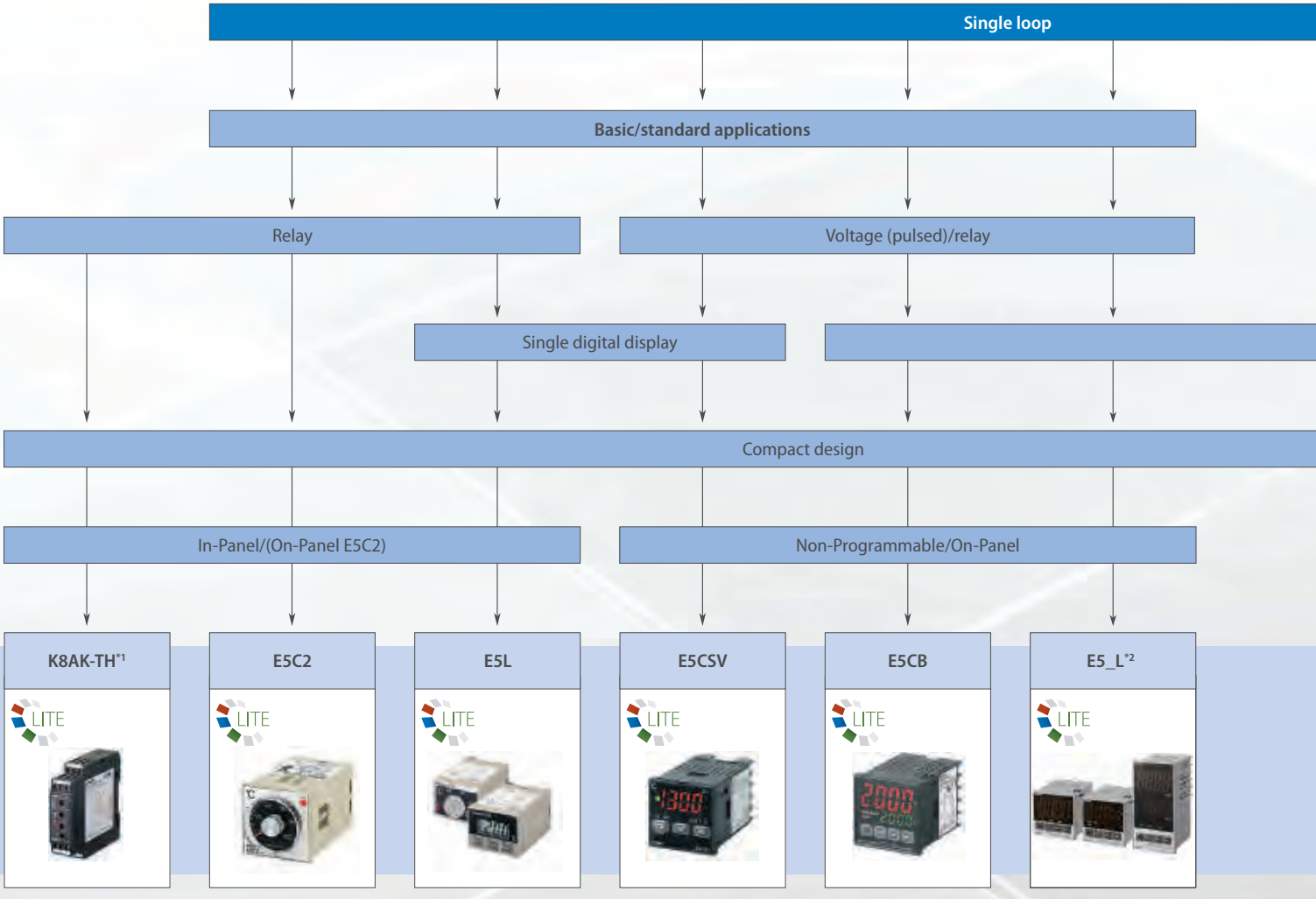
## Digital panel indicators

# E5_C – THE NEW STANDARD

## …in temperature control

Omron has been an active innovator in temperature control since introducing its first temperature controller in 1967. Now temperature control has taken a giant leap forward with Omron's next generation of controllers – the E_C, which set new global standards in the crucial areas of precision, user friendliness and control performance. The E_C series will save you time and effort in set-up and operation, while enabling faster and more accurate monitoring/control of your process. The high visibility display of the new series is also extremely easy to read and virtually eliminates any possibility for human error.

Always the latest news on:
**industrial.omron.eu/en/news/product-news**




R639
Page 661

M229
Page 517

M428

M227
Page 519

M426
Page 520

Please contact your local representative.

Multi-loop

Advanced

Voltage (pulsed)/relay/mA linear

Dual/triple digital display

Modular design

Non-/Programmable (T)/On-Panel (E5DC In-Panel)

Programmable/ In-Panel

**Temperature sensors**

applicable for all temperature controller

**E5_C/E5_C-T**

M425, M436
Page 521, 527

**E5_NH/E5_NH-T**

M225
Page 529

**E5_R/E5_R-T**

M424
Page 531

**CelciuX° (EJ1)**

M422
Page 533

**E52-E**

M433
Page 535

*1 Temperature limiter
*2 Only available in Africa, Middle East and Russia

# Selection table

| Category | | Analog temperature controller | Analog/digital temperature controller | Digital temperature controller | | |
|---|---|---|---|---|---|---|
| | |  |  |  |  |  |
| **Model** | | **E5C2** | **E5L-A/C** | **E5CSV** | **E5CB** | **E5_L** |
| Selection criteria | Type | Lite line | | | | |
| | Panel | On-panel/In-Panel | In-Panel | On-panel | | |
| | Loops | 1 | 1 | 1 | 1 | 1 |
| | Size | 1/16 DIN | 45 × 35 mm | 1/16 DIN | 1/16 DIN | 1/16, 1/32 DIN |
| Control mode | ON/OFF \| PID \| 2-PID[*1] | ■/P \| ■ \| – | ■ \| – \| – | ■ \| – \| ■ | ■ \| – \| ■ | ■ \| – \| ■ |
| | Operation[*2] | H/C | H/C | H/C | H/C | H/C |
| | Valve Control[*3] | – | – | – | – | – |
| Features | Accuracy | – | ±1°C | ±0.5% | ±0.5% | ±0.5% |
| | Auto-/Self-/Gradient-tuning | – \| – | – \| – | ■ \| ■ | ■ \| ■ \| – | ■ \| ■ \| – |
| | Transfer output | – | – | – | – | – |
| | Remote input | – | – | – | – | – |
| | Number of alarms | – | – | 1 | 1 | 1 |
| | Heater alarm | – | – | – | – | – |
| | IP rating front panel | IP40 | IP40 | IP66 | IP66 | IP50 |
| | Display | – | Analog (A)/3 digit (C) | Single 3.5 digit | Dual 4 digit | Dual 4 digit |
| Supply voltage | 110/240 VAC | ■ | ■ | ■ | ■ | ■ |
| | 24 VAC/VDC | – | – | □ | □ | – |
| Comms | RS-232 \| RS-485 | – \| – | – \| – | – \| – | – \| – | – \| – |
| | Event IP | – | – | – | – | – |
| | QLP port | – | – | – | ■[*4] | – |
| | DeviceNet | – | – | – | – | – |
| | Modbus | – | – | – | ■ | – |
| | PROFIBUS | – | – | – | – | – |
| | Modbus TCP | – | – | – | – | – |
| | ProfiNet | – | – | – | – | – |
| Control output | Relay \| SSR | – \| – | – \| – | ■ \| – | ■ \| – | ■ \| – |
| | Voltage (pulse) | – | – | ■ | ■ | ■ |
| | Linear voltage | – | – | – | – | – |
| | Linear current | – | – | – | – | – |
| Input type – linear | mA | – | – | – | – | – |
| | mV | – | – | – | – | – |
| | V | – | – | – | – | – |
| Input type – Thermocouple | K | ■ | – | ■ | ■ | ■ |
| | J | ■ | – | ■ | ■ | ■ |
| | T | – | – | ■ | ■ | ■ |
| | E | – | – | – | – | – |
| | L | – | – | ■ | – | – |
| | U | – | – | ■ | – | – |
| | N | – | – | ■ | – | – |
| | R | – | – | ■ | ■ | ■ |
| | S | – | – | – | ■ | ■ |
| | B | – | – | – | – | – |
| | W | – | – | – | – | – |
| | PLII | – | – | – | – | – |
| Input type – RTD | Pt100 \| JPt100 \| THE | ■ \| – \| ■ | – \| – \| ■[*5] | ■ \| ■ \| – | ■ \| – \| – | ■ \| – \| – |
| | Page/Quick Link | 517 | Please contact your local representative. | 519 | 520 | Please contact your local representative. |

[*1] 2-PID is Omron´s easy to use high performance PID algorithm
[*2] H = heat, H/C = heat or cool, H & C = heat and/or cool
[*3] Valve control = relay up and down
[*4] QLP: Quick Link Port to connected TC to PC using the smart USB cable E58-CIFQ2
[*5] SP sensor provided

| Digital temperature controller | Digital programmable temperature controller | Digital (programmable) temperature controller | | Digital temperature/ Gradient controller |
|---|---|---|---|---|
|  |  |  |  |  |
| **E5_C** | **E5_C-T** | **E5_NH/E5_NH-T** | **E5_R/E5_R-T** | **CelciuX° (EJ1/-G)** |
| Pro line | Pro$^{plus}$ (Lite) line – Programmable (T) | Pro$^{plus}$ line – Programmable (T) | | Pro line |
| On-panel/In-Panel | | On-panel | | In-panel |
| 1 | 1 | 1 | 2/4 | 2/4 |
| 1/4, 1/8, 1/16, 1/32, 22,5 mm | 1/4, 1/8, 1/16 DIN | 1/4, 1/8, 1/16 DIN | 1/4, 1/8 DIN | 31 × 95.5 × 109 mm |
| ■ \| – \| ■ | ■ \| – \| ■ | ■ \| – \| ■ | ■ \| – \| ■ | ■ \| – \| ■ |
| H & C | H & C | H & C | H & C | H & C |
| □ | □ | □ | □ | – |
| ±0.3% | ±0.3% | ±0.1% | ±0.1% | ±0.5% |
| ■ \| ■ \| – | ■ \| ■ \| – | ■ \| ■ \| – | ■ \| – \| – | ■ \| – \| ■ (only G) |
| □ | □ | □ | □ | □ (only EJ1) |
| □ | □ | □ | □ | □ |
| 0-4 | 3-4 | 2-3 | 2-3 | 2 |
| □*6 | □*6 | □*6 | □*6 | □ |
| IP66 | IP66 | IP66 | IP66 | IP20 |
| Dual/triple 4 digit | Dual/triple 4 digit | Dual/triple 5 digit | Triple 5 digit | – |
| ■ | ■ | ■ | ■ | – |
| □ | □ | □ | □ | 24 VDC |
| – \| □ | – \| □ | □ \| □ | – \| □ | ■ \| ■ |
| □ | □ | □ | □ | □ |
| ■*7 | ■*7 | ■*10 | ■*10 | ■ |
| – | – | – | □ | □ |
| ■ | ■ | ■ | ■ | ■ |
| □*8 | □*8 | □*8 | □*8 | □*8 |
| □*9 | □*9 | □*9 | □*9 | □*9 |
| □*9 | □*9 | □*9 | □*9 | □*9 |
| ■ \| – | ■ \| – | ■ \| ■ | ■ \| – | – \| – |
| ■ | ■ | ■ | ■ | ■ |
| – | – | ■ | – | – |
| ■ | ■ | ■ | ■ | ■ (only EJ1) |
| ■ | ■ | ■ | ■ | ■ |
| – | – | – | – | – |
| ■ | ■ | ■ | ■ | ■ |
| ■ | ■ | ■ | ■ | ■ |
| ■ | ■ | ■ | ■ | ■ |
| ■ | ■ | ■ | ■ | ■ |
| ■ | ■ | ■ | ■ | ■ |
| ■ | ■ | ■ | ■ | ■ |
| ■ | ■ | ■ | ■ | ■ |
| ■ | ■ | ■ | ■ | ■ |
| ■ | ■ | ■ | ■ | ■ |
| ■ | ■ | ■ | ■ | ■ |
| ■ | ■ | ■ | ■ | ■ |
| ■ | ■ | ■ | – | ■ |
| ■ \| ■ \| – | ■ \| ■ \| – | ■ \| ■ \| – | ■ \| – \| – | ■ \| ■ \| – |
| 521 | 527 | 529 | 531 | 533 |

*6 Heater alarm = heater burnout & SSR failure detection
*7 Quick link port using comm. cable E58-CIFQ2
*8 PROFIBUS-DP communication option via PRT1-SCU11
*9 EJ1N-HFU-ETN Serial gateway
*10 QLP: Quick Link Port to connected TC to PC using the smart USB cable E58-CIFQ1

## Easy-to-use, basic temperature controller with analog dial setting

Omron's basic ON/OFF or PD controller features an analog setting dial. This compact, low-cost controller has a setting accuracy of 2% of full scale. It incorporates a plug-in socket allowing for DIN-rail or flush mounting.

- Compact, cost-effective controller
- Control mode: ON/OFF or P
- Control output: relay
- Power supply: 100 to 240 VAC
- Thermocouple K: 0 to 1200°C, J: 0 to 400°C, Pt100: –50 to 400°C

## Ordering information

### Standard models (Power supply: 100 to 240 VAC)

| Input | | | Control method | On/OFF | Proportional (P) |
|---|---|---|---|---|---|
| | | | Output/Indication method | Relay/No indication | |
| Input/ standard scale (°C) | Thermocouple | K (CA) Chromel vs. Alumel | 0 to 200 °C | E5C2-R20K AC100-240 0-200 | E5C2-R40K AC100-240 0-200 |
| | | | 0 to 300 °C | – | E5C2-R40K AC100-240 0-300 |
| | | | 0 to 400 °C | E5C2-R20K AC100-240 0-400 | E5C2-R40K AC100-240 0-400 |
| | | | 0 to 600 °C | E5C2-R20K AC100-240 0-600 | E5C2-R40K AC100-240 0-600 |
| | | | 0 to 800 °C | E5C2-R20K AC100-240 0-800 | E5C2-R40K AC100-240 0-800 |
| | | | 0 to 1000 °C | E5C2-R20K AC100-240 0-1000 | – |
| | | | 0 to 1200 °C | E5C2-R20K AC100-240 0-1200 | – |
| | | J (IC) Iron versus Constantan | 0 to 200 °C | E5C2-R20J AC100-240 0-200 | – |
| | | | 0 to 300 °C | E5C2-R20J AC100-240 0-300 | – |
| | | | 0 to 400 °C | E5C2-R20J AC100-240 0-400 | – |
| | Resistance thermometer | Platinum resistance thermometer | –50 to 50 °C | E5C2-R20P-D AC100-240 -50-50 | – |
| | | | 0 to 50 °C | E5C2-R20P-D AC100-240 0-50 | – |
| | | | 0 to 100 °C | E5C2-R20P-D AC100-240 0-100 | – |
| | | | 0 to 200 °C | E5C2-R20P-D AC100-240 0-200 | – |
| | | | 0 to 300 °C | E5C2-R20P-D AC100-240 0-300 | – |
| | | | 0 to 400 °C | E5C2-R20P-D AC100-240 0-400 | – |
| | Thermistor | THE (replaceable element) | 0 to 100 °C | E5C2-R20G AC100-240 0-100 | – |
| | | | 100 to 200 °C | E5C2-R20G AC100-240 100-200 | – |
| | | | 150 to 300 °C | E5C2-R20G AC100-240 150-300 | – |

| Input ranges | Thermocouple *1 | | Platinum resistance thermometer | Thermistor *2 |
|---|---|---|---|---|
| | K (CA) chromel vs. alumel | J (IC) iron vs. constantan | Pt100 | THE |
| °C | 0 to 200 (5),<br>0 to 400 (10),<br>0 to 600 (20),<br>0 to 800 (20),<br>0 to 1,000 (25),<br>0 to 1,200 (25) | 0 to 200 (5),<br>0 to 300 (10),<br>0 to 400 (10) | –50 to 50 (2),<br>0 to 50 (1),<br>0 to 100 (2),<br>0 to 200 (5),<br>0 to 300 (10),<br>0 to 400 (10) | 0 to 100 (2) (6 kΩ at 0°C),<br>100 to 200 (2) (550 Ω @ 200°C)<br>150 to 300 (2) (4 kΩ @ 200°C) |

*1 Values in ( ) are the minimum unit.
*2 Values in ( ) are the thermistor resistive value.

### Accessories

| Functions | Order code |
|---|---|
| Front connecting socket with finger protection | P2CF-08-E |
| Back connecting socket (for flush mounting) | P3G-08 |
| Finger protection cover (for P3G-08) | Y92A-48G |
| Protective front cover (IP66) | Y92A-48B |

## Specifications

| | |
|---|---|
| **Supply voltage** | 100 to 240 VAC, 50/60 Hz |
| **Thermocouple input type** | K, J (with sensor break detection) |
| **RTD input type** | Pt100, THE |
| **Control mode** | ON/OFF or P control |
| **Setting method** | analog setting |
| **Output** | Relay, SPDT, 3 A at 250 VAC |
| **Life expectancy** | Electrical: 100,000 operations min. |
| **Setting accuracy** | ±2% FS max. |
| **Hysteresis** | Approx. 0.5% FS (fixed) |
| **Proportional band** | 3% FS (fixed) |
| **Reset range** | 5 ±1% FS min. |
| **Control period** | 20 s |
| **IP Rating front panel** | IP40 (IP66 cover available) |
| **IP rating terminals** | IP00 |
| **Ambient temperature** | –10 to 55°C |
| **Size in mm (HxWxD)** | 48×48×96 |

## The easy way to perfect temperature control

This multi-range 1/16 DIN controller with alarm function offers field-selectable PID control or ON/OFF control. The large, single display shows process value, direction of deviation from set point, output and alarm status.

- All setting fields configurable with switches
- Multi-input (Thermocouple/Pt100)
- Clearly visible 3.5 digit display with character height of 13.5 mm
- Control output: relay, voltage (for driving SSR)
- ON/OFF or 2-PID control with auto-tuning and self-tuning

## Ordering information

| Size in mm | Supply voltage | Number of alarm points | Control output | Order code |
|---|---|---|---|---|
| 1/16 DIN<br>48H×48W×78D | 100 to 240 VAC | 1 | Relay | E5CSV-R1T-500 |
| | | | Voltage (for driving SSR) | E5CSV-Q1T-500 |
| | 24 VAC/VDC | 1 | Relay | E5CSV-R1TD-500 |
| | | | Voltage (for driving SSR) | E5CSV-Q1TD-500 |

**Note:** Other models are available on request.

### Accessories

| Type | Order code |
|---|---|
| Hard protective cover | Y92A-48B |

## Specifications

| Item | | E5CSV |
|---|---|---|
| Supply voltage | | 100 to 240 VAC, 50/60 Hz or 24 VAC/VDC (depending on model) |
| Operating voltage range | | 85 to 110% of rated supply voltage |
| Power consumption | | 5 VA |
| Sensor input | | Multi-input (thermocouple/platinum resistance thermometer): K, J, L, T, U, N, R, Pt100, JPt100 |
| Control output | Relay output | SPST-NO, 250 VAC, 3 A (resistive load) |
| | Voltage output (for driving SSR) | 12 VDC, 21 mA (with short-circuit protection circuit) |
| Control method | | ON/OFF or 2-PID (with auto-tune and self-tune) |
| Alarm output | | SPST-NO, 250 VAC, 1 A (resistive load) |
| Setting method | | Digital setting using front panel keys (functionality set-up with DIP switch) |
| Indication | | 7-segment digital display (character height: 13.5 mm) and deviation indicators |
| Ambient temperature | | –10 to 55°C (with no condensation or icing) |
| Setting/indication accuracy | | ±0.5% of indication value or ±1 °C, whichever is greater ±1 digit max. |
| Hysteresis (for ON/OFF control) | | 0.2% FS (0.1% FS for multi-input (thermocouple/platinum resistance thermometer) models) |
| Proportional band (P) | | 1 to 999°C (automatic adjustment using AT/ST) |
| Integral time (I) | | 0 to 1,999 s (automatic adjustment using AT/ST) |
| Derivative time (D) | | 0 to 1,999 s (automatic adjustment using AT/ST) |
| Control period | | 2/20 s |
| Sampling period | | 500 ms |
| Electrical life expectancy | | 100,000 operations min. (relay output models) |
| Weight | | Approx. 120 g (controller only) |
| Degree of protection | | Front panel: Equivalent to IP66; rear case: IP20; terminals: IP00 |
| Memory protection | | EEPROM (non-volatile memory) (number of writes: 1,000,000) |
| Size in mm (H×W×D) | | 48×48×78 |

## Best price performance ratio and user-friendliness combined with ergonomic design

Thanks to a clear and easy-to-use menu structure, the E5CB General Purpose Controller is extremely user friendly. But despite very simply layered, the E5CB still offers a high performance inherited from the E5CN series. Even if no power is available, the E5CB can be powered and parameterized with only a few clicks using the free ThermoMini remote software.

- Set up your configuration in only 30 s
- Large display (16.2 mm) legible up to 5 m
- Built to last and regulate precisely with Omron unique 2-PID algorithm
- Easy and quick remote parameterization via free ThermoMini software
- Speed up your application with a sampling period time of 250 ms

## Ordering information

| Size | Power supply voltage | Input type | Alarm output | Control output | Order code |
|---|---|---|---|---|---|
| E5CB<br>48 × 48 mm | 100 to 240 VAC | Thermocouple | 1 | Relay output | E5CB-R1TC |
| | | Platinum resistance thermometer | | | E5CB-R1P |
| | | Thermocouple | | Voltage output (for driving SSR) | E5CB-Q1TC |
| | | Platinum resistance thermometer | | | E5CB-Q1P |
| | 24 VAC/VDC | Thermocouple | | Relay output | E5CB-R1TCD |
| | | Platinum resistance thermometer | | | E5CB-R1PD |
| | | Thermocouple | | Voltage output (for driving SSR) | E5CB-Q1TCD |
| | | Platinum resistance thermometer | | | E5CB-Q1PD |

### Accessories

| Option | Order code |
|---|---|
| USB-Serial conversion cable  | E58-CIFQ2 |

### Software

| Description | Features |
|---|---|
| ThermoMini | Freeware/Parameter copying and cloning tool<br>Parameter export (.csv), self-expressing |

## Specifications

| Item | E5CB |
|---|---|
| Power supply voltage | 100 to 240 VAC 50/60 Hz, 24 VAC 50/60 Hz, or 24 VDC |
| Operating voltage range | 85% to 110% of rated supply voltage |
| Power consumption | Approx. 3.5 VA (100 to 240 VAC)<br>Approx. 3.5 VA (24 VAC)<br>Approx. 2.5 W (24 VDC) |
| Sensor input | Models with thermocouple inputs<br>Thermocouple: K, J, T, R, or S (JIS C 1602-1995, IEC60584-1) |
| | Models with platinum resistance thermometer inputs<br>Platinum resistance thermometer: Pt100 (JIS C 1604-1997, IEC60751) |
| Control output | SPST-NO, 250 VAC, 3 A (resistive load), electrical life: 100,000 operations,<br>minimum applicable load: 5 V, 10 mA |
| | Output voltage: 12 VDC +25%/−15% (PNP), max. load current: 21 mA, with short-circuit protection circuit |
| Alarm output | SPST-NO, 250 VAC, 1 A (resistive load), electrical life: 100,000 operations, minimum load: 5 V, 10 mA |
| Control method | ON/OFF control or 2-PID control (with auto-tuning) |
| Setting method | Digital setting using front panel keys |
| Indication method | 7-segment digital display and individual indicators<br>Character height: 16.2 mm (PV) |
| Other functions | Temperature input shift, run/stop, protection functions, etc. |
| Ambient operating temperature | −10 to 55°C (with no condensation or icing)/With a three-year guarantee: −10 to 50°C |
| Ambient operating humidity | 25% to 85% |
| Storage temperature | −25 to 65°C (with no condensation or icing) |
| Size in mm (H × W × D) | 48×48×65 |

**Note:** Other models (E5C_L/E5EW) with similar features but without USB communication are only available for "Emerging Countries". Please ask you local Sales representative for further information.

## High performance & simplicity

The next generation E5_C temperature controller is setting a new global standard in terms of precision and user-friendly design. Best control performance, easy set-up and outstanding visibility of the white IP66 LCD display have been integrated into a spacing-saving housing with only 60 mm of depth.

- Fast and precise regulation: 50 ms sampling loop period time
- Easy to set up, and operate intuitively via CX-Thermo without power supply
- Best contrasty display using white LCD technology which is visible from a far distance and from any angle
- Useful alarm and diagnosis functions for secure operation
- Practical timer and logic operation functions eliminating the need of a PLC

PRO

## Ordering information

### E5CC (all models 3 auxiliary outputs)

| Output | Option No. | Fixed option | Order code | |
|---|---|---|---|---|
| | | | 110-240 VAC | 24 VAC/VDC |
| Out1: Relay<br>Out2: non | – | – | E5CC-RX3A5M-000 | E5CC-RX3D5M-000 |
| | 001 | Event input 2,<br>Heater burnout SSR defect detection | E5CC-RX3A5M-001 | E5CC-RX3D5M-001 |
| | 003 | Communication 3-phase heater alarm | E5CC-RX3A5M-003 | E5CC-RX3D5M-003 |
| | 005 | Event input 4 | E5CC-RX3A5M-005 | E5CC-RX3D5M-005 |
| | 006 | Event input 2,<br>Transfer output | E5CC-RX3A5M-006 | E5CC-RX3D5M-006 |
| | 007 | Event input 2,<br>Remote SP | E5CC-RX3A5M-007 | E5CC-RX3D5M-007 |
| Out1: Voltage (pulse)<br>Out2: non | – | – | E5CC-QX3A5M-000 | E5CC-QX3D5M-000 |
| | 001 | Event input 2,<br>Heater burnout SSR defect detection | E5CC-QX3A5M-001 | E5CC-QX3D5M-001 |
| | 003 | Communication 3-phase heater alarm | E5CC-QX3A5M-003 | E5CC-QX3D5M-003 |
| | 005 | Event input 4 | E5CC-QX3A5M-005 | E5CC-QX3D5M-005 |
| | 006 | Event input 2,<br>Transfer output | E5CC-QX3A5M-006 | E5CC-QX3D5M-006 |
| | 007 | Event input 2,<br>Remote SP | E5CC-QX3A5M-007 | E5CC-QX3D5M-007 |
| Out1: Voltage (pulse)<br>Out2: Voltage (pulse) | – | – | E5CC-QQ3A5M-000 | E5CC-QQ3D5M-000 |
| | 001 | Event input 2,<br>Heater burnout SSR defect detection | E5CC-QQ3A5M-001 | E5CC-QQ3D5M-001 |
| | 003 | Communication 3-phase heater alarm | E5CC-QQ3A5M-003 | E5CC-QQ3D5M-003 |
| | 005 | Event input 4 | E5CC-QQ3A5M-005 | E5CC-QQ3D5M-005 |
| | 006 | Event input 2,<br>Transfer output | E5CC-QQ3A5M-006 | E5CC-QQ3D5M-006 |
| | 007 | Event input 2,<br>Remote SP | E5CC-QQ3A5M-007 | E5CC-QQ3D5M-007 |
| Out1: Linear current<br>Out2: non | – | – | E5CC-CX3A5M-000 | E5CC-CX3D5M-000 |
| | 004 | Event input 2,<br>Communication | E5CC-CX3A5M-004 | E5CC-CX3D5M-004 |
| | 005 | Event input 4 | E5CC-CX3A5M-005 | E5CC-CX3D5M-005 |
| | 006 | Event input 2,<br>Transfer output | E5CC-CX3A5M-006 | E5CC-CX3D5M-006 |
| | 007 | Event input 2,<br>Remote SP | E5CC-CX3A5M-007 | E5CC-CX3D5M-007 |
| Out1: Linear current<br>Out2: Voltage (pulse) | – | – | E5CC-CQ3A5M-000 | E5CC-CQ3D5M-000 |
| | 001 | Event input 2,<br>Heater burnout SSR defect detection | E5CC-CQ3A5M-001 | E5CC-CQ3D5M-001 |
| | 003 | Communication 3-phase heater alarm | E5CC-CQ3A5M-003 | E5CC-CQ3D5M-003 |
| | 005 | Event input 4 | E5CC-CQ3A5M-005 | E5CC-CQ3D5M-005 |
| | 006 | Event input 2,<br>Transfer output | E5CC-CQ3A5M-006 | E5CC-CQ3D5M-006 |
| | 007 | Event input 2,<br>Remote SP | E5CC-CQ3A5M-007 | E5CC-CQ3D5M-007 |

**Note:** As well as these models other models are available on request. Please contact the local sales office for special requests.

### E5EC/E5AC (all models 4 auxiliary outputs)

| Output | Option No | Fixed option | Order code | |
|---|---|---|---|---|
| | | | 110-240 VAC | 24 VAC/VDC |
| Out1: Relay<br>Out2: non | – | – | E5_C-RX4A5M-000 | E5_C-RX4D5M-000 |
| | 009 | Event input 2,<br>Communication 3-phase heater alarm | E5_C-RX4A5M-009 | E5_C-RX4D5M-009 |
| | 010 | Event input 4,<br>Heater burnout SSR defect detection | E5_C-RX4A5M-010 | E5_C-RX4D5M-010 |
| | 011 | Event input 6,<br>Remote SP Heater burnout SSR defect detection,<br>Transfer output | E5_C-RX4A5M-011 | E5_C-RX4D5M-011 |
| Out1: Voltage (pulse)<br>Out2: non | – | – | E5_C-QX4A5M-000 | E5_C-QX4D5M-000 |
| | 009 | Event input 2,<br>Communication 3-phase heater alarm | E5_C-QX4A5M-009 | E5_C-QX4D5M-009 |
| | 010 | Event input 4,<br>Heater burnout SSR defect detection | E5_C-QX4A5M-010 | E5_C-QX4D5M-010 |
| | 011 | Event input 6,<br>Remote SP Heater burnout SSR defect detection,<br>Transfer output | E5_C-QX4A5M-011 | E5_C-QX4D5M-011 |
| Out1: Relay<br>Out2: Relay | – | – | E5_C-RR4A5M-000 | E5_C-RR4D5M-000 |
| | 009 | Event input 2,<br>Communication 3-phase heater alarm | E5_C-RR4A5M-009 | E5_C-RR4D5M-009 |
| | 010 | Event input 4,<br>Heater burnout SSR defect detection | E5_C-RR4A5M-010 | E5_C-RR4D5M-010 |
| | 011 | Event input 6,<br>Remote SP Heater burnout SSR defect detection,<br>Transfer output | E5_C-RR4A5M-011 | E5_C-RR4D5M-011 |
| Out1: Voltage (pulse)<br>Out2: Voltage (pulse) | – | – | E5_C-QQ4A5M-000 | E5_C-QQ4D5M-000 |
| | 009 | Event input 2,<br>Communication 3-phase heater alarm | E5_C-QQ4A5M-009 | E5_C-QQ4D5M-009 |
| | 010 | Event input 4,<br>Heater burnout SSR defect detection | E5_C-QQ4A5M-010 | E5_C-QQ4D5M-010 |
| | 011 | Event input 6,<br>Remote SP Heater burnout SSR defect detection,<br>Transfer output | E5_C-QQ4A5M-011 | E5_C-QQ4D5M-011 |
| Out1: Voltage (pulse)<br>Out2: Relay | – | – | E5_C-QR4A5M-000 | E5_C-QR4D5M-000 |
| | 009 | Event input 2,<br>Communication 3-phase heater alarm | E5_C-QR4A5M-009 | E5_C-QR4D5M-009 |
| | 010 | Event input 4,<br>Heater burnout SSR defect detection | E5_C-QR4A5M-010 | E5_C-QR4D5M-010 |
| | 011 | Event input 6,<br>Remote SP Heater burnout SSR defect detection,<br>Transfer output | E5_C-QR4A5M-011 | E5_C-QR4D5M-011 |
| Out1: Linear current<br>Out2: non | – | – | E5_C-CX4A5M-000 | E5_C-CX4D5M-000 |
| | 004 | Event input 2,<br>Communication | E5_C-CX4A5M-004 | E5_C-CX4D5M-004 |
| | 005 | Event input 4 | E5_C-CX4A5M-005 | E5_C-CX4D5M-005 |
| | 013 | Event input 6,<br>Remote SP,<br>Transfer output | E5_C-CX4A5M-013 | E5_C-CX4D5M-013 |
| | 014 | Event input 4,<br>Communication Remote SP,<br>Transfer output | E5_C-CX4A5M-014 | E5_C-CX4D5M-014 |
| Out1: Linear current<br>Out2: Linear current | – | – | E5_C-CC4A5M-000 | E5_C-CC4D5M-000 |
| | 004 | Event input 2,<br>Communication | E5_C-CC4A5M-004 | E5_C-CC4D5M-004 |
| | 005 | Event input 4 | E5_C-CC4A5M-005 | E5_C-CC4D5M-005 |
| | 013 | Event input 6,<br>Remote SP Transfer output | E5_C-CC4A5M-013 | E5_C-CC4D5M-013 |
| | 014 | Event input 4,<br>Communication Remote SP,<br>Transfer output | E5_C-CC4A5M-014 | E5_C-CC4D5M-014 |
| Out1: Linear current<br>Out2: Voltage (pulse) | – | – | E5_C-CQ4A5M-000 | E5_C-CQ4D5M-000 |
| | 009 | Event input 2,<br>Communication 3-phase heater alarm | E5_C-CQ4A5M-009 | E5_C-CQ4D5M-009 |
| | 010 | Event input 4,<br>Heater burnout SSR defect detection | E5_C-CQ4A5M-010 | E5_C-CQ4D5M-010 |
| | 011 | Event input 6,<br>Remote SP Heater burnout SSR defect detection,<br>Transfer output | E5_C-CQ4A5M-011 | E5_C-CQ4D5M-011 |
| Out1: Relay[*1]<br>Out2: Relay[*1] | – | – | E5_C-PR4A5M-000 | E5_C-PR4D5M-000 |
| | 004 | Event input 2,<br>Communication | E5_C-PR4A5M-004 | E5_C-PR4D5M-004 |
| | 014 | Event input 4,<br>Communication Remote SP,<br>Transfer output | E5_C-PR4A5M-014 | E5_C-PR4D5M-014 |

[*1] Position proportional control model

### E5GC (models with 0, 1 or 2 auxiliary outputs)

| Output | Terminal type | Option No | Fixed option | Order code | |
|---|---|---|---|---|---|
| | | | | 110-240 VAC | 24 VAC/VDC |
| Out 1: Relay | Screw terminals (with cover) | – | – | E5GC-RX0A6M-000 | E5GC-RX0D6M-000 |
| | | | | E5GC-RX1A6M-000 | E5GC-RX106M-000 |
| | | | | E5GC-RX2A6M-000 | E5GC-RX206M-000 |
| | | 015 | Communication | E5GC-RX1A6M-015 | E5GC-RX106M-015 |
| | | | | E5GC-RX2A6M-015 | E5GC-RX206M-015 |
| | | 016 | Event input 1 | E5GC-RX2A6M-016 | E5GC-RX206M-016 |
| | | 023 | Heater Burnout SSR defect detection | E5GC-RX2A6M-023 | E5GC-RX206M-023 |
| | | 024 | Event input 2 | E5GC-RX1A6M-024 | E5GC-RX106M-024 |
| | Screwless clamp terminal | – | – | E5GC-RX0ACM-000 | E5GC-RX0DCM-000 |
| | | | | E5GC-RX1ACM-000 | E5GC-RX1DCM-000 |
| | | | | E5GC-RX2ACM-000 | E5GC-RX2DCM-000 |
| | | 015 | Communication | E5GC-RX1ACM-015 | E5GC-RX1DCM-015 |
| | | | | E5GC-RX2ACM-015 | E5GC-RX2DCM-015 |
| | | 016 | Event input 1 | E5GC-RX2ACM-016 | E5GC-RXZDCM-016 |
| | | 023 | Heater Burnout SSR defect detection | E5GC-RX2ACM-023 | E5GC-RXZDCM-023 |
| | | 024 | Event input 2 | E5GC-RX1ACM-024 | E5GC-RX1DCM-024 |
| Out 1: Voltage (pulse) | Screw terminals (with cover) | – | – | E5GC-QX0A6M-000 | E5GC-QX0D6M-000 |
| | | | | E5GC-QX1A6M-000 | E5GC-QX106M-000 |
| | | | | E5GC-QX2A6M-000 | E5GC-QX206M-000 |
| | | 015 | Communication | E5GC-QX1A6M-015 | E5GC-QX106M-015 |
| | | | | E5GC-QX2A6M-015 | E5GC-QX206M-015 |
| | | 016 | Event input 1 | E5GC-QX2A6M-016 | E5GC-QX206M-016 |
| | | 023 | Heater Burnout SSR defect detection | E5GC-QX2A6M-023 | E5GC-QX206M-023 |
| | | 024 | Event input 2 | E5GC-QX1A6M-024 | E5GC-QX106M-024 |
| | Screwless clamp terminal | – | – | E5GC-QX0ACM-000 | E5GC-QX0DCM-000 |
| | | | | E5GC-QX1ACM-000 | E5GC-QX1DCM-000 |
| | | | | E5GC-QX2ACM-000 | E5GC-QX2DCM-000 |
| | | 015 | Communication | E5GC-QX1ACM-015 | E5GC-QX1DCM-015 |
| | | | | E5GC-QX2ACM-015 | E5GC-QX2DCM-015 |
| | | 016 | Event input 1 | E5GC-QX2ACM-016 | E5GC-QX2DCM-016 |
| | | 023 | Heater Burnout SSR defect detection | E5GC-QX2ACM-023 | E5GC-QX2DCM-023 |
| | | 024 | Event input 2 | E5GC-QX1ACM-024 | E5GC-QX1DCM-024 |
| Out 1: Liner current | Screw terminals (with cover) | – | – | E5GC-CX0A6M-000 | E5GC-CX0D6M-000 |
| | | | | E5GC-CX1A6M-000 | E5GC-CX106M-000 |
| | | | | E5GC-CX2A6M-000 | E5GC-CX206M-000 |
| | | 015 | Communication | E5GC-CX1A6M-015 | E5GC-CX106M-015 |
| | | | | E5GC-CX2A6M-015 | E5GC-CX206M-015 |
| | | 016 | Event input 1 | E5GC-CX2A6M-016 | E5GC-CX206M-016 |
| | | 024 | Event input 2 | E5GC-CX1A6M-024 | E5GC-CX106M-024 |
| | Screwless clamp terminal | – | – | E5GC-CX0ACM-000 | E5GC-CX0DCM-000 |
| | | | | E5GC-CX1ACM-000 | E5GC-CX10CM-000 |
| | | | | E5GC-CX2ACM-000 | E5GC-CX20CM-000 |
| | | 015 | Communication | E5GC-CX1ACM-015 | E5GC-CX10CM-015 |
| | | | | E5GC-CX2ACM-015 | E5GC-CX20CM-015 |
| | | 016 | Event input 1 | E5GC-CX2ACM-016 | E5GC-CX20CM-016 |
| | | 024 | Event input 2 | E5GC-CX1ACM-024 | E5GC-CX10CM-024 |

### E5DC (models with 0 or 2 auxiliary outputs)

| Output | Option No | Fixed option | Order code | |
|---|---|---|---|---|
| | | | 110-240 VAC | 24 VAC/VDC |
| Out1: Relay | – | – | E5DC-RX2ASM-000 | E5DC-RX2DSM-000 |
| | 002 | Communication, Heater Burnout SSR defect detection | E5DC-RX2ASM-002 | E5DC-RX2DSM-002 |
| | 015 | Communication | E5DC-RX0ASM-015*1 | E5DC-RX0DSM-015*1 |
| | 017 | Event Input 1, Heater Burnout SSR defect detection | E5DC-RX2ASM-017 | E5DC-RX2DSM-017 |
| Out1: Voltage (pulse) | – | – | E5DC-QX2ASM-000 | E5DC-QX2DSM-000 |
| | 002 | Communication, Heater Burnout SSR defect detection | E5DC-QX2ASM-002 | E5DC-QX2DSM-002 |
| | 015 | Communication | E5DC-QX0ASM-015*1 | E5DC-QX0DSM-015*1 |
| | 017 | Event Input 1, Heater Burnout SSR defect detection | E5DC-QX2ASM-017 | E5DC-QX2DSM-017 |
| Out1: Linear curent | – | – | E5DC-CX2ASM-000 | E5DC-CX2DSM-000 |
| | 015 | Communication | E5DC-CX0ASM-015*1 | E5DC-CX0DSM-015*1 |
| | 015 | Communication | E5DC-CX2ASM-015 | E5DC-CX2DSM-015 |
| | 016 | Event Input 1 | E5DC-CX2ASM-016 | E5DC-CX2DSM-016 |

*1 Auxiliary outputs are not possible for these models.

### E5_C optional tools

| Option | Order code |
|---|---|
| USB based configuration cable | E58-CIFQ2, E58-CIFQ2-E (for E5AC, E5DC, E5EC and E5GC) |
| PC based configuration and tuning software | EST2-2C-MV4 |

## Specifications

### E5CC/E5EC/E5AC

| Item | | E5CC | E5EC | E5AC |
|---|---|---|---|---|
| Power supply voltage | | A in model number: 100 to 240 VAC, 50/60 Hz<br>D in model number: 24 VAC, 50/60 Hz; 24 VDC | | |
| Operating voltage range | | 85% to 110% of rated supply voltage | | |
| Power consumption | | 6.5 VA max. at 100 to 240 VAC, and<br>4.1 VA max. at 24 VAC or<br>2.3 W max. at 24 VDC | 8.3 VA max. at 100 to 240 VAC, and<br>5.5 VA max. at 24 VAC or<br>3.2 W max. at 24 VDC | 9.0 VA max. at 100 to 240 VAC, and<br>5.6 VA max. at 24 VAC or<br>3.4 W max. at 24 VDC |
| Sensor input | | • Temperature inputs<br>Thermocouple: K, J, T, E, L, U, N, R, S, B, W, or PL II<br>Platinum resistance thermometer: Pt100 or JPt100<br>Infrared temperature sensor (ES1B): 10 to 70°C, 60 to 120°C, 115 to 165°C, or 140 to 260°C<br>• Analog inputs<br>Current input (mA): 4 to 20 or 0 to 20<br>Voltage input (V): 1 to 5, 0 to 5, or 0 to 10 | | |
| Input impedance | | Current input: 150 Ω max., Voltage input: 1 MΩ min.<br>(Use a 1:1 connection when connecting the ES2-HB/THB.) | | |
| Control method | | ON/OFF control or 2-PID control (with auto-tuning) | | |
| Indication accuracy | | Thermocouple input: (±0.3% of indicated value or ±1°C, whichever is greater) ±1 digit max.<br>Platinum resistance thermometer input: (±0.2% of indicated value or ±0.8°C, whichever is greater) ±1 digit max.<br>Analog input: ±0.2% FS ±1 digit max.<br>CT input: ±5% FS ±1 digit max. | Thermocouple input: (±0.3% of indicated value or ±1°C, whichever is greater) ±1 digit max.<br>Platinum resistance thermometer input: (±0.2% of indicated value or ±0.8°C, whichever is greater) ±1 digit max.<br>Analog input: ±0.2% FS ±1 digit max.<br>CT input: ±5% FS ±1 digit max.<br>Potentiometer input: ±5% FS ±1 digit max. | |
| Auto-Tuning | | Yes, 40%/100% MV output limit selection. When using Heat/Cool: Automatic cool gain adjustment | | |
| Self-Tuning | | Yes | | |
| Control outputs | Relay output | SPST-NO, 250 VAC, 3 A (resistive load), electrical life: 100,000 operations, minimum applicable load: 5 V, 10 mA | SPST-NO, 250 VAC, 5 A (resistive load), electrical life: 100,000 operations, minimum applicable load: 5 V, 10 mA | |
| | Voltage output (for driving SSR) | Output voltage: 12 VDC ±20% (PNP), max. load current: 21 mA, with short-circuit protection circuit | Output voltage: 12 VDC ±20% (PNP), max. load current: 40 mA, with short-circuit protection circuit<br>(The maximum load current is 21 mA for models with two control outputs.) | |
| | Linear current output | 4 to 20 mA DC/0 to 20 mA DC, load: 500 Ω max., resolution: approx. 10,000 | | |
| Auxiliary outputs | Number of outputs | 3 | 4 | |
| | Output specifications | N.O. relay outputs, 250 VAC,<br>Models with 3 outputs: 2 A (resistive load), electrical life: 100,000 operations, minimum applicable load: 5 V, 10 mA | N.O. relay outputs, 250 VAC,<br>Models with 4 outputs: 2 A (resistive load), electrical life: 100,000 operations, minimum applicable load: 5 V, 10 mA | |
| Event inputs | Number of inputs | 2 or 4 or 6 max (depends on the model) | | |
| | External contact input specifications | Contact input: ON: 1 kΩ max., OFF: 100 kΩ min. | | |
| | | Non-contact input: ON: Residual voltage: 1.5 V max., OFF: Leakage current: 0.1 mA max. | | |
| | | Current flow: approx. 7 mA per contact | | |
| Setting method | | Digital setting using front panel keys or via Remote Software CX-Thermo V4.5 | | |
| Indication method | | 11-segment digital display and individual indicators | | |
| Multi SP | | Up to eight set points (SP0 to SP7) can be saved and selected using event inputs, key operations, or serial communications. | | |
| Other functions | | Manual output, heating/cooling control, loop burnout alarm, SP ramp, other alarm functions, heater burnout detection (including SSR failure detection), 40% AT, 100% AT, MV limiter, input digital filter, self-tuning, temperature input shift, run/stop, protection functions, extraction of square root, MV change rate limit, logic operations, PV/SV status display, simple program, automatic cooling coefficient adjustment | | |
| Ambient operating temperature | | –10 to 55°C (with no condensation or icing) | | |
| Ambient operating humidity | | 25% to 85% | | |
| Storage temperature | | –25 to 65°C (with no condensation or icing) | | |
| Degree of protection | | Front panel: IP66, Rear case: IP20, Terminals: IP00 | | |
| Sampling period | | 50 ms | | |
| Size in mm (H×W×D) | | 48×48×64 | 48×96×64 | 96×96×64 |

## E5GC

| Item | | E5GC |
|---|---|---|
| Power supply voltage | | A in model number: 100 to 240 VAC, 50/60 Hz<br>D in model number: 24 VAC, 50/60 Hz; 24 VDC |
| Sensor input | | • Temperature input<br>Thermocouple: K, J, T, E, L, U, N, R, S, B, W, or PL II<br>Platinum resistance thermometer: Pt100 or JPt100<br>Infrared temperature sensor (ES1B): 10 to 70°C, 60 to 120°C, 115 to 165°C, or 140 to 260°C<br>• Analog input<br>Current input: 4 to 20 mA or 0 to 20 mA<br>Voltage input: 1 to 5 V, 0 to 5 V, or 0 to 10 V |
| Control method | | ON/OFF control or 2-PID control (with auto-tuning) |
| Control output | Relay output | SPST-NO, 250 VAC, 2 A (resistive load), electrical life: 100,000 operations, minimum applicable load: 5 V, 10 mA (reference value) |
| | Voltage output (for driving SSR) | Output voltage 12 VDC ±20% (PNP), max. Load current: 21 mA, with short-circuit protection circuit |
| | Linear current output | 4 to 20 mA DC/0 to 20 mA DC, load: 500 Ω max., resolution: Approx. 10,000 |
| Auxiliary output | Number of outputs | 1 or 2 (depends on model) |
| | Output specifications | SPST-NO relay outputs, 250 VAC, 2 A (resistive load),<br>Electrical life: 100,000 operations, Minimum applicable load: 10 mA at 5 V (reference value) |
| Indication method | | 11-segment digital displays and individual indicators<br>Character height: PV: 10.5 mm, SV: 5.0 mm |
| Multi SP | | Up to eight set points (SP0 to SP7) can be saved and selected using the event inputs, key operations, or serial communications.*1 |
| Other functions | | Manual output, heating/cooling control, loop burnout alarm, SP ramp, other alarm functions, heater burnout (HB) alarm (including SSR failure (HS) alarm), 40% AT, 100% AT, MV limiter, input digital filter, self tuning, robust tuning, PV input shift, run/stop, protection functions, extraction of square root, MV change rate limit, logic operations, temperature status display, simple programming, moving average of input value, display brightness setting, simple transfer output, and work bit message.*2 |
| Size in mm (H×W×D) | | 24×48×93 |

*1 Only four set points are selectable for event inputs.
*2 Simple transfer output and work bit message are only for E5GC.

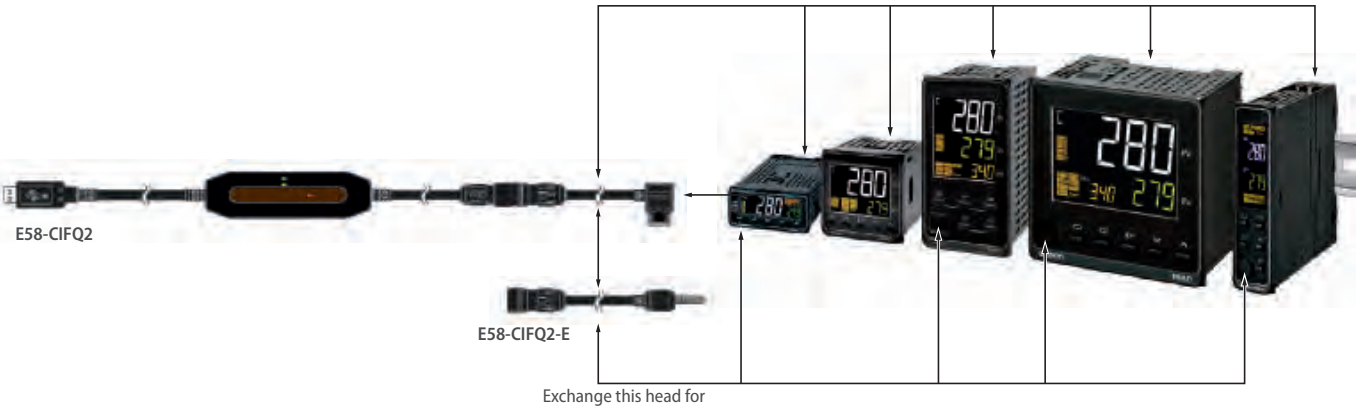
## E5DC

| Item | | E5DC |
|---|---|---|
| Power supply voltage | | A in model number: 100 to 240 VAC, 50/60 Hz<br>D in model number: 24 VAC, 50/60 Hz; 24 VDC |
| Operating voltage range | | 85% to 110% of rated supply voltage |
| Power consumption | | 4.9 VA max. at 100 to 240 VAC, and<br>2.8 VA max. at 24 VDC or<br>1.5 W max. at 24 VDC |
| Sensor input | | • Temperature inputs<br>Thermocouple: K, J, T, E, L, U, N, R, S, B, W, or PL II<br>Platinum resistance thermometer: Pt100 or JPt100<br>Infrared temperature sensor (ES1B): 10 to 70°C, 60 to 120°C, 115 to 165°C, or 140 to 260°C<br>• Analog inputs<br>Current input (mA): 4 to 20 or 0 to 20<br>Voltage input (V): 1 to 5, 0 to 5, or 0 to 10 |
| Input impedance | | Current input: 150 Ω max., Voltage input: 1 MΩ min. (Use a 1:1 connection when connecting the ES2-HB/THB.) |
| Control method | | ON/OFF control or 2-PID control (with auto-tuning) |
| Indication accuracy | | Thermocouple input: (±0.3% of PV or ±1°C, whichever is greater) ±1 digit max.<br>Platinum resistance thermometer input: (±0.2% of PV or ±0.8°C, whichever is greater) ±1 digit max.<br>Analog input: ±0.2% FS ±1 digit max.<br>CT input: ±5% FS ±1 digit max. |
| Auto-Tuning | | Yes, 40%/100% MV output limit selection. When using Heat/Cool: Automatic cool gain adjustment |
| Self-Tuning | | Yes |
| Control outputs | Relay output | SPST-NO, 250 VAC, 3 A (resistive load), electrical life: 100,000 operations, minimum applicable load: 5 V, 10 mA |
| | Voltage output (for driving SSR) | Output voltage: 12 VDC ±20% (PNP), max. load current: 20 mA, with short-circuit protection circuit |
| | Linear current output | 4 to 20 mA DC/0 to 20 mA DC, load: 500 Ω max., resolution: approx. 10,000 |
| Auxiliary outputs | Number of outputs | 2 (depends on model) |
| | Output specifications | SPST-NO relay outputs: 250 VAC, 2 A (resistive load),<br>Electrical life: 100,000 operations, minimum applicable load: 5 V, 10 mA |
| Event inputs | Number of inputs | 1 (depends on model) |
| | External contact input specifications | Contact input: ON: 1 kΩ max., OFF: 100 kΩ min. |
| | | Non-contact input: ON: Residual voltage: 1.5 V max., OFF: Leakage current: 0.1 mA max. |
| | | Current flow: approx. 7 mA per contact |
| Setting method | | Digital setting using front panel keys |
| Indication method | | 11-segment digital displays and individual indicators<br>Character height: PV 8.5 mm, SV: 8.0 mm |
| Multi SP | | Up to eight set points (SP0 to SP7) can be saved and selected using event inputs, key operations, or serial communications.*1 |
| Other functions | | Manual output, heating/cooling control, loop burnout alarm, SP ramp, other alarm functions, heater burnout (HB) alarm (including SSR failure (HB) alarm), 40% AT, 100% AT, MV limiter, input digital filter, self tuning, robust tuning, PV input shift, run/stop, protection functions, extraction of square root, MV change rate limit, simple calculations, temperature status display, simple programming, moving average of input value, and display brightness setting |
| Ambient operating temperature | | –10 to 55°C (with no condensation or icing), for 3-year warranty: –10 to 50°C (with no condensation or icing) |
| Ambient operating humidity | | 25% to 85% |
| Storage temperature | | –25 to 65°C (with no condensation or icing) |
| Degree of protection | | Main unit: IP20, Terminal unit: IP00 |
| Sampling period | | 50 ms |
| Size in mm (H×W×D) | | 96×22.5×85 |

*1 Only two set points are selectable for event inputs.

### USB communication cable E58-CIFQ2

| Item | E5AC | E5CC | E5DC | E5EC | E5GC |
|---|---|---|---|---|---|
| E58-CIFQ2 | ■ | ■ | ■ | ■ | ■ |
| E58-CIFQ2-E | ■ | – | ■ | ■ | ■ |



## Compact and intelligent Ramp/Soak controller

The E5_C-T Ramp/Soak temperature controllers expands the E5_C family to handle process applications. Capable of addressing up to 6 event inputs and up to 4 auxiliary outputs all in a compact 60 mm (depth) housing, makes this controller series one of Omron's most powerful and versatile temperature controllers.

- Set up to 8 programs with 32 segments totaling 256 program segments simply via CX-Thermo software.
- The three-level display is visible simultaneously so each process status can be easily identified.
- "Segment Jump" allows users to move directly to the specified segment reducing programming time and increase production throughput.

## Ordering information

### E5CC-T

| Input | Output | Alarms | HB*1 alarm & SSR*2 defect detection | Comm. (RS-485) | Event Input | Transfer output | Order code | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | 100 to 240 VAC | 24VAC/VDC |
| Temperature sensor/ analog | Out 1: Relay Out 2: None | 3 | – | – | – | – | E5CC-TRX3A5M-000 | E5CC-TRX3D5M-000 |
| | | | 1 | | 2 | | E5CC-TRX3A5M-001 | E5CC-TRX3D5M-001 |
| | | | 2*3 | 1 | – | | E5CC-TRX3A5M-003 | E5CC-TRX3D5M-003 |
| | | | – | | 2 | | E5CC-TRX3A5M-004 | E5CC-TRX3D5M-004 |
| | | | | – | 4 | | E5CC-TRX3A5M-005 | E5CC-TRX3D5M-005 |
| | | | | | 2 | Y | E5CC-TRX3A5M-006 | E5CC-TRX3D5M-006 |
| | Out 1: Voltage (pulse) Out 2: None | | | | – | – | E5CC-TQX3A5M-000 | E5CC-TQX3D5M-000 |
| | | | 1 | | 2 | | E5CC-TQX3A5M-000 | E5CC-TQX3D5M-000 |
| | | | 2*3 | 1 | – | | E5CC-TQX3A5M-003 | E5CC-TQX3D5M-003 |
| | | | – | | 2 | | E5CC-TQX3A5M-004 | E5CC-TQX3D5M-004 |
| | | | | – | 4 | | E5CC-TQX3A5M-005 | E5CC-TQX3D5M-005 |
| | | | | | 2 | Y | E5CC-TQX3A5M-006 | E5CC-TQX3D5M-006 |
| | Out 1: Current linear Out 2: None | | | | – | – | E5CC-TCX3A5M-000 | E5CC-TCX3D5M-000 |
| | | | | 1 | 2 | | E5CC-TCX3A5M-004 | E5CC-TCX3D5M-004 |
| | | | | – | 4 | | E5CC-TCX3A5M-005 | E5CC-TCX3D5M-005 |
| | | | | | 2 | Y | E5CC-TCX3A5M-006 | E5CC-TCX3D5M-006 |
| | Out 1: Voltage (pulse) Out 2: Voltage (pulse) | | | | – | – | E5CC-TQQ3A5M-000 | E5CC-TQQ3D5M-000 |
| | | | 1 | | 2 | | E5CC-TQQ3A5M-001 | E5CC-TQQ3D5M-001 |
| | | | 2*3 | 1 | – | | E5CC-TQQ3A5M-003 | E5CC-TQQ3D5M-003 |
| | | | – | | 2 | | E5CC-TQQ3A5M-004 | E5CC-TQQ3D5M-004 |
| | | | | – | 4 | | E5CC-TQQ3A5M-005 | E5CC-TQQ3D5M-005 |
| | | | | | 2 | Y | E5CC-TQQ3A5M-006 | E5CC-TQQ3D5M-006 |
| | Out 1: Current linear Out 2: Voltage (pulse) | | | | – | – | E5CC-TCQ3A5M-000 | E5CC-TCQ3D5M-000 |
| | | | | 1 | 2 | | E5CC-TCQ3A5M-004 | E5CC-TCQ3D5M-004 |
| | | | | – | 4 | | E5CC-TCQ3A5M-005 | E5CC-TCQ3D5M-005 |
| | | | | | 2 | Y | E5CC-TCQ3A5M-006 | E5CC-TCQ3D5M-006 |

*1 HB = Heater burnout
*2 SSR = Solid state relay
*3 3-Phase heater burnout alarm

### E5AC-T/E5EC-T

| Input | Output | Alarms | HB*1 alarm & SSR*2 defect detection | Comm. (RS-485) | Event Input | Transfer output | Order code*3 | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | Model: 100 to 240 VAC | Model: 24VAC/VDC |
| Temperature sensor/ analog | Out 1: Relay Out 2: None | 4 | – | – | – | – | E5_C-TRX4A5M-000 | E5_C-TRX4D5M-000 |
| | | | 1 | 1 | 2 | | E5_C-TRX4A5M-008 | E5_C-TRX4D5M-008 |
| | | | | – | 4 | | E5_C-TRX4A5M-010 | E5_C-TRX4D5M-010 |
| | | | | | 6 | Y | E5_C-TRX4A5M-019 | E5_C-TRX4D5M-019 |
| | Out 1: Voltage (pulse) Out 2: None | | – | | – | – | E5_C-TQX4A5M-000 | E5_C-TQX4D5M-000 |
| | | | 1 | 1 | 2 | | E5_C-TQX4A5M-008 | E5_C-TQX4D5M-008 |
| | | | | – | 4 | | E5_C-TQX4A5M-010 | E5_C-TQX4D5M-010 |
| | | | | | 6 | Y | E5_C-TQX4A5M-019 | E5_C-TQX4D5M-019 |
| | Out 1: Current linear Out 2: None | | – | | – | – | E5_C-TCX4A5M-000 | E5_C-TCX4D5M-000 |
| | | | | 1 | 2 | | E5_C-TCX4A5M-004 | E5_C-TCX4D5M-004 |
| | | | | – | 4 | | E5_C-TCX4A5M-005 | E5_C-TCX4D5M-005 |
| | | | | | 6 | Y | E5_C-TCX4A5M-021 | E5_C-TCX4D5M-021 |
| | | | | 1 | 4 | Y | E5_C-TCX4A5M-022 | E5_C-TCX4D5M-022 |

*1 HB = Heater burnout
*2 SSR = Solid state relay
*3 Replace "_" with "A" for E5AC or "E" for E5EC

### E5AC-T/E5EC-T

| Input | Output | Alarms | HB[*1] alarm & SSR[*2] defect detection | Comm. (RS-485) | Event Input | Transfer output | Order code[*3] | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | Model: 100 to 240 VAC | Model: 24VAC/VDC |
| Temperature sensor/ analog | Out 1: Current linear Out 2: Current linear | 4 | – | – | – | – | E5_C-TCC4A5M-000 | E5_C-TCC4D5M-000 |
| | | | | 1 | 2 | | E5_C-TCC4A5M-004 | E5_C-TCC4D5M-004 |
| | | | | – | 4 | | E5_C-TCC4A5M-005 | E5_C-TCC4D5M-005 |
| | | | | | 6 | Y | E5_C-TCC4A5M-021 | E5_C-TCC4D5M-021 |
| | | | | 1 | 4 | Y | E5_C-TCC4A5M-022 | E5_C-TCC4D5M-022 |
| | Out 1: Relay Out 2: Relay | | | – | – | – | E5_C-TRR4A5M-000 | E5_C-TRR4D5M-000 |
| | | | 1 | 1 | 2 | | E5_C-TRR4A5M-008 | E5_C-TRR4D5M-008 |
| | | | | – | 4 | | E5_C-TRR4A5M-010 | E5_C-TRR4D5M-010 |
| | | | | | 6 | Y | E5_C-TRR4A5M-019 | E5_C-TRR4D5M-019 |
| | Out 1: Voltage (pulse) Out 2: Voltage (pulse) | | – | | – | – | E5_C-TQQ4A5M-000 | E5_C-TQQ4D5M-000 |
| | | | 1 | 1 | 2 | | E5_C-TQQ4A5M-008 | E5_C-TQQ4D5M-008 |
| | | | | – | 4 | | E5_C-TQQ4A5M-010 | E5_C-TQQ4D5M-010 |
| | | | | | 6 | Y | E5_C-TQQ4A5M-019 | E5_C-TQQ4D5M-019 |
| | Out 1: Voltage (pulse) Out 2: Relay | | – | | – | – | E5_C-TQR4A5M-000 | E5_C-TQR4D5M-000 |
| | | | 1 | 1 | 2 | | E5_C-TQR4A5M-008 | E5_C-TQR4D5M-008 |
| | | | | – | 4 | | E5_C-TQR4A5M-010 | E5_C-TQR4D5M-010 |
| | | | | | 6 | Y | E5_C-TQR4A5M-019 | E5_C-TQR4D5M-019 |
| | Out 1: Current linear Out 2: Voltage (pulse) | | – | | – | – | E5_C-TCQ4A5M-000 | E5_C-TCQ4D5M-000 |
| | | | 1 | 1 | 2 | | E5_C-TCQ4A5M-008 | E5_C-TCQ4D5M-008 |
| | | | | – | 4 | | E5_C-TCQ4A5M-010 | E5_C-TCQ4D5M-010 |
| | | | | | 6 | Y | E5_C-TCQ4A5M-019 | E5_C-TCQ4D5M-019 |
| | Out 1: Relay Out 2: Relay (Valve control) | | – | | – | – | E5_C-TPR4A5M-000 | E5_C-TPR4D5M-000 |
| | | | | 1 | 2 | | E5_C-TPR4A5M-004 | E5_C-TPR4D5M-004 |
| | | | | | 4 | Y | E5_C-TPR4A5M-022 | E5_C-TPR4D5M-022 |

[*1] HB = Heater burnout
[*2] SSR = Solid state relay
[*3] Replace "_" with "A" for E5AC or "E" for E5EC

## Specifications

### E5CC-T/E5AC-T/E5EC-T

| | E5CC-T | E5EC-T | E5AC-T |
|---|---|---|---|
| Sizes in mm (W × H × D) | 48×48×60 | 48×96×60 | 96×96×60 |
| Supply voltage | 100 to 240 VAC 50/60Hz or 24 VAC/VDC | | |
| Sensor input | Temperature input Thermocouple: K, J, T, E, L, U, N, R, S, B, W, or PL II Platinum resistance thermometer: Pt100 or JPt100 Infrared temperature sensor (ES1B): 10 to 70°C, 60 to 120°C, 115 to 165°C, or 140 to 260°C Analog input Current input: 4 to 20 mA or 0 to 20 mA Voltage input: 1 to 5 V, 0 to 5 V, or 0 to 10 V | | |
| Control mode | 2-PID control (with auto-tuning) or ON/OFF control | | |
| Accuracy | Thermocouple: (±0.3% of indication value or ±1°C, whichever is greater) ±1 digit max. /Platinum resistance thermometer: (±0.2% of indication value or ±0.8°C, whichever is greater) ±1 digit max.Analog input: ±0.2% FS ±1 digit max.CT input: ±5% FS ±1 digit max.Potentiometer input: ±5% FS ±1 digit max. | | |
| Functions | Manual output, heating/cooling control, loop burnout alarm, other alarm functions, heater burnout (HB) alarm (including SSR failure (HS) alarm), 40% AT, 100% AT, MV limiter, input digital filter, robust tuning, PV input shift, protection functions, extraction of square root, MV change rate limit, logic operations, temperature status display, moving average of input value, and display brightness setting | | |
| Programs / segments | 8/32 | | |
| PID sets | 8 | | |
| Communication | RS-485 (multi-drop), CompowayF or Modbus RTU | | |
| Event inputs | 2-6 | | |
| QLP (Quick link port) | Yes, via USB and E58-CIFQ2 conversion cable | | |
| Ambient temperature | –10 to 55 °C | | |
| IP rating of front panel | IP66 | | |
| Sampling period time | 50 ms | | |

### E5CC-T/E5AC-T/E5EC-T series optional tools

| | |
|---|---|
| USB PC based configuration cable | E58-CIFQ2 for E5CC-T |
| | E58-CIFQ2 (& E58-CIFQ2-E) for E5AC-T and E5EC-T |

### E5CC-T/E5AC-T/E5EC-T series software

| | |
|---|---|
| CX-Thermo >4.62 | Professional parameterization and cloning software, data-logging, Fine-Tuning, logic operations, easy setting of process steps<br>Operation system: Microsoft Windows XP (Service Pack 3 or higher)/Vista/7/8 |

## Universal compact digital process controllers

The E5_N-H series of process controllers take the proven concept of the general purpose E5_N series to a process level. Main features of the E5_N-H series are universal inputs, process outputs and options such as transfer output, remote setpoint and set-value programmer.

- Control mode: ON/OFF or 2-PID, Valve control on EN-H/AN-H
- Control output: relay, voltage (pulse), SSR, linear current and voltage
- Power supply: 100/240 VAC or 24 VDC/VAC
- Easy PC connection for parameter cloning, setting and tuning
- Clear and intuitive set-up and operation

## Ordering information

| Type | Input | Output | Fixed option | Alarms | Order code | |
|---|---|---|---|---|---|---|
| | | | | | 48x48 mm model (includes supply voltage indication) | |
| On-panel | Universal TC/Pt/mV mA/V | Relay output | – | 3 software alarms 2 SUB outputs | E5CN-HR2M-500 AC100-240 | E5CN-HR2MD-500 AC/DC24 |
| | | Voltage (pulse) | | | E5CN-HQ2M-500 AC100-240 | E5CN-HQ2MD-500 AC/DC24 |
| | | Current output | | | E5CN-HC2M-500 AC100-240 | E5CN-HC2MD-500 AC/DC24 |
| | | Linear voltage output | | | E5CN-HV2M-500 AC100-240 | E5CN-HV2MD-500 AC/DC24 |
| | | Relay output | SV programmer (8 programs of 32 segments) | | E5CN-HTR2M-500 AC100-240 | E5CN-HTR2MD-500 AC/DC24 |
| | | Voltage (pulse) | | | E5CN-HTQ2M-500 AC100-240 | E5CN-HTQ2MD-500 AC/DC24 |
| | | Current output | | | E5CN-HTC2M-500 AC100-240 | E5CN-HTC2MD-500 AC/DC24 |
| | | Linear voltage output | | | E5CN-HTV2M-500 AC100-240 | E5CN-HTV2MD-500 AC/DC24 |

**Note:** - Output and Alarm Relays: 3 A/250 VAC, electrical life: 100,000 operations
- Output voltage (pulse): 12 V, 21 mA (ie. to drive solid state relays)
- Linear current: 0(4) to 20 mA
- Linear voltage output: 0 to 10 V

### Accessories

**E5CN-H option boards**

(One slot available in each instrument)

| Option | | | | Order code |
|---|---|---|---|---|
| Event inputs | | | | E53-CNBN2 |
| Event inputs | Control output 2 Voltage (for driving SSR) | | | E53-CNQBN2 |
| Event inputs | | | Heater burnout/SSR failure/Heater overcurrent detection | E53-CNHBN2 |
| Event inputs | | Transfer output | | E53-CNBFN2 |
| Communications RS-232C | Control output 2 Voltage (for driving SSR) | | | E53-CN01N2 |
| Communications RS-232C | | | | E53-CNQ01N2 |
| Communications RS-232C | | | Heater burnout/SSR failure/Heater overcurrent detection | E53-CNH01N2 |
| Communications RS-485 | | | | E53-CN03N2 |
| Communications RS-485 | Control output 2 Voltage (for driving SSR) | | | E53-CNQO3N2 |
| Communications RS-485 | | | Heater burnout/SSR failure/Heater overcurrent detection | E53-CNH03N2 |
| Communications RS-485 | | | 3-phase heater burnout/SSR failure/ Heater overcurrent detection | E53-CNHH03N2 |
| | Control output 2 Voltage (for driving SSR) | Transfer output | | E53-CNQFN2 |
| | Control output 2 Voltage (for driving SSR) | | Heater burnout/SSR failure/Heater overcurrent detection | E53-CNQHN2 |
| | Control output 2 Voltage (for driving SSR) | | 3-phase heater burnout/SSR failure/ Heater overcurrent detection | E53-CNQHHN2 |

| Control method | Auxiliary output | Control output 1/2 | Heater burnout | Transfer output | Order code (includes supply voltage indication) | |
|---|---|---|---|---|---|---|
| | | | | | 96 × 96 mm model | 48 × 96 mm model |
| Basic | 2 alarm relays | none fitted, 2 slots | 1-phase | | E5AN-HAA2HBM-500 AC100-240 | E5EN-HAA2HBM-500 AC100-240 |
| | | none fitted, 2 slots | | | E5AN-HAA2HBMD-500 AC/DC24 | E5EN-HAA2HBMD-500 AC/DC24 |
| | | 2 SSR output fitted | | | E5AN-HSS2HBM-500 AC100-240 | E5EN-HSS2HBM-500 AC100-240 |
| | | 2 SSR output fitted | | | E5AN-HSS2HBMD-500 AC/DC24 | E5EN-HSS2HBMD-500 AC/DC24 |
| | | none fitted, 2 slots | 3-phase | 4 to 20 mA output | E5AN-HAA2HHBFM-500 AC100-240 | E5EN-HAA2HHBFM-500 AC100-240 |
| | | none fitted, 2 slots | | | E5AN-HAA2HHBFMD-500 AC/DC24 | E5EN-HAA2HHBFMD-500 AC/DC24 |
| | | 2 SSR output fitted | | | E5AN-HSS2HHBFM-500 AC100-240 | E5EN-HSS2HHBFM-500 AC100-240 |
| | | 2 SSR output fitted | | | E5AN-HSS2HHBFMD-500 AC/DC24 | E5EN-HSS2HHBFMD-500 AC/DC24 |
| | 3 alarm relays | none fitted, 2 slots | | | E5AN-HAA3BFM-500 AC100-240 | E5EN-HAA3BFM-500 AC100-240 |
| | | none fitted, 2 slots | | | E5AN-HAA3BFMD-500 AC/DC24 | E5EN-HAA3BFMD-500 AC/DC24 |
| | | 2 SSR output fitted | | | E5AN-HSS3BFM-500 AC100-240 | E5EN-HSS3BFM-500 AC100-240 |
| | | 2 SSR output fitted | | | E5AN-HSS3BFMD-500 AC/DC24 | E5EN-HSS3BFMD-500 AC/DC24 |
| Valve controller | 2 alarm relays | 2 relay output fitted | | | E5AN-HPRR2BM-500 AC100-240 | E5EN-HPRR2BM-500 AC100-240 |
| | | | | | E5AN-HPRR2BMD-500 AC/DC24 | E5EN-HPRR2BMD-500 AC/DC24 |
| | | | | 4 to 20 mA output | E5AN-HPRR2BFM-500 AC100-240 | E5EN-HPRR2BFM-500 AC100-240 |
| | | | | | E5AN-HPRR2BFMD-500 AC/DC24 | E5EN-HPRR2BFMD-500 AC/DC24 |
| SV programmer (8 programs of 32 segments | 2 alarm relays | none fitted, 2 slots | 1-phase | | E5AN-HTAA2HBM-500 | E5EN-HTAA2HBM-500 AC100-240 |
| | | | | | E5AN-HTAA2HBMD-500 | E5EN-HTAA2HBMD-500 AC/DC24 |
| | | | 3-phase | 4 to 20 mA output | E5AN-HTAA2HHBFM-500 | E5EN-HTAA2HHBFM-500 |
| | | | | | E5AN-HTAA2HHBFMD-500 | E5EN-HTAA2HHBFMD-500 |
| | 3 alarm relays | | | | E5AN-HTAA3BFM-500 | E5EN-HTAA3BFM-500 |
| | | | | | E5AN-HTAA3BFMD-500 | E5EN-HTAA3BFMD-500 |
| SV programmer and valve controller | 2 alarm relays | 2 relay output fitted | | | E5AN-HTPRR2BM-500 | E5EN-HTPRR2BM-500 |
| | | | | | E5AN-HTPRR2BMD-500 | E5EN-HTPRR2BMD-500 |
| | | | | 4 to 20 mA output | E5AN-HTPRR2BFM-500 | E5EN-HTPRR2BFM-500 |
| | | | | | E5AN-HTPRR2BFMD-500 | E5EN-HTPRR2BFMD-500 |

**Note:** - All E5EN-H/AN-H have 2 event inputs
- All E5EN-H/AN-H have Remote Setpoint 4 to 20 mA input

### Specifications E5CN-H/EN-H/AN-H

| | E5CN-H(T) | E5EN-H(T) | E5AN-H(T) |
|---|---|---|---|
| **Supply voltage** | 100 to 240 VAC 50/60 Hz or 24 VAC, 50/60Hz; 24 VDC | | |
| **Sensor input** | Thermocouple: K, J, T, E, L, U, N, R, S, B, W or PL II | | |
| | Platinum resistance thermometer: Pt100 or JPt100 | | |
| | Current input: 4 to 20 mA or 0 to 20 mA | | |
| | Voltage input: 1 to 5 V, 0 to 5 V or 0 to 10 V | | |
| **Control mode** | ON/OFF, 2-PID and valve (PRR) | | |
| **Accuracy** | Thermocouple: (± 0.1% of indicated value or ±1°C, whichever is greater) ± digit max.<br>Platinum resistance thermometer: (± 0.1% of indicated value or ± 0.5°C, whichever is greater) ± 1 digit max.<br>Analog input: ± 0.1% FS ± 1 digit max. | | |
| **Auto-tuning** | yes, 40% and 100% MV output limit selection. When using Heat/Cool: automatic cool gain adjustment | | |
| **Self-tuning** | yes | | |
| **RS-232C/RS-422/RS-485** | optional, CompowayF or Modbus selectable | | |
| **Event input** | Optional (Standard 2 event input in EN-H/AN-H) | | |
| **QLP port (USB connection PC)** | yes | | |
| **Ambient temperature** | –10 to 55°C | | |
| **IP Rating front panel** | IP66 | | |
| **Sampling period** | 60 ms | | |
| **Sizes[*1] in mm (W × H × D)** | 48×48×76.5 | 48×96×77.2 | 96×96×77.2 |

[*1] With mounted terminal cover

### E5AN-H/EN-H output option boards

(2 slots available in E5_N-HAA__-500 models: SS models have 2 fixed SSR output modules)

| Option | Order code |
|---|---|
| Relay | E53-RN |
| Voltage (pulse) PNP 12 VDC | E53-QN |
| Voltage (pulse) NPN 24 VDC | E53-Q3 |
| Voltage (pulse) PNP 24 VDC | E53-Q4 |
| Linear 4 to 20 mA | E53-C3N |
| Linear 0 to 20 mA | E53-C3DN |
| Linear 0 to 10 V | E53-V34N |
| Linear 0 to 5 V | E53-V35N |

### E5AN-H/EN-H option boards

(one slot available in each instrument)

| Option | Order code |
|---|---|
| RS-232C communications (CompoWay/F/Modbus) | E53-EN01 |
| RS-422 communications (CompoWay/F/Modbus) | E53-EN02 |
| RS-485 communications (CompoWay/F/Modbus) | E53-EN03 |
| Event input | E53-AKB |

### E5AN-H/EN-H series optional tools

| Option | | Order code |
|---|---|---|
| USB PC based configuration cable |  | E58-CIFQ1 |
| PC based configuration and tuning software | CX-Thermo | EST2-2C-MV4 |

## Fast, accurate and equipped for application specific needs

The E5_R series provides you with high accuracy inputs (0.01°C for Pt100) and a 50 ms sample and control cycle for all four loops. Its unique Disturbance Overshoot Reduction Adjustment ensures solid, robust control.

- Easy and clear read-out thanks to bright Liquid Crystal Display
- Exceptional versatility – multi-loop control, cascade control, and valve control
- Easy integration with DeviceNet, PROFIBUS or Modbus
- SV programmer optional, 32 programs with up to 256 segments

## Ordering information

| Function | Loops | Input analog | Event Inputs | Number of outputs | Outputs | AUX outputs | Communication | Order code (96 × 96 mm) | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | 100 to 240 VAC | 24 VAC/DC |
| standard | 1 | 1 | 2 | 2 | QC,Q | 4R | – | E5AR-Q4B AC100-240 | E5AR-Q4B AC/DC24 |
| standard | 1 | 1 | 2 | 2 | QC,Q | 4R | RS-485 | E5AR-Q43B-FLK AC100-240V | |
| standard | 1 | 1 | 6 | 2 | QC,Q | 4R | RS-485 | E5AR-Q43DB-FLK AC100-240V | |
| standard | 1 | 1 | 6 | 4 | QC,Q,C,C | 4R | RS-485 | E5AR-QC43DB-FLK AC100-240 | E5AR-QC43DB-FLK AC/DC24 |
| standard | max 2 | 2 | 4 | 2 | QC,Q | 4R | RS-485 | E5AR-Q43DW-FLK AC100-240V | |
| standard | max 2 | 2 | 4 | 4 | QC,Q,QC,Q | 4R | RS-485 | E5AR-QQ43DW-FLK AC100-240 | E5AR-QQ43DW-FLK AC/24 |
| standard | max 4 | 4 | 4 | 4 | QC,Q,QC,Q | 4R | RS-485 | E5AR-QQ43DWW-FLK AC100-240V | |
| standard | 1 | 1 | 2 | 2 | C,C | 4R | – | E5AR-C4B AC100-240 | E5AR-C4B AC/DC24 |
| standard | 1 | 1 | 2 | 2 | C,C | 4R | RS-485 | E5AR-C43B-FLK AC100-240V | |
| standard | 1 | 1 | 6 | 2 | C,C | 4R | RS-485 | E5AR-C43DB-FLK AC100-240V | |
| standard | max 2 | 2 | 4 | 2 | C,C | 4R | RS-485 | E5AR-C43DW-FLK AC100-240V | |
| standard | max 4 | 4 | 4 | 4 | C,C,C,C | 4R | RS-485 | E5AR-CC43DWW-FLK AC100-240 | E5AR-CC43DWW-FLK AC/DC24 |
| valve | 1 | 1 + pot | 4 | 2 | R,R | 4R | – | E5AR-PR4DF AC100-240 | E5AR-PR4DF AC/DC24 |
| valve | 1 | 1 + pot | 4 | 4 | R,R,QC,Q | 4R | RS-485 | E5AR-PRQ43DF-FLK AC100-240 | E5AR-PRQ43DF-FLK AC/DC24 |
| standard | 1 | 1 | 2 | 2 | QC,Q | 4R | DeviceNet | E5AR-Q4B-DRT AC100-240V | E5AR-Q4B-DRT AC24V |
| standard | 1 | 1 | 2 | 4 | QC,Q,C,C | 4R | DeviceNet | E5AR-QC4B-DRT AC100-240V | E5AR-QC4B-DRT AC24V |
| standard | max 2 | 2 | – | 4 | QC,Q,QC,Q | 4R | DeviceNet | E5AR-QQ4W-DRT AC100-240V | E5AR-QQ4W-DRT AC24V |
| standard | 1 | 1 | 2 | 2 | C,C | 4R | DeviceNet | E5AR-C4B-DRT AC100-240V | E5AR-C4B-DRT AC24V |
| standard | max 4 | 4 | – | 4 | C,C,C,C | 4R | DeviceNet | E5AR-CC4WW-DRT AC100-240V | |
| valve | 1 | 1 + pot | – | 2 | R,R | 4R | DeviceNet | E5AR-PR4F-DRT AC100-240V | E5AR-PR4F-DRT AC24V |
| valve | 1 | 1 + pot | – | 4 | R,R,QC,Q | 4R | DeviceNet | E5AR-PRQ4F-DRT AC100-240V | E5AR-PRQ4F-DRT AC24V |
| SV programmer | 1 | 1 | 2 | 2 | QC,Q | 4R | – | E5AR-TQ4B AC100-240 | E5AR-TQ4B AC/DC24 |
| SV programmer | 1 | 1 | 2 | 2 | C,C | 4R | – | E5AR-TC4B AC100-240 | E5AR-TC4B AC/DC24 |
| SV programmer | 1 | 1 | 2 | 2 | QC,Q | 4R | RS-485 | E5AR-TQ43B-FLK AC100-240 | |
| SV programmer | 1 | 1 | 2 | 2 | C,C | 4R | RS-485 | E5AR-TC43B-FLK AC100-240 | |
| SV programmer | 1 | 1 | 10 | 2 | QC,Q | 10T | RS-485 | E5AR-TQE3MB-FLK AC100-240 | |
| SV programmer | 1 | 1 | 10 | 2 | C,C | 10T | RS-485 | E5AR-TCE3MB-FLK AC100-240 | |
| SV programmer | 1 | 1 | 10 | 4 | QC,Q,C,C | 10T | RS-485 | E5AR-TQCE3MB-FLK AC100-240V | E5AR-TQCE3MB-FLK AC/DC24 |
| SV programmer | max 2 | 2 | 4 | 2 | QC,Q | 4R | RS-485 | E5AR-TQ43DW-FLK AC100-240 | |
| SV programmer | max 2 | 2 | 4 | 2 | C,C | 4R | RS-485 | E5AR-TC43DW-FLK AC100-240 | |
| SV programmer | max 2 | 2 | 8 | 4 | QC,Q,QC,Q | 10T | RS-485 | E5AR-TQQE3MW-FLK AC100-240 | E5AR-TQQE3MW-FLK AC/DC24 |
| SV programmer | max 4 | 4 | 8 | 2 | C,C,C,C | 10T | RS-485 | E5AR-TCCE3MWW-FLK AC100-240 | E5AR-TCCE3MWW-FLK AC/DC24 |
| SV programmer | max 4 | 4 | 8 | 4 | QC,Q,QC,Q | 10T | RS-485 | E5AR-TQQE3MWW-FLK AC100-240 | |
| SV programmer + valve | 1 | 1 + pot | 4 | 2 | R,R | 4R | – | E5AR-TPR4DF AC100-240 | E5AR-TPR4DF AC/DC24 |
| SV programmer + valve | 1 | 1 + pot | 8 | 4 | R,R,QC,Q | 10T | RS-485 | E5AR-TPRQE3MF-FLK AC100-240 | E5AR-TPRQE3MF-FLK AC/DC24 |

**Note**
- Standard = heat and/or cool PID control, valve = valve positioning (relay up/down) (PRR)
- max 2 = 2 loops heat and/or cool or 1 loop cascade, ratio or remote SP
- max 4 = 4 loops heat and/or cool
- 1, 2 or 4 = number of analog universal input 1 + pot = 1 universal and 1 slide wire feedback from valve
- QC = voltage (pulse) or current (switch), Q = voltage (pulse), C = current, 4R = 4 two pole relay, 2T = two transistor output NPN

| Function | Loops | Input analog | Event Inputs | Number of outputs | Outputs | AUX outputs | Communication | Order code (48 × 96 mm) | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | 100 to 240 VAC | 24 VAC/DC |
| standard | 1 | 1 | 2 | 2 | QC+Q | 4R | – | E5ER-Q4B AC100-240 | E5ER-Q4B AC/DC24 |
| standard | 1 | 1 | 2 | 2 | QC+Q | 4R | RS-485 | E5ER-Q43B-FLK AC100-240V | |
| standard | 1 | 1 | 2 | 4 | QC+Q+C+C | 4R | RS-485 | E5ER-QC43B-FLK AC100-240 | E5ER-QC43B-FLK AC/DC24 |
| standard | 1 | 1 | 6 | 2 | QC+Q | 2T | RS-485 | E5ER-QT3DB-FLK AC100-240V | |
| standard | max 2 | 2 | 4 | 2 | QC+Q | 2T | RS-485 | E5ER-QT3DW-FLK AC100-240 | E5ER-QT3DW-FLK AC/DC24 |
| standard | 1 | 1 | 2 | 2 | C+C | 4R | – | E5ER-C4B AC100-240 | E5ER-C4B AC/DC24 |
| standard | 1 | 1 | 2 | 2 | C+C | 4R | RS-485 | E5ER-C43B-FLK AC100-240V | |
| standard | 1 | 1 | 6 | 2 | C+C | 2T | RS-485 | E5ER-CT3DB-FLK AC100-240V | |
| standard | max 2 | 2 | 4 | 2 | C+C | 2T | RS-485 | E5ER-CT3DW-FLK AC100-240 | E5ER-CT3DW-FLK AC/DC24 |
| valve | 1 | 1 + pot | 4 | 2 | R+R | 2T | – | E5ER-PRTDF AC100-240 | E5ER-PRTDF AC/DC24 |
| valve | 1 | 1 + pot | – | 4 | R+R+QC+Q | 4R | RS-485 | E5ER-PRQ43F-FLK AC100-240 | E5ER-PRQ43F-FLK AC/DC24 |
| standard | 1 | 1 | 2 | 2 | QC+Q | 2T | DeviceNet | E5ER-QTB-DRT AC100-240V | E5ER-QTB-DRT AC24V |
| standard | max 2 | 2 | – | 2 | QC+Q | 2T | DeviceNet | E5ER-QTW-DRT AC100-240V | E5ER-QTW-DRT AC24V |
| standard | 1 | 1 | 2 | 2 | C+C | 2T | DeviceNet | E5ER-CTB-DRT AC100-240V | E5ER-CTB-DRT AC24V |
| standard | max 2 | 2 | – | 2 | C+C | 2T | DeviceNet | E5ER-CTW-DRT AC100-240V | E5ER-CTW-DRT AC24V |
| valve | 1 | 1 + pot | – | 2 | R+R | 2T | DeviceNet | E5ER-PRTF-DRT AC100-240V | E5ER-PRTF-DRT AC24V |
| SV programmer | 1 | 1 | 2 | 2 | QC+Q | 4R | – | E5ER-TQ4B AC100-240 | E5ER-TQ4B AC/DC24 |
| SV programmer | 1 | 1 | 2 | 2 | C+C | 4R | – | E5ER-TC4B AC100-240 | E5ER-TC4B AC/DC24 |
| SV programmer | 1 | 1 | 2 | 2 | QC+Q | 4R | RS-485 | E5ER-TQC43B-FLK AC100-240 | E5ER-TQC43B-FLK AC/DC24 |
| SV programmer | max 2 | 2 | 4 | 2 | QC+Q | 2T | RS-485 | E5ER-TQT3DW-FLK AC100-240 | E5ER-TQT3DW-FLK AC/DC24 |
| SV programmer | max 2 | 2 | 4 | 2 | C+C | 2T | RS-485 | E5ER-TCT3DW-FLK AC100-240 | E5ER-TCT3DW-FLK AC/DC24 |
| SV programmer + valve | 1 | 1 + pot | 4 | 2 | R+R | 2T | – | E5ER-TPRTDF AC100-240 | E5ER-TPRTDF AC/DC24 |
| SV programmer + valve | 1 | 1 + pot | – | 3 | R+R+QC | 4R | RS-485 | E5ER-TPRQ43F-FLK AC100-240 | E5ER-TPRQ43F-FLK AC/DC24 |

**Note**
- Standard = heat and/or cool PID control, valve = valve positioning (relay up/down) (PRR)
- max 2 = 2 loops heat and/or cool or 1 loop cascade, ratio or remote SP
- max 4 = 4 loops heat and/or cool
- 1, 2 or 4 = number of analog universal input 1 + pot = 1 universal and 1 slide wire feedback from valve
- QC = voltage (pulse) or current (switch), Q = voltage (pulse), C = current, 4R = 4 two pole relay, 2T = two transistor output NPN

### Accessories

| Terminal covers | Order code |
|---|---|
| Terminal cover for E5AR | E53-COV14 |
| Terminal cover for E5ER | E53-COV15 |

### E5_R/E5_R-T optional tools

| Option | Order code |
|---|---|
| PC based configuration and tuning software CX-Thermo | EST2-2C-MV4 |

## Specifications

| Item | |
|---|---|
| **Thermocouple input type** | K, J, T, E, L, U, N, R, S, B, W |
| **RTD input type** | Pt100 |
| **Linear input type** | mA, V |
| **Control mode** | 2-PID or ON/OFF control |
| **Accuracy** | ±0.1% FS |
| **Auto-tuning** | yes |
| **RS-485** | optional |
| **Event input** | optional |
| **Ambient temperature** | –10 to 55°C |
| **IP rating front panel** | IP66 |
| **Sampling period** | 50 ms |
| **Size in mm (H×W×D)** | E5ER: 96×48×110<br>E5AR: 96×96×110 |


## CelciuX° (EJ1) - Multi-Loop temperature control – Control and Connectivity

CelciuX° (EJ1) is designed to handle complex temperature profiles thanks to Omron's unique Gradient temperature Control (GTC) algorithm and to offer easy program-less communication with Omron and third-party PLCs and HMI. Above all, CelciuX° (EJ1) incorporates all "simple to use" clever temperature control technology, like 2-PID, disturbance control and various ways of tuning.

- Interfaces to a wide range of industrial networks
- Reduced engineering due to Program-less communications, Smart Active Parts and Function Block Libraries
- Available with screw terminals and screw-less clamp terminals
- One unit handling various types of input, such as Pt, Thermocouple, mA, and V input
- Gradient Temperature Control (GTC)

## Ordering information

| Type | Control points | Control outputs | Auxiliary outputs | Other functions | Terminal | Order code |
|---|---|---|---|---|---|---|
| Basic unit | 2 | 2 voltage (pulse) | 2 transistor (NPN) *1 | 2 CT input *2 + 2 event input | M3 screws | EJ1N-TC2A-QNHB |
| Basic unit | 2 | 2 voltage (pulse) | 2 transistor (NPN) *1 | 2 CT input *2 + 2 event input | Screw-less clamp | EJ1N-TC2B-QNHB |
| Basic unit | 2 | 2 current | 2 transistor (NPN) *1 | 2 event input | M3 screws | EJ1N-TC2A-CNB |
| Basic unit | 2 | 2 current | 2 transistor (NPN) *1 | 2 event input | Screw-less clamp | EJ1N-TC2B-CNB |
| Basic unit | 4 | 4 voltage (pulse) | – | – | M3 screws | EJ1N-TC4A-QQ |
| Basic unit | 4 | 4 voltage (pulse) | – | – | Screw-less clamp | EJ1N-TC4B-QQ |
| High function unit | – | – | 4 transistor (NPN) | 4 event input | M3 screws | EJ1N-HFUA-NFLK |
| High function unit | – | – | 4 transistor (NPN) | 4 event input | Screw-less clamp | EJ1N-HFUB-NFLK |
| DeviceNet unit | – | – | – | – | Screw connector | EJ1N-HFUB-DRT |
| Ethernet unit *3 | – | – | – | – | 3 x RJ45 | EJ1N-HFU-ETN |
| End unit *4 | – | – | 2 transistor (NPN) | – | M3 screws | EJ1C-EDUA-NFLK |
| End unit *4 | – | – | 2 transistor (NPN) | – | Removable Connector | EJ1C-EDUC-NFLK |

*1 For heating/cooling control applications, the auxiliary outputs on the 2-point models are used for cooling control. On the 4-point models, heating/cooling control can be performed for two input points only.
*2 When using the heater burnout alarm, purchase a Current Transformer (E54-CT1 or E54-CT3) separately.
*3 This unit mounts to the left of the CelciuX° (EJ1) configuration and enables PROFINET or Modbus/TCP network connection. Combine the HFU-ETN with an EDU_-NFLK end unit to use with other devices supporting Modbus-RTU like E5_N temperature controllers and MX2 Inverters.
*4 An End unit is always required for connection to a Basic unit or an HFU. An HFU cannot operate without a Basic unit.

| Type | Control points | Control outputs | Auxiliary outputs | Other functions | Terminal | Order code |
|---|---|---|---|---|---|---|
| Basic unit | 2 (GTC) | 2 voltage (pulse) *1 | 2 transistor (NPN) | 2 CT input *2 | M3 screws | EJ1G-TC2A-QNH |
| Basic unit | 2 (GTC) | 2 voltage (pulse) *1 | 2 transistor (NPN) | 2 CT input *2 | Screw-less clamp | EJ1G-TC2B-QNH |
| Basic unit | 4 (GTC) | 4 voltage (pulse) *1 | – | – | M3 screws | EJ1G-TC4A-QQ |
| Basic unit | 4 (GTC) | 4 voltage (pulse) *1 | – | – | Screw-less clamp | EJ1G-TC4B-QQ |
| High function unit | – (GTC) | – | 4 transistor (NPN) | – | M3 screws | EJ1G-HFUA-NFLK |
| High function unit | – (GTC) | – | 4 transistor (NPN) | – | Screw-less clamp | EJ1G-HFUB-NFLK |
| End unit *3 | – | – | 2 transistor (NPN) | – | M3 screws | EJ1C-EDUA-NFLK |
| End unit *3 | – | – | 2 transistor (NPN) | – | Removable Connector | EJ1C-EDUC-NFLK |

*1 Heating/cooling control is not supported for gradient temperature control.
*2 When using the heater burnout alarm, use a Current Transformer (E54-CT1 or E54-CT3) (sold separately).
*3 An End-unit (EDU) is always required to connect an HFU and or a Basic TC unit for Communications and Power supply. A GTC (Gradient Temperature Control) basic TC unit always requires a GTC HFU unit.

### Accessories

#### Current transformer

| Diameter | Order code |
|---|---|
| 5.8 dia. | E54-CT1 |
| 12.0 dia. | E54-CT3 |

#### Communications and cables

| Description | Order code |
|---|---|
| G3ZA connecting cable 5 meter | EJ1C-CBLA050 |
| USB programming cable | E58-CIFQ1 |
| PC based configuration and tuning software CX-Thermo | EST2-2C-MV4 |
| PROFIBUS Gateway | PRT1-SCU11 |

## Specifications

| Item | Type | EJ1_-TC2 | EJ1_-TC4 |
|---|---|---|---|
| Power supply voltage | | 24 VDC | |
| Operating voltage range | | 85% to 110% of rated voltage | |
| Power consumption | | 4 W max. (at maximum load) | 5 W max. (at maximum load) |
| Input (see note)*1 | | Thermocouple: K, J, T, E, L, U, N, R, S, B, W, PLII<br>ES1B Infrared Thermosensor: 10 to 70°C, 60 to 120°C, 115 to 165°C, 140 to 260°C.<br>Analog input: 4 to 20 mA, 0 to 20 mA, 1 to 5 V, 0 to 5 V, 0 to 10 V<br>Platinum resistance thermometer: Pt100, JPt100 | |
| Input impedance | | Current input: 150Ω max., voltage input: 1 MΩ min. | |
| Control outputs | Voltage output | Output voltage: 12 VDC ±15%, max. load current: 21 mA (PNP models with short-circuit protection circuit) | |
| | Transistor output | Max. operating voltage: 30 V, max. load current: 100 mA | – |
| | Current output | Current output range: 4 to 20 mA or 0 to 20 mA DC<br>Load: 500 Ω max. (including transfer output)<br>(Resolution: Approx: 2,800 for 4 to 20 mA DC,<br>approx. 3,500 for 0 to 20 mA DC) | – |
| Event inputs | Input points | 2 | – |
| | Contact input | ON: 1 kΩ max., OFF. 100 kΩ min. | – |
| | Non-contact input | ON: Residual voltage: 1.5 V max.,<br>OFF: Leakage current: 0.1 mA max. | – |
| | | Outflow current: approx. 4 mA per point | – |
| Number of input and control points | | Input points: 2, control points: 2 | Input points: 4, control points: 4 |
| Setting method | | Via communications | |
| Control method | | ON/OFF control or 2-PID (with autotuning, selftuning, Heat & Cool autotuning and non-linear cool output selection) | |
| Other functions | | Two-point input shift, digital input filter, remote SP, SP ramp, manual manipulated variable, manipulated variable limiter, interference overshoot adjustment, loop burnout alarm, RUN/STOP, banks, I/O allocations, etc. | |
| Alarm output | | 2 points via End unit | |
| Communication | | RS-485, PROFIBUS, Modbus, DeviceNet | RS-485, PROFIBUS, Modbus, DeviceNet |
| Size in mm (W×H×D) | | 31×96×109 | |
| Weight | | 180 g | |
| Ambient temperature range | | Operating –10°C to 55°C, Storage –25°C to 65°C (with no icing or condensation) | |
| Ambient humidity range | | Operating 25% to 85% (with no condensation) | |

*1 Inputs are fully multi-input. Therefore, platinum resistance thermometer, thermocouple, infrared thermosensor, and analog input can be selected.

### Dimensions

| Item | Size in mm (H×W×D) |
|---|---|
| EJ1N-HFU_-NFL_ | 95.4×31.0×104.9/109.0 |
| EJ1N-HFUB-DRT | 90.9×31.0×82.2 |
| EJ1C-EDU | 95.4×15.7×76.2/79.7 |

## Temperature sensors for standard applications

E52-E temperature sensors and thermocouples provide accurate temperature sensing for standard and challenging environments and include a wide range of mounting and connection options.
For best control results, the E52-E series is optimized to operate perfectly with suitable E5_ temperature controllers.

- Thermocouples and PT100 elements
- Wide range of housing, mounting and connection options
- Best performance match with temperature controllers from the E5_ portfolio

## Ordering information

| Line-Type | Series | Technology | Sub-Type | Min [°C] | Max [°C] | Dia. [mm] | Length [mm] | Material | Type | Fixing | Length [m] | Order code |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PRO-Line | Smooth tube | t/c*1 | T | –80 | 400 | 3 | 100 | SUS 316 | 2-wire | pre-wired with cable end shoes | 2 | E52-ETT3-100-2-A |
| | | | | | | 6 | | | | | | E52-ETT6-100-2-A |
| | | | J | | 600 | 1 | | | | | | E52-ETJ1-100-2-A |
| | | | | | | 2 | | | | | | E52-ETJ2-100-2-A |
| | | | | | | 3 | | | | | | E52-ETJ3-100-2-A |
| | | | | | | 4.5 | | | | | | E52-ETJ4.5-100-2-A |
| | | | | | | 6 | | | | | | E52-ETJ6-100-2-A |
| Lite-Line | | | | 0 | 400 | 4 | | SUS 304 | | | | E52-ELTJ4-100-2-A |
| | | | | | | 5 | | | | | | E52-ELTJ5-100-2-A |
| | | | | | | 6 | | | | | | E52-ELTJ6-100-2-A |
| | | | | | | 8 | | | | | | E52-ELTJ8-100-2-A |
| Pro-Line | | | K | –80 | 1100 | 1 | | INCONEL 600 | | | | E52-ETK1-100-2-A |
| | | | | | | 2 | | | | | | E52-ETK2-100-2-A |
| | | | | | | 3 | | | | | | E52-ETK3-100-2-A |
| | | | | | | 4.5 | | | | | | E52-ETK4.5-100-2-A |
| | | | | | | 6 | | | | | | E52-ETK6-100-2-A |
| Lite-Line | | | | 0 | 400 | 4 | | SUS 304 | | | | E52-ELTK4-100-2-A |
| | | | | | | 5 | | | | | | E52-ELTK5-100-2-A |
| | | | | | | 6 | | | | | | E52-ELTK6-100-2-A |
| | | | | | | 8 | | | | | | E52-ELTK8-100-2-A |
| Pro-Line | | PT100 | class B | –50 | 500 | 3 | 250 | SUS 316 | 3-wire | pre-wired with open cable ends | | E52-EP3-250-2-B |
| | | | | | | 6 | | | | | | E52-EP6-250-2-B |
| Lite-Line | | | | 0 | 400 | 4 | 50 | SUS 304 | | | | E52-ELP4-50-2-A |
| | | | | | | 5 | 100 | | | | | E52-ELP5-100-2-A |
| | | | | | | 6 | | | | | | E52-ELP6-100-2-A |
| | | | | | | 8 | | | | | | E52-ELP8-100-2-A |
| Pro-Line | Bayonet mounting | | | –50 | | 6 | 35 | SUS 316 | | | | E52-EP6-35-2-BG1/4G-B |
| | Enclosed terminals, smooth tube | | | | 500 | | 200 | | 2-wire | enclosed screw terminals | – | E52-EP6-200-T2-B |
| | Bayonet mounting | t/c*1 | J | 0 | 400 | | 15 | | | pre-wired with open cable ends | 2 | E52-ETJ6-15-2-BG1/4G-B |
| | Enclosed terminals, smooth tube | | K | | 1150 | | 200 | INCONEL 600 | | enclosed screw terminals | – | E52-ETK6-200-T2-B |
| | | | J | | 720 | | | SUS 316 | | | | E52-ETJ6-200-T2-B |
| | Enclosed terminals, G1/2"g; mounting | | K | | 1150 | | | INCONEL 600 | | | | E52-ETK6-200-T2-CG1/2G-B |
| | | | J | | 720 | | | SUS 316 | | | | E52-ETJ6-200-T2-CG1/2G-B |
| | | PT100 | class B | –50 | 500 | | | | 3-wire | | | E52-EP6-200-T2-CG1/2G-B |
| | Enclosed terminals, clamp mounting 1.5" | | | | 200 | | 100 | | | | | E52-EP6-100-T2-CC1.5-B |
| | Enclosed terminals, clamp mounting 2" | | | | | | | | | | | E52-EP6-100-T2-CC2-B |
| Pro$^{plus}$-Line | Surface temperature | t/c*1 | J | 0 | 250 | 10 | dia | Cu (tin plated) | 2-wire | pre-wired with open cable ends | 2 | E52-ETJS1-B |
| | Environmental temperature | PT100 | class B | –40 | 80 | – | – | Aluminium | 3-wire | enclosed screw terminals | – | E52-EPE1-B |
| | | | | | | | | PVC | | | | E52-EPE2-B |
| | Non-contact | IR*2 | up to 60 mm | 10 | 260 | M18 | 44.5 | ABS | 4-wire | pre-wired with open cable ends | 3 | ES1B |
| | | | up to 1000 mm | 0 | 400 | | 120 | SUS 304 | 5-wire | | 2 | ES1C-A40 |

*1 t/c = Thermocouple
*2 IR = Infrared Sensor

**Note:** Further types with different dia., tube & cable lengths and other confectioning are available on request.

## Omron's intelligent PROFIBUS and CompoWay/F gateway

This gateway supports all CompoWay/F equipped products, including temperature controllers, digital panel indicators, etc. It can also be used for connecting MCW151-E and E5_K series.

- Cost-effectively integrates basic instruments into a PROFIBUS network
- Requires no complex protocol conversion writing
- Has function blocks for drag-and-drop configuration
- Connects up to 15 instruments to a single PROFIBUS point

### Ordering information

| Name | Order code |
|---|---|
| PROFIBUS remote terminal serial communications unit | PRT1-SCU11 |

Supports all CompoWay/F equipped units, but has "drag-and-drop" function blocks for

- E5AN/E5EN/E5CN/E5GN
- E5ZN and CelciuX° (EJ1)
- E5AR/E5ER
- E5AK/E5EK

### Specifications

| Item | PRT1-SCU11 |
|---|---|
| Storage temperature | –20 to +75°C |
| Ambient temperature | 0 to 55°C |
| Ambient humidity | 10 to 90% (non-condensing) |
| EMC compliance | EN 50081-2, EN 61131-2 |
| Power supply | +24 VDC (+10%/–15%)<br>Current consumption 80 mA (typical) |
| Weight | 125 g (typical) |
| Communication interface | RS-485 based PROFIBUS-DP<br>RS-422A Host link<br>RS-485 CompoWay/F<br>RS-232C Peripheral<br>Port supporting connection to thermotools |
| Size in mm (H×W×D) | 90×40×65 |

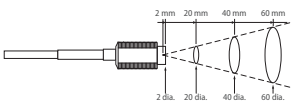
# ES1B

## Achieve low-cost measurements with an infrared thermosensor

This infrared thermosensor provides an accurate, stable and cost-effective way to measure the temperature of objects. It behaves just like a standard K-type thermocouple, which enables it to operate with any temperature controller or alarm unit.

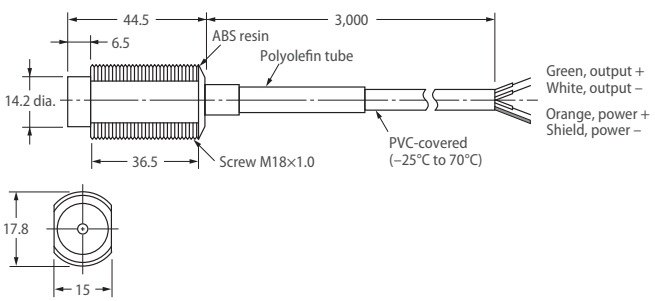
- Cost-effective infrared thermosensor
- Contactless, meaning no deterioration, unlike thermocouples
- 4 temperature ranges available: 10-70°C, 60-120°C, 115-165°C and 140-260°C
- Response speed 300 ms

### Ordering information

| Appearance and sensing characteristics | Specification | Order code |
|---|---|---|
|  | 10 to 70°C | ES1B 10-70C |
| | 60 to 120°C | ES1B 60-120C |
| | 115 to 165°C | ES1B 115-165C |
| | 140 to 260°C | ES1B 140-260C |



### Dimensions (unit: mm)





### Specifications

| Item | | ES1B |
|---|---|---|
| Power supply voltage | | 12/24 VDC |
| Current consumption | | 20 mA max. |
| Accuracy | ±5°C | ±2% PV or ±2°C, whichever is larger |
| | ±10°C | ±4% PV or ±4°C, whichever is larger |
| | ±30°C | ±6% PV or ±6°C, whichever is larger |
| | ±40°C | ±8% PV or ±8°C, whichever is larger |
| Reproducibility | | ±1% PV or ±1°C, whichever is larger |
| Temperature drift | | 0.4°C/°C max. |
| Receiver element | | Thermopile |
| Response speed | | Approximately 300 ms at response rate of 63% |
| Operating temperature | | –25 to 70°C (with no icing or condensation) |
| Allowable ambient humidity | | 35 to 85% |
| Degree of protection | | IP65 |
| Size in mm | | head: 17.8 dia.×44.5 (screw M18×1.0),<br>cable 3,000 |

## Achieve Superior Environmental Resistance and a Wide Measurement Range of 0 to 400°C.

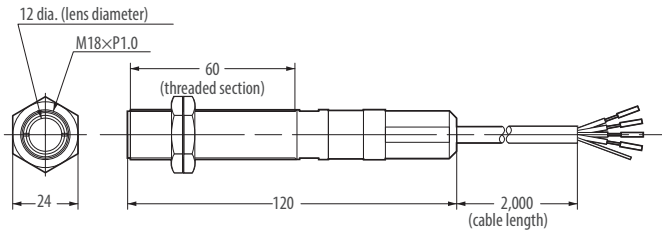
This infrared thermosensor provides an fast, accurate and very stable way to measure the temperature of objects. Its output provides a universal 4-20 mA, which enables it to operate with many temperature controllers or PLCs.

- Flexible placement with slim cylindrical shape and long focus with a distance of 500 mm and area diameter of 80 mm.
- The SUS body and silicon lens resist ambient operating temperatures of up to 70°C and resist dust and water to the equivalent of IP67.
- Fast measurement with high-speed response of 100 ms/90%.
- Strong resistance to noise with output of 4 to 20 mA.

### Ordering information

| Specification (measuring temperature range) | Order code |
|---|---|
| 0 to 400°C | ES1C-A40 |

### Dimensions (unit: mm)




### Ratings and Characteristics

| Item | Model | ES1C |
|---|---|---|
| Power supply voltage | | 12 to 24 VDC |
| Operating voltage range | | 90% to 110% of rated voltage |
| Current consumption | | 70 mA max. |
| Measuring temperature range | | 0 to 400°C |
| Measurement accuracy | | 0 to 200°C: ±2°C, 201 to 400°C: ±1% (emissivity: 0.95) |
| Response time | | 100 ms/90% |
| Reproducibility | | ±1°C of reading value |
| Emissivity | | 0.95 fixed |
| Current output | | 4 to 20 mA DC, Load: 250 Ω max. |
| Ambient temperature range | | Operating: 0 to 70°C, Storage: –20 to 70°C (with no icing or condensation) |
| Ambient humidity range | | Operating and storage: 35% to 85% |
| Vibration resistance (destruction) | | 1.5-mm amplitude at 10 to 55 Hz for 2 hours each in the X, Y, and Z directions |
| Weight | | 180 g |
| Degree of protection | | Equivalent to IP67 |

# EJ1N-HFU-ETN

## Connect Modbus slaves to ETHERNET

The EJ1N-HFU-ETN provides the solution to connect a CelciuX° (EJ1) in-panel multi-loop PID controller to PROFINET and Modbus/TCP. Although built on the CelciuX° (EJ1) platform, this unit can be used as a gateway for discrete Modbus units when only using the EJ1N-EDU endplate.

- Connects Modbus serial slaves to PROFINET and Modbus/TCP
- Built for integration into the CelciuX° (EJ1)
- Usable as a gateway for discrete units like E5_N-series temperature controllers and MX2 inverters.
- Flexible implementation with standard .gsd files

MODBUS/TCP PROFINET INDUSTRIAL ETHERNET

### Ordering information

| Name | Order code |
|---|---|
| ETHERNET to Serial Gateway | EJ1N-HFU-ETN |

### Specifications

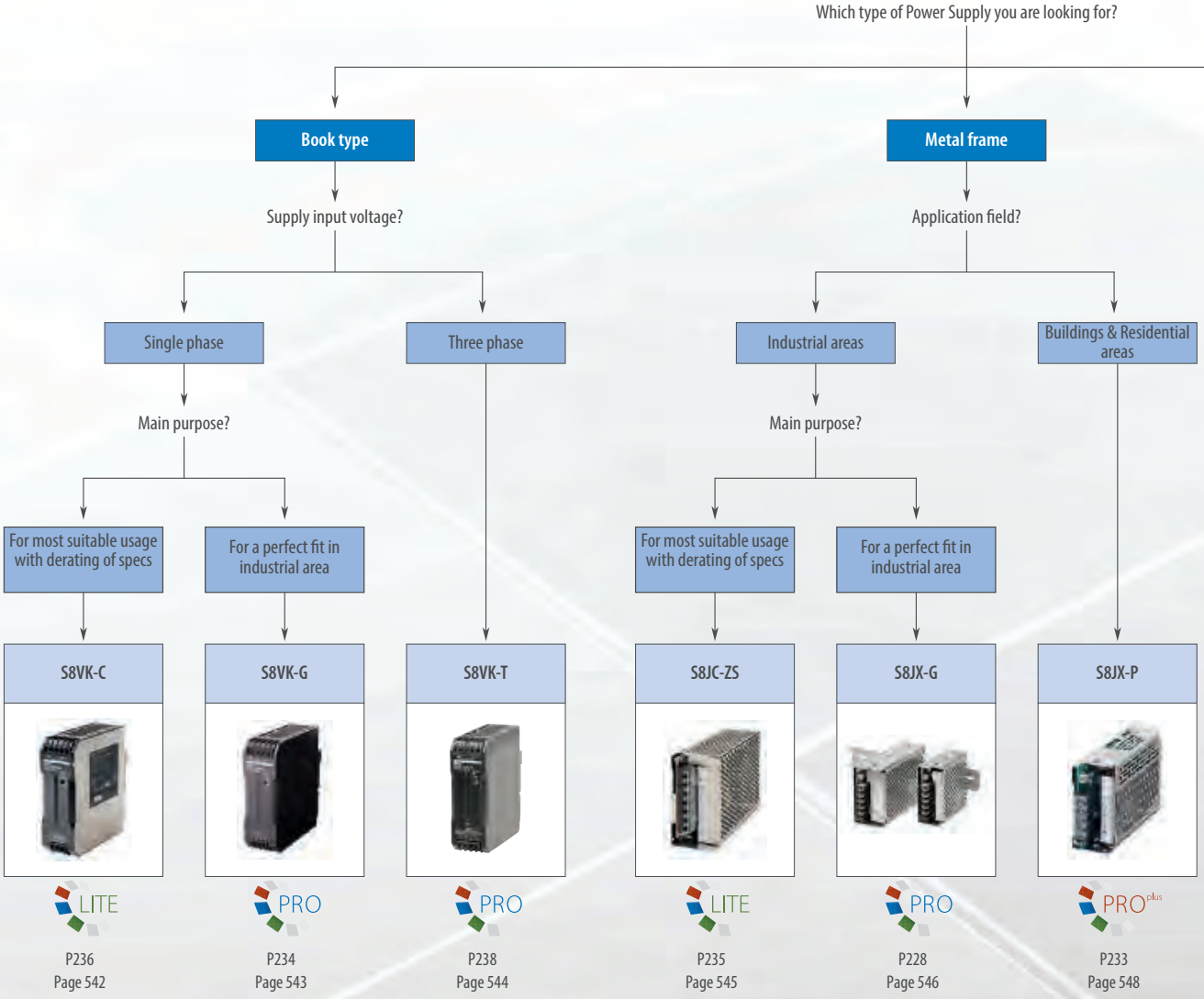
| Item | EJ1N-HFU-ETN |
|---|---|
| PROFINET | IO Device |
| Conformance | Class A |
| Supported RT | Class 1 |
| Minimum Update Rate | 8 ms |
| Number of Modbus RTU nodes | 31 |
| Ambient operating temperature | –10°C to 55°C |
| Ambient operating humidity | 25% to 85% |
| Storage temperature | –20°C to 65°C |
| Weight | 170 g |

# RELIABLE AND EASY OPERATION – WORLDWIDE

## S8VK-G – The right power supply for your application

The S8VK-G offers a wide product range (from 15 W up to 480 W), in a very compact size.
It is 13% smaller than comparable power supplies and the smallest on the market of its type.

- Wide operating temperature range (–40 to +70ºC) to guarantee operation stability
- Double set of DC output terminals (three for the negative) to provide easy wiring
- High efficiency (90%) to reduce energy consumption
- Power Boost functionality (120%)
- Improved DIN-rail mounting clip to provide better vibration resistance and allow for easy installation



DC Backup

Application purpose?

Power supply device

Battery backup

Buffer module

Redundancy unit

Additional unit

Open frame

S8TS

P243
Page 549

S8T-DCBU-01

P244
Page 551

S8T-DCBU-02

P245
Page 551

S8VK-R

PRO plus

P237
Page 552

S8M

P227
Page 553

S8EX

P239
Page 550

# Selection table

| Category | | Book type power supply | | | | | | Metal frame power supply | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | |  | | | |  |  |  | | | |
| Model | | S8VK-G | | | | S8VK-C | S8VK-T | S8JX-P | | | |
| Selection Criteria | Type | Pro line | | | | Lite line | Pro line | Pro plus line | | | |
| | Phases | Single phase | | | | | Three phases | Single phase | | | |
| | Rated voltage | 100 V to 240 VAC (90 to 350 VDC) | | | | 100 V to 240 VAC | 3 × 320 V to 576 VAC | 100 V to 240 VAC | | | |
| | Voltage | 5 V | 12 V | 24 V | 48 V | 24 V | | 5 V | 12 V | 24 V | 48 V |
| Power | 15 W | ■ 3 A | ■ 1.2 A | ■ 0.65 A | – | | | | | | |
| | 25 W | – | | | | | | | | | |
| | 30 W | ■ 5 A | ■ 2.5 A | ■ 1.3 A | – | | | | | | |
| | 35 W | – | | | | | | | | | |
| | 50 W | – | | | | | | ■ 10 A | ■ 4.2 A | ■ 2.1 A | ■ 1.1 A |
| | 60 W | – | ■ 4.5 A | ■ 2.5 A | – | ■ 2.5 A | – | | | | |
| | 90 W | – | | | | | | | | | |
| | 100 W | – | | | | | | ■ 20 A | ■ 8.5 A | ■ 4.5 A | ■ 2.1 A |
| | 120 W | – | | ■ 5 A | – | ■ 5 A | | – | | | |
| | 150 W | – | | | | | | ■ 30 A | ■ 13 A | ■ 6.5 A | ■ 3.3 A |
| | 180 W | – | | | | | | | | | |
| | 240 W | – | | ■ 10 A | ■ 5 A | ■ 10 A | | – | | | |
| | 300 W | – | | | | | | ■ 60 A | ■ 27 A | ■ 14 A | ■ 7 A |
| | 350 W | – | | | | | | | | | |
| | 480 W | – | | ■ 20 A | ■ 10 A | ■ 20 A | | – | | | |
| | 600 W | – | | | | | | ■ 120 A | ■ 53 A | ■ 27 A | ■ 13 A |
| | 960 W | – | | | | | ■ 40 A | – | | | |
| | 1,500 W | – | | | | | | | | | |
| Features | Conformes to EN61000-3-2 | ■ | | | | – | ■ | | | | |
| | DC back-up | – | | | | | | | | | |
| | Capacitor back-up | □ | | | | | □ | □ | | | |
| | Undervoltage alarm | – | | | | | | | | | |
| | Overvoltage protection | ■ | | | | | | | | | |
| | Overload protection | ■ | | | | | | | | | |
| | DIN-rail mounting | ■ | | | | | | | | | |
| | Screw mounting (with bracket) | ■ | | | | | | | | | |
| | EMI Class B | ■ | | | | – | ■ | ■ | | | |
| | UL Class 2 | ■ 15 W, 30 W, 60 W only | | | | – | | | | | |
| | N+1 Redundancy | □ | | | | | | – | | | |
| | Parallel operation | ■ by 2 units | | | | – | ■ by 2 units | ■ 300 W, 600 W only by 5 units | | | |
| | Power Boost | ■ 120% | | | | – | ■ 120% | ■ 300 W, 600 W at 24 V 115% | | | |
| | Page/Quick Link | 543 | | | | 542 | 544 | 548 | | | |

| Metal frame power supply | | | | | | | | Modular | | | Open frame power supply | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | | | | |  | | |  | | |  | | | | | |
| S8JX-G | | | | | S8JC-ZS | | | S8TS | | | S8EX | | | | | |
| Pro line | | | | | Lite line | | | | | | | | | | | |
| Single phase | | | | | | | | | | | | | | | | |
| 100 V to 240 VAC | | | | | 200 V to 240 VAC | | | 100 V to 240 VAC | | | 100 to 240 VAC (85 to 264 VAC) | | | | | |
| 5 V | 12 V | 15 V | 24 V | 48 V | 5 V | 12 V | 24 V | 5 V | 12 V | 24 V | 5 V | 12 V | 15 V | 24 V | 36 V | 48 V |
| ■ 3 A | ■ 1.3 A | ■ 1.0 A | ■ 0.65 A | ■ 0.35 A | ■ 3 A | ■ 1.3 A | ■ 0.7 A | – | | | ■ 3 A | ■ 1.3 A | ■ 1.0 A | ■ 0.7 A | – | ■ 0.32 A |
| – | | | | | | | | ■ 5 A | – | | | | | | | |
| – | | | | | | | | – | ■ 2.5 A | – | ■ 6 A | ■ 2.5 A | ■ 2 A | ■ 1.3 A | – | ■ 0.65 A |
| ■ 7 A | ■ 3 A | ■ 2.4 A | ■ 1.5 A | ■ 0.75 A | ■ 7 A | ■ 3.0 A | ■ 1.5 A | – | | | | | | | | |
| ■ 10 A | ■ 4.2 A | – | ■ 2.1 A | ■ 1.1 A | ■ 10 A | ■ 4.2 A | ■ 2.1 A | – | | | ■ 10 A | ■ 4.3 A | – | ■ 2.1 A | – | ■ 1.1 A |
| – | | | | | | | | | ■ 5 A | ■ 2.5 A | – | | | | | |
| – | | | | | | | | | ■ 7.5 A | – | – | | | | | |
| ■ 20 A | ■ 8.5 A | – | ■ 4.5 A | ■ 2.1 A | ■ 20 A | ■ 8.5 A | ■ 4.5 A | – | | | ■ 20 A | ■ 8.5 A | – | ■ 4.3 A | – | ■ 2.1 A |
| – | | | | | | | | | ■ 10 A | ■ 5 A | | | | | | |
| ■ 30 A | ■ 13 A | – | ■ 6.5 A | ■ 3.3 A | ■ 30 A | ■ 12.5 A | ■ 6.5 A | – | | | ■ 30 A | ■ 12.5 A | – | ■ 6.3 A | – | ■ 3.2 A |
| – | | | | | | | | | | ■ 7.5 A | | | | | | |
| – | | | | | | | | | | ■ 10 A | – | | | ■ 10 A | ■ 6.7 A | ■ 5 A |
| ■ 60 A | ■ 27 A | – | ■ 14 A | ■ 7 A | – | | | | | | | | | | | |
| – | | | | | ■ 60 A | ■ 29 A | ■ 14.6 A | – | | | | | | | | |
| – | | | | | | | | | | | | | | | | |
| ■ 120 A | ■ 53 A | - | ■ 27 A | ■ 13 A | – | | | | | | | | | | | |
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| – | | | | | | | | ■ | ■ 1 unit | | – | | | | | |
| – | | | | | | | | ■ | | | – | | | | | |
| ■ 300 W, 600 W only by 5 units | | | | | – | | | | ■ | | – | | | | | |
| – | | | | | | | | | | | □ | | | | | |
| 546 | | | | | 545 | | | 549 | | | 550 | | | | | |

■ Standard □ Available – No/not available

## The cost effective book type power supply

The S8VK-C Lite family is an ideal choice for cost-sensitive applications that require a dependable high-quality power supply. The S8VK-C have an universal 100 to 240 V 50/60 Hz input capability (DC input (90 to 350 VDC) also possible) and they are available with power ratings from 60 to 480 W.

- Operating temperature range of –25 to 60ºC
- Double set of DC output terminals (three for the negative) provide easy wiring
- Overload and overvoltage protection
- Conforms to EN61204-3, EN55011 Class A

## Ordering information

| Type | Power ratings | Input voltage | Output voltage | Output current | Size (W × H × D) [mm] | Order code |
|---|---|---|---|---|---|---|
| Power supply Single-phase | 60 W | Single phase 100 to 240 VAC<br>Allowable range: 85 to 264 VAC, 90 to 350 VDC | 24 V | 2.5 A | 32 × 90 × 110 | S8VK-C06024 |
| | 120 W | | 24 V | 5 A | 40 × 125 × 113 | S8VK-C12024 |
| | 240 W | | 24 V | 10 A | 60 × 125 × 140 | S8VK-C24024 |
| | 480 W | | 24 V | 20 A | 95 × 125 × 140 | S8VK-C48024 |

## Specifications

| Item | | 60 W | 120 W | 240 W | 480 W |
|---|---|---|---|---|---|
| Efficiency (Typ. at 230 VAC) | | 88% | 89% | 89% | 92% |
| Input | Rated input voltage | 100 to 240 VAC | | | |
| | Allowable range | 85 to 264 VAC, 90 to 350 VDC | | | |
| Output | Voltage adjustment range (with V.ADJ) | –10% to 15% | | | |
| | Input variation influence | 0.5% max. (at 85 to 264 VAC input, 100% load) | | | |
| | Load variation Influence | 1.5% max, at 0% to 100% load | | | |
| | Temperature variation influence | 0.05%/°C max. | | | |
| Overload protection | | Yes | | | |
| Overvoltage protection | | Yes | | | |
| Operating ambient temperature | | –25 to 60°C (–13 to 140°F) | | | |
| Series operation | | Yes, up to 2 units | | | |
| Parallel operation | | No | | | |
| EMI | | Conforms to EN 61204-3, EN 55011 Class A | | | |
| EMS | | Conforms to EN 61204-3 high severity levels | | | |
| Approved standards | | UL: UL 508 (Listing), UL 60950-1, cUL: CSA C22.2 No. 107.1 and No. 60950-1, EN/VDE: EN 50178 (=VDE0160), EN 60950-1 (=VDE0805) | | | |
| Degree of protection | | IP20 by EN/IEC 60529 | | | |

## The standard book type power supply

The standard S8VK-G Pro line is our "install and forget" option, offering longer lifetime, higher protection and more features.The S8VK-G offers a wide product range (from 15 up to 480 W), in a very compact package. There are models available for 5, 12, 24 and 48 VDC output voltage. DC input (90 to 350 VDC) is also available through the whole range.

- Wide operating temperature range (–40 to 70°C) that guarantees stable operation
- Double set of DC output terminals (three for the negative) provide easy wiring
- High efficiency 90% to reduce the energy consumption
- Power boost functionality (120%) for the right start of the application
- Improved DIN-rail mounting clip provides a better resistance to vibrations and allows easy installation (using one hand to mount in a flash)

## Ordering information

| Type | Power ratings | Input voltage | Output voltage | Output current | Size (W × H × D) [mm] | Order code |
|---|---|---|---|---|---|---|
| Power supply Single-phase | 15 W | 100 to 240 VAC<br><br>Allowable range: 85 to 264 VAC, 90 to 350 VDC, 2 phases less than 240 VAC | 5 V | 3 A | 22.5 × 90 × 90 | S8VK-G01505 |
| | | | 12 V | 1.2 A | | S8VK-G01512 |
| | | | 24 V | 0.65 A | | S8VK-G01524 |
| | 30 W | | 5 V | 5 A | 32 × 90 × 90 | S8VK-G03005 |
| | | | 12 V | 2.5 A | | S8VK-G03012 |
| | | | 24 V | 1.3 A | | S8VK-G03024 |
| | 60 W | | 12 V | 4.5 A | 32 × 90 × 110 | S8VK-G06012 |
| | | | 24 V | 2.5 A | | S8VK-G06024 |
| | 120 W | | 24 V | 5 A | 40 × 125 × 113 | S8VK-G12024 |
| | 240 W | | 24 V | 10 A | 60 × 125 × 140 | S8VK-G24024 |
| | | | 48 V | 5 A | | S8VK-G24048 |
| | 480 W | | 24 V | 20 A | 95 × 125 × 140 | S8VK-G48024 |
| | | | 48 V | 10 A | | S8VK-G48048 |

## Specifications

| Item | | 15 W | 30 W | 60 W | 120 W | 240 W | 480 W |
|---|---|---|---|---|---|---|---|
| Efficiency (Typ. at 230 VAC) | | 80% (24 V) | 86% (24 V) | 88% (24 V) | 89% (24 V) | 92% (24 V) | 93% (24 V) |
| Input | Rated input voltage | 100 to 240 VAC | | | | | |
| | Allowable range | 85 to 264 VAC, 90 to 350 VDC. 2 phases less than 240 VAC | | | | | |
| Output | Voltage adjustment range (with V.ADJ) | –10% to 15% | | | | | |
| | Input variation influence | 0.5% max. (at 85 to 264 VAC input, 100% load) | | | | | |
| | Load variation Influence | 3.0% max. (5 V), 2.0% max. (12 V), 1.5% max. (24, 48 V), at 0% to 100% load | | | | | |
| | Temperature variation influence | 0.05%/°C max. | | | | | |
| Overload protection | | Yes, 130% of rated current typ. | | | | | |
| Power Boost | | 120% of rated current | | | | | |
| Overvoltage protection | | Yes | | | | | |
| Operating ambient temperature | | –40 to 70°C (–40 to 158°F) | | | | | |
| Series operation | | Yes, up to 2 units | | | | | |
| Parallel operation | | Yes, up to 2 units | | | | | |
| EMI | | Conforms to EN 61204-3, EN 55011 Class B | | | | | |
| EMS | | Conforms to EN 61204-3 high severity levels | | | | | |
| Harmonic current emissions | | Conforms to EN 61000-3-2 | | | | | |
| Approved standards | | UL: UL 508 (Listing), UL 60950-1, cUL: CSA C22.2 No. 107.1 and No. 60950-1, UL 1310 Class 2 output for 15 W, 30 W, 60 W<br>EN/VDE: EN 50178 (=VDE0160), EN 60950-1 (=VDE0805), Lloyd's Register | | | | | |
| Fulfilled standards | | SELV (EN 60950-1/EN 50178/UL 60950-1), PELV(EN 60204-1,EN 50178), Safety of power transformers (EN 61558-2-16), EN 50274 for terminal parts | | | | | |
| Degree of protection | | IP20 by EN/IEC 60529 | | | | | |

PRO

## Compact 3-phase input power supply

The S8VK-T has an exceptionally wide operating temperature range from – 40 to 70°C as well as S8VK-G, single phase power supply. These models have also good endurance against hard vibration and guarantee the stable operation even in the harshest of environments.

- Input range: 3 × 320 to 576 VAC, 2 × 340 to 576 VAC
- Safety standard, UL 508, ANSI 12.12.01, EN 50178, EN 60950-1, UL 60950-1, CSA No. 60950-1, EN 60204-1 PELV, EN 61558-2-16 Safety transformer. Lloyd's Register
- Protection IP20 by EN/IEC 60529
- EMI Class B
- 120% boost function

## Ordering information

| Type | Power ratings | Input voltage | Output voltage | Output current | Size (W × H × D) [mm] | Order code |
|---|---|---|---|---|---|---|
| Power supply three-phase | 120 W | 3 × 380 to 480 VAC, 2 × 380 to 480 VAC 450 to 600 VDC (Excluding 960 W) | 24 V | 5 A | 40×125×113 | S8VK-T12024 |
| | 240 W | | | 10 A | 60×125×140 | S8VK-T24024 |
| | 480 W | Allowable range: 3 × 320 to 576 VAC, 2 × 340 to 576 VAC, 450 to 810 VDC (Excluding 960 W) | | 20 A | 95×125×140 | S8VK-T48024 |
| | 960 W | | | 40 A | 135×125×170 | S8VK-T96024 |

## Specifications

| Item | | 120 W | 240 W | 480 W | 960 W |
|---|---|---|---|---|---|
| Efficiency (Typ. at 400 VAC) | | 89% | 89% | 91% | 92% |
| Input | Rated Input Voltage | 3 × 380 to 480 VAC, 2 × 380 to 480 VAC, 450 to 600 VDC | | | 3 × 380 to 480 VAC, 2 × 380 to 480 VAC |
| | Allowable range | 3 × 320 to 576 VAC, 2 × 340 to 576 VAC, 450 to 810 VDC | | | 3 × 320 to 576 VAC, 2 × 340 to 576 VAC |
| Output | Voltage adjustment range (with V.ADJ) | 22.5 to 29.5 V | | | |
| | Input variation influence | 0.5% max. (at 3 × 320 to 576 VAC input, 100% load) | | | |
| | Load variation Influence | 1.5% max. at 0 to 100% load | | | |
| | Temperature variation influence | 0.05%/°C max. | | | |
| Overload protection | | Yes, 125% of rated current typ. | | | |
| Power Boost | | 120% of rated current | | | |
| Overvoltage protection | | Yes | | | |
| Operating ambient temperature | | –40 to 70°C (–40 to 158°F) | | | |
| Series Operation | | Yes, Up to 2 units | | | |
| Parallel Operation | | Yes, Up to 2 units | | | |
| EMI | | Conforms to EN 61204-3, EN 55011 Class B | | | |
| EMS | | Conforms to EN 61204-3 high severity levels | | | |
| Harmonic current emissions | | Conforms to EN 61000-3-2 | | | |
| Approved Standards | | UL: UL 508 (Listing), ANSI/ISA 12.12.01 EN/VDE: EN 50178, Lloyd's Register | UL: UL 508 (Listing), ANSI/ISA 12.12.01, UL 60950-1, CSA: C22.2 No.60950-1, EN/VDE: EN 50178, EN 60950-1, Lloyd's Register | | |
| Fulfilled Standards | | SELV (EN 50178), PELV (EN 60204-1, EN 50178), Safety of Power Transformers (EN 61558-2-16), EN 50274 for Terminal parts | SELV (EN 60950-1/EN 50178/UL 60950-1), PELV (EN 60204-1, EN 50178), Safety of Power Transformers (EN 61558-2-16), EN 50274 for Terminal parts | | |
| Degree of protection | | IP20 by EN / IEC 60529 | | | |

## Cost effective range with CE marking

The S8JC-ZS Lite family of metal framed power supplies is our best standard power supply for material cost reduction. The range covers 15 W, 35 W, 50 W, 100 W, 150 W and 350 W models and all are available with 5, 12 or 24 VDC output voltages.

- CE marking
- Overload and over voltage protection
- Conforms to EN 61204-3, EN 55011 Class A

## Ordering information

| Power ratings | Output voltage | Output current | Size in mm (H × W × D) | Order code |
|---|---|---|---|---|
| 15 W | 5 V | 3.0 A | 97 × 36 × 79.5 | S8JC-ZS01505CD-AC2 |
| | 12 V | 1.3 A | | S8JC-ZS01512CD-AC2 |
| | 24 V | 0.7 A | | S8JC-ZS01524CD-AC2 |
| 35 W | 5 V | 7 A | 98.3 × 38 × 129 | S8JC-ZS03505CD-AC2 |
| | 12 V | 3.0 A | | S8JC-ZS03512CD-AC2 |
| | 24 V | 1.5 A | | S8JC-ZS03524CD-AC2 |
| 50 W | 5 V | 10 A | 98.3 × 38 × 129 | S8JC-ZS05005CD-AC2 |
| | 12 V | 4.2 A | | S8JC-ZS05012CD-AC2 |
| | 24 V | 2.1 A | | S8JC-ZS05024CD-AC2 |
| 100 W | 5 V | 20 A | 98 × 50 × 159 | S8JC-ZS10005CD-AC2 |
| | 12 V | 8.5 A | 97.6 × 38 × 159 | S8JC-ZS10012CD-AC2 |
| | 24 V | 4.5 A | | S8JC-ZS10024CD-AC2 |
| 150 W | 5 V | 30 A | 98 × 43 × 199 | S8JC-ZS15005CD-AC2 |
| | 12 V | 12.5 A | 98 × 50 × 159 | S8JC-ZS15012CD-AC2 |
| | 24 V | 6.5 A | | S8JC-ZS15024CD-AC2 |
| 350 W | 5 V | 60 A | 115 × 50 × 193.6 | S8JC-ZS35005CD-AC2 |
| | 12 V | 29 A | | S8JC-ZS35012CD-AC2 |
| | 24 V | 14.6 A | 115 × 50 × 194.8 | S8JC-ZS35024CD-AC2 |

## Specifications

| Item | | 15 W | 35 W | 50 W | 100 W | 150 W | 350 W |
|---|---|---|---|---|---|---|---|
| Efficiency (Typ.) | | 80% (24 V) | 84% (24 V) | 83% (24 V) | 87% (24 V) | 87% (24 V) | 84% (24 V) |
| Input | Rated input voltage | 200 to 240 VAC | | | | | |
| | Allowable range | 185 to 264 VAC | | | | | |
| Output | Voltage adjustment range(with V.ADJ) | ±10% | | | | | |
| Overload protection | | Yes, 105% of rated current | | | | | |
| Overvoltage protection | | Yes | | | | | |
| Operating ambient temperature | | –20 to 60°C (–4 to 140°F) | | | | | |
| Series operation | | No | | | | | |
| Parallel operation | | No | | | | | |
| Fulfilled standards | | EN 50178 (CE mark by self declaration) | | | | | |

## Slim and economic power supply

The S8JX-G is Omron's cost effective power supply delivering Omron's quality and reliability. The range of this Power Supply covers up to 600 W, the output voltages are 5, 12, 15, 24 or 48 VDC. The low profile and multiple mounting options help you reduce panel space. With a minimum life expectancy of 10 years and protection against overvoltage, over-current and short circuiting, the S8JX-G has the reliability you expect from Omron.

- Wide range in DC-output voltage (5 V, 12 V, 15 V, 24 V and 48 V) and wattage (15 to 600 W)
- LED indication power ON
- Over-voltage, over-current, and short circuit protection
- Vibration resistance 4,5 g
- All models can be DIN-rail mounted
- Approvals: UL, cUL, UL508 Listed, SEMI F47, VDE

## Ordering information

| Power ratings | Output voltage | Output current | Size in mm (H × W × D) | Order code |
|---|---|---|---|---|
| 15 W | 5 V | 3 A | 91 × 40 × 90 | S8JX-G01505CD |
| | 12 V | 1.3 A | | S8JX-G01512CD |
| | 15 V | 1 A | | S8JX-G01515CD |
| | 24 V | 0.65 A | | S8JX-G01524CD |
| | 48 V | 0.35 A | | S8JX-G01548CD |
| 35 W | 5 V | 7 A | | S8JX-G03505CD |
| | 12 V | 3 A | | S8JX-G03512CD |
| | 15 V | 2.4 A | | S8JX-G03515CD |
| | 24 V | 1.5 A | | S8JX-G03524CD |
| | 48 V | 0.75 A | | S8JX-G03548CD |
| 50 W | 5 V | 10 A | 92 × 40 × 100 | S8JX-G05005CD |
| | 12 V | 4.2 A | | S8JX-G05012CD |
| | 24 V | 2.1 A | | S8JX-G05024CD |
| | 48 V | 1.1 A | | S8JX-G05048CD |
| 100 W | 5 V | 20 A | 92 × 50 × 150 | S8JX-G10005CD |
| | 12 V | 8.5 A | | S8JX-G10012CD |
| | 24 V | 4.5 A | | S8JX-G10024CD |
| | 48 V | 2.1 A | | S8JX-G10048CD |
| 150 W | 5 V | 30 A | 92 × 60 × 178 | S8JX-G15005CD |
| | 12 V | 13 A | | S8JX-G15012CD |
| | 24 V | 6.5 A | 92 × 50 × 150 | S8JX-G15024CD |
| | 48 V | 3.3 A | | S8JX-G15048CD |
| 300 W | 5 V | 60 A | 92 × 110 × 164.5 | S8JX-G30005CD |
| | 12 V | 27 A | | S8JX-G30012CD |
| | 24 V | 14 A | 92 × 110 × 167 | S8JX-G30024CD |
| | 48 V | 7 A | | S8JX-G30048CD |
| 600 W | 5 V | 120 A | 92 × 150 × 160 | S8JX-G60005C |
| | 12 V | 53 A | | S8JX-G60012C |
| | 24 V | 27 A | | S8JX-G60024C |
| | 48 V | 13 A | | S8JX-G60048C |

## Specifications

| Item | | 15 W | 35 W | 50 W | 100 W | 150 W | 300 W | 600 W |
|---|---|---|---|---|---|---|---|---|
| Efficiency (Typ. at 230 VAC) | | 81% (24 V) | 84% (24 V) | 86% (24 V) | 88% (24 V) | 90% (24 V) | 88% (24 V) | 84% (24 V) |
| Input | Rated input voltage | 100 to 240 VAC | | | | | 100 to 120 VAC/200 to 240 VAC, Switchable | |
| | Allowable range | 85 to 264 VAC, 80 to 370 VDC (DC is not applicable for the safety standards.) | | | | | 85 to 132 VAC/170 to 264 VAC | |
| Output | Voltage adjustment range (with V.ADJ) | −10% to 15% for 5 V to 24 V, ±10% for 48 V (with V.ADJ) | | | | | | |
| | Input variation influence | 0.4% max. (at 85 to 264 VAC input, 100% load) | | | | | | |
| | Load variation Influence | 0.8% max. at 0% to 100% load | | | | | | |
| | Temperature variation influence | 0.05%/°C max. | | | | | | |
| Overload protection | | Yes, 105% to 160% of rated current | | | | | | |
| Overvoltage protection | | Yes | | | | | | |
| Operating ambient temperature | | −10 to 60°C (14 to 140°F) | | | | | | |
| Series operation | | Yes, up to 2 units | | | | | Yes, up to 2 units | |
| Parallel operation | | No | | | | | Yes, up to 5 units | |
| EMI | | Conforms to EN 61204-3, EN 55011 Class A | | | | | | |
| EMS | | Conforms to EN 61204-3 high severity levels | | | | | | |
| Approved standards | | UL: UL 508 (Listing), UL 60950-1, cUL: CSA C22.2 No. 107.1 and No. 60950-1, EN/VDE: EN 50178 (=VDE0160), EN 60950-1 (=VDE0805) | | | | | UL: UL 508 (Recognition), UL 60950-1, cUR: CSA C22.2 No. 107.1 and No. 60950-1, EN/VDE: EN 50178 (=VDE0160), EN 60950-1 (=VDE0805) | |
| Fulfilled standards | | EN 50274 for terminal parts | | | | | | |

## EMI Class B and Power Factor Correction

The main improvements provided by the S8JX-P models are harmonic current suppression/PFC (Power Factor Correction) and EMI EN55011 Class B compliant. In addition, further functionalities have been implemented (applies only to 300 and 600 W models):

- Remote sensing, to compensate for voltage drops on the load lines
- Remote control, using an external signal allows to turn the output ON and OFF without removing the input voltage
- Alarm output, informing about PS errors, such as fan failure or insufficient voltage

## Ordering information

| Power ratings | Output voltage | Output current | Size in mm (H × W × D) | Order code |
|---|---|---|---|---|
| 50 W | 5 V | 10 A | 92 × 42 × 129 | S8JX-P05005CD |
| | 12 V | 4.2 A | | S8JX-P05012CD |
| | 24 V | 2.1 A | | S8JX-P05024CD |
| | 48 V | 1.1 A | | S8JX-P05048CD |
| 100 W | 5 V | 20 A | 92 × 42 × 159 | S8JX-P10005CD |
| | 12 V | 8.5 A | | S8JX-P10012CD |
| | 24 V | 4.5 A | | S8JX-P10024CD |
| | 48 V | 2.1 A | | S8JX-P10048CD |
| 150 W | 5 V | 30 A | 92 × 42 × 159 | S8JX-P15005CD |
| | 12 V | 13 A | | S8JX-P15012CD |
| | 24 V | 6.5 A | | S8JX-P15024CD |
| | 48 V | 3.3 A | | S8JX-P15048CD |
| 300 W | 5 V | 60 A | 92 × 71 × 165 | S8JX-P30005CD |
| | 12 V | 27 A | | S8JX-P30012CD |
| | 24 V | 14 A | | S8JX-P30024CD |
| | 48 V | 7 A | | S8JX-P30048CD |
| 600 W | 5 V | 120 A | 92 × 110 × 165 | S8JX-P60005CD |
| | 12 V | 53 A | | S8JX-P60012CD |
| | 24 V | 27 A | | S8JX-P60024CD |
| | 48 V | 13 A | | S8JX-P60048CD |

## Specifications

| Item | | 50 W | 100 W | 150 W | 300 W | 600 W |
|---|---|---|---|---|---|---|
| Efficiency (Typ. at 230 VAC) | | 82% (24 V) | 87% (24 V) | 88% (24 V) | 87% (24 V) | 85% (24 V) |
| Input | Rated input voltage | 100 to 240 VAC | | | | |
| | Allowable range | 85 to 264 VAC, 80 to 370 VDC (DC is not applicable for the safety standards.) | | | | |
| Output | Voltage adjustment range (with V.ADJ) | −10% to 15% for 5 V to 24 V, ±10% for 48 V (with V.ADJ) | | | −10% to 15% for 12 V and 24 V, ±10% for 5 V and 48 V | |
| | Input variation influence | 0.4% max. (at 85 to 264 VAC input, 100% load) | | | | |
| | Load variation Influence | 0.8% max. at 0% to 100% load | | | | |
| | Temperature variation influence | 0.05%/°C max. | | | | |
| Overload protection | | Yes, 105% to 160% of rated current | | | | |
| Power Boost | | – | | | 115% of rated current for 24 V only | |
| Overvoltage protection | | Yes | | | | |
| Operating ambient temperature | | −10 to 70°C (14 to 158°F) | | | | |
| Series operation | | Yes, up to 2 units | | | | |
| Parallel operation | | No | | | Yes, up to 5 units | |
| EMI | | Conforms to EN 61204-3, EN 55011 Class B | | | | |
| EMS | | Conforms to EN 61204-3 high severity levels | | | | |
| Harmonic current emissions | | Conforms to EN61000-3-2 | | | | |
| Approved standards | | UL: UL508 (Listing), UL60950-1, cUL: CSA C22.2 No. 107.1 and No. 60950-1, EN/VDE: EN 50178 (=VDE0160), EN 60950-1 (=VDE0805), | | | | |
| Fulfilled standards | | EN 50274 for Terminal parts | | | | |

## Industrial use, modular power supply for multiple configurations

The S8TS is an expandable power supply; standard units can easily be snapped together in parallel to provide you with ultimate flexibility. Expandable up to 4 units, it can deliver a total power of 240W at 24VDC or a multi-output configuration.

- Improves system reliability by building up N+1 redundancy
- Standard unit; 60 W at 24 VDC, 30 W at 12 VDC and 25 W at 5 VDC
- Battery back-up unit protects against power outage (see accessories)
- Buffer unit protects against power glitches and outage (see accessories)
- EMI Class B, UL Class 2, UL Class 1 division 2

## Ordering information

| Basic block | | Order code | | | |
|---|---|---|---|---|---|
| Output voltage | Output current | Screw terminal type | | Connector terminal type | |
| | | With bus line connectors *1 | Without bus line connectors *2 | With bus line connectors *1 | Without bus line connectors *2 |
| 24 V | 2.5 A | S8TS-06024-E1 *3 | S8TS-06024 | S8TS-06024F-E1 | S8TS-06024F |
| 12 V | 2.5 A | S8TS-03012-E1 | S8TS-03012 | S8TS-03012F-E1 | S8TS-03012F |
| 5 V | 5 A | – | S8TS-02505 | – | S8TS-02505F |

*1 One S8T-BUS01 connector and one S8T-BUS02 connector are included as accessories.
*2 Bus line connectors can be ordered separately if necessary.
*3 Conforms to EMI class B with DC minus terminal ground.

### Accessories

| Bus line connector | | |
|---|---|---|
| Type | Number of connectors | Order code |
| AC line + DC line bus (For parallel operation) | 1 connector | S8T-BUS01 |
| | 10 connectors *1 | S8T-BUS11 |
| AC line bus (For series operation or isolated operation) | 1 connector | S8T-BUS02 |
| | 10 connectors *2 | S8T-BUS12 |

*1 One package contains 10 S8T-BUS01 connectors.
*2 One package contains 10 S8T-BUS02 connectors.

## Specifications

| Item | | 5 V models | 24/12 V models | |
|---|---|---|---|---|
| | | Single operation | Single operation | Parallel operation |
| Efficiency | | 62% min. | 24 V models: 75%, 12 V models: 70% min. | |
| Power factor | | 0.8 min. | 24 V models: 0.9 min., 12 V models: 0.8 min. | |
| Input voltage | | 100 to 240 VAC, (85 to 264 VAC), single-phase | | |
| Output voltage | Voltage adjustment | 5 V ±10% min. | 24 V models: 22 to 28 V, 12 V models: 12 V ±10% min. | |
| | Ripple | 2% (p-p) max. | 2% (p-p) max. | 2% (p-p) max. |
| | Input variation | 0.5% max. | – | – |
| | Temperature influence | 0.05%/°C max. (with rated input, 10 to 100% load) | | |
| Overcurrent protection | | 105 to 125% of rated load current, inverted L drop, automatic reset | | |
| Overvoltage protection | | yes | yes | yes |
| Output indicator | | yes (green) | yes (green) | yes (green) |
| Weight | | 450 g max. | 450 g max. | 450 g max. |
| Series operation | | yes | yes | yes |
| Parallel operation | | no | yes | yes |
| Size in mm (HxWxD) | | 120x43x120 | | |

## Open frame power supply, the best to build-in small equipment

The S8EX is a open frame power supply to mount on small equipment directly. The wide variation of output voltage and Power boost function 200% can contribute the down sizing of equipment and the standardization of power supply

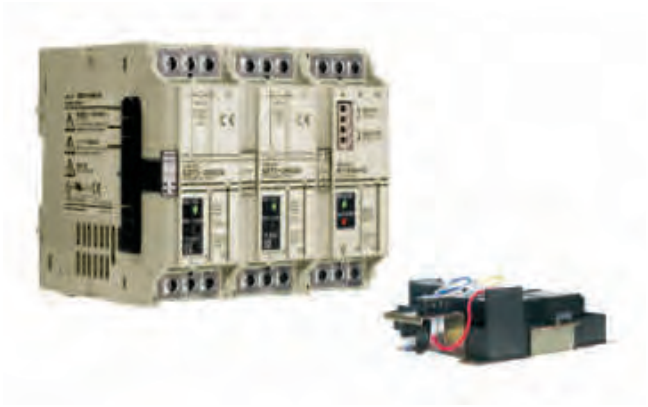
- 200% Power boost function
- Connector terminals
- Various installations are possible.
- Wide operation temperature range: –10 to 70°C

## Ordering information

| Power ratings | Input voltage | Output voltage | Output current | Size (W × H × D) [mm] | Order code |
|---|---|---|---|---|---|
| 15 W | 100 to 240 VAC | 5 V | 3 A | 50 × 22 × 105 | S8EX-N01505 |
| | | 12 V | 1.3 A | | S8EX-N01512 |
| | | 15 V | 1 A | | S8EX-N01515 |
| | | 24 V | 0.7 A | | S8EX-N01524 |
| | | 48 V | 0.32 A | | S8EX-N01548 |
| 30 W | | 5 V | 6 A | 50 × 27 × 105 | S8EX-N03005 |
| | | 12 V | 2.5 A | | S8EX-N03012 |
| | | 15 V | 2 A | | S8EX-N03015 |
| | | 24 V | 1.3 A | | S8EX-N03024 |
| | | 48 V | 0.65 A | | S8EX-N03048 |
| 50 W | | 5 V | 10 A | 50 × 28.5 × 132 | S8EX-BP05005 |
| | | 12 V | 4.3 A | | S8EX-BP05012 |
| | | 24 V | 2.1 A | | S8EX-BP05024 |
| | | 48 V | 1.1 A | | S8EX-BP05048 |
| 100 W | | 5 V | 20 A | 62 × 35.5 × 155 | S8EX-P10005 |
| | | 12 V | 8.5 A | | S8EX-BP10012 |
| | | 24 V | 4.3 A | | S8EX-BP10024 |
| | | 48 V | 2.1 A | | S8EX-BP10048 |
| 150 W | | 5 V | 30 A | 75 × 37.5 × 160 | S8EX-P15005 |
| | | 12 V | 12.5 A | | S8EX-BP15012 |
| | | 24 V | 6.3 A | | S8EX-BP15024 |
| | | 48 V | 3.2 A | | S8EX-BP15048 |
| 240 W | | 24 V | 10 A | 84 × 42.5 × 180 | S8EX-BP24024 |
| | | 36 V | 6.7 A | | S8EX-BP24036 |
| | | 48 V | 5 A | | S8EX-BP24048 |

## Specifications

| Specification | | 15 W | 30 W | 50 W | 100 W | 150 W | 240 W |
|---|---|---|---|---|---|---|---|
| Efficiency (Typ at 200 VAC) | | 78% (24 V) | 86% (24 V) | 85% (24 V) | 86% (24 V) | 87% (24 V) | 90% (24 V) |
| Input | Rated Input Voltage | 100 to 240 VAC | | | | | |
| | Allowable range | 85 to 264 VAC | | | | | |
| Output | Voltage adjustment range (with V.ADJ) | ±10% | | | | | |
| | Input variation influence | 0.5% max. (at 85 to 264 VAC input, 100% load) | | | | | |
| | Load variation Influence | 2.0% max. (5 V), 1.5% max. (12, 24, 36, 48 V), at 0 to 100% load | | | | | |
| | Temperature variation influence | 0.05%/°C max. | | | | | |
| Overload protection | | Yes, 105 to 160% of rated current | | | | | |
| Power Boost | | – | | 150% of rated current (5 V of 50 W, 12 V)<br>200% of rated current (24 V, 36 V, 48 V) | | | |
| Overvoltage protection | | Yes | | | | | |
| Operating ambient temperature | | –10 to 70°C (14 to 158°F) | | | | | |
| EMI | | Conforms to EN 61204-3, EN55011 Class B | | | | | |
| EMS | | Conforms to EN 61204-3 high severity levels | | | | | |
| Harmonic current emissions | | Conforms to EN 61000-3-2 | | | | | |
| Approved Standards | | UL: UR 60950-1, cUR: CSA C22.2 No.60950-1,<br>EN/VDE: EN 50178 (=VDE 0160), EN 60950-1 (=VDE 0805) | | | | | |



## S8T-DCBU-01

The S8T-DCBU-01 battery backup block supplies 24 VDC for a fixed period of time during AC input outages to considerably improve system reliability.

- Supplies 24 VDC for a long period of time during AC input outages
- For system reliability improvement
- Block power supply basic block is connected by the bus line connector
- Simple system configuration
- Alarms indicated on main unit and via alarm signal output

### Ordering information

| Product | Input voltage | Output voltage | Output current | | Order code |
|---|---|---|---|---|---|
| DC back-up block | 24 to 28 VDC | 24 V | 3.7 A/8 A | | S8T-DCBU-01 |
| Battery holder | – | – | – | | S82Y-TS01 |
| **Product** | **Input voltage** | **Output voltage** | **Output current** | **Type** | **Order code** |
| Basic block (use together with the DC back-up block) | 100 to 240 VAC | 24 V | 2.5 A | Screw terminal type / With bus line connectors | S8TS-06024-E1 |
| | | | | Screw terminal type / Without bus line connectors | S8TS-06024 |
| | | | | Connector terminal type / With bus line connectors | S8TS-06024F-E1 |
| | | | | Connector terminal type / Without bus line connectors | S8TS-06024F |
| **Product** | **Back-up time** | **Overcurrent protection operating point selector** | | | **Order code** |
| Battery | 8 min./3.7 A | 5.7 A (typ.) | – | | LC-R122R2PG |
| | 4 min./8.0 A | 5.7 A (typ.) | 11.7 A (typ.) | | LC-R123R4PG |

**Note:** The S8TS DC back-up block is for S8TS power supplies only.

### Specifications

| Item | Size in mm (HxWxD) |
|---|---|
| **S8T-DCBU-01** | 120x43x130 |
| **Battery holder** | 82x185.7x222.25 |

## S8T-DCBU-02

Prevents equipment stoppage, data loss and other problems resulting from momentary power failures. One S8T-DCBU-02 buffer block provides a back-up time of 500 ms at an output current of 2.5 A. Can be wired to the 24 VDC output from any switch mode power supply.

- Connects to all Omron power supplies: S8TS, S8VS, S82J, S82K, S8VM, S8PE
- Connects to both single-phase and three-phase power supplies
- Connects to an S8TS power supply via an S8T-BUS03 bus line connector
- Parallel connection up to 4 units to increase back-up time and capacity
- Complies with Semi F47-0200 standard

### Ordering information

| Input voltage | Output voltage (during back-up operation) | Output current | Order code |
|---|---|---|---|
| 24 VDC (24 to 28 VDC) | 22.5 V | 2.5 A | S8T-DCBU-02 |

#### Accessories

| Type | Number of connectors | Order code |
|---|---|---|
| DC bus line connector (for use with S8TS only) | 1 connector | S8T-BUS03 |
| | 10 connectors | S8T-BUS13 |

### Specifications

| Item | Size in mm (H×W×D) |
|---|---|
| **S8T-DCBU-02** | 120×43×120 |

## Redundancy Unit, contributes to build high reliable systems

The S8VK-R is a redundancy unit used with S8VK Power Supply series. This unit consists of 2 main diodes and additional function to build the redundancy of Power supply and can save your design time by the combination of S8VK series with high reliability.

- Redundancy operating LED for the status confirmation
- A signal output for failure detection of power supplies
- By adjusting the power supply voltage to light up Balance LED the lifetime of power supplies will be more than twice.
- •Wide operation temperature range: −40 to 70°C

## Ordering information

| Input voltage | Output current | Size (W × H × D) [mm] | Order code |
|---|---|---|---|
| 5 to 30 VDC | 10 A | 32 × 90 × 110 | S8VK-R10 |
| 10 to 60 VDC | 20 A | 40 × 125 × 113 | S8VK-R20 |

## Specifications

| Type | S8VK-R10 | S8VK-R20 |
|---|---|---|
| Rated Input Voltage | 5 to 30 V | 10 to 60 V |
| Output Current | 10 A | 20 A |
| Voltage Drop | 0.7 V max at 10 A | 0.9 V max at 20 A |
| Operation Temperature range | –40 to 70°C | –40 to 70°C |
| Safety Standard | UL 60950-1, UL 508, cURus, cULus, EN 50178, EN 60950-1 | |
| Signal output | 30 VDC 50 mA max by Photo MOS Relay | |
| Redundancy OK Indicator | LED (Green), The function to know the both of PS operate normally. | |
| Voltage Balance Indicator | LED (Green), The function to help to get the balance of 2 unit PS output voltage | |
| Grounding terminal | – | Yes, One for Chassis grounding |

## Digital multi circuit protector for DC output of power supply

The S8M turns your machine directly into UL Class 2 compliant, maximum tripping current is 3,8 A per channel (adjustable). This unit controls up to 4 circuits. On top of this you will get startup/shutdown–sequence control, display and alarm functions, like voltage, output current, runtime, and over temperature and external reset. These functions can be set by using the front buttons or with the free support tool software. These settings can be protected.

- 4 circuit protection up-to 4 A per channel
- UL Class 2 (max. 3.8 A)
- Emergency stop by external signal
- Optimize use of available power through start-up sequence
- Maintenance control

## Ordering information

| Input voltage | Communications | UL class 2 output | Size (W × H × D) [mm] | Order code |
|---|---|---|---|---|
| 24 VDC | – | – | 75 × 115 × 94 | S8M-CP04 |
| | RS-232C | – | | S8M-CP04-R |
| | | Compliant | | S8M-CP04-RS |

## Specifications

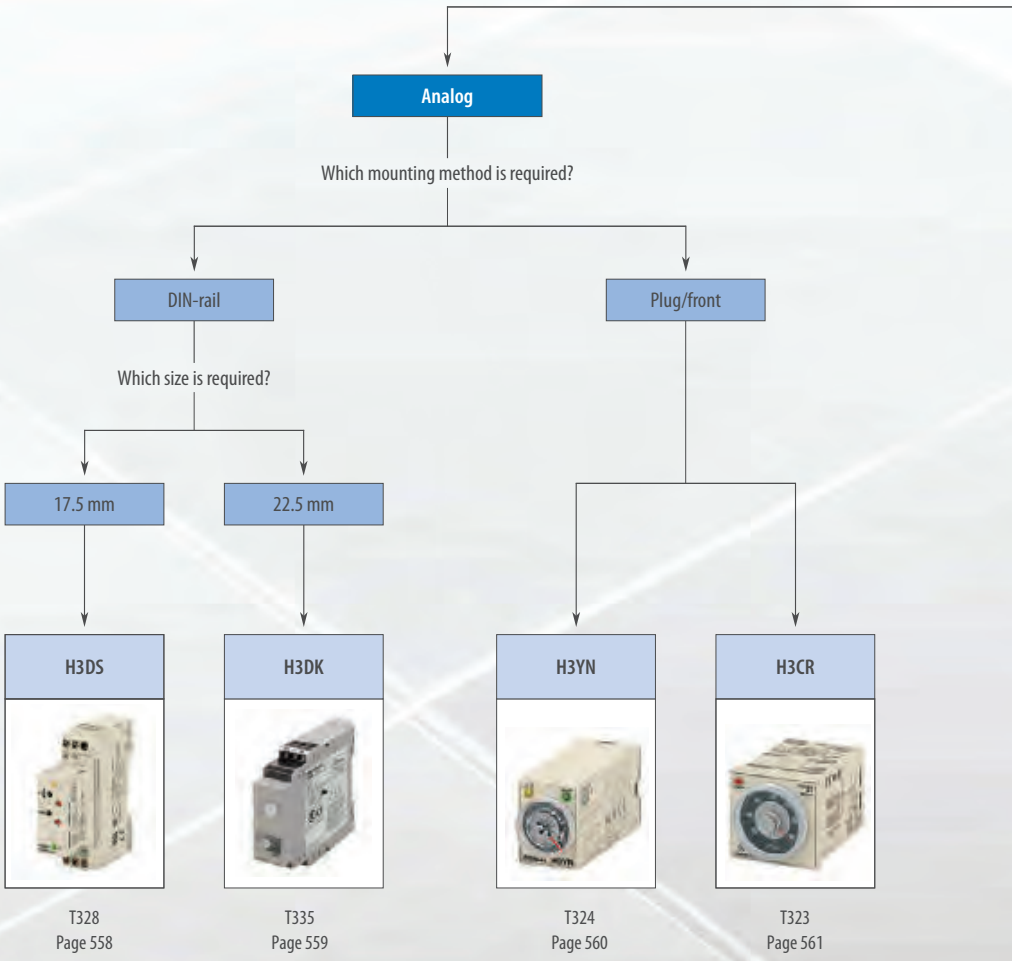
| Type | | S8M-CP04 | S8M-CP04-R | S8M-CP04-RS |
|---|---|---|---|---|
| Input characteristics | Rated input voltage | 24 VDC (19.2 to 26.4 VDC) | | |
| | Allowable input current | 17.0 A max. | | 16.0 A max |
| | Power consumption | 10 W max | | 15 W max |
| Output characteristics | Number of branches | 4 | | |
| | Max tripping current | 4.0 A | | 3.8 A |
| | Adjustable tripping range | 0.5 to 4.0 A in 0.1 A units | | 0.5 to 3.8 A in 0.1 A units |
| | Internal voltage drop | 0.5V max at 4 A | | 0.7V max at 3.8 A |
| Approved Standards | | UL: UL508(Listing), UR 60950-1<br>cUL, cUR: CSA C22.2 No. 107.1 and No.60950-1<br>EN/VDE: EN 50178 (=VDE 0160), EN 60950-1 (=VDE 0805) | | UL: UL508(Listing), Class 2 per UL 1310), UR 60950-1<br>cUL, cUR: CSA C22.2 No. 107.1 and No.60950-1<br>EN/VDE: EN 50178 (=VDE 0160), EN 60950-1 (=VDE 0805) |

# WHEN TIMING ACCURACY MATTERS!

## H5CX – The most complete digital timer

The H5CX series offers multiple-functions and -timing ranges for precise timing control, as well as real twin-timing and memory function. These and other added-value features ensure that the H5CX covers almost every possible user requirement in timers.

- 15 different time functions
- Three color display value, red, orange or green
- Models with instantaneous contact outputs
- 0.001 s to 9999 h, 10 ranges




Which type of timer is needed?

- **Digital**
  - Which size is required?
    - 48×24 mm → **H8GN timer/counter**

T429
Page 571

    - 48×48 mm → **H5CX**

T322
Page 562

- **Motor timer** → **H2C**

T338
Page 563

# Selection table

| Category | | | Analog solid state timer | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | |  |  |  |  |  |  |  |  |  |  |  |
| Model | | | H3DS-M | H3DS-S | H3DS-A | H3DS-F | H3DS-G | H3DS-X | H3DK-M | H3DK-S | H3DK-F | H3DK-G | H3DK-H |
| Selection criteria | Mounting | | DIN-rail | | | | | | | | | | |
| | Size | | 17.5 mm | | | | | | 22.5 mm | | | | |
| | Type | | Multi-functional | | | Twin timer | Star-delta | Two-wired | Multi-functional | | Twin timer | Star-delta | Power OFF-delay |
| Contact configuration | Time limit | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | Instantaneous | | – | – | – | – | – | – | ■ | ■ | – | – | – |
| | Programmable contacts | | – | – | – | – | – | – | ■ | ■ | – | – | – |
| | 14 pins | | – | – | – | – | – | – | – | – | – | – | – |
| | 11 pins | | – | – | – | – | – | – | – | – | – | – | – |
| | 8 pins | | – | – | – | – | – | – | – | – | – | – | – |
| | Screw terminals | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | Screw-less clamp terminals | | □ | □ | □ | □ | □ | □ | – | – | – | – | – |
| | Screw-less clamp sockets | | – | – | – | – | – | – | – | – | – | – | – |
| Inputs | Voltage input | | □ | □ | □ | – | – | – | □ | □ | – | – | – |
| Outputs | Transistor | | – | – | – | – | – | – | – | – | – | – | – |
| | Relay | | ■ | ■ | ■ | ■ | ■ | – | ■ | ■ | ■ | ■ | ■ |
| | SCR | | – | – | – | – | – | ■ | – | – | – | – | – |
| | Relay output type | SPDT | ■ | ■ | ■ | ■ | – | – | □ | ■ | ■ | ■ (2x) | ■ |
| | | SPST-NO | – | – | – | – | ■ (2×) | – | – | – | – | – | – |
| | | DPDT | – | – | – | – | – | – | □ | ■ | – | – | – |
| | | 4PDT | – | – | – | – | – | – | – | – | – | – | – |
| Features | Time range | Total time range | 0.1 s to 120 h | 1 s to 120 h | 2 s to 120 h | 0.1 s to 12 h | 1 s to 120 s | 0.1 s to 120 h | 0.1 s to 1,200 h | 0.1 s to 1,200 h | 0.1 s to 1,200 h | 1 s to 120 s | 0.1 s to 120 s |
| | | Number of sub ranges | 7 | 7 | 7 | 6 | 2 | 7 | 12 | 12 | 8 | 2 | 2 (model dependent) |
| | Supply voltage | | 24 to 230 VAC or 24 to 48 VDC | 24 to 230 VAC or 24 to 48 VDC | 24 to 230 VAC or 24 to 48 VDC | 24 to 230 VAC or 24 to 48 VDC | 24 to 230 VAC or 24 to 48 VDC | 24 to 230 VAC or 24 to 48 VDC | 24 to 240 VAC/DC or 12 VDC | 24 to 240 VAC/DC or 12 VDC | 24 to 240 VAC/DC or 12 VDC | 24 to 240 VAC/ DC, 240 to 440 VAC, 12 VDC | 100 to 120 VAC, 200 to 240 VAC, 24 to 48 VAC/DC |
| | Number of operating modes | | 8 | 4 | 1 | 2 | 1 | 1 | 8 | 4 | 1 | 1 | 1 |
| Functions | ON-delay | | ■ | ■ | – | – | – | ■ | ■ | ■ | – | – | – |
| | Flicker OFF start | | ■ | – | – | ■ | – | – | ■ | – | ■ | – | – |
| | Flicker ON start | | ■ | ■ | – | ■ | – | – | ■ | ■ | ■ | – | – |
| | Signal ON-/OFF-delay | | ■ | – | – | – | – | – | ■ | – | – | – | – |
| | Signal OFF-delay | | ■ | – | – | – | – | – | ■ | – | – | – | ■ |
| | Interval (signal or power start) | | ■ | ■ | – | – | – | – | ■ | ■ | – | – | – |
| | One-shot output (ON-delay) | | ■ | ■ | – | – | – | – | ■ | ■ | – | – | – |
| | ON-delay (fixed) | | – | – | ■ | – | – | – | – | – | – | ■ | – |
| | Independent ON/OFF time setting | | – | – | – | – | – | – | – | – | – | – | – |
| | Star-delta | | – | – | – | – | ■ | – | – | – | – | – | – |
| Remarks | Transistor | | – | – | – | – | – | ■ | – | – | – | – | – |
| | Page/Quick Link | | 558 | | | | | | 559 | | | | |

| Category | | | Analog solid state timer | | | | | Digital timer | | Motor timer |
|---|---|---|---|---|---|---|---|---|---|---|
| | | |  |  |  |  | |  |  |  |
| Model | | | H3YN | H3CR-A | H3CR-F | H3CR-G | H3CR-H | H5CX | H8GN | H2C |
| Selection criteria | Mounting | | Socket/on panel | | | | | | | |
| | Size | | 21.5 mm | 1/16 DIN | | | | | 1/32 DIN | 1/16 DIN |
| | Type | | Miniature | Multi-functional | Twin timer | Star-delta | Power OFF-delay | Multi-functional | Preset counter/ timer | Motor timer |
| Contact configuration | Time limit | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | Instantaneous | | – | ■ | – | ■ | ■ | ■ | – | ■ |
| | Programmable contacts | | – | – | – | – | – | ■ | ■ | – |
| | 14 pins | | ■ | – | – | – | – | – | – | – |
| | 11 pins | | – | □ | □ | □ | □ | □ | – | □ |
| | 8 pins | | ■ | □ | □ | □ | □ | □ | – | □ |
| | Screw terminals | | – | – | – | – | – | □ | ■ | □ |
| | Screw-less clamp terminals | | – | – | – | – | – | – | – | – |
| | Screw-less clamp sockets | | □ | – | – | – | – | – | – | – |
| Inputs | Voltage input | | – | □ | – | – | – | – | – | – |
| Outputs | Transistor | | – | □ | – | – | – | □ | – | – |
| | Relay | | ■ | □ | ■ | ■ | ■ | □ | ■ | ■ |
| | SCR | | – | – | – | – | – | – | – | – |
| | Relay output type | SPDT | – | □ | – | – | □ | □ | ■ | ■ |
| | | SPST-NO | – | – | – | ■ (2x) | – | – | – | – |
| | | DPDT | □ | □ | ■ | – | □ | – | – | – |
| | | 4PDT | □ | – | – | – | – | – | – | – |
| Features | Time range | Total time range | 0.1 s to 10 h (model dependent) | 0.05 s to 300 h, 0.1 s to 600 h (model dependent) | 0.05 s to 30 h or 1.2 s to 300 h (model dependent) | 0.5 s to 120 s | 0.05 s to 12 s, 1.2 s to 12 min | 0.001 s to 9999 h (configurable) | 0.000 s to 9999 h (configurable) | 0.2 s to 30 h |
| | | Number of sub ranges | 2 | 9 | 14 | 4 | 4 | 10 | 9 | 15 |
| | Supply voltage | | 24, 100 to 120, 200 to 230 VAC, 12, 24, 48, 100 to 110, 125 VDC | 100 to 240 VAC, 100 to 125 VDC, 24 to 48 VAC, 12 to 48 VDC | 100 to 240 VAC, 12 VDC, 24 VAC/DC, 48 to 125 VDC | 100 to 120 VAC, 200 to 240 VAC | 100 to 120 VAC, 200 to 240 VAC, 24 VAC/DC, 48 VDC, 100 to 125 VDC | 100 to 240 VAC, 24 VAC, 12 to 24 VDC | 24 VDC | 24, 48, 100, 110, 115, 120, 200, 220, 240 VAC |
| | Number of operating modes | | 4 | 6 (model dependent) | – | 1 | 1 | 15 | 6 | 2 |
| Functions | ON-delay | | ■ | □ | – | – | – | ■ | ■ | ■ |
| | Flicker OFF start | | ■ | □ | ■ | – | – | ■ | ■ | – |
| | Flicker ON start | | ■ | □ | ■ | – | – | ■ | – | – |
| | Signal ON-/OFF-delay | | – | □ | – | – | – | ■ | – | – |
| | Signal OFF-delay | | – | □ | – | – | ■ | ■ | ■ | ■ |
| | Interval (signal or power start) | | ■ | □ | – | – | – | ■ | ■ | – |
| | One-shot output (ON-delay) | | – | □ | – | – | – | ■ | – | – |
| | ON-delay (fixed) | | – | – | – | – | – | ■ | – | – |
| | Independent ON/OFF time setting | | – | – | – | – | – | ■ | ■ | – |
| | Star-delta | | – | – | – | ■ | – | – | – | – |
| Remarks | Transistor | | – | □ | – | – | – | ■ | – | – |
| | Page/Quick Link | | 560 | 561 | | | | 562 | 571 | 563 |

■ Standard □ Available – No/not available

## DIN-rail mounted, standard 17.5 mm wide solid state timer range

This broad range of timers includes many functionalities and has a wide AC/DC power supply range. Models with screwless clamp connection available.

- 17.5 mm width, modular 45 mm
- DIN-rail mounting
- 24-48 VDC and 24-230 VAC
- 0.1 s to 120 h, 7 ranges

## Ordering information

| Type | Supply voltage | Control output | Time setting range | Operating modes | Order code | |
|---|---|---|---|---|---|---|
| | | | | | Screw terminal type | Screw-less clamp type |
| Multi-functional timer | 24 to 230 VAC (50/60 Hz)/ 24 to 48 VDC | SPDT | 0.1 s to120 h | ON-delay, flicker OFF start, flicker ON start, signal ON/OFF-delay, signal OFF-delay, interval, one-shot | H3DS-ML | H3DS-MLC |
| Standard timer | | | | ON-delay, flicker ON start, interval, one-shot | H3DS-SL | H3DS-SLC |
| Single function timer | | | | ON-delay | H3DS-AL | H3DS-ALC |
| Twin timer | | Relay SPDT | 0.1 s to 12 h | Flicker OFF start, flicker ON start | H3DS-FL | H3DS-FLC |
| Star-delta timer | | 2× Relay SPST-NO | 1 s to 120 s | Star-delta | H3DS-GL | H3DS-GLC |
| Two-wired timer | 24 to 230 VAC/VDC (50/60 Hz) | SCR output | 0.1 s to 120 h | ON-delay | H3DS-XL | H3DS-XLC |

## Specifications

| | |
|---|---|
| **Terminal block** | Screw terminal type: Clamps two 2.5 $mm^2$ max. bar terminals without sleeves<br>Screw-less clamp type: Clamps two 1.5 $mm^2$ max. bar terminals without sleeves |
| **Mounting method** | DIN-rail mounting |
| **Operating voltage range** | 85 to 110% of rated supply voltage |
| **Power reset** | Minimum power-off time: 0.1 s, 0.5 s for H3DS-G |
| **Reset voltage** | 2.4 VAC/VDC max., 1.0 VAC/VDC max. for H3DS-X |
| **Voltage input** | Max. permissible capacitance between input lines (terminals B1 and A2): 2,000 pF |
| | Load connectable in parallel with inputs (terminals B1 and A1) |
| | H-level: 20.4 to 253 VAC/20.4 to 52.8 VDC |
| | L-level: 0 to 2.4 VAC/VDC |
| **Control output** | Contact output: 5 A at 250 VAC with resistive load ($\cos\phi = 1$) |
| | 5 A at 30 VDC with resistive load ($\cos\phi = 1$) |
| **Ambient temperature** | Operating: -10 to 55°C (with no icing) |
| | Storage: -25 to 65°C (with no icing) |
| **Accuracy of operating time** | ±1% max. of FS (±1% ±10 ms max. at 1.2 s range) |
| **Setting error** | ±10% ±50 ms max. of FS |
| **Influence of voltage** | ±0.7% max. of FS (±0.7% ±10 ms max. at 1.2 s range) |
| **Influence of temperature** | ±5% max. of FS (±5% ±10 ms max. at 1.2 s range) |
| **Life expectancy (not H3DS-X)** | Mechanical: 10 million operations min. (under no load at 1,800 operations/h) |
| | Electrical: 100,000 operations min. (5 A at 250 VAC, resistive load at 360 operations/h) |
| **Size in mm(HxWxD)** | 80x17.5x73 |

## DIN-rail mounted, standard 22.5 mm wide solid state timer range

The H3DK series of timers provides a wide AC/DC power supply and time range to reduce the number of items.

- Size in mm (H×W×D): 79×22.5×100
- DIN-rail mounting
- 12 VDC and 24-240 VAC/VDC (except -H). 240-440 VAC for -G
- Wide time setting range: 0.10 s - 1,200 h (except -H and -G), 12 ranges (for -M and -S)

## Ordering information

| Type | Supply voltage | Control output | Time setting range | Operating modes | Order code |
|---|---|---|---|---|---|
| Multi-functional standard timers | 12 VDC | SPDT | 0.1 s to 1200 h | ON-delay, flicker OFF start, flicker ON start, signal ON/OFF-delay, signal OFF-delay, interval, one-shot | H3DK-M1A DC12 |
| | | DPDT | | | H3DK-M2A DC12 *1 |
| | | SPDT | | ON-delay, flicker ON start, interval, one-shot | H3DK-S1A DC12 |
| | | DPDT | | | H3DK-S2A DC12 *1 |
| | 24 to 240 VAC/VDC | SPDT | | ON-delay, flicker OFF start, flicker ON start, signal ON/OFF-delay, signal OFF-delay, interval, one-shot | H3DK-M1 AC/DC24-240 |
| | | DPDT | | | H3DK-M2 AC/DC24-240 *1 |
| | | SPDT | | ON-delay, flicker ON start, interval, one-shot | H3DK-S1 AC/DC24-240 |
| | | DPDT | | | H3DK-S2 AC/DC24-240 *1 |
| Twin timer | 12 VDC | SPDT | 0.1 s to 12 h | Flicker OFF start, flicker ON start | H3DK-FA DC12 |
| | 24 to 240 VAC/VDC | | | | H3DK-F AC/DC24-240 |
| Star-delta timer | 12 VDC | 2× SPDT | 1 to 120 s | Star-delta | H3DK-GA DC12 |
| | 24 to 240 VAC/VDC | | | | H3DK-G AC/DC24-240 |
| | 240 to 440 VAC | | | | H3DK-GE AC/DC240-440 |
| Power OFF-delay timer | 24 to 48 VAC/VDC | SPDT | 1 to 120 s | Signal OFF-delay | H3DK-HBL AC/DC24-48 |
| | | | 0.1 to 12 s | | H3DK-HBS AC/DC24-48 |
| | 100 to 120 VAC | | 1 to 120 s | | H3DK-HCL AC100-120V |
| | | | 0.1 to 12 s | | H3DK-HCS AC100-120V |
| | 200 to 240 VAC | | 1 to 120 s | | H3DK-HDL AC200-240V |
| | | | 0.1 to 12 s | | H3DK-HDS AC200-240V |

*1 One output can be set to instantaneous.

## Specifications

| | |
|---|---|
| **Operating voltage range** | 85 to 110% of rated supply voltage (90 to 110% for the 12 VDC models). |
| **Power reset** | Minimum power-off time: H3DK-M/S, H3DK-F: 0.1 s, H3DK-G: 0.5 s. (Not for H3DK-H) |
| **Reset voltage** | 10% of rated voltage. (Not for H3DK-H) |
| **Voltage input (H3DK-M/-S)** | 24 to 240 VAC/DC: H-level 20.4 to 264 VAC/VDC, L-level 0 to 2.4 VAC/VDC. |
| | 12 VDC: H-level 10.8 to 13.2 VDC, L-level 0 to 1.2 VDC. |
| **Control output** | Contact output: 5 A at 250 VAC with resistive load ($\cos\phi = 1$), 5 A at 24 VDC (30 VDC for -M/-S) with resistive load (not for H3DK-GE) |
| **Ambient temperature** | Operating: -20 to 55°C (with no icing), storage: -40 to 70°C (with no icing) |
| **Accuracy of operating time** | ±1% of FS max. (±1% ±10 ms max. at 1.2 s range) |
| **Setting error** | ±10% of FS ±0.05 s max. |
| **Minimum input signal width** | 50 ms (start input) (Only for H3DK-M/S) |
| **Influence of voltage** | ±0.5% of FS max. (±0.5% ±10 ms max. at 1.2 s range). For H3DK-G: ±0.5% of FS max. |
| **Influence of temperature** | ±2% of FS max. (±2% ±10 ms max. at 1.2s range). For H3DK-G: ±2% of FS max. |
| **Life expectancy** | Mechanical: 10 million operations min. (under no load at 1,800 operations/h) |
| | Electrical: 100,000 operations min. (5 A at 250 VAC, resistive load at 360 operations/h) |
| **Degree of protection** | IP30 (terminal block: IP20) |
| **Terminal block** | Clamps two 2.5 $mm^2$ max. bar terminals without sleeves |
| **Size in mm (H×W×D)** | 79×22.5×100 |


## Miniature timer with multiple time ranges and multiple operating modes

H3YN features 4 multi-operating modes: ON-delay, interval, flicker ON start and flicker OFF start.

- Size in mm (H×W×D): 28×21.5×52.6
- Plug-in
- All supply voltages available
- 0.1 s to 10 h
- DPDT (5A) or 4PDT (3A)

## Ordering information

| Supply voltage | Functions | Time-limit contact | Order code | |
|---|---|---|---|---|
| | | | Short-time range model (0.1 s to 10 min) | Long-time range model (0.1 min to 10 h) |
| 12 VDC | ON-delay<br>Interval<br>Flicker ON<br>Flicker OFF | DPDT | H3YN-2 12DC | H3YN-21 12DC |
| 24 VAC | | | H3YN-2 24AC | H3YN-21 24AC |
| 24 VDC | | | H3YN-2 24DC | H3YN-21 24DC |
| 100 to 120 VAC | | | H3YN-2 100-120AC | H3YN-21 100-120AC |
| 200 to 230 VAC | | | H3YN-2 200-230AC | H3YN-21 200-230AC |
| 12 VDC | | 4PDT | H3YN-4 12DC | H3YN-41 12DC |
| 24 VAC | | | H3YN-4 24AC | H3YN-41 24AC |
| 24 VDC | | | H3YN-4 24DC | H3YN-41 24DC |
| 100 to 120 VAC | | | H3YN-4 100-120AC | H3YN-41 100-120AC |
| 200 to 230 VAC | | | H3YN-4 200-230AC | H3YN-41 200-230AC |

### Accessories

#### Connecting socket

| Timer | DIN-rail mounting/ front-connecting socket | Back-connecting socket |
|---|---|---|
| | | PCB terminal |
| H3YN-2/-21 | PYF08A, PYF08A-N, PYF08A-E | PY08-02 |
| H3YN-4/-41 | PYF14A, PYF14A-N, PYF14A-E | PY14-02 |

#### Hold-down clips

| Applicable socket | Order code |
|---|---|
| PYF08A, PYF08A-N, PYF08A-E, PYF14A, PYF14A-N, PYF14A-E | Y92H-3 (pair) |
| PY08, PY08-02, PY14-02 | Y92H-4 |

## Specifications

| Item | H3YN-2/-4 | H3YN-21/-41 |
|---|---|---|
| Time ranges | 0.1 s to 10 min (1 s, 10 s, 1 min, or 10 min max. selectable) | 0.1 min to 10 h (1 min, 10 min, 1 h, or 10 h max. selectable) |
| Rated supply voltage | 24, 100 to 120, 200 to 230 VAC (50/60 Hz)<br>12, 24, 48, 100 to 110, 125 VDC | |
| Pin type | Plug-in | |
| Operating mode | ON-delay, interval, flicker OFF start, or flicker ON start (selectable with DIP switch) | |
| Operating voltage range | 85 to 110% of rated supply voltage (12 VDC: 90 to 110% of rated supply voltage) | |
| Reset voltage | 10% min. of rated supply voltage | |
| Control outputs | DPDT: 5 A at 250 VAC, resistive load ($\cos\phi = 1$), 4PDT: 3 A at 250 VAC, resistive load ($\cos\phi = 1$) | |
| Accuracy of operating time | ±1% FS max. (1 s range: ±1% ±10 ms max.) | |
| Setting error | ±10% ±50 ms FS max. | |
| Reset time | Min. power-opening time: 0.1 s max. (including halfway reset) | |
| Influence of voltage | ±2% FS max. | |
| Influence of temperature | ±2% FS max. | |
| Ambient temperature | Operating: –10 to 50°C (with no icing), storage: –25 to 65°C (with no icing) | |
| Degree of protection | IP40 | |
| Size in mm (H×W×D) | 28×21.5×52.6 | |


## DIN 48 × 48 mm multi-functional timer series

This elaborate range of solid state timers provides you with a multi-functional timer, twin timer, star-delta timer and a power OFF-delay timer.

- 48 × 48 mm front-panel/plug-in
- High-/low-voltage models (except -H and -G)
- 0.05 s to 300 h (except -H and -G)
- DPDT, 5 A at 250 VAC
- Transistor 100 mA at 30 VDC

## Ordering information

| Output | Number of pins | Supply voltage | Time range | Operating mode | Order code |
|---|---|---|---|---|---|
| Relay DPDT | 11 | 100 to 240 VAC/100 to 125 VDC | 0.05 s to 300 h | ON-delay, flicker OFF start, flicker ON start, signal ON/OFF-delay, signal OFF-delay, interval | H3CR-A 100-240AC/100-125DC |
| | | 24 to 48 VAC/12 to 48 VDC | | | H3CR-A 24-48AC/12-48DC |
| Transistor | | 24 to 48 VAC/12 to 48 VDC | 0.05 s to 300 h | | H3CR-AS 24-48AC/12-48DC |
| Relay DPDT | 8 | 100 to 240 VAC/100 to 125 VDC | 0.05 s to 300 h | ON-delay, flicker ON start, interval, one-shot | H3CR-A8 100-240AC/100-125DC |
| | | 24 to 48 VAC/12 to 48 VDC | | | H3CR-A8 24-48AC/12-48DC |
| Transistor | | 24 to 48 VAC/12 to 48 VDC | 0.05 s to 300 h | | H3CR-A8S 24-48AC/12-48DC |
| Relay SPDT | | 100 to 240 VAC/100 to 125 VDC | | | H3CR-A8E 100-240AC/100-125DC |
| | | 24 to 48 VAC/VDC | | | H3CR-A8E 24-48AC/DC |
| Relay DPDT | 11 | 100 to 240 VAC | 0.05 s to 30 h | Flicker OFF start | H3CR-F 100-240AC |
| | | 24 VAC/VDC | | | H3CR-F 24AC/DC |
| | 8 | 100 to 240 VAC | | | H3CR-F8 100-240AC |
| | | 24 VAC/VDC | | | H3CR-F8 24AC/DC |
| | 11 | 100 to 240 VAC | 0.05 s to 30 h | Flicker ON start | H3CR-FN 100-240AC |
| | | 24 VAC/VDC | | | H3CR-FN 24AC/DC |
| | 8 | 100 to 240 VAC | | | H3CR-F8N 100-240AC |
| | | 24 VAC/VDC | | | H3CR-F8N 24AC/DC |
| Time-limit contact and instantaneous contact | | 100 to 120 VAC | | Star-delta | H3CR-G8EL 100-120AC |
| | | 200 to 240 VAC | | | H3CR-G8EL 200-240AC |
| DPDT | 8 | 100 to 120 VAC | 0.05 to 12 s | Power OFF-delay | H3CR-H8LS 100-120AC |
| | | 200 to 240 VAC | | | H3CR-H8LS 200-240AC |
| | | 24 VAC/VDC | | | H3CR-H8LS 24AC/DC |
| | | 100 to 120 VAC | 0.05 to 12 m | | H3CR-H8LM 100-120AC |
| | | 200 to 240 VAC | | | H3CR-H8LM 200-240AC |
| | | 24 VAC/VDC | | | H3CR-H8LM 24AC/DC |

### Accessories

| Name/specifications | | Order code |
|---|---|---|
| Flush-mounting adapter | | Y92F-30 |
| Protective cover | | Y92A-48B |
| Front connecting socket | 8-pin, finger-safe type, DIN-rail | P2CF-08-E |
| Front connecting socket | 11-pin,finger-safe type, DIN-rail | P2CF-11-E |
| Back connecting socket | 8-pin | P3G-08 |
| | 11-pin | P3GA-11 |

| Name/specifications | | Order code |
|---|---|---|
| Time setting ring | Setting a specific time | Y92S-27 |
| | Limiting the setting range | Y92S-28 |
| Panel cover | Light grey (5Y7/1) | Y92P-48GL |
| | Black (N1.5) | Y92P-48GB |

## Specifications

| | | |
|---|---|---|
| **Accuracy of operating time** | | ±0.2% FS max. (±0.2% ±10 ms max. in a range of 1.2 s) |
| **Influence of voltage** | | ±0.2% FS max. (±0.2% ±10 ms max. in a range of 1.2 s) |
| **Influence of temperature** | | ±1% FS max. (±1% ±10 ms max. in a range of 1.2 s) |
| **Ambient temperature** | | Operating: –10 to 55°C (with no icing),<br>storage: –25 to 65°C (with no icing) |
| **Life expectancy** | **Mechanical** | 20,000,000 operations min. (under no load at 1,800 operations/h) |
| | **Electrical** | 100,000 operations min. (5 A at 250 VAC, resistive load at 1,800 operations/h) |
| **Size in mm (H×W×D)** | | 48×48×66.6 (H3CR-A, -F), 48×48×78 (H3CR-G, -H) |
| **Setting error** | | ±5% FS ±50 ms |
| **Degree of protection** | | IP40 (panel surface) |
| **Weight** | | Approx. 90 g |

## The most complete digital standard timer on the market

H5CX offers you the most complete series of products on the market today. Based on extensive customer research, these new timers have been designed with value added features that users both need and appreciate.

- Size in mm (H×W×D): 48×48×59 to 78 mm
- Three color display value, red, green or orange
- Models with Instantaneous Contact Outputs
- 0.001 s to 9999 h, 10 ranges
- Input NPN, PNP and contact

## Ordering information

| Output type | Supply voltage | Functions | External connection | Size in mm (H×W×D) | Inputs | Order code |
|---|---|---|---|---|---|---|
| Contact output | 100 to 240 VAC | A: Signal ON-delay<br>A-1: Signal ON-delay 2<br>A-2: Power ON-delay 1<br>A-3: Power ON-delay 2<br>b: Repeat cycle 1<br>b-1: Repeat cycle 2<br>d: Signal OFF-delay<br>E: Interval<br>F: Cumulative<br>Z: ON/OFF-duty adjustable flicker | Screw terminals | 48×48×84 | Signal, Reset, Gate (NPN/PNP inputs) | H5CX-A-N |
| | 12 to 24 VDC/24 VAC | | | 48×48×65 | | H5CX-AD-N |
| Transistor output | 100 to 240 VAC | | | 48×48×84 | | H5CX-AS-N |
| | 12 to 24 VDC/24 VAC | | | 48×48×65 | | H5CX-ASD-N |
| Contact output | 100 to 240 VAC | | 11-pin socket | 48×48×69.7 | Signal, Reset, Gate (NPN/PNP inputs) | H5CX-A11-N |
| | 12 to 24 VDC/24 VAC | | | | | H5CX-A11D-N |
| Transistor output | 100 to 240 VAC | | | | | H5CX-A11S-N |
| | 12 to 24 VDC/24 VAC | | | | | H5CX-A11SD-N |
| Contact output | 100 to 240 VAC | toff: Twin timer OFF start<br>ton: Twin timer ON start | 8-pin socket | 48×48×69.7 | Signal, Reset (NPN inputs) | H5CX-L8-N |
| | 12 to 24 VDC/24 VAC | | | | | H5CX-L8D-N |
| Transistor output | 100 to 240 VAC | | | | | H5CX-L8S-N |
| | 12 to 24 VDC/24 VAC | | | | | H5CX-L8SD-N |
| Contact output<br>Models with instantaneous contact outputs | 100 to 240 VAC | A-2: Power ON-delay 1<br>b: Repeat cycle 1<br>E: Interval<br>Z: ON/OFF-duty adjustable flicker<br>toff: Twin timer OFF start 1<br>ton: Twin timer ON start 1 | | | – | H5CX-L8E-N |
| | 12 to 24 VDC/24 VAC | | | | | H5CX-L8ED-N |
| Transistor output | 12 to 24 VDC | A: Signal ON-delay 1<br>F: Cumulative | Screw terminals | 48×48×65 | Signal, Reset, Gate (NPN/PNP inputs) | H5CX-BWSD-N |

### Accessories

| Name | | Order code |
|---|---|---|
| Flush-mounting adapter | | Y92F-30 |
| Waterproof packing | | Y92S-29 |
| Front-connecting socket | 8-pin, finger safe type | P2CF-08-E |
| | 11-pin, finger safe type | P2CF-11-E |
| Back-connecting socket | 8-pin | P3G-08 |
| | 11-pin | P3GA-11 |
| Hard cover | | Y92A-48 |
| Soft cover | | Y92A-48F1 |
| Front panels (4-digit models) | Light gray | Y92P-CXT4G |
| | White | Y92P-CXT4S |

## Specifications

| Item | H5CX-A_ | H5CX-A11_ | H5CX-L8_ |
|---|---|---|---|
| **Display** | 7-segment, negative transmissive LCD | | |
| | Present value: 12 mm high characters | | |
| | red, orange or green (programmable) | red | |
| | Set value: 6 mm high characters, green | | |
| **Digits** | 4 digits | | |
| **Total time range** | 0.001 s to 9,999 h (configurable) | | |
| **Timer mode** | Elapsed time (Up), remaining time (Down) (selectable) | | |
| **Input signals** | Signal, reset, gate | | Signal, reset |
| **Key protection** | Yes | | |
| **Memory backup** | EEPROM (overwrites: 100,000 times min.) that can store data for 10 years min. | | |
| **Ambient temperature** | Operating: –10 to 55°C (no icing or condensation), side-by-side mounting: –10 to 50°C | | |
| **Case color** | Black (N1.5) | | |


## DIN-sized (48×48) motor timer with variable time ranges

This motor timer series provides you with many features, such as ON-delay, time indicator, moving pointer and synchronous motor. Moreover, the LED indicator shows the time operation, time range and the rated voltage.

- DIN-sized 48 × 48mm
- Front-panel/plug-in/DIN-rail
- All supply voltages available
- 0.2 s to 30 h
- SPDT, 6A at 250VAC

## Ordering information

| Operation/resetting system | Internal connection | Terminal | Time-limit contact | Instantaneous contact | Time range code | Order code |
|---|---|---|---|---|---|---|
| Time-limit operation/ electric resetting | Separate motor and clutch connection | 11-pin socket | SPDT | SPDT | 1.25 s to 30 h in 5 ranges | H2C-RSA 110AC |
| | | | | | | H2C-RSA 220AC |
| | | | | | | H2C-RSA 24AC |
| | | | | | 0.2 s to 6 h in 5 ranges | H2C-RSB 110AC |
| | | | | | | H2C-RSB 220AC |
| | | | | | | H2C-RSB 24AC |
| | | | | | 0.5 s to 12 h in 5 ranges | H2C-RSC 110AC |
| | | | | | | H2C-RSC 220AC |
| | | | | | | H2C-RSC 24AC |
| Time-limit operation/ self-resetting | Separate motor and clutch connection | 11-pin socket | SPDT | SPDT | 1.25 s to 30 h in 5 ranges | H2C-SA 110AC |
| | | | | | | H2C-SA 220AC |
| | | | | | | H2C-SA 24AC |
| | | | | | 0.2 s to 6 h in 5 ranges | H2C-SB 110AC |
| | | | | | | H2C-SB 220AC |
| | | | | | | H2C-SB 24AC |
| | | | | | 0.5 s to 12 h in 5 ranges | H2C-SC 110AC |
| | | | | | | H2C-SC 220AC |
| | | | | | | H2C-SC 24AC |

**Note:** Other voltages available on request

### Accessories

| Name/specifications | | Order code |
|---|---|---|
| DIN-rail mounting/ front-connecting socket | 8-pin, finger safe type | P2CF-08-E |
| | 11-pin, finger safe type | P2CF-11-E |
| Back-connecting socket | 8-pin, screw terminal | P3G-08 |
| | 11-pin | P3GA-11 |

| Name/specifications | | Order code |
|---|---|---|
| Hold-down clip (pair) | For PL08 and PL11 sockets | Y92H-1 |
| | For PF085A socket | Y92H-2 |
| Flush mounting adapter | | Y92F-30 |
| Time setting ring | | Y92A-Y1 |

## Specifications

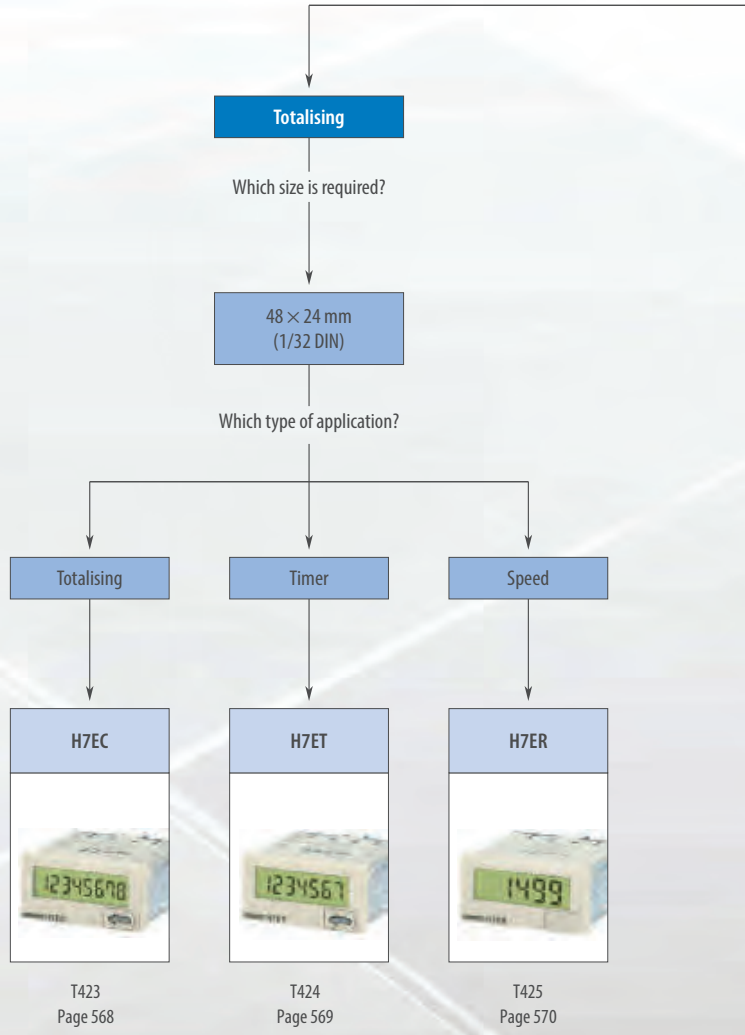
| | |
|---|---|
| **Operating voltage range** | 85 to 110% of rated supply voltage |
| **Reset voltage** | 10% max. of rated supply voltage |
| **Reset time** | Min. power-opening time: 0.5 s, min. pulse width: 0.5 s |
| **Control outputs** | 6 A at 250 VAC, resistive load (cosϕ = 1) |
| **Mounting method** | Flush mounting (except for H2C-F/-FR models), surface-mounting, DIN-rail mounting |
| **Life expectancy** | Mechanical: 10,000,000 operations min. |
| | Electrical: 500,000 operations min. |
| **Motor life expectancy** | 20,000 h |
| **Accuracy of operating time** | ±0.5% FS max. (±1% max. at 0.2 to 6 s for the time range code B or at 0.5 to 12 s for the time range code C) |
| **Setting error** | ±2% FS max. |
| **Reset time** | 0.5 s max. |
| **Influence of voltage** | ±1% FS max. |
| **Influence of temperature** | ±2% FS max. |
| **Ambient temperature** | Operating: –10 to 50°C |
| **Case color** | Light grey (Munsell 5Y7/1) |
| **Degree of protection** | IP40 (panel surface) |
| **Size in mm (H×W×D)** | 48×48×77.5 |

# MULTI-FUNCTIONAL PRESET COUNTER

## H7CX – Designed with value added features

The H7CX series offers the ultimate in versatility and intuitive programming.

- 7 basic functions in one
- Switching color on threshold, green, orange & red
- Twin counter mode
- 12 different outputs modes
- Display 6 digits from -100 K +1 up to 1 M -1




What is the type of counting application?

**Pre-set counter time count**

Which size is required?

- 48 × 24 mm (1/32 DIN) → **H8GN counter/timer**

T429
Page 571

- 48 × 48 mm (1/16 DIN) → **H7CX**

T422
Page 572

**Cam positioner**

Which size is required?

- 96 × 96 mm (1/4 DIN) → **H8PS**

F424
Page 573

# Selection table

| Category | | Self-powered total | Self-powered timer | Self-powered tachometer |
|---|---|---|---|---|
| | |  |  |  |
| Model | | H7EC | H7ET | H7ER |
| Selection criteria | Display | LCD | | |
| | Size | 1/32 DIN | | |
| Outputs | Control outputs | – | – | – |
| | 5 stage | – | – | – |
| | Total | ■ | ■ | – |
| | Time | – | ■ | – |
| | Preset | – | – | – |
| | Batch | – | – | – |
| | Dual | – | – | – |
| | Tachometer | ■ | – | ■ |
| Inputs | Control inputs | No-voltage, PNP/NPN, DC-voltage, AC/DC multi-voltage | No-voltage, PNP/NPN, DC-voltage, AC/DC multi-voltage | No-voltage, PNP/NPN |
| Features | Dual operation | – | – | – |
| | Number of digits | 8 | 7 | 4 or 5 |
| | NPN/PNP switch | ■ | ■ | ■ |
| | Back-lit | □ | □ | □ |
| | External reset | ■ | ■ | – |
| | Manual reset | ■ | ■ | – |
| | Number of banks | – | – | – |
| | Built-in sensor power supply | – | – | – |
| | IP rating | IP66 | IP66 | IP66 |
| Terminals | Screw terminals | ■ | ■ | ■ |
| | PCB terminals | – | – | – |
| | 11-pin socket | – | – | – |
| Supply voltage | 100 to 240 VAC | – | – | – |
| | 12 to 24 VDC | – | – | – |
| | 24 VDC | □ | □ | □ |
| | Comms | – | – | – |
| Functions | Up | ■ | ■ | – |
| | Down | – | – | – |
| | Up/down | – | – | – |
| | Reversible | – | – | – |
| | Speed | 0 to 30 Hz or 0 to 1 kHz | – | 1 or 10 kHz |
| | Counting range | 0 to 99999999 | 0.0 h to 999999.9 h <--><br>0.0 h to 3999 d 23.9 h or<br>0 s to 999 h 59 min 59 s <--><br>0.0 min to 9999 h 59.9 min | 1000 s-1 or 1000 min-1; 1000 s-1 or 1000 min-1 <--> 10000 min-1 |
| Color | Beige | ■ | ■ | ■ |
| | Black | ■ | ■ | ■ |
| | Page/Quick Link | 568 | 569 | 570 |

| Counter type | | Pre-set counter/timer | Pre-set counter | Cam positioner |
|---|---|---|---|---|
| | |  |  |  |
| **Model** | | **H8GN** | **H7CX** | **H8PS** |
| Selection criteria | Display | LCD negative transmissive | | LCD negative transmissive |
| | Size | 1/32 DIN | 1/16 DIN | 1/4 DIN |
| Outputs | Control outputs | 1 relay (SPDT) | 1 relay (SPDT), transistor | NPN or PNP, cam outputs 8/16/32, run out, tachometer |
| | 5 stage | ■ | □ | – |
| | Total | ■ | □ | – |
| | Time | ■ | – | – |
| | Preset | ■ | □ | – |
| | Batch | ■ | □ | – |
| | Dual | ■ | □ | – |
| | Tachometer | – | □ | – |
| Inputs | Control inputs | No-voltage | No-voltage, PNP/NPN | Encoder |
| Features | Dual operation | ■ | ■ | □ |
| | Number of digits | PV: 4, SV: 4 | PV: 4, SV: 4 or PV: 6, SV: 6 | 7 |
| | NPN/PNP switch | – | ■ | – |
| | Back-lit | – | ■ | ■ |
| | External reset | ■ | ■ | – |
| | Manual reset | ■ | ■ | 8 (16- and 32-output models only) |
| | Number of banks | 4 | – | – |
| | Built-in sensor power supply | – | ■ | – |
| | IP rating | IP66 | IP66 | IP40 |
| Terminals | Screw terminals | ■ | ■ | ■ |
| | PCB terminals | – | – | ■ |
| | 11-pin socket | – | □ | – |
| Supply voltage | 100 to 240 VAC | – | ■ | – |
| | 12 to 24 VDC | – | ■ | – |
| | 24 VDC | ■ | – | ■ |
| | Comms | □ | – | – |
| Functions | Up | ■ | ■ | – |
| | Down | ■ | ■ | – |
| | Up/down | – | ■ | – |
| | Reversible | ■ | ■ | – |
| | Speed | 0 to 30 Hz or 0 to 5 kHz | 0 to 30 Hz or 0 to 5 kHz | – |
| | Counting range | -999 to 9999 | -99999 to 999999 | – |
| Color | Beige | – | – | ■ |
| | Black | ■ | ■ | – |
| | Page/Quick Link | 571 | 572 | 573 |

■ Standard □ Available – No/not available


## Self-powered LCD totaliser

The H7E series is available with large display with 8.6 mm character height. It includes models with backlight for improved visibility in dimly lit places. The H7E family includes total counters, time counters, tachometers and PCB mounted counters.

- Size in mm (H×W×D): 24×48×55.5, 1/32 DIN size housing
- 8 digits, 8.6 mm character height
- Black or light-grey housing
- Dual input speed: 30 Hz <-> 1 kHz
- Short body: all models have a depth of 48.5 mm

## Ordering information

| Count input | Max. counting speed | Display | Order code | |
|---|---|---|---|---|
| | | | Light grey body | Black body |
| No-voltage | 30 Hz <-> 1 kHz (switchable) | 7-segment LCD | H7EC-N | H7EC-N-B |
| PNP/NPN universal DC voltage input | 30 Hz <-> 1 kHz (switchable) | 7-segment LCD | H7EC-NV | H7EC-NV-B |
| | | 7-segment LCD with backlight | H7EC-NV-H | H7EC-NV-BH |
| AC/DC multi-voltage input | 20 Hz | 7-segment LCD | H7EC-NFV | H7EC-NFV-B |

## Specifications

| Item | H7EC-NV-_/H7EC-NV-_H | H7EC-NFV-_ | H7EC-N-_ |
|---|---|---|---|
| Operating mode | Up type | | |
| Mounting method | Flush mounting | | |
| External connections | Screw terminals, optional wire-wrap terminals | | |
| Number of digits | 8 | | |
| Display | 7-segment LCD with or without backlight, zero suppression (character height: 8.6 mm) | | |
| Max. counting speed | 30 Hz/1 kHz | 20 Hz | 30 Hz/1 kHz |
| Case color | Light grey or black (-B models) | | |
| Attachment | Waterproof packing, flush mounting bracket | | |
| Supply voltage | Backlight model: 24 VDC (0.3 W max.) (only for backlight)<br>No-backlight model: Not required (powered by built-in battery) | Not required (powered by built-in battery) | |
| Count input | High (logic) level: 4.5 to 30 VDC<br>Low (logic) level: 0 to 2 VDC<br>(input impedance: Approx. 4.7 kΩ) | High (logic) level:<br>24 to 240 VAC/VDC, 50/60 Hz<br>Low (logic) level:<br>0 to 2.4 VAC/VDC, 50/60 Hz | No voltage input<br>Maximum short-circuit impedance:<br>10 kΩ max.<br>Short-circuit residual voltage: 0.5 V max.<br>Minimum open impedance: 750 kΩ min. |
| Reset input | | No voltage input<br>Maximum short-circuit impedance:<br>10 kΩ max.<br>Short-circuit residual voltage: 0.5 V max.<br>Minimum open impedance: 750 kΩ min. | |
| Minimum signal width | 20 Hz: 25 ms, 30 Hz: 16.7 ms, 1 KHz: 0.5 ms | | |
| Reset system | External reset and manual reset: Minimum signal width of 20 ms | | |
| Ambient temperature | Operating: –10 to 55°C (with no condensation or icing), storage: –25 to 65°C (with no condensation or icing) | | |
| Degree of protection | Front-panel: IP66, NEMA4, terminal block: IP20 | | |
| Battery life (reference) | 7 years min. with continuous input at 25°C (lithium battery) | | |
| Size in mm (H×W×D) | 24×48×55.5 | | |


## Self-powered time counter

The H7E series is available with large display with 8.6 mm character height. It includes models with backlight for improved visibility in dimly lit places. The H7E family includes total counters, time counters, tachometers and PCB mounted counters.

- Size in mm (H×W×D) 24×48×55.5, 1/32 DIN size housing
- 7 digits, 8.6 mm character height
- Black or light-grey housing
- Dual time range 999999.9 h <-> 3999 d 23.9 h or 999 h 59 m 59 s <-> 9999 h 59.9m

## Ordering information

| Timer input | Display | Order code | | | |
|---|---|---|---|---|---|
| | | Time range 999999.9h <-> 3999d23.9h (switchable) | | Time range 999h59m59s <-> 9999h59.9m | |
| | | Light grey body | Black body | Light grey body | Black body |
| No-voltage input | 7-segment LCD | H7ET-N | H7ET-N-B | H7ET-N1 | H7ET-N1-B |
| PNP/NPN universal DC voltage input | 7-segment LCD | H7ET-NV | H7ET-NV-B | H7ET-NV1 | H7ET-NV1-B |
| | 7-segment LCD with backlight | H7ET-NV-H | H7ET-NV-BH | H7ET-NV1-H | H7ET-NV1-BH |
| AC/DC multi-voltage input | 7-segment LCD | H7ET-NFV | H7ET-NFV-B | H7ET-NFV1 | H7ET-NFV1-B |

## Specifications

| Item | H7ET-NV_-_/H7ET-NV_-_H | H7ET-NFV_-_ | H7ET-N_-_ |
|---|---|---|---|
| Operating mode | Accumulating | | |
| Mounting method | Flush mounting | | |
| External connections | Screw terminals | | |
| Display | 7-segment LCD with or without backlight, zero suppression (character height: 8.6 mm) | | |
| Number of digits | 7 | | |
| Case color | Light grey or black (-B models) | | |
| Attachment | Waterproof packing, flush mounting bracket, time unit labels | | |
| Supply voltage | Backlight model: 24 VDC (0.3 W max.) (for backlight)<br>No-backlight model: Not required (powered by built-in battery) | Not required (powered by built-in battery) | |
| Timer input | High (logic) level: 4.5 to 30 VDC<br>Low (logic) level: 0 to 2 VDC<br>(Input impedance: Approx. 4.7 kΩ) | High (logic) level:<br>24 to 240 VAC/VDC, 50/60 Hz<br>Low (logic) level:<br>0 to 2.4 VAC/VDC, 50/60 Hz | No voltage input<br>Maximum short-circuit impedance:<br>10 kΩ max.<br>Short-circuit residual voltage: 0.5 V max.<br>Minimum open impedance: 750 kΩ min. |
| Reset input | | No voltage input<br>Maximum short-circuit impedance:<br>10 kΩ max.<br>Short-circuit residual voltage: 0.5 V max.<br>Minimum open impedance: 750 kΩ min. | |
| Minimum pulse width | 1 s | | |
| Reset system | External reset and manual reset: Minimum signal width of 20 ms | | |
| Ambient temperature | Operating: –10 to 55°C (with no condensation or icing), storage: –25 to 65°C (with no condensation or icing) | | |
| Time accuracy | ±100 ppm (25°C) | | |
| Degree of protection | Front-panel: IP66, NEMA4 with waterproof packing, terminal block: IP20 | | |
| Battery life (reference) | 10 years min. with continuous input at 25°C (lithium battery) | | |
| Size in mm (H×W×D) | 24×48×55.5 | | |


## Self-powered tachometer

The H7E series is available with large display with 8.6 mm character height. It includes models with backlight for improved visibility in dimly lit places. The H7E family includes total counters, time counters, tachometers and PCB mounted counters.

- Size in mm (H×W×D) 24×48×53.5, 1/32 DIN size housing
- 5 digits, 8.6 mm character height
- Black or light-grey housing
- Dual revolution display

## Ordering information

| Count input | Display | Order code | | | |
|---|---|---|---|---|---|
| | | Max. revolutions displayed (applicable encoder resolution) | | | |
| | | 1,000 $s^{-1}$ (1 pulse/rev.)<br>1,000 $min^{-1}$ (60 pulse/rev.) | | 1,000.0 $s^{-1}$ (10 pulse/rev)<br>1,000.0 $min^{-1}$ (600 pulse/rev) <-><br>10,000 $min^{-1}$ (60 pulse/rev) (switchable) | |
| | | Light grey body | Black body | Light grey body | Black body |
| No-voltage input | 7-segment LCD | H7ER-N | H7ER-N-B | | |
| PNP/NPN universal DC voltage input | 7-segment LCD | H7ER-NV | H7ER-NV-B | H7ER-NV1 | H7ER-NV1-B |
| | 7-segment LCD with backlight | H7ER-NV-H | H7ER-NV-BH | H7ER-NV1-H | H7ER-NV1-BH |

## Specifications

| Item | H7ER-NV1-_/H7ER-NV1-_H | H7ER-NV-_/H7ER-NV-_H | H7ER-N-_ |
|---|---|---|---|
| Operating mode | Up type | | |
| Mounting method | Flush mounting | | |
| External connections | Screw terminals, wire-wrap terminals | | |
| Display | 7-segment LCD with or without backlight, zero suppression (character height: 8.6 mm) | | |
| Number of digits | 5 | 4 | |
| Max. revolutions displayed | 1,000.0 $s^{-1}$ (when encoder resolution of 10 pulse/rev is used)<br>1,000.0 $min^{-1}$ (when encoder resolution of 600 pulse/rev is used)<br><-> 10,000 $min^{-1}$ (when encoder resolution of 60 pulse/rev is used)<br>(switchable with switch) | 1,000 $s^{-1}$ (when encoder resolution of 1 pulse/rev is used)<br>1,000 $min^{-1}$ (when encoder resolution of 60 pulse/rev is used) | |
| Attachment | Waterproof packing, flush mounting bracket, revolution unit labels | | |
| Supply voltage | Backlight model: 24 VDC (0.3 W max.) (for backlight lit)<br>No-backlight model: Not required (powered by built-in battery) | | Not required (powered by built-in battery) |
| Count input | High (logic) level: 4.5 to 30 VDC<br>Low (logic) level: 0 to 2 VDC<br>(Input impedance: Approx. 4.7 kΩ) | | No voltage input<br>Maximum short-circuit impedance:<br>10 kΩ max.<br>Short-circuit residual voltage: 0.5 V max.<br>Minimum open impedance: 750 kΩ min. |
| Max. counting speed | 10 kHz | 1 kHz | |
| Minimum signal width | 10 kHz: 0.05 ms, 1 kHz: 0.5 ms | | |
| Ambient temperature | Operating: –10 to 55°C (with no condensation or icing), storage: –25 to 65°C (with no condensation or icing) | | |
| Degree of protection | Front-panel: IP66, NEMA4 with waterproof packing, terminal block: IP20 | | |
| Battery life (reference) | 7 years min. with continuous input at 25°C (lithium battery) | | |
| Size in mm (H×W×D) | 24×48×53.5 | | |


## World's smallest compact preset counter/timer

The H8GN is a 1/32 DIN timer and counter in one. It is simple to switch between the timer and counter functions. During operation it is also possible to switch the display to monitor the totalising count value in 8 digits. Many sophisticated functions come as standard with H8GN.

- Size in mm (H×W×D) 24×48×83, 1/32 DIN size housing
- 8 digit display, 4 value and 4 set value
- Front mounting
- –999 to 9999
- 24 VDC

## Ordering information

| Functions | | Supply voltage | Output | Order code | |
|---|---|---|---|---|---|
| | | | | Communications | |
| Counter | Timer | | | No communications | RS-485 |
| Counter: Up/down/reversible,<br>4 digits, N, F, C or K output modes<br>Total counter: 8 digits | A: ON-delay<br>B: Flicker<br>D: Signal OFF-delay<br>E: Interval<br>F: Accumulative<br>Z: ON/OFF-duty adjustable flicker | 24 VDC | Contact output (SPDT) | H8GN-AD | H8GN-AD-FLK |

## Specifications

| | | |
|---|---|---|
| Rated supply voltage | | 24 VDC |
| Operating voltage range | | 85 to 110% of rated supply voltage |
| Power consumption | | 1.5 W max. (for max. DC load) (inrush current: 15 A max.) |
| Mounting method | | Flush-mounting |
| External connections | | Screw terminals (M3 screws) |
| Terminal screw tightening torque | | 0.5 Nm max. |
| Attachment | | Waterproof packing, flush-mounting bracket |
| Display | | 7-segment, negative transmissive LCD; time display (h, min, s); CMW, OUT, RST, TOTAL<br>Present value (red, 7 mm high characters); set value (green, 3.4 mm high characters) |
| Digits | | PV: 4 digits, SV: 4 digits, when total count value is displayed: 8 digits (zeros suppressed) |
| Memory backup | | EEPROM (non-volatile memory) (number of writes: 100,000 times) |
| Counter | Maximum counting speed | 30 Hz or 5 kHz |
| | Counting range | –999 to 9,999 |
| | Input modes | Increment, decrement, individual, quadrature inputs |
| Timer | Timer modes | Elapsed time (up), remaining time (down) |
| Inputs | Input signals | For counter: CP1, CP2, and reset<br>For timer: Start, gate, and reset |
| | Input method | No-voltage input (contact short-circuit and open input)<br>Short-circuit (ON) impedance: 1 kΩ max. (approx. 2 mA runoff current at 0 Ω)<br>Short-circuit (ON) residual voltage: 2 VDC max.<br>Open (OFF) impedance: 100 kΩ min.<br>Applied voltage: 30 VDC max. |
| | Start, reset, gate | Minimum input signal width: 1 or 20 ms (selectable) |
| | Power reset | Minimum power-opening time: 0.5 s |
| Control output | | SPDT contact output: 3 A at 250 VAC/30 VDC, resistive load ($\cos\phi = 1$) |
| Minimum applied load | | 10 mA at 5 VDC (failure level: P, reference value) |
| Reset system | | External, manual, and power supply resets (for timer in A, B, D, E, or Z modes) |
| Sensor waiting time | | 260 ms max.<br>(inputs cannot be received during sensor wait time if control outputs are turned OFF) |
| Timer function | Accuracy of operating time and setting error (including temperature and voltage effects) | Signal start: ±0.03% ±30 ms max.<br>Power-ON start: ±0.03% ±50 ms max. |
| Ambient temperature | Operating storage | –10 to 55°C (with no icing or condensation) |
| | | –25 to 65°C (with no icing or condensation) |
| Case color | | Rear section: Grey smoke; front section: N1.5 (black) |
| Degree of protection | | Panel surface: IP66 and NEMA Type 4X (indoors); rear case: IP20, terminal block: IP20 |
| Size in mm (H×W×D) | | 24×48×83 |


## The most complete digital standard counter on the market

H7CX offers you the most complete series of products on the market today.
Based on extensive customer research, these new counters have been designed with value added features that users both need and appreciate.

- Size in mm (H×W×D) 48×48×59 to 78 mm 1/16 DIN size housing
- Three color display value, red, green or orange
- Twin counter mode
- 6 digit model –99,999 to 999,999, set value –99,999 to 999,999 or 0 to 999,999
- Input contact, NPN or PNP

## Ordering information

| Type | External connection | Sensor power supply | Supply voltage | Output type | Digits | Size in mm (H×W×D) | Order code |
|---|---|---|---|---|---|---|---|
| 1-stage counter<br>1-stage counter with total counter<br>2-stage counter<br>1-stage counter with batch counter<br>Dual counter (addition/subtraction)<br>Tachometer<br>Twin counter | Screw terminal | 12 VDC | 100 to 240 VAC | Contact and transistor output | 6 | 48×48×84 | H7CX-AU-N |
| | | | 12 to 24 VDC/24 VAC | | | | H7CX-AUD1-N |
| | | | | Transistor output (2×) | | | H7CX-AUSD1-N |
| | | | 100 to 240 VAC | Contact output (2×) | | | H7CX-AW-N |
| | | | 12 to 24 VDC/24 VAC | | | | H7CX-AWD1-N |
| 1-stage counter<br>1-stage counter with total counter | 11-pin socket | 12 VDC | 100 to 240 VAC | Contact output | | 48×48×69.7 | H7CX-A11-N |
| | | | 12 to 24 VDC/24 VAC | | | | H7CX-A11D1-N |
| | | | 100 to 240 VAC | Transistor output | | | H7CX-A11S-N |
| | | | 12 to 24 VDC/24 VAC | | | | H7CX-A11SD1-N |
| | Screw terminal | | 100 to 240 VAC | Contact output | | 48×48×84 | H7CX-A-N |
| | | | 100 to 240 VAC | Transistor output | | | H7CX-AS-N |

### Accessories

| Name | | Order code |
|---|---|---|
| Flush-mounting adapter | | Y92F-30 |
| Waterproof packing | | Y92S-29 |
| DIN-rail mounting/front-connecting socket | 11-pin, finger safe type | P2CF-11-E |
| Back-connecting socket | 11-pin | P3GA-11 |
| | Finger safe terminal cover for P3GA-11 | Y92A-48G |
| Hard cover | | Y92A-48 |
| Soft cover | | Y92A-48F1 |
| Front panels (4-digit models) | Light gray | Y92P-CXC4G |
| | White | Y92P-CXC4S |
| Front panels (6-digit models) | Light gray | Y92P-CXC6G |
| | White | Y92P-CXC6S |

## Specifications

| | |
|---|---|
| **Display** | 7-segment, negative transmissive LCD |
| **Digits** | 6-digits: –99,999 to 999,999, SV range: –99999 to 999999 or 0 to 999999 |
| **Max. counting speed** | 30 Hz or 5 kHz (selectable, ON/OFF ratio 1:1) |
| **Input modes** | Increment, decrement, increment/decrement (UP/DOWN A (command input), UP/DOWN B (individual inputs), or UP/DOWN C (quadrature inputs)) |
| **Control output** | Contact output: 3 A at 250 VAC/30 VDC, resistive load ($\cos\phi = 1$)<br>Minimum applied load: 10 mA at 5 VDC<br>Transistor output: NPN open collector, 100 mA at 30 VDC<br>Residual voltage: 1.5 VDC max. (approx. 1V)<br>Leakage current: 0.1 mA max. |
| **Key protection** | Yes |
| **Decimal point adjustment** | Yes (rightmost 3 digits) |
| **Sensor waiting time** | 290 ms max. |
| **Memory backup** | EEPROM (overwrites: 100,000 times min.) stores data 10 years min. |
| **Ambient temperature** | Operating: –10 to 55°C (–10 to 50°C when mounted side by side) |
| **Case color** | Black (N1.5) (Optional Front Panels are available to change the Front Panel color to light gray or white.) |
| **Life expectancy** | Mechanical: 10,000,000 operations min. |
| | Electrical: 100,000 operations min. (3 A at 250 VAC, resistive load) |
| **Degree of protection** | Panel surface: IP66, NEMA 4 (indoors), and UL Type 4X (indoors) |

## Compact, easy-to-use cam positioner

The H8PS provides high speed operation at 1,600 r/min and high-precision settings to 0.5° ensuring widespread application. H8PS features a highly visible display with back-lit negative transmissive LCD. Advance angle compensation function compensates for output delays.

- 96 to 121.2H×96W×60.6 to 67.5D mm
- Front-panel / DIN-rail
- 24 VDC
- 8-, 16- and 32-outputs
- NPN/PNP 100 mA at 30 VDC

## Ordering information

| Number of outputs | Mounting method | Output configuration | Bank function | Size in mm (H×W×D) | Order code |
|---|---|---|---|---|---|
| 8-outputs | Flush-mounting | NPN transistor output | No | 96×96×67.5 | H8PS-8B |
| | | PNP transistor output | | | H8PS-8BP |
| | Front-mounting/DIN-rail mounting | NPN transistor output | | 96×96×60.6 | H8PS-8BF |
| | | PNP transistor output | | | H8PS-8BFP |
| 16-outputs | Flush-mounting | NPN transistor output | Yes | 96×96×67.5 | H8PS-16B |
| | | PNP transistor output | | | H8PS-16BP |
| | Front-mounting/DIN-rail mounting | NPN transistor output | | 121.2×96×60.6 | H8PS-16BF |
| | | PNP transistor output | | | H8PS-16BFP |
| 32-outputs | Flush-mounting | NPN transistor output | | 96×96×67.5 | H8PS-32B |
| | | PNP transistor output | | | H8PS-32BP |
| | Front-mounting/DIN-rail mounting | NPN transistor output | | 121.2×96×60.6 | H8PS-32BF |
| | | PNP transistor output | | | H8PS-32BFP |

### Encoders

| Type | Resolution | Cable length | Order code |
|---|---|---|---|
| Economy | 256 | 2 m | E6CP-AG5C-C 256 2M |
| Standard | 256 | 1 m | E6C3-AG5C-C 256 1M |
| | | 2 m | E6C3-AG5C-C 256 2M |
| | 360 | | E6C3-AG5C-C 360 2M |
| | 720 | | E6C3-AG5C-C 720 2M |
| Rigid | 256 | 2 m | E6F-AG5C-C 256 2M |
| | 360 | | E6F-AG5C-C 360 2M |
| | 720 | | E6F-AG5C-C 720 2M |

### Accessories

| Name | Specification | Order code |
|---|---|---|
| Discrete wire output cable | 2 m | Y92S-41-200 |
| Connector-type output cable | 2 m | E5ZE-CBL200 |
| Support software | CD-ROM | H8PS-SOFT-V1 |
| USB cable | A miniB, 2 m | Y92S-40 |
| Parallel input adapter | Two units can operate in parallel | Y92C-30 |
| Protective cover | | Y92A-96B |
| Watertight cover | | Y92A-96N |
| DIN-rail mounting base | | Y92F-91 |

### Encoder accessories

| Name | Specification | Order code |
|---|---|---|
| Shaft coupling for the E6CP | Axis: 6 mm dia. | E69-C06B |
| Shaft coupling for the E6C3 | Axis: 8 mm dia. | E69-C08B |
| Shaft coupling for the E6F | Axis: 10 mm dia. | E69-C10B |
| Extension cable | 5 m (same for E6CP, E6C3, and E6F) | E69-DF5 |

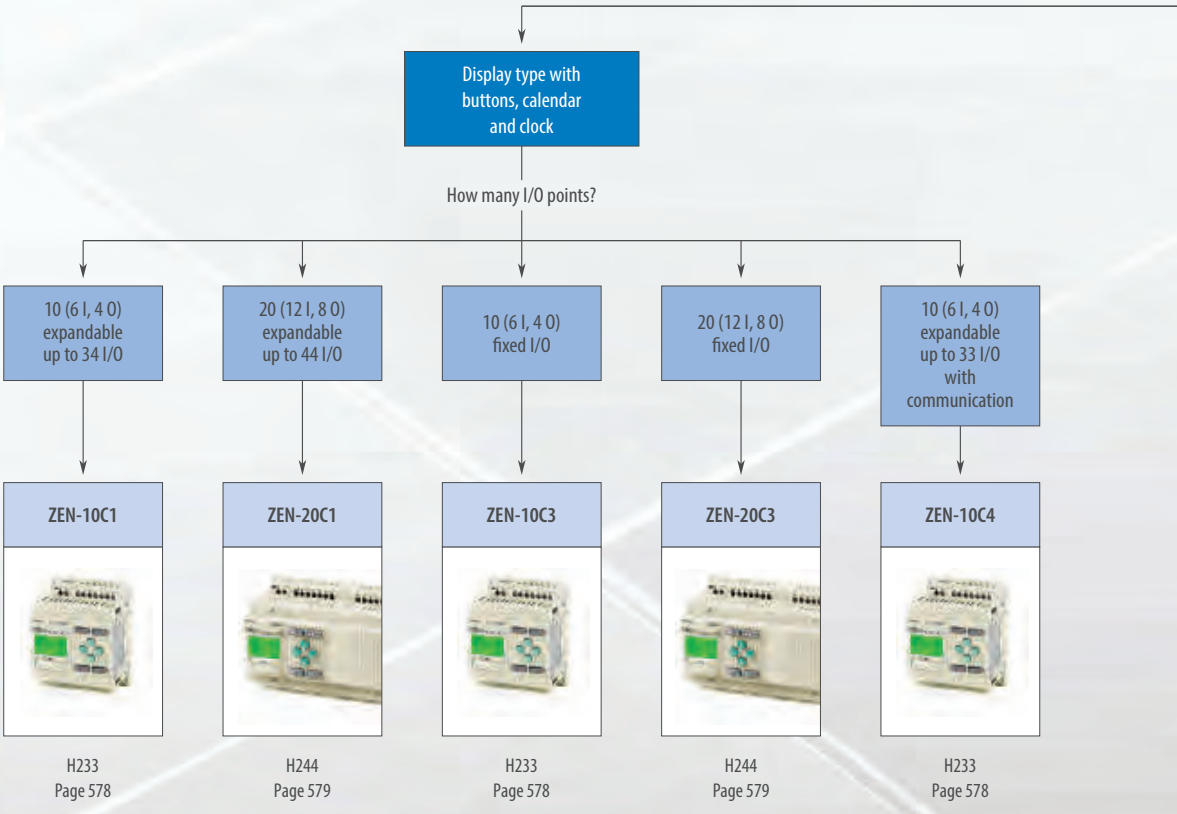
## Specifications

| | | | |
|---|---|---|---|
| Rated supply voltage | | | 24 VDC |
| Inputs | Encoder input | | 8-output models: None; 16-/32-output models: Bank inputs 1/2/4, origin input, start input |
| | External inputs | Input signals | 8-output models: None; 16-/32-output models: Bank inputs 1/2/4, origin input, start input |
| | | Input type | No voltage inputs: ON impedance: 1 kΩ max. (leakage current: Approx. 2 mA at 0 Ω)<br>ON residual voltage: 2 V max., OFF impedance: 100 kΩ min., applied voltage: 30 VDC max.<br>Minimum input signal width: 20 ms |
| Number of banks | | | 8 banks (for 16-/32-output models only) |
| Display method | | | 7-segment, negative transmissive LCD (main display: 11 mm (red), sub-display: 5.5 mm (green)) |
| Memory backup method | | | EEPROM (overwrites: 100,000 times min.) that can store data for 10 years min. |
| Ambient operating temperature | | | –10 to 55°C (with no icing or condensation) |
| Storage temperature | | | –25 to 65°C (with no icing or condensation) |
| Ambient humidity | | | 25 to 85% |
| Degree of protection | | | Panel surface: IP40, rear case: IP20 |
| Case color | | | Light grey (Munsell 5Y7/1) |

# ZEN - SIMPLICITY AT ITS BEST

The ZEN series offers simple logic control for a wide variety of applications. With many on-board functions like season and weekly timers, counters, analog inputs and using the ladder logic, you can automate the application very quickly. Adjustments and maintanance is easy using the models with an LCD.

- RS-485 communication
- Expandable I/O
- Memory Data backup



What functionality is required?

- **LED type**
  - How many I/O points?
    - 10 (6 I, 4 O) expandable up to 34 I/O → **ZEN-10C2**  H233 Page 578
    - 20 (12 I, 8 O) expandable up to 44 I/O → **ZEN-20C2**  H244 Page 579
- **Expansion unit**
  - How many extra I/O points?
    - 8 I/O (4 I, 4 O) → **ZEN-8E**  H267 Page 580
- **Power supply** → **ZEN-PA**  H268 Page 581

| |  |  | | |
|---|---|---|---|---|
| **Model** | **ZEN-10C** | **ZEN-20C** | | |
| **Type** | CPU unit | CPU unit | | |
| **Features C1** | With LCD Display, program/control buttons, calendar and real-time clock | With LCD display, program/control buttons, calendar and real-time clock | | |
| **Features C2** | With LED indication<br>Logic control<br>Programming by software | With LED indication<br>Logic control<br>Programming by software | | |
| **Features C3** | Same as C1 but not expandable. | Same as C1 but not expandable. | | |
| **Features C4** | Same as C1 but instead of one output relay you get RS-485 communication. | – | | |
| **Features Starter kits** | Complete set with C1 CPU including software, cable and manual | – | | |
| **Number of I / O points** | 10 expandable up to 34 I/O (C4 up to 33 I/O) | 20 expandable up to 44 I/O | | |
| **Inputs** | 6 | 12 | | |
| **Inputs/power supply** | 100 to 240 VAC or 12 to 24 VDC | 100 to 240 VAC or 12 to 24 VDC | | |
| **Outputs** | 4 relays (C4 = 3 relays) or 4 transistors | 8 relays or 8 transistors | | |
| **Page/Quick Link** | 578 | 579 | | |



– No/not available

## Flexible automation

The ZEN-10C offers simple logic control in a choice of four CPU units. Expansion is possible on three of these CPU's of up to 34 I/O whereas the fourth (C3 Units) is fixed at 10 I/O. All DC models have analog input and a high-speed counter input up to 150 Hz.

- DC input/supply units have analog input + high speed counter
- The ZEN-10C4 has RS-485 communication
- Expansion available with relay output or transistor output
- ZEN-Kits the best choice to start!

## Ordering information

| Name | Number of I/O points | Inputs (I)/ power supply | | Outputs (Q) | | Type | LCD, buttons (B), calendar and clock | Analog input/ comparators (A) | 8-digit counter (F)/ comparators (G) | No. of bits 16 | No. of bits 8 | Size in mm (H×W×D) | Order code |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CPU units | 10 Expandable up to 34 I/O | 6 | 100 to 240 VAC | 4 | Relays | LCD | yes | – | – | Work bits (M) Holding bits (H) Timers (T) Counters (C) Weekly timers (@) LCD display (D) Timer/counter comparator (P) | Holding timers (#) Button input (B) | 90×70×56 | ZEN-10C1AR-A-V2 |
| | | | | | | LED | – | – | – | | | | ZEN-10C2AR-A-V2 |
| | | | 12 to 24 VDC | | | LCD | yes | yes / 4 | yes / 4 | | | | ZEN-10C1DR-D-V2 |
| | | | | | | LED | – | yes / 4 | yes / 4 | | | | ZEN-10C2DR-D-V2 |
| | | | | | Transistors | LCD | yes | yes / 4 | yes / 4 | | | | ZEN-10C1DT-D-V2 |
| | | | | | | LED | – | yes / 4 | yes / 4 | | | | ZEN-10C2DT-D-V2 |
| | Fixed I/O | | 100 to 240 VAC | | Relays | LCD | yes | – | yes / 4 | | | | ZEN-10C3AR-A-V2 |
| | | | 12 to 24 VDC | | | LCD | yes | yes / 4 | yes / 4 | | | | ZEN-10C3DR-D-V2 |
| | 10 Expandable up to 33 I/O | | 100 to 240 VAC | 3 | | LCD/ Comm. | yes | – | yes / 4 | | | | ZEN-10C4AR-A-V2 |
| | | | 12 to 24 VDC | | | | yes | yes / 4 | yes / 4 | | | | ZEN-10C4DR-D-V2 |
| ZEN kit | | Set containing CPU unit (ZEN-10C1AR-A-V2), connecting cable, ZEN support software and manual. | | | | | | | | | | | ZEN-KIT01-EV4 |
| | | Set containing CPU unit (ZEN-10C1DR-D-V2), connecting cable, ZEN support software and manual. | | | | | | | | | | | ZEN-KIT02-EV4 |

## Specifications

| Item | Specifications | |
|---|---|---|
| | ZEN-10C_AR-A-V2 | ZEN-10C_D_-D-V2 |
| Power supply voltage | 100 to 240 VAC, 50/60 Hz | 12 to 24 VDC (DC ripple rate: 5%) |
| Rated power supply voltage | 85 to 264 VAC | 10.8 to 28.8 VDC |
| Power consumption | 9 VA max. | 4 W max. |
| Inrush current | 3 A max. | 30 A max. |
| Ambient temperature | 0°C to 55°C (–25°C to 55°C for ZEN-10C2 models (LED)) | |
| Ambient storage | –20°C to 55°C (–40°C to 75°C for ZEN-10C2 models (LED)) | |
| Control method | Stored program control | |
| I/O control method | Cyclic scan | |
| Programming language | Ladder diagram | |
| Program capacity | 96 lines (3 input conditions and 1 output per line) | |
| LCD display | 12 characters x 4 lines, with backlight (LCD-type CPU unit only) | |
| Operation keys | 8 (4 cursor keys and 4 operation keys) (LCD-type CPU unit only) | |
| Super-capacitor holding time | 2 days min. (25°C) | |
| Battery life (ZEN-BAT01) | 10 years min. (25°C) | |
| Calendar & Clock function | Accuracy: ±15 s/month (at 25°C) | |

## Accessories

| Name | Description | Order code |
|---|---|---|
| Memory Cassette | EEPROM (for data security and copying) | ZEN-ME01 |
| Battery unit | Battery (keeps time, date and bit values for 10 years at 25°C) | ZEN-BAT01 |
| Connecting Cable | For the programming software, RS-232C cable, 9-way `D' connector for PC | ZEN-CIF01 |
| USB-Serial conversion cable | USB-Serial conversion cable (to be used in combination with ZEN-CIF01) | CS1W-CIF31 |
| ZEN support software | Runs on Windows ME, 2000, XP, NT4.0 Service Pack 3, Vista | ZEN-SOFT01-V4 |

## Extended flexible automation

Ideal for small-scale control applications, the ZEN-20C provides an economical alternative to discrete timers, counters and general purpose relays. With 12 Inputs and 8 relay or transistor Outputs, and expansion possibilities of up to 44 I/O on C1 and C2 models, the ZEN-20C offers extended flexibility, with features such as calendar and real time clock functionality.

- ZEN-20C1/C2 expandable up to 44 I/Os
- ZEN DC units have analog input 0-10 VDC
- DC models have as well high speed counter 150 Hz
- Expansion available with relay output or transistor output

## Ordering information

| Name | Number of I/O points | Inputs (I)/ power supply | | Outputs (Q) | | Type | LCD, buttons (B), calendar and clock | Analog input/ comparators (A) | 8-digit counter (F)/ comparators (G) | No. of bits 16 | No. of bits 8 | Size in mm (H×W×D) | Order code |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CPU units | 20 | 12 | 100 to 240 VAC | 8 | Relays | LCD | yes | – | – | Work bits (M)<br>Holding bits (H)<br>Timers (T)<br>Counters (C)<br>Weekly timers (@)<br>LCD display (D)<br>Timer/counter comparator (P) | Holding timers (#)<br>Button input (B) | 90×122.5×56 | ZEN-20C1AR-A-V2 |
| | Expandable up to 44 I/O | | | | | LED | – | – | – | | | | ZEN-20C2AR-A-V2 |
| | | | 12 to 24 VDC | | | LCD | yes | yes / 4 | yes / 4 | | | | ZEN-20C1DR-D-V2 |
| | | | | | | LED | – | yes / 4 | yes / 4 | | | | ZEN-20C1DR-D-V2 |
| | | | | | Transistors | LCD | yes | yes / 4 | yes / 4 | | | | ZEN-20C1DT-D-V2 |
| | | | | | | LED | – | yes / 4 | yes / 4 | | | | ZEN-20C2DT-D-V2 |
| | Fixed I/O | | 100 to 240 VAC | | Relays | LCD | yes | – | yes / 4 | | | | ZEN-20C3AR-A-V2 |
| | | | 12 to 24 VDC | | | LCD | yes | yes / 4 | yes / 4 | | | | ZEN-20C3DR-D-V2 |

## Specifications

| Item | Specifications | |
|---|---|---|
| | ZEN-20C_AR-A-V2 | ZEN-20C_D_-D-V2 |
| Power supply voltage | 100 to 240 VAC, 50/60 Hz | 12 to 24 VDC (DC ripple rate: 5%) |
| Rated power supply voltage | 85 to 264 VAC | 10.8 to 28.8 VDC |
| Power consumption | 11 VA max. | 5 W max. |
| Inrush current | 4 A max. | 30 A max. |
| Ambient temperature | 0°C to 55°C (–25°C to 55°C for ZEN-20C2 models (LED)) | |
| Ambient storage | –20°C to 55°C (–40°C to 75°C for ZEN-20C2 models (LED)) | |
| Control method | Stored program control | |
| I/O control method | Cyclic scan | |
| Programming language | Ladder diagram | |
| Program capacity | 96 lines (3 input conditions and 1 output per line) | |
| LCD display | 12 characters x 4 lines, with backlight (LCD-type CPU unit only) | |
| Operation keys | 8 (4 cursor keys and 4 operation keys) (LCD-type CPU unit only) | |
| Super-capacitor holding time | 2 days min. (25°C) | |
| Battery life (ZEN-BAT01) | 10 years min. (25°C) | |
| Calendar & Clock function | Accuracy: ±15 s/month (at 25°C) if applicable | |

## Accessories

| Name | Description | Order code |
|---|---|---|
| Memory Cassette | EEPROM (for data security and copying) | ZEN-ME01 |
| Battery unit | Battery (keeps time, date and bit values for 10 years at 25°C) | ZEN-BAT01 |
| Connecting Cable | For the programming software, RS-232C cable, 9-way `D' connector for PC | ZEN-CIF01 |
| USB-Serial conversion cable | USB-Serial conversion cable (to be used in combination with ZEN-CIF01) | CS1W-CIF31 |
| ZEN support software | Runs on Windows ME, 2000, XP, NT4.0 Service Pack 3, Vista | ZEN-SOFT01-V4 |

## ZEN Expansion units

To scale-up your ZEN application we provide three different expansion units in only 35 mm width ZEN housing. All expansion units have standard 4 inputs and 4 outputs. You can add maximum 3 expansion units to one CPU.

- 4 inputs, 100 to 240 VAC or 12 to 24 VDC
- 4 outputs, either relays or transistors (only DC models)
- DIN-rail mounting
- Size in mm (H×W×D): 90×35×56

## Ordering information

| Name | Number of I/O points | Inputs (X)/power supply | | Outputs (Y) | | Size in mm (H×W×D) | Order code |
|---|---|---|---|---|---|---|---|
| Expansion I/O units | 8 | 4 | 100 to 240 VAC | 4 | Relays | 90×35×56 | ZEN-8E1AR |
| | | | 12 to 24 VDC | | | | ZEN-8E1DR |
| | | | | | Transistors | | ZEN-8E1DT |

## Specifications

| Item | Specifications | |
|---|---|---|
| | ZEN-8E1AR | ZEN-8E1D_ |
| Power supply voltage | 100 to 240 VAC, 50/60 Hz | 12 to 24 VDC (DC ripple rate: 5% max.) |
| Rated power supply voltage | 85 to 264 VAC | 10.8 to 28.8 VDC |
| Power consumption | 4 VA max. | 2 W max. |
| Inrush current | 1.5 A max. | 15 A max. |
| Ambient temperature | 0°C to 55°C (–25°C to 55°C for ZEN-10C2 models (LED)) | |
| Ambient storage | –20°C to 55°C (–40°C to 75°C for ZEN-10C2 models (LED)) | |


## ZEN Power Supply

The ZEN Power Supply has the same compact housing as our 10 I/O CPU units. With a current/wattage output of 1.3 A/30 W it covers enough power to supply the DC ZEN itself and the eventually used sensors. If needed parallel operation is possible.

- Output voltage 24 VDC
- Output current 1.3 A
- Capacity 30 W
- Allows parallel operation
- Size in mm (H×W×D): 90×70×56

## Ordering information

| Power rating | Inputs voltage | Output current | Order code |
|---|---|---|---|
| 30 W | 100 to 240 VAC | 1.3 A | ZEN-PA03024 |

## Specifications

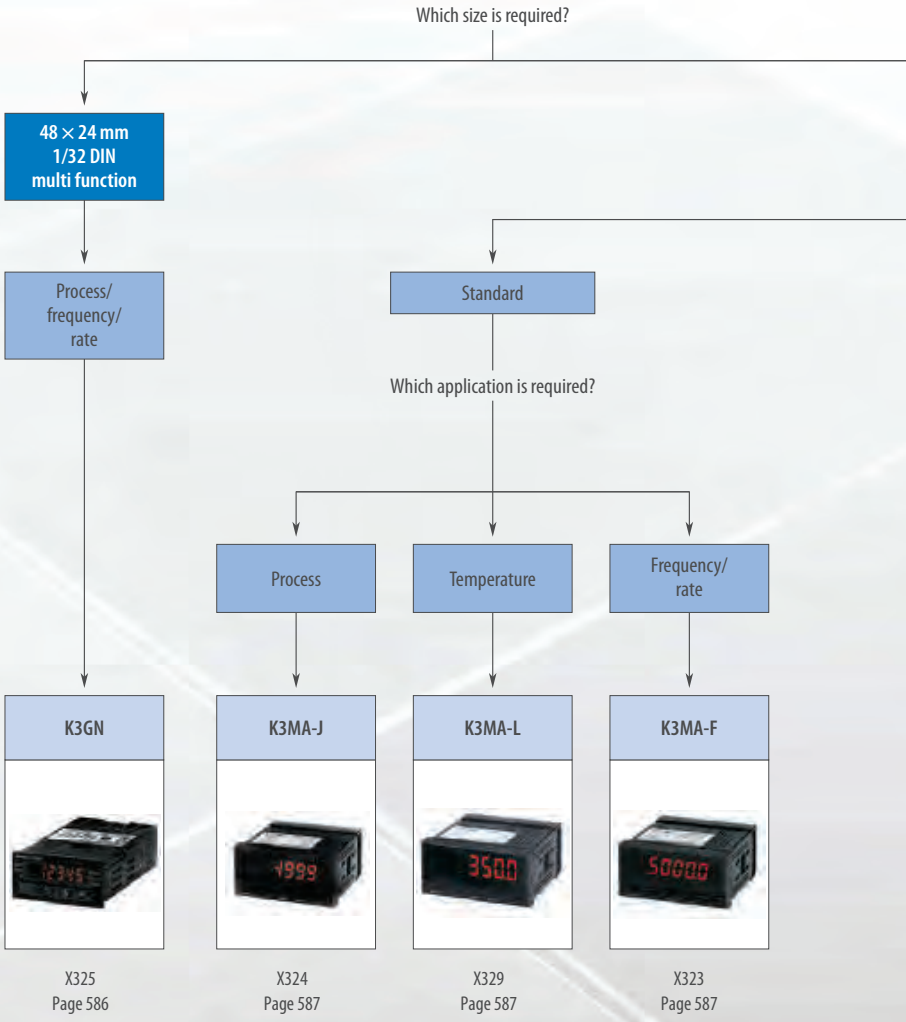
| Item | Specifications | |
|---|---|---|
| Power rating | 30 W | |
| Efficiency | 80% min. (24 V) | |
| Input voltage | 100 to 240 VAC (85 to 264 VAC), single-phase | |
| Output voltage | Voltage adjustment | ±10% to ±15% (with V. ADJ) min. of rate output voltage |
| | Ripple | 2% (p-p) max. (–25°C to –10°C: 4% max.) |
| | Input variation | 0.5% max. |
| | Temperature | 0.05% / °C max. |
| Overload protection | 105% to 135% of rated load current, inverted L drop, intermittent | |
| Overvoltage protection | yes | |
| Input Current | 100 V | 0.8 A max. |
| | 200 V | 0.45 A max. |
| Output indicator | yes (green) | |
| Weight | 240 g max. | |
| Operating temperature | –10°C to 60°C | |
| Parallel operation | yes (2 units max.) | |

# LOOKING FOR PERFECT MEASURING & READ-OUT?

## K3HB-V – For perfect weighing

With our K3HB series we cover a wide range of applications. One of them is the weighing indicator which performs perfect measurement in any weighing application. The instrument can be equipped with a load-cell power supply of 10 V/100 mA. Several option boards for communication, contact output boards or event inputs are also available. On top of these you can get direct DeviceNet communication.

- High speed sampling 20 ms
- Equipped with position meter
- Two color display for easy recognition




96 × 48 mm (1/8 DIN)

Advanced

Which application is required?

| Process | Temperature | Weighing | Linear sensor | Up/down counting pulse | Time interval | Rotary pulse |
|---|---|---|---|---|---|---|
| K3HB-X | K3HB-H | K3HB-V | K3HB-S | K3HB-C | K3HB-P | K3HB-R |
|  |  |  |  |  |  |  |
| X335 Page 588 | X332 Page 588 | X334 Page 588 | X333 Page 588 | X326 Page 590 | X327 Page 590 | X328 Page 590 |

# Selection table

| Category | | Multifunctional digital panel indicator | Process indicator | Temperature indicator | Frequency/rate indicator | Process indicator |
|---|---|---|---|---|---|---|
| | |  |  |  |  |  |
| Model | | K3GN | K3MA-J | K3MA-L | K3MA-F | K3HB-X |
| Size | | 1/32 DIN | 1/8 DIN | | | |
| Features | Color change display | ■ | ■ | ■ | ■ | ■ |
| | Number of digits | 5 | 5 | 4 | 5 | 5 |
| | Leading zero suppression | ■ | ■ | ■ | ■ | ■ |
| | Forced zero function | ■ | ■ | ■ | ■ | ■ |
| | Min./max. hold function | ■ | ■ | ■ | ■ | ■ |
| | Average processing | ■ | ■ | ■ | ■ | ■ |
| | User selectable inputs | ■ | ■ | ■ | ■ | ■ |
| | Start-up compensating time | ■ | – | – | ■ | – |
| | Key protection | ■ | ■ | ■ | ■ | ■ |
| | Decimal point position setting | ■ | ■ | ■ | ■ | ■ |
| | Accuracy | ±0.1% of full scale | ±0.1% of full scale | ±0.1% of full scale | ±0.1% of full scale | ±0.1% of full scale (DC voltage & DC current), ±0.5% of full scale (AC voltage & AC current) |
| | Input range | 0 to 20 mA, 4 to 20 mA or 0 to 5 V, 1 to 5 V, -5 to 5 V, -10 to 10 V or 0 to 30 Hz or 0 to 5 kHz | 0 to 20 mA, 4 to 20 mA or 0 to 5 V, 1 to 5 V, -5 to 5 V, -10 to 10 V | Pt100, JPt100 or thermocouple K, J, T, E, L, U, N, R, S, B | 0 to 30 Hz or 0 to 5 kHz | 0.000 to 10.000 A, 0.0000 to 19.999 mA, -199.99 to 199.99 mA, 4.000 to 20.000 mA, 0.0 to 400.0 V, 0.0000 to 1.999 V, -199.99 to 199.99 V, 1.0000 to 5.0000 V |
| | Sample rate | 250 ms | 250 ms | 500 ms | – | 20 ms |
| | Features | Remote/local processing, parameter initialisation, programmable output configuration, process value hold | Teaching, comparative output pattern selection, parameter initialisation, programmable output configuration, process value hold | Programmable output configuration, process value hold | Teaching, comparative output pattern selection, programmable output configuration, process value hold | Scaling, teaching, averaging, output hysteresis, output OFF-delay, output test, bank selection, reset, comparative output |
| | Sensor power supply | – | – | – | ■ | □ |
| Front protection | IP rating | IP66 | IP66 | IP66 | IP66 | IP66 |
| | Supply voltage | 24 VDC | 24 VAC/VDC or 100 to 240 VAC | 24 VAC/VDC or 100 to 240 VAC | 24 VAC/VDC or 100 to 240 VAC | 100 to 240 VAC or 24 VAC/VDC |
| Inputs | NPN | ■ | – | ■ | ■ | □ |
| | PNP | ■ | – | ■ | ■ | □ |
| | Temperature | – | – | – | – | – |
| | Contact | – | – | – | ■ | – |
| | Voltage pulse | – | – | – | ■ | – |
| | Load cell | – | – | – | – | – |
| | DC voltage | ■ | ■ | ■ | – | □ |
| | DC current | ■ | ■ | – | – | □ |
| | AC voltage | – | – | – | – | □ |
| | AC current | – | – | – | – | □ |
| Outputs | Relay | ■ | ■ | ■ | ■ | □ |
| | NPN | ■ | – | – | – | □ |
| | PNP | ■ | – | – | – | □ |
| | Linear | – | – | – | – | □ |
| | BCD | – | – | – | – | – |
| | Comms | ■ | – | – | – | □ |
| | Page/Quick Link | 586 | 587 | | | 588 |

| Temperature indicator | Weighing indicator | Linear sensor indicator | Up/down counting pulse indicator | Time interval indicator | Rotary pulse indicator |
|---|---|---|---|---|---|
|  |  |  |  |  |  |
| **K3HB-H** | **K3HB-V** | **K3HB-S** | **K3HB-C** | **K3HB-P** | **K3HB-R** |
| 1/8 DIN | | | | – | – |
| ■ | ■ | ■ | ■ | ■ | ■ |
| 5 | 5 | 5 | 5 | 5 | 5 |
| ■ | ■ | ■ | ■ | ■ | ■ |
| ■ | ■ | ■ | ■ | ■ | ■ |
| ■ | ■ | ■ | ■ | ■ | ■ |
| ■ | ■ | ■ | ■ | ■ | ■ |
| ■ | ■ | ■ | ■ | ■ | ■ |
| – | – | – | – | – | ■ |
| ■ | ■ | ■ | ■ | ■ | ■ |
| ■ | ■ | ■ | ■ | ■ | ■ |
| Thermocouple: ±0.3% of full scale, Pt-100: ±0.2% of full scale | ±0.1% of full scale | One input: ±0.1% of full scale, two inputs: ±0.2% of full scale | | ±0.08% rgd ±1 digit | ±0.006% rgd ±1 digit ±0.02% rgd ±1 digit |
| Pt100, thermocouple K, J, T, E, L, U, N, R, S, B, W | 0.00 to 199.99 mV, 0.000 to 19.999 mV, 100.00 mV, 199.99 mV | 0 to 20 mA, 4 to 20 mA, 0 to 5 V, -5 to 5 V, -10 to 10 V | No voltage contact: 30 Hz, voltage pulse: 50 kHz, open collector: 50 kHz | No voltage contact: 30 Hz, voltage pulse: 50 kHz, open collector: 50 kHz | No voltage contact: 30 Hz, voltage pulse: 50 kHz, open collector: 50 kHz |
| 20 ms | 20 ms | 0.5 ms | – | – | – |
| Scaling, teaching, averaging, output hysteresis, output OFF-delay, output test, bank selection, reset, comparative output | Scaling, teaching, averaging, output hysteresis, output OFF-delay, output test, bank selection, reset, comparative output | Scaling, 2-input calculation, teaching, averaging, output hysteresis, output OFF-delay, output test, bank selection, reset, comparative output | Scaling, measurement operation selection, output hysteresis, output OFF-delay, output test, display value selection, display color selection, key protection, bank selection, display refresh period, maximum/minimum hold, reset | Scaling, measurement operation selection, output hysteresis, output OFF-delay, output test, teaching, display value selection, display color selection, key protection, bank selection, display refresh period, maximum/minimum hold, reset | Scaling, measurement operation selection, averaging, previous average value comparison, output hysteresis, output OFF-delay, output test, teaching, display value selection, display color selection, key protection, bank selection, display refresh period, maximum /minimum hold, reset |
| □ | □ | □ | □ | □ | □ |
| IP66 | IP66 | IP66 | IP66 | IP66 | IP66 |
| 100 to 240 VAC or 24 VAC/VDC | 100 to 240 VAC or 24 VAC/VDC | 100 to 240 VAC or 24 VAC/VDC | 100 to 240 VAC or 24 VAC/VDC | 100 to 240 VAC or 24 VAC/VDC | 100 to 240 VAC or 24 VAC/VDC |
| □ | □ | □ | ■ | ■ | ■ |
| □ | □ | □ | ■ | ■ | ■ |
| ■ | – | – | – | – | – |
| – | – | – | – | – | – |
| – | – | – | ■ | ■ | ■ |
| – | ■ | – | – | – | – |
| – | – | ■ | – | – | – |
| – | – | ■ | – | – | – |
| – | – | – | – | – | – |
| – | – | – | – | – | – |
| □ | □ | □ | □ | □ | □ |
| □ | □ | □ | □ | □ | □ |
| □ | □ | □ | □ | □ | □ |
| □ | □ | □ | □ | □ | □ |
| – | – | – | □ | □ | □ |
| □ | □ | □ | □ | □ | □ |
| 588 | | | 590 | | |

■ Standard □ Available – No/not available


## Compact and intelligent digital panel meter

The K3GN is able to cover a wide variety of applications with its 3 main functions: process meter, RPM processor/tachometer and digital data display for PC/PLC. Configuration is easy and the design is advanced and compact.

- Process indicator DC voltage/current
- RPM process/tachometer
- Digital data display for PC/PLC
- Very compact 1/32 DIN housing: Size in mm (HxWxD): 24x48x83mm
- 5-digit display with programmable display color, in red or green

## Ordering information

| Input type | Supply voltage | Output | Order code | |
|---|---|---|---|---|
| | | | No communications | RS-485 |
| DC voltage/current, NPN | 24 VDC | Dual relays (SPST-NO) | K3GN-NDC 24 DC | K3GN-NDC-FLK 24 DC |
| | | Three NPN open collector | K3GN-NDT1 24 DC | K3GN-NDT1-FLK 24 DC |
| DC voltage/current, PNP | | Dual relays (SPST-NO) | K3GN-PDC 24 DC | K3GN-PDC-FLK 24 DC |
| | | Three PNP open collector | K3GN-PDT2 24 DC | K3GN-PDT2-FLK 24 DC |

## Specifications

| | |
|---|---|
| **Supply voltage** | 24 VDC |
| **Operating voltage range** | 85 to 110% of the rated supply voltage |
| **Power consumption** | 2.5 W max. (at max. DC load with all indicators lit) |
| **Ambient temperature** | Operating: –10 to 55°C (with no condensation or icing)<br>Storage: –25 to 65°C (with no condensation or icing) |
| **Display refresh period** | Sampling period (sampling times multiplied by number of averaging times if average processing is selected) |
| **Max. displayed digits** | 5 digits (–19999 to 99999) |
| **Display** | 7-segment digital display, character height: 7.0 mm |
| **Polarity display** | "-" is displayed automatically with a negative input signal |
| **Zero display** | Leading zeros are not displayed |
| **Scaling function** | Programmable with front-panel key inputs (range of display: -19999 to 99999).<br>The decimal point position can be set as desired. |
| **External controls** | HOLD: (measurement value held) |
| | ZERO: (forced-zero) |
| **Hysteresis setting** | Programmable with front-panel key inputs (0001 to 9999) |
| **Other functions** | Programmable color display<br>Selectable output operating action<br>Teaching set values<br>Average processing (simple average)<br>Lockout configuration<br>Communications writing control (communications output models only) |
| **Output** | Relays: 2 SPST-NO<br>Transistors: 3 NPN open collector<br>3 PNP open collector |
| | Combinations:<br>Communications output (RS-485) + relay outputs<br>Communications output (RS-485) + transistor outputs<br>Communications output (RS-485) + transistor outputs (3 PNP open collector) |
| **Communications** | Communications function: RS-485 |
| **Delay in comparative outputs (transistor outputs)** | 750 ms max. |
| **Degree of protection** | Front-panel: NEMA4X for indoor use (equivalent to IP66)<br>Rear case: IEC standard IP20<br>Terminals: IEC standard IP20 |
| **Memory protection** | Non-volatile memory (EEPROM) (possible to rewrite 100,000 times) |
| **Size in mm (H×W×D)** | 24×48×80 |


## Highly visible LCD display with 2 color (red and green) LEDs

The K3MA series comes with a process meter, a frequency/rate meter and a temperature meter of either 100 to 240 VAC or 24 VAC/VDC. All are equipped with the same quality display and have the same short depth of 80 mm.

- 1/8 DIN size housing
- Highly visible, negative transmissive backlit LCD display
- 14.2 mm high characters
- 5 digits (–19,999 to 99,999), K3MA-L: 4 digits
- Front-panel IP66

## Ordering information

| Indicator | Supply voltage | Input type & ranges | Output | Order code |
|---|---|---|---|---|
| Process meter | 100 to 240 VAC | DC voltage: 0 to 5 V, 1 to 5 V, -5 to 5 V, -10 to 10 V<br>DC current: 0 to 20 mA, 4 to 20 mA | 2 relay contact outputs (SPST-NO) | K3MA-J-A2 100-240VAC |
| | 24 VAC/VDC | | 2 relay contact outputs (SPST-NO) | K3MA-J-A2 24VAC/VDC |
| Temperature meter | 100 to 240 VAC | Platinum-resistance thermometer: Pt100, JPt100<br>or thermocouple K, J, T, E, L, U, N, R, S, B | 1 relay contact output (SPDT) | K3MA-L-C 100-240VAC |
| | 24 VAC/VDC | | 1 relay contact output (SPDT) | K3MA-L-C 24VAC/VDC |
| Frequency/rate meter | 100 to 240 VAC | Rotary pulse: No voltage: 0.05 to 30.00 Hz;<br>open collector: 0.1 to 5000.0 Hz | 2 relay contact outputs (SPST-NO) | K3MA-F-A2 100-240VAC |
| | 24 VAC/VDC | | 2 relay contact outputs (SPST-NO) | K3MA-F-A2 24VAC/VDC |

### Accessories

| Type | Order code |
|---|---|
| Splash-proof soft cover | K32-49SC |
| Hard cover | K32-49HC |

## Specifications

| Item | 100-240 VAC models | 24 VAC/VDC models |
|---|---|---|
| **Supply voltage** | 100 to 240 VAC | 24 VAC (50/60 Hz), 24 VDC |
| **Operating voltage range** | 85 to 110% of the rated supply voltage | |
| **Power consumption (under maximum load)** | 6 VA max. | 4.5 VA max. (24 VAC) 4.5 W max. (24 VDC) |
| **Ambient temperature** | Operating: –10 to 55°C (with no condensation or icing)<br>Storage: –25 to 65°C (with no condensation or icing) | |
| **Weight** | Approx. 200 g | |
| **Display** | 7-segment digital display, character height: 14.2 mm | |
| **Polarity display** | "-" is displayed automatically with a negative input signal | |
| **Zero display** | Leading zeros are not displayed | |
| **Hold function** | Max. hold (maximum value), min. hold (minimum value) | |
| **Hysteresis setting** | Programmable with front-panel key inputs (0001 to 9,999) | |
| **Delay in comparative outputs** | 1 s max. | |
| **Degree of protection** | Front-panel: NEMA4X for indoor use (equivalent to IP66)<br>Rear case: IEC standard IP20<br>Terminals: IEC standard IP00 + finger protection (VDE 0106/100) | |
| **Memory protection** | Non-volatile memory (EEPROM) (possible to rewrite 100,000 times) | |
| **Size in mm (H×W×D)** | 48×96×80 | |

## Process, temperature, weighing and linear sensor indicators

These indicators with analog input feature a clear and easy-to-use color change display. All models are equipped with an IP66 housing. K3HB series is high speed, with a sample rate of 50 Hz, and even 2,000 Hz for K3HB-S

- Position meter indication for easy monitoring
- Optional DeviceNet, RS-232C, RS-485
- Double display, with 5 digits, in two colors
- 1/8 DIN size housing

## Ordering information

| Type of indicator | Input sensor type and range | Supply voltage | Order code |
|---|---|---|---|
| Process indicator K3HB-X | AC current input, from 0.000 to 10.000 A, 0.0000 to 19.999 mA | 100 to 240 VAC | K3HB-XAA 100-240VAC |
| | | 24 VAC/VDC | K3HB-XAA 24VAC/VDC |
| | DC current input, from ±199.99 mA, to 4.000 to 20.000 mA | 100 to 240 VAC | K3HB-XAD 100-240VAC |
| | | 24 VAC/VDC | K3HB-XAD 24VAC/VDC |
| | AC voltage input, from 0.0 to 400.0 V to 0.0000 to 1.999 V | 100 to 240 VAC | K3HB-XVA 100-240VAC |
| | | 24 VAC/VDC | K3HB-XVA 24VAC/VDC |
| | DC voltage input, from ±199.99 V to 1.0000 to 5.0000 V | 100 to 240 VAC | K3HB-XVD 100-240VAC |
| | | 24 VAC/VDC | K3HB-XVD 24VAC/VDC |
| Temperature indicator K3HB-H | Temperature input Pt100, thermocouple K, J, T, E, L, U, N, R, S, B, W | 100 to 240 VAC | K3HB-HTA 100-240VAC |
| | | 24 VAC/VDC | K3HB-HTA 24VAC/VDC |
| Weighing indicator K3HB-V | Load cell input (DC low voltage input), 0.00 to 199.99 mV, 0.000 to 19.999 mV, 100.00 mV, 199.999 mV | 100 to 240 VAC | K3HB-VLC 100-240 VAC |
| | | 24 VAC/VDC | K3HB-VLC 24VAC/VDC |
| Linear sensor indicator K3HB-S | DC process input, 0 to 5 V, 1 to 5 V, –5 to 5 V, –10 to 10 V, 0 to 20 mA, 4 to 20 mA | 24 VAC/VDC | K3HB-SSD AC/DC24 |
| | | 100 to 240 VAC | K3HB-SSD AC100-240 |

### Option boards

#### Sensor power supply/output boards

| Slot | Output | | Sensor power supply | Communications | Applicable indicator types | Order code |
|---|---|---|---|---|---|---|
| B | Relay | PASS: SPDT | 12 VDC ±10%, 80 mA | – | K3HB-X, -H, -S | K33-CPA *1 |
| | Linear current | DC0(4) - 20 mA | | – | K3HB-X, -H, -S | K33-L1 A *2 |
| | Linear voltage | DC0(1) - 5 V, 0 to 10 V | | – | K3HB-X, -H, -S | K33-L2A *2 |
| | – | – | | – | K3HB-X, -H, -S | K33-A *2 |
| | – | – | | RS-232C | K3HB-X, -H, -S | K33-FLK1 A *2 |
| | – | – | | RS-485 | K3HB-X, -H, -S | K33-FLK3A *2 |
| | Relay | PASS: SPDT | 10 VDC ±5%, 100 mA | – | K3HB-V | K33-CPB *1 |
| | Linear current | DC0(4) - 20 mA | | – | K3HB-V | K33-L1B *2 |
| | Linear voltage | DC0(1) - 5 V, 0 to 10 V | | – | K3HB-V | K33-L2B *2 |
| | – | – | | – | K3HB-V | K33-B *2 |
| | – | – | | RS-232C | K3HB-V | K33-FLK1B *2 |
| | – | – | | RS-485 | K3HB-V | K33-FLK3B *2 |

#### Relay/transistor output boards

| Slot | Output | | Communications | Order code |
|---|---|---|---|---|
| C | Relay | H/L: SPDT each | – | K34-C1 |
| | | HH/H/LL/L: SPST-NO each | – | K34-C2 |
| | Transistor | NPN open collector: HH/H/PASS/L/LL | – | K34-T1 |
| | | PNP open collector: HH/H/PASS/L/LL | – | K34-T2 |
| | – | – | DeviceNet | K34-DRT *2 |

#### Event input boards

| Slot | Input type | Number of points | Communications | Order code |
|---|---|---|---|---|
| D | NPN open collector | 5 | M3 terminal blocks | K35-1 |
| | | 8 | 10-pin MIL connector | K35-2 |
| | PNP open collector | 5 | M3 terminal blocks | K35-3 |
| | | 8 | 10-pin MIL connector | K35-4 |

*1 CPA/CPB can be combined with relay outputs only.
*2 Only one of the following can be used by each digital indicator: RS-232C/RS-485 communications, a linear output, or DeviceNet communications. K3HB has got three slots for option boards: Slot B, slot C and slot D.

### Accessories

| Type | Order code |
|---|---|
| Special cable (for event inputs with 8-pin connector) | K32-DICN |

## Specifications

| | | | |
|---|---|---|---|
| Power supply voltage | | | 100 to 240 VAC (50/60 Hz), 24 VAC/VDC, DeviceNet power supply: 24 VDC |
| Allowable power supply voltage range | | | 85 to 110% of the rated power supply voltage, DeviceNet power supply: 11 to 25 VDC |
| Power consumption | | | 100 to 240 V: 18 VA max. (max. load), 24 VAC/DC: 11 VA/7 W max. (max. load) |
| Display method | | | Negative LCD (backlit LED) display 7-segment digital display<br>(character height: PV: 14.2 mm (green/red); SV: 4.9 mm (green)) |
| Ambient operating temperature | | | –10 to 55°C (with no icing or condensation) |
| Display range | | | –19,999 to 99,999 |
| Weight | | | Approx. 300 g (base unit only) |
| Degree of protection | | Front-panel | Conforms to NEMA 4X for indoor use (equivalent to IP66) |
| | | Rear case | IP20 |
| | | Terminals | IP00 + finger protection (VDE0106/100) |
| Memory protection | | | EEPROM (non-volatile memory), number of rewrites: 100,000 |
| Event input ratings | | Contact | ON: 1 kΩ max., OFF: 100 kΩ min. |
| | | No-contact | ON residual voltage: 2 V max., OFF leakage current: 0.1 mA max., load current: 4 mA max.<br>Maximum applied voltage: 30 VDC max. |
| Output ratings | Transistor output | Maximum load voltage | 24 VDC |
| | | Maximum load current | 50 mA |
| | | Leakage current | 100 µA max. |
| | Contact output (resistive load) | Rated load | 5 A at 250 VAC, 5 A at 30 VDC |
| | | Rated through current | 5 A |
| | | Mechanical life expectancy | 5,000,000 operations |
| | | Electrical life expectancy | 100,000 operations |
| | Linear output | Allowable load impedance | 500 Ω max. (mA); 5 kΩ min. (V) |
| | | Resolution | Approx. 10,000 |
| | | Output error | ±0.5% FS |
| Size in mm (H×W×D) | | | 48×96×100 |

## Rotary pulse, timer interval and up/down counting pulse indicators

These indicators with analog input feature a clear and easy-to-use color change display. All models are equipped with an IP66 housing. K3HB-R and -C are high-speed, with a sample rate up to 50 kHz.

- Position meter indication for easy monitoring
- Optional DeviceNet, RS-232C, RS-485
- Double display, with 5 digits, in two colors
- 1/8 DIN size housing

## Ordering information

| Type of indicator | Input ranges | Supply voltage | Input sensor | Order code |
|---|---|---|---|---|
| Rotary pulse indicator K3HB-R | No voltage contact: 30 Hz max.<br>Voltage pulse: 50 kHz max.<br>Open collector: 50 kHz max. | 100 to 240 VAC | NPN input/voltage pulse | K3HB-RNB 100-240VAC |
| | | 24 VAC/VDC | | K3HB-RNB 24VAC/VDC |
| | | 100 to 240 VAC | PNP input | K3HB-RPB 100-240VAC |
| | | 24 VAC/VDC | | K3HB-RPB 24VAC/VDC |
| | | 100 to 240 VAC | NPN | K3HB-PNB 100-240VAC |
| | | 100 to 240 VAC | PNP | K3HB-PPB 100-240VAC |
| Timer interval indicator K3HB-P | | 24 VAC/VDC | PNP | K3HB-PPB 24VAC/VDC |
| | | 100 to 240 VAC | NPN | K3HB-CNB 100-240VAC |
| Up/down counting pulse indicator K3HB-C | | 24 VAC/VDC | NPN | K3HB-CNB 24VAC/VDC |
| | | 24 VAC/VDC | PNP | K3HB-CPB 24VAC/VDC |

### Option boards

#### Sensor power supply/output boards

| Slot | Output | | Sensor power supply | Communications | Order code |
|---|---|---|---|---|---|
| B | Relay | PASS: SPDT | 12 VDC ±10%, 80 mA | – | K33-CPA *1 |
| | Linear current | DC0(4) - 20 mA | | – | K33-L1 A *2 |
| | Linear voltage | DC0(1) - 5 V, 0 to 10 V | | – | K33-L2A *2 |
| | – | – | | – | K33-A *2 |
| | – | – | | RS-232C | K33-FLK1 A *2 |
| | – | – | | RS-485 | K33-FLK3A *2 |

#### Relay/transistor output boards

| Slot | Output | | Communications | Order code |
|---|---|---|---|---|
| C | Relay | H/L: SPDT each | – | K34-C1 |
| | | HH/H/LL/L: SPST-NO each | – | K34-C2 |
| | Transistor | NPN open collector: HH/H/PASS/L/LL | – | K34-T1 |
| | | PNP open collector: HH/H/PASS/L/LL | – | K34-T2 |
| | – | | DeviceNet | K34-DRT *2 |
| | BCD + transistor | NPN open collector: HH/H/PASS/L/LL | – | K34-BCD |

#### Event input boards

| Slot | Input type | Number of points | Communications | Order code |
|---|---|---|---|---|
| D | NPN open collector | 5 | M3 terminal blocks | K35-1 |
| | | 8 | 10-pin MIL connector | K35-2 |
| | PNP open collector | 5 | M3 terminal blocks | K35-3 |
| | | 8 | 10-pin MIL connector | K35-4 |

*1 CPA can be combined with relay outputs only.
*2 Only one of the following can be used by each digital indicator: RS-232C/RS-485 communications, a linear output, or DeviceNet communications. K3HB has got three slots for option boards: Slot B, slot C and slot D.

### Accessories

| Type | Order code |
|---|---|
| Special cable (for event inputs with 8-pin connector) | K32-DICN |
| Special BCD output cable | K32-BCD |

## Specifications

| | | | |
|---|---|---|---|
| Power supply voltage | | | 100 to 240 VAC (50/60 Hz), 24 VAC/VDC, DeviceNet power supply: 24 VDC |
| Allowable power supply voltage range | | | 85 to 110% of the rated power supply voltage, DeviceNet power supply: 11 to 25 VDC |
| Power consumption | | | 100 to 240 V: 18 VA max. (max. load), 24 VAC/DC: 11 VA/7 W max. (max. load) |
| Display method | | | Negative LCD (backlit LED) display 7-segment digital display<br>(character height: PV: 14.2 mm (green/red); SV: 4.9 mm (green)) |
| Ambient operating temperature | | | –10 to 55°C (with no icing or condensation) |
| Display range | | | –19,999 to 99,999 |
| Weight | | | Approx. 300 g (base unit only) |
| Degree of protection | | Front-panel | Conforms to NEMA 4X for indoor use (equivalent to IP66) |
| | | Rear case | IP20 |
| | | Terminals | IP00 + finger protection (VDE0106/100) |
| Memory protection | | | EEPROM (non-volatile memory), number of rewrites: 100,000 |
| Event input ratings | | Contact | ON: 1 kΩ max., OFF: 100 kΩ min. |
| | | No-contact | ON residual voltage: 2 V max., OFF leakage current: 0.1 mA max., load current: 4 mA max.<br>Maximum applied voltage: 30 VDC max. |
| Output ratings | Transistor output | Maximum load voltage | 24 VDC |
| | | Maximum load current | 50 mA |
| | | Leakage current | 100 µA max. |
| | Contact output (resistive load) | Rated load | 5 A at 250 VAC, 5 A at 30 VDC |
| | | Rated through current | 5 A |
| | | Mechanical life expectancy | 5,000,000 operations |
| | | Electrical life expectancy | 100,000 operations |
| | Linear output | Allowable load impedance | 500 Ω max. (mA); 5 kΩ min. (V) |
| | | Resolution | Approx. 10,000 |
| | | Output error | ±0.5% FS |
| Size in mm (H×W×D) | | | 48×96×100 |

# Switching components

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Content

# Switching components

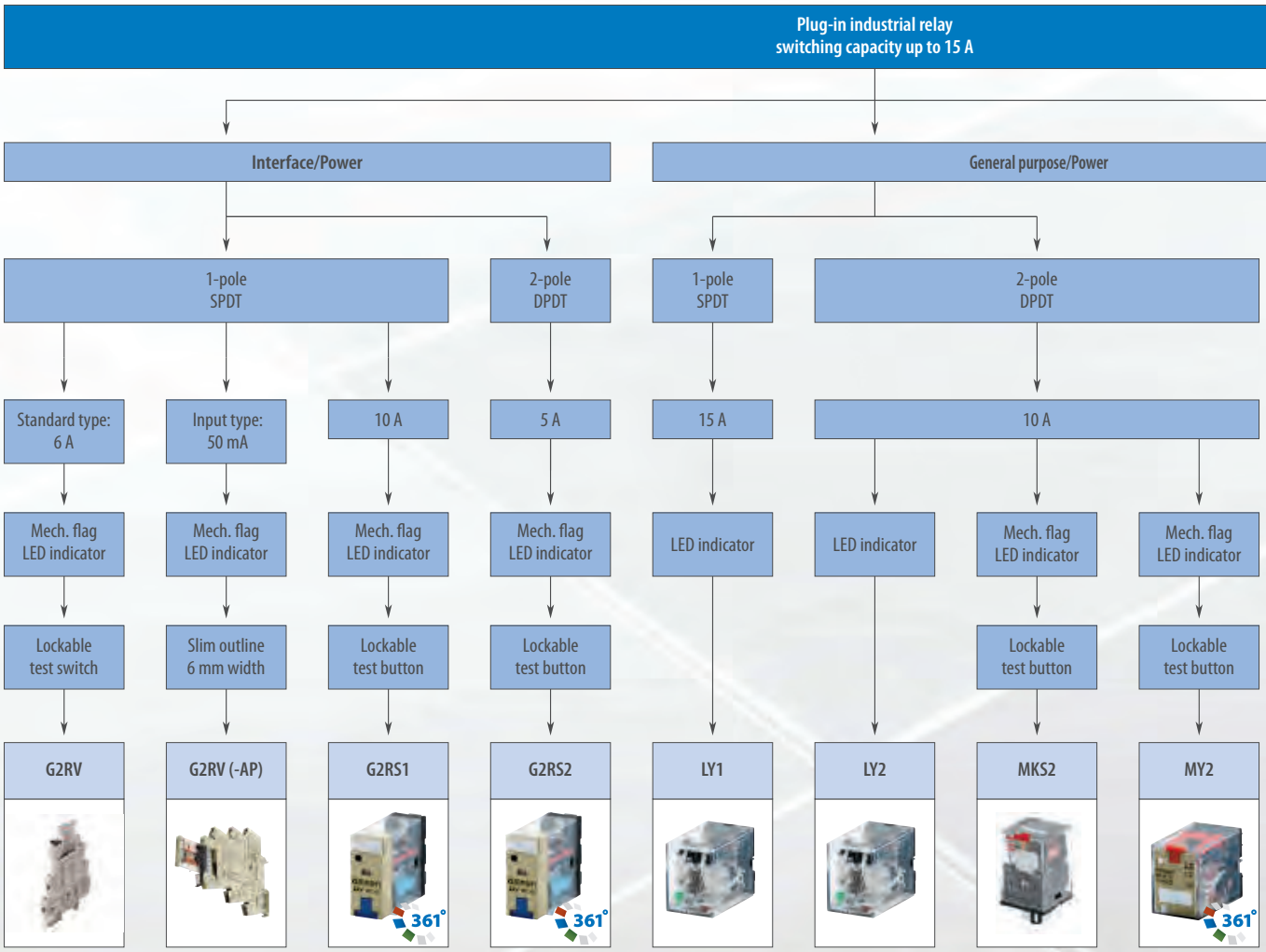
# UNIQUE!

## G2RV-SL☐☐ 1-6 mm relay with lockable test switch

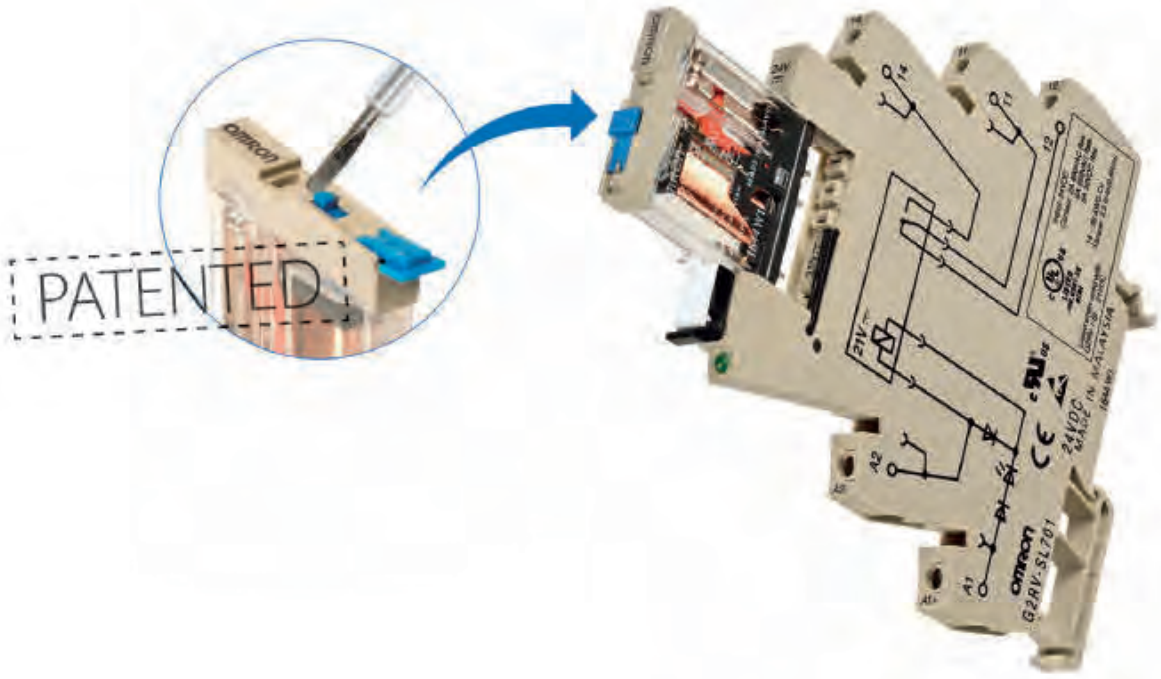
At the heart of the industrial G2RV relay is a strong mechanical pin with a large contact surface that ensures reliable connection and high conductivity between the socket and relay. The patented switch design with rotating protection cover is (almost) impossible to achieve in an adapted PCB relay.

Benefits lockable test switch:

- Test panel, machine or system functionality, or simulate an actuator when one or more modules are offline or have been removed
- Rotating protection cover stops accidental operation
- See from distance that the switch is protected – eg, in a hazardous environment




R226 Page 599 | R226 Page 599 | R225 Page 601 | R225 Page 601 | R224 Page 605 | R224 Page 605 | R235 Page 606 | R223 Page 603




High power relays up to 40 A

DC-switching

3-pole 3PDT

4-pole 4PDT

SPST-NO, SPST-NO/ SPST-NC

1/2-pole SPST/DPDT

4-pole, 4PST-NO 3PST-NO/SPST-NC DPST-NO/DPST-NC

| 10 A | 10 A | 5 A | 10 A | 30 A | 25 A | 40 A |
|---|---|---|---|---|---|---|
| Mech. flag LED indicator | LED indicator | LED indicator | Mech. flag LED indicator | Operation indicators | | | |
| Lockable test button | | | Lockable test button | Lockable test button | Momentary test button | | Mirror contact |
| MKS3 | LY3 | LY4 | MY4 | MKS(X) | G7L | G7J | G7Z |
| R235 Page 606 | R224 Page 605 | R224 Page 605 | R223 Page 603 | R234 | R227 | R233 Page 607 | R228 |

# Selection table

| Category | | Interface/Power | | | | General purpose/Power | | |
|---|---|---|---|---|---|---|---|---|
| | |  | |  | |  | | |
| **Family** | | **G2RV** | | **G2R-_-S** | | **MY** | | |
| Selection criteria | 1-pole | ■ | ■ | ■ | – | – | – | – |
| | 2-pole | – | – | – | ■ | ■ | – | – |
| | 3-pole | – | – | – | – | – | – | – |
| | 4-pole | – | – | – | – | – | ■ | ■ |
| | Contact configuration | SPDT | SPDT | SPDT | DPDT | DPDT | 4PDT | 4PDT bifurcated |
| | Contact material | AgSnIn | AgSnIn + gold plating | AgSnIn | AgSnIn | Ag | AgNi + Au | AgNi + Au |
| | Max. switching current | 6 A | 50 mA | 10 A | 5 A | 10 A | 5 A | 5 A |
| | Min. switching current | 10 mA at 5 VDC | 1 mA at 100 mVDC | 100 mA at 5 VDC | 10 mA at 5 VDC | 1 mA at 5 VDC | 1 mA at 1 VDC | 0.1 mA at 1 VDC |
| | Gold clad/plate | – | ■ | □ | □ | – | ■ | ■ |
| | Width max. (Relay only) | 5.2 mm | 5.2 mm | 13.0 mm | 13.0 mm | 21.5 mm | 21.5 mm | 21.5 mm |
| Features | LED indication | ■ | ■ | □ | □ | □ | □ | □ |
| | Mechanical flag | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | Momentary testbutton | – | – | – | – | – | – | – |
| | Momentary/ Lockable testbutton (/switch) | □ | – | □ | □ | □ | □ | □ |
| | Label | □ | □ | □ | □ | □ | □ | □ |
| | Diode (DC coil) | ■ | ■ | □ | □ | □ | □ | □ |
| | Varistor (AC coil) | – | – | – | – | – | – | – |
| | CR network (AC coil) | ■ | ■ | – | – | □ | □ | □ |
| Wiring to socket | Screw (plate clamp) | – | – | □ | □ | □ | □ | □ |
| | Screw (box clamp) | □ | □ | □ | □ | □ | □ | □ |
| | Screw-less clamp | □ | □ | □ | □ | □ | □ | □ |
| | Page/Quick Link | 599 | | 601 | | 603 | | |

| Category | | High power relays | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | |  | | | |  | |  | | |
| **Family** | | **G7J** | | | | **G7L** | | **G7Z** | | |
| Selection criteria | 1-pole | – | – | – | – | ■ | – | – | – | – |
| | 2-pole | – | – | – | – | – | ■ | – | – | – |
| | 3-pole | – | – | – | – | – | – | – | – | – |
| | 4-pole | ■ | ■ | ■ | ■ | – | – | ■ | ■ | ■ |
| | Contact configuration | 4PST-NO | 4PST-NO | 3PST-NO/ SPST-NC | DPST-NO/ DPST-NC | SPST-NO | DPST-NO | 4PST-NO | 3PST-NO/ SPST-NC | DPST-NO/ DPST-NC |
| | Max. switching current | 25 A | 25 A | 25 A | 25 A | 30 A | 25 A | 40 A | 40 A | 40 A |
| | Min. permissible load | 100 mA at 24 VDC | 100 mA at 24 VDC | 100 mA at 24 VDC | 100 mA at 24 VDC | 100 mA at 5 VDC | 100 mA at 5 VDC | 2 A at 24 VDC | 2 A at 24 VDC | 2 A at 24 VDC |
| | Auxilary contact block mirror contact | – | – | – | – | – | – | ■ | ■ | ■ |
| | Momentary testbutton | – | – | – | – | □ | □ | – | – | – |
| Relay terminals | Screw | □ | □ | □ | □ | □ | □ | □ | □ | □ |
| | Quick-connect | □ | □ | □ | □ | □ | □ | – | – | – |
| | PCB terminals | □ | □ | □ | □ | □ | □ | – | – | – |
| Mounting | Screw | – | – | – | – | – | – | □ | □ | □ |
| | DIN rail | – | – | – | – | – | – | □ | □ | □ |
| | Clip (screw) | □ | □ | □ | □ | □ | □ | – | – | – |
| | Flange (screw) | □ | □ | □ | □ | □ | □ | – | – | – |
| | DIN rail (adapter) | – | – | – | – | □ | □ | – | – | – |
| | Page/Quick Link | 607 | | | | R227 | | R228 | | |

| Category | | General purpose/Power | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | |  | | | | |  | |  | |
| **Family** | | **LY** | | | | | **MKS** | | **MKS(X)** | |
| Selection criteria | 1-pole | ■ | – | – | – | – | – | – | ■ | – |
| | 2-pole | – | ■ | ■ | – | – | ■ | – | – | ■ |
| | 3-pole | – | – | – | ■ | – | – | ■ | – | – |
| | 4-pole | – | – | – | – | ■ | – | – | – | – |
| | Contact configuration | SPDT | DPDT | DPDT bifurcated | 3PDT | 4PDT | DPDT | 3PDT | SPST-NO | SPST-NO/SPST-NC |
| | Contact material | AgSnIn | AgSnIn | AgSnIn | AgSnIn | AgSnIn | AgSnIn | AgSnIn | AgSnIn | AgSnIn |
| | Max. switching current | 15 A | 10 A | 7 A | 10 A | 10 A | 10 A | 10 A | 10 A, 220 VDC; 15 A, 250 VAC | 5 A, 220 VDC; 15 A, 250 VAC |
| | Min. switching current | 100 mA at 5 VDC | 100 mA at 5 VDC | 10 mA at 5 VDC | 100 mA at 5 VDC | 100 mA at 5 VDC | 10 mA at 1 VDC | 10 mA at 1 VDC | 10 mA at 24 VDC | 10 mA at 24 VDC |
| | Gold clad/plate | – | □ | ■ | – | – | – | – | – | – |
| | Width max. (Relay only) | 21.5 mm | 21.5 mm | 21.5 mm | 31.5 mm | 41.5 mm | 34.5 mm | 34.5 mm | 34.5 mm | 34.5 mm |
| Features | LED indication | □ | □ | □ | □ | □ | □ | □ | □ | □ |
| | Mechanical flag | – | – | – | – | – | ■ | ■ | – | – |
| | Momentary testbutton | – | – | – | – | – | – | – | – | – |
| | Momentary/ Lockable testbutton | – | – | – | – | – | □ | □ | □ | □ |
| | Label | – | – | – | – | – | □ | □ | – | – |
| | Diode (DC coil) | □ | □ | □ | □ | □ | □ | □ | Optional for socket | Optional for socket |
| | Varistor (AC coil) | – | – | – | – | – | □ | □ | – | – |
| | CR network (AC coil) | – | □ | □ | – | – | – | – | – | – |
| Wiring to socket | Screw (plate clamp) | □ | □ | □ | □ | □ | □ | □ | □ | □ |
| | Screw (box clamp) | – | – | – | – | – | □ | □ | – | – |
| | Screw-less clamp | – | – | – | – | – | – | – | – | – |
| | Page/Quick Link | 605 | | | | | 606 | | R234 | |

■ Standard □ Available – No/not available

## The only truly industrial 6 mm relay

Having been designed from first principles, instead of being adapted from a PCB relay, Omron's G2RV series is the only genuine slim industrial relay on the market. As a result, the G2RV offers a wide array of benefits to machine manufacturers and panel builders. Just 6mm wide, the relay is ideal for compact panels and equipment, yet it offers all of the durability and reliability required for industrial applications.

- Lockable test switch models available
- Large plug-in pins – excellent connection
- LED/mechanical flag – check operation
- Transparent housing – check condition
- Slim outline – space saving
- Push-in/accessories – simple wiring
- Special input type with gold plated contacts
- G3RV compatible

## Ordering information

| Relay | Input voltage | Order code | |
|---|---|---|---|
| | | Screw terminals | Push-in terminals |
| Standard type without lockable test switch | 12 VDC | G2RV-SL700 DC12 | G2RV-SL500 DC12 |
| | 24 VDC | G2RV-SL700 DC24 | G2RV-SL500 DC24 |
| | 24 VAC/VDC | G2RV-SL700 AC/DC24 | G2RV-SL500 AC/DC24 |
| | 48 VAC/VDC | G2RV-SL700 AC/DC48 | G2RV-SL500 AC/DC48 |
| | 110 VAC | G2RV-SL700 AC110 | G2RV-SL500 AC110 |
| | 230 VAC | G2RV-SL700 AC230 | G2RV-SL500 AC230 |
| Standard type with lockable test switch | 24 VDC | G2RV-SL701 DC24 | G2RV-SL501 DC24 |
| | 24 VAC/VDC | G2RV-SL701 AC/DC24 | G2RV-SL501 AC/DC24 |
| Input type | 12 VDC | G2RV-SL700-AP DC12 | G2RV-SL500-AP DC12 |
| | 24 VDC | G2RV-SL700-AP DC24 | G2RV-SL500-AP DC24 |
| | 24 VAC/VDC | G2RV-SL700-AP AC/DC24 | G2RV-SL500-AP AC/DC24 |
| | 48 VAC/VDC | G2RV-SL700-AP AC/DC48 | G2RV-SL500-AP AC/DC48 |
| | 110 VAC | G2RV-SL700-AP AC110 | G2RV-SL500-AP AC110 |
| | 230 VAC | G2RV-SL700-AP AC230 | G2RV-SL500-AP AC230 |

### Accessories

| Type | Description | Order code |
|---|---|---|
| Cross bar | 2-pole | P2RVM-020_ |
| Cross bar | 3-pole | P2RVM-030_ |
| Cross bar | 4-pole | P2RVM-040_ |
| Cross bar | 10-pole | P2RVM-100_ |
| Cross bar | 20-pole | P2RVM-200_ |
| PLC interface | Connect 8 relays and PLC output | P2RVC-8-O-F |
| PLC interface | Connect 8 relays and PLC input | P2RVC-8-I-F |
| Label | Plastic, for mounting on socket | R99-15 for G2RV |
| Label (Sticker) | Paper for mounting on socket or relay | R99-16 for G2RV |
| Separating plate | Provides isolation between adjacent relays to achieve 400 V isolation | P2RV-S |
| Relay only | Maintenance part for G2RV-SL_00-series 12 VDC | G2RV-1-S DC11 |
| Relay only | Maintenance part for G2RV-SL_00-series 24 VDC and 24 VAC/VDC | G2RV-1-S DC21 |
| Relay only | Maintenance part for G2RV-SL_00-series 48 VAC/VDC and 110, 230 VAC | G2RV-1-S DC48 |
| Relay only | Maintenance part for G2RV-SL_01-series 24 VDC and 24 VAC/VDC | G2RV-1-SI SC21 |
| Relay only | Maintenance part for G2RV-SL-AP series 12 VDC | G2RV-1-S-AP DC11 |
| Relay only | Maintenance part for G2RV-SL-AP series 24 VDC and 24 VAC/VDC | G2RV-1-S-AP DC21 |
| Relay only | Maintenance part for G2RV-SL-AP series 48 VAC/VDC and 110, 230 VAC | G2RV-1-S-AP DC48 |

**Note:** _ Select color: R=Red, S=Blue, B=Black

### Interface cables

| PLC brand | PLC type | Number of I/O | I/O type | Cable length | Order code |
|---|---|---|---|---|---|
| Omron | CJ1 | 32 | Digital Output (MIL) | 1.0 m | P2RV-4-100C |
| | | | | 2.0 m | P2RV-4-200C |
| | | | | 3.0 m | P2RV-4-300C |
| | | | | 5.0 m | P2RV-4-500C |
| | | | Digital Input (Fujitsu) | 1.0 m | P2RV-4-100IFC |
| | | | | 2.0 m | P2RV-4-200IFC |
| | | | | 3.0 m | P2RV-4-300IFC |
| | | | | 5.0 m | P2RV-4-500IFC |
| | | | Digital Input (MIL) | 1.0 m | P2RV-4-100IMC |
| | | | | 2.0 m | P2RV-4-200IMC |
| | | | | 3.0 m | P2RV-4-300IMC |
| | | | | 5.0 m | P2RV-4-500IMC |
| | GRT1 SmartSlice | 8 | Digital Output | 0.5 m | P2RV-A050C-OMR GRT1 |
| | | | | 1.0 m | P2RV-A100C-OMR GRT1 |
| | | | Digital Input | 0.5 m | P2RV-A050IC-OMR GRT1 |
| | | | | 1.0 m | P2RV-A100IC-OMR GRT1 |
| | NX | 8 | Digital Output | 0.5 m | P2RV-A050C-OMR NX |
| | | | | 1.0 m | P2RV-A100C-OMR NX |
| | | | Digital Input | 0.5 m | P2RV-A050IC-OMR NX |
| | | | | 1.0 m | P2RV-A100IC-OMR NX |
| Siemens | S7/300 | 32 | Digital Input and Digital Output | 2.0 m | P2RV-200C-SIM S7/300 |
| | | | | 2.5 m | P2RV-250C-SIM S7/300 |
| | | | | 3.0 m | P2RV-300C-SIM S7/300 |
| | | | | 5.0 m | P2RV-500C-SIM S7/300 |
| | S7/400 | 32 | Digital Input and Digital Output | 2.0 m | P2RV-200C-SIM S7/400 |
| | | | | 2.5 m | P2RV-250C-SIM S7/400 |
| | | | | 3.0 m | P2RV-300C-SIM S7/400 |
| | | | | 5.0 m | P2RV-500C-SIM S7/400 |
| Multi purpose (flying leads) | All | 8 | Digital Input and Digital Output | 1.0 m | P2RV-A100C |
| | | | | 2.0 m | P2RV-A200C |
| | | | | 3.0 m | P2RV-A300C |
| | | | | 5.0 m | P2RV-A500C |

## Specifications

### Coil ratings

| Item | Standard type | Input type[*1] |
|---|---|---|
| **Contact form** | SPDT | |
| **Input voltage** | 12, 24 VDC, 24, 48 VAC/VDC, 110, 230 VAC | |
| **Rated load** | 6 A at 250 VAC<br>6 A at 30 VDC | 50 mA at 30 VAC<br>50 mA at 36 VDC |
| **Max. switching voltage** | 400 VAC, 125 VDC | 30 VAC, 36 VDC |
| **Max. switching current** | 6 A | 50 mA |
| **Max. switching power** | 1,500 VA/180 W (resistive load) | |
| **Min. permissible load** | 10 mA at 5 VDC | 1 mA at 100 mVDC |
| **Mechanical durability** | 5 Million operations min. | |
| **Electrical durability (rated load)** | 100 K operations (typical) | 5 Million operations min. |
| **Dielectric strength** | 4,000 VAC, 50/60 Hz for 1 min between coil and contacts;<br>1,000 VAC, 50/60 Hz for 1 min between contacts of same polarity | |
| **Ambient temperature** | –40 to 55°C | |
| **Approved standards** | UL, IEC/VDE, Lloyd's, and CE marking | |
| **Size in mm (H×W×D)** | 92.7×106.3×6.2 (push-in type)<br>97.4×106.3×6.2 (screw type) | |

[*1] If a gold layer is destroyed, contact ratings of standard type are applicable


## Plug-in relay with enhanced features covers a wide range of applications

G2RS series, which comes as standard with a mechanical indicator and nameplate covering a wide range of interface applications.
Optionally available with gold clad contacts and diode, whilst the socket and crossbar range are offering a maximum of flexibility during installation.

- SPDT type 10A / DPDT type 5 A
- Mechanical Flag, LED indicator and momentary / lockable testbutton optional
- Transparent housing
- Screwless clamp terminal sockets available
- Space saving – 16 mm width (including sockets)

## Ordering information

| Contact form | Diode | LED indicator | Test button | Gold clad 3 µm | Order code | | |
|---|---|---|---|---|---|---|---|
| | | | | | (___ = coil voltage + AC/DC) | Common coil voltages *1 | |
| | | | | | | DC | AC |
| SPDT (1-pole) | no | no | no | no | G2R-1-S___(S) | 24 | 230 |
| | | yes | | | G2R-1-SN___(S) | 12, 24 | 24, 110, 230 |
| | | | yes | | G2R-1-SNI___(S) | 12, 24 | 12, 24, 110, 230 |
| | | | | yes | G2R-1-SNI-AP3___(S) | – | 230 |
| | yes | | no | no | G2R-1-SND___(S) | 12, 24 | – |
| | | | yes | | G2R-1-SNDI___(S) | 24 | – |
| | | | | yes | G2R-1-SNDI-AP3___(S) | 24 | – |
| DPDT (2-pole) | no | no | no | no | G2R-2-S___(S) | 24 | 24, 110, 240 |
| | | yes | | | G2R-2-SN___(S) | 12, 24, 48 | 24, 110, 230 |
| | | | | yes | G2R-2-SN-AP3___(S) | 24 | – |
| | | | yes | no | G2R-2-SNI___(S) | 12, 24 | 12, 24, 110, 230 |
| | | | | yes | G2R-2-SNI-AP3___(S) | – | 230 |
| | yes | no | no | no | G2R-2-SD___(S) | – | – |
| | | yes | | | G2R-2-SND___(S) | 12, 24 | – |
| | | | | yes | G2R-2-SND-AP3___(S) | 24 | – |
| | | | yes | no | G2R-2-SNDI___(S) | 12, 24 | – |
| | | | | yes | G2R-2-SNDI-AP3___(S) | 24 | – |

*1 Other coil voltages available. Please see specifications.

### Sockets & accessories

| For type | Order code | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | DIN rail | | | | | | | | | PCB |
| | Screwless clamp | | | | | Screw (plate clamp) | Screw (box clamp) | | | Soldering |
| | Socket | Clip | Cross bar AC type | Cross bar DC type | Name plate | Socket | Socket | Clip | Name plate | Socket |
| G2R-1-S | P2RF-05-S | P2CM-S | P2RM-SR | P2RM-SB | R99-11 | P2RF-05-E | P2RF-05-ESS | P2CM-ESS | PYC-TR | P2R-05P |
| G2R-2-S | P2RF-08-S | P2CM-S | P2RM-SR | P2RM-SB | R99-11 | P2RF-08-E | P2RF-08-ESS | P2CM-ESS | PYC-TR | P2R-08P |

## Specifications

### Coil ratings

| Rated voltage | | Must operate voltage | Must release voltage | Max. voltage | Power consumption (approx.) |
|---|---|---|---|---|---|
| | | % of rated voltage | | | |
| AC | 24 V, 110 V, 120 V, 230 V, 240 V | 80% max. | 30% max. | 110% | 0.9 VA (60 Hz) |
| DC | 6 V, 12 V, 24 V, 48 V | 70% max. | 15% max. | 110% | 0.53 W |

### Contact ratings

| Number of poles | 1-pole | | 2-pole | |
|---|---|---|---|---|
| Load | Resistive load (cosφ = 1) | Inductive load (cosφ = 0.4; L/R = 7) | Resistive load (cosφ = 1) | Inductive load (cosφ = 0.4; L/R = 7) |
| Rated load | 10 A at 250 VAC<br>10 A at 30 VDC | 7.5 A at 250 VAC<br>5 A at 30 VDC | 5 A at 250 VAC<br>5 A at 30 VDC | 2 A at 250 VAC<br>3 A at 30 VDC |
| Rated carry current | 10 A | | 5 A | |
| Max. switching voltage | 440 VAC, 125 VDC | | 380 VAC, 125 VDC | |
| Max. switching current | 10 A | | 5 A | |
| Max. switching power | 2,500 VA, 300 W | 1,875 VA, 150 W | 1,250 VA, 150 W | 500 VA, 90 W |
| Failure rate (reference value) | 100 mA at 5 VDC | | 10 mA at 5 VDC | |
| Mechanical life | AC: 10,000,000 operations min., DC: 20,000,000 operations min. | | | |
| Electrical life | 100,000 operations min. | | | |

Technical data

| Item | 1-pole | 2-pole |
|---|---|---|
| Contact material | AgSnIn | |
| Operating time | 15 ms max. | 15 ms max. |
| Release time | AC: 10 ms max., DC: 5 ms max. | AC: 15 ms max., DC: 10 ms max. |
| Dielectric strength | 5,000 VAC (coil-contact) | 5,000 VAC (coil-contact) |
| Ambient temperature | Operating: –40 to 70°C (no icing or condensation) | |
| Size in mm (H×W×D) | 35.5×13×29 | |


## Versatile plug-in relay that sets the standard

Over 1 billion pieces of this mini power relay have been manufactured since its introduction and have successfully been used in many different applications. Bifurcated contacts optionally are available to achieve reliable low current switching during the entire electrical life. Full range of sockets covering mounting by screw, box clamp and screw-less clamp method.

- DPDT type 10 A / 4PDT type 5 A
- Mechanical flag, LED indicator and momentary / lockable testbutton optional
- Transparent housing
- Low power switching (1 mA at 5 VDC) / Bifurcated 4PDT (0.1 mA at 1 VDC)
- Screw-less clamp terminal sockets available

## Ordering information

| Contact form | Diode | LED indicator | Lockable test button | Order code (___ = coil voltage + AC/DC) | | | |
|---|---|---|---|---|---|---|---|
| | | | | ⊖ ⊕ 13 14 A1 A2 | ⊕ ⊖ 13 14 A1 A2 | Common coil voltages *1 | |
| | | | | | | DC | AC |
| DPDT | no | no | no | MY2___(S) | – | 12, 24 | 12, 24, 48/50, 110/120, 220/240 |
| DPDT | | yes | | MY2N___(S) | – | 12, 24 | 24, 110/120, 220/240 |
| DPDT | yes | | | MY2N-D2___(S) | – | 24 | – |
| DPDT | no | | yes | MY2IN___S) | – | 12, 24, 48 | 12, 24, 110/120, 220/240 |
| DPDT | | | | – | MY2IN1___(S) | 12, 24 | – |
| DPDT | yes | | | MY2IN-D2___(S) | – | 24 | – |
| DPDT | | | | – | MY2IN1-D2___(S) | 24 | – |
| 4PDT | no | no | no | MY4___(S) | – | 12, 24, 48, 100/110, 125 | 12, 24, 48/50, 110/120, 220/240 |
| 4PDT | | yes | | MY4N___(S) | – | 12, 24, 48, 100/110 | 24, 110/120, 220/240 |
| 4PDT | yes | | | MY4N-D2___(S) | – | 12, 24 | – |
| 4PDT | no | | yes | MY4IN___(S) | – | 12, 24, 48 | 12, 24, 48/50, 110/120, 220/240 |
| 4PDT | | | | – | MY4IN1___(S) | 12, 24, 48 | – |
| 4PDT | yes | | | MY4IN-D2___(S) | – | 24 | – |
| 4PDT | | | | – | MY4IN1-D2___(S) | 24, 48 | – |

*1 Other coil voltages available. Please see specifications.

**Note**
- MY4 also available with bifurcated contacts => example MY4Z
- MY2 and MY4 AC 110/120, 220/240 types also available with suppression => example MY4N-CR

### Sockets & accessories

#### Input terminals separated from output terminals

| | Order code | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Screw-less clamp | | | | | Box clamp | | | |
| For type | Socket | Clip | Cross bar AC type | Cross bar DC type | Name plate | Socket | Metal spring clip | Plastic holding clip | Label |
| MY2 | PYF08S | PYCM-08S | PYDM-08SR | PYDM-08SB | R99-11 | PYF14-ESS | PYC-0 | PYC-35 | PYCTR1 |
| MY4 | PYF14S | PYCM-14S | PYDM-14SR | PYDM-14SB | R99-11 | PYF14-ESS | PYC-0 | PYC-35 | PYCTR1 |

#### Combined input/output terminals

| | Order code | | | | | | |
|---|---|---|---|---|---|---|---|
| | Screw terminal | | | Box clamp | | | |
| Order code | Socket | Clip (set = 2 pcs) | Clip for MY2IN (set = 2 pcs) | Socket | Metal spring clip | Plastic holding clip | Label |
| MY2 | PYF08A-N | PYC-A1 | PYC-E1 | PYF14-ESN | PYC-0 | PYC-35 | PYCTR1 |
| MY4 | PYF14A-N | PYC-A1 | | PYF14-ESN | PYC-0 | PYC-35 | PYCTR1 |

## Specifications

### Coil ratings

| Rated voltage | | Must operate voltage | Must release voltage | Max. voltage | Power consumption (approx.) |
|---|---|---|---|---|---|
| | | % of rated voltage | | | |
| AC | 6 V, 12 V, 24 V, 48/50 V | 80% max | 30% min. | 110% | 1.0 to 1.2 VA (60 Hz) |
| | 110/120 V, 220/240 V | | | | 0.9 to 1.1 VA (60 Hz) |
| DC | 6 V, 12 V, 24 V, 48 V, 100/110 V | | 10% min. | | 0.9 W |

### Contact ratings

| Item | 2-pole | | 4-pole | | 4-pole (bifurcated) | |
|---|---|---|---|---|---|---|
| | Resistive load (cosφ = 1) | Inductive load (cosφ = 0.4; L/R = 7) | Resistive load (cosφ = 1) | Inductive load (cosφ = 0.4; L/R = 7) | Resistive load (cosφ = 1) | Inductive load (cosφ = 0.4; L/R = 7) |
| Rated load | 5 A at 250 VAC | 2 A at 250 VAC | 3 A at 250 VAC | 0.8 A at 250 VAC | 3 A at 250 VAC | 0.8 A at 250 VAC |
| | 5 A at 30 VDC | 2 A at 30 VDC | 3 A at 30 VDC | 1.5 A at 30 VDC | 3 A at 30 VDC | 1.5 A at 30 VDC |
| Rated carry current | 10 A | | 5 A | | | |
| Max. switching voltage | 250 VAC, 125 VDC | | 250 VAC, 125 VDC | | | |
| Max. switching current | 10 A | | 5 A | | | |
| Max. switching power | 2,500 VA, 300 W | 1,250 VA, 300 W | 1,250 VA, 150 W | 500 VA, 150 W | 1,250 VA, 150 W | 500 VA, 150 W |
| Failure rate (reference value) | 5 VDC at 1 mA | | 1 VDC at 1 mA | | 1 VDC at 100 µA | |
| Mechanical life | AC: 50,000,000 operations min., DC: 100,000,000 operations min. | | | | 20,000,000 operations min. | |
| Electrical life | 500,000 operations min. | | 200,000 operations min. | | 100,000 operations min. | |

### Technical data

| Item | 2-pole | 4-pole |
|---|---|---|
| Contact Material: | Ag | AgNi + Au |
| Operating time | 20 ms max. | |
| Release time | 20 ms max. | |
| Dielectric strength | 2,000 VAC | |
| Ambient temperature | Operating: –55 to 70°C (no icing) | |
| Size in mm (H×W×D) | 28×21.5×36 | |

### Dimension relay + socket

| Type | Size in mm (H×W×D) |
|---|---|
| PYF08S + MYS | 90×23.2×38.2 |
| PYF08A-E + MYS | 76×23×31 |
| PYF08A-N + MYS | 73×22×30 |
| PYF14S + MYS | 89.2×31×36.5 |
| PYF14A-E + MYS | 76×29.5×31 |
| PYF14A-N + MYS | 73×29.5×30 |
| PYF14-ESN + MYS | 82×27×80 (incl. plastic holding clip PYC-35) |
| PYF14-ESS + MYS | 83×27×82 (inc. plastic holding clip PYC-35) |

## Miniature 15 A power relay

LY-series comes in SPDT, DPDT, 3PDT and 4PDT types covering depending on the number of poles 10 or even 15A rated load. Bifurcated contacts available for DPDT configuration only, whilst the optional Diodes for DC and CR circuit for AC coils are available for all plug-in types.

- SPDT type 15 A / DPDT, 3PDT and 4PDT type 10 A
- Led indicator optional
- Transparent housing
- Suppression by optional Built-in Diodes (DC only) or CR network (AC-types)
- DIN rail mounting by socket. PCB and Flange mounting available

## Ordering information

| Contact form | LED indicator | Diode | Terminals | | | Order code *1 (___ = coil voltage + AC/DC) | Common coil voltages *2 | |
|---|---|---|---|---|---|---|---|---|
| | | | Plug-in/solder | PCB | Upper-mounting plug-in/solder | | DC | AC |
| SPDT (1 pole) | no | no | yes | no | no | LY1___ | 24 | – |
| SPDT (1 pole) | yes | yes | | | | LY1N-D2___ | 24 | – |
| DPDT (2 pole) | no | no | | | | LY2___ | 12, 24, 100/110 | 24, 100/110, 110/120, 220/240 |
| DPDT (2 pole) | | | no | | yes | LY2F___ | – | 220/240 |
| DPDT (2 pole) | yes | yes | yes | | no | LY2N-D2___ | 24 | – |
| 3PDT (3 pole) | no | no | | | | LY3___ | 24 | – |
| 4PDT (4 pole) | | | | | | LY4___ | 12, 24, 100/110, 125 | 24, 100/110, 230 |
| 4PDT (4 pole) | yes | yes | | | | LY4N-D2___ | 24 | – |

*1 For other options like CR suppression, please see specifications.
*2 Other coil voltages available. Please see specifications.

### Sockets & accessories

| | Order code | | | |
|---|---|---|---|---|
| | DIN rail | | PCB | |
| | Screw | | Soldering | |
| For type | Socket | Clip (set = 2 pcs) | Socket | Clip (set = 2 pcs.) |
| LY1/LY2 | PTF08A-E | PYC-A1 | PT08-0 | PYC-P |
| LY2 CR-type | PTF08A-E | Y92H-3 | PT08-0 | PYC-1 |
| LY3 | PTF11A-E | PYC-A1 | PT11-0 | PYC-P |
| LY4 | PTF14A-E | PYC-A1 | PT14-0 | PYC-P |

### Dimension relay & socket

| Type | Size in mm (H×W×D) |
|---|---|
| PTF08A-E + LY | 78.5×28.5×71 |
| PTF11A-E + LY | 78.5×37×71 |
| PTF14A-E + LY | 78.5×45.5×71 |

## Specifications

### Coil ratings

| Poles | Rated voltage | | Must operate voltage | Must release voltage | Max. voltage | Power consumption (approx.) |
|---|---|---|---|---|---|---|
| | | | % of rated voltage | | | |
| 1 or 2 | AC | 6 V, 12 V, 24 V, 50 V | 80% max. | 30% min. | 110% | 1.0 to 1.2 VA (60 Hz) |
| | | 100/110 V, 110/120 V, 200/220 V, 220/240 V | | | | 0.9 to 1 VA (60 Hz) |
| | DC | 6 V, 12 V, 24 V, 48 V, 100/110 V | | 10% min. | | 0.9 W |
| 3 | AC | 6 V, 12 V, 24 V, 50 V, 100/110 V, 200/220 V | 80% max. | 30% min. | 110% | 1.6 to 2.0 VA (60 Hz) |
| | DC | 6 V, 12 V, 24 V, 48 V, 100/110 V | | 10% min | | 1.4 W |
| 4 | AC | 6 V, 12 V, 24 V, 50 V, 100/110 V, 200/220 V | 80% max. | 30% min. | 110% | 1.95 to 2.5 VA (60 Hz) |
| | DC | 6 V, 12 V, 24 V, 48 V, 100/110 V | | 10% min | | 1.5 W |

### Technical data

| | |
|---|---|
| Contact material | AgSnIn |
| Operating time | 25 ms max. |
| Release time | 25 ms max. |
| Dielectric strength | 1,000 VAC |
| Ambient temperature *1 | –25 to 70°C |

*1 See datasheet for more details.

### Contact ratings

| Relay | Single contact 1-pole | | Single contact 2-, 3- or 4-pole | | Bifurcated contacts 2-pole | |
|---|---|---|---|---|---|---|
| Load | Resistive load (cosφ = 1) | Inductive load (cosφ = 0.4; L/R = 7) | Resistive load (cosφ = 1) | Inductive load (cosφ = 0.4; L/R = 7) | Resistive load (cosφ = 1) | Inductive load (cosφ = 0.4; L/R = 7) |
| Rated load | 110 VAC at 15 A | 110 VAC at 10 A | 110 VAC at 10 A | 110 VAC at 7.5 A | 110 VAC at 5 A | 110 VAC at 4 A |
| | 24 VDC at 15 A | 24 VDC at 7 A | 24 VDC at 10 A | 24 VDC at 5 A | 24 VDC at 5 A | 24 VDC at 4 A |
| Rated carry current | 15 A | | 10 A | | 7 A | |
| Max. switching voltage | 250 VAC, 125 VDC | | 250 VAC, 125 VDC | | 250 VAC, 125 VDC | |
| Max. switching current | 15 A | | 10 A | | 7 A | |
| Max. switching power | 1,700 VA | 1,100 VA | 1,100 VA | 825 VA | 550 VA | 440 VA |
| | 360 W | 170 W | 240 W | 120 W | 120 W | 100 W |
| Failure rate (reference value) | 100 mA at 5 VDC | | 100 mA at 5 VDC | | 10 mA at 5 VDC | |
| Mechanical life | AC: 50,000,000 operations min., DC: 100,000,000 operations min. | | | | | |
| Electrical life | 1-, 3-, 4-pole: 200,000 operations min., 2-pole: 500,000 operations min. | | | | | |

## Exceptionally reliable general purpose relay with 8 or 11 plug-in pins for round sockets

MK relay breaks compared to its size relatively large currents. The AgSnIn contacts ensure long electrical lifetime (min. 100,000 operations). Wide switching range from 10 mA at 1 VDC upto 10 A at 250 VAC.

- 8-pin DPDT and 11-pin 3PDT contact types
- Switching current up to 10 A
- Lockable test button for easy testing
- Temperature rating from –40°C up to 60°C

## Ordering information

| Contact form | Mechanical indicator & lockable test button | LED indicator | Diode | Order code *1 (_ _ _ = coil voltage + AC/DC) | Common coil voltages *2 | |
|---|---|---|---|---|---|---|
| | | | | | DC | AC |
| DPDT (2-pole) | yes | no | no | MKS2PI | 12, 24, 110 | 24, 110, 230 |
| | | yes | | MKS2PIN | 24 | 24, 230 |
| 3PDT (3-pole) | | no | | MKS3PI-5 | 12, 24, 48, 110 | 12, 24, 110, 230 |
| | | | yes | MKS3PI-D-5 | 24 | N/A |
| | | yes | no | MKS3PIN-5 | 12, 24 | 24, 110, 230 |
| | | | yes | MKS3PIN-D-5 | 24 | N/A |

*1 Many various terminal arrangements possible, please see specifications.
*2 Other coil voltages available. Please see specifications.

### Sockets & accessories

| For type | Order code | | | |
|---|---|---|---|---|
| | DIN rail | | | |
| | Screw | | Box clamp | |
| | Socket | Clip (set= 2 pcs.) | Socket | |
| MKS2 | PF083A-E | PFC-A1 | – | PF083A-D |
| MKS3 | PF113A-E | PFC-A1 | PF113A-N | PF113A-D |

## Specifications

### Coil ratings

| Rated voltage | | Must operate voltage | Must release voltage | Max. voltage | Power consumption (approx.) |
|---|---|---|---|---|---|
| | | % of rated voltage | | | |
| AC | 6 V, 12 V, 24 V, 100 V, 110 V, 120 V, 200 V, 220 V, 230 V, 240 V | 80% max. | 30% min. | 110% | 2.3 VA (60 Hz) |
| | | | | | 2.7 VA (50 Hz) |
| DC | 6 V, 12 V, 24 V, 48 V, 100 V, 110 V | | 15% min. | | 1.4 W |

### Contact ratings

| Load | 2- or 3-pole | |
|---|---|---|
| | Resistive load (cosφ = 1) | Inductive load (cosφ = 0.4; L/R = 7) |
| Contact material | AgSnIn | |
| Rated load | NO: 10 A at 250 VAC<br>NC: 5 A at 30 VDC | 7 A at 250 VAC |
| Rated carry current | 10 A | |
| Max. switching voltage | 250 VAC, 250 VDC | – |
| Max. switching current | 10 A | |
| Max. switching power | 2,500 VA/ 300 W | 1,250 VA/150 W |
| Mechanical life | 5,000,000 operations min. | |
| Electrical life | 100.000 operations min. | |

### Technical data

| | |
|---|---|
| Operating time | AC: 20 ms max., DC: 30 ms max. |
| Release time | 20 ms max. (40 ms max. for built-in Diode relays) |
| Dielectric strength | 2,500 VAC (coil-contact) |
| Ambient temperature | Operating: –40 to 60°C (with no icing or condensation) |
| Size in mm (H×W×D) | 34.5×34.5×53.3 |

### Dimension relay & socket

| Type | Size in mm (H×W×D) |
|---|---|
| PF083A-E + MKS | 56×41×77.8 (incl. clip) |
| PF113A-E + MKS | 56×42.8×87.8 (incl. clip) |
| PF_ _ _A-D + MKS | 65×38×80.3 |


## High capacity, high dielectric strength 4 pole power relay

G7J series developed for switching resistive, inductive as well as motor loads.
No contact chattering for momentary voltage drops up to 50% of rated voltage.
High dielectric strength (4KV) between coil and contacts as well as between different polarity contacts.

- 25 A Rated current
- 4PST-NO, 3PST-NO / SPST-NC or DPST-NO / DPST-NC
- Bifurcated contacts optional
- Terminals: Screw, Quick-connect or PCB pins
- Mounting by insertion into a clip or just by screws (flange type)

## Ordering information

| Contact form | Mounting | | Terminal | | | Order code *1 (___ = coil voltage + AC/DC) | Common coil voltages *2 | |
|---|---|---|---|---|---|---|---|---|
| | PCB | W-bracket mounting | PCB | Quick-connect | Screw | | DC | AC |
| 4PST-NO | yes | no | yes | no | no | G7J-4A-P___ | 12, 24 | 200/240 |
| | no | yes | no | | yes | G7J-4A-B___ | 24 | – |
| | | | | yes | no | G7J-4A-T___ | 12, 24 | 200/240 |
| 3PST-NO/SPST-NC | yes | no | yes | no | | G7J-3A1B-P___ | 24 | – |
| | no | yes | no | | yes | G7J-3A1B-B___ | 24 | – |
| DPST-NO/SPST-NC | | | | yes | no | G7J-3A1B-T___ | 24 | 200/240 |
| DPST-NO/DPST-NC | yes | no | yes | no | | G7J-2A2B-P___ | 24 | – |

*1 For other options like bifurcated contacts, please see specifications.
*2 Other coil voltages available. Please see specifications.

### Accessories

| For type | Order code |
|---|---|
| | W-bracket |
| G7J Screw terminal type | R99-04 for G5F |
| G7J Quick Connect type | |

## Specifications

### Coil ratings

| Rated voltage | | Must operate voltage | Must release voltage | Max. voltage | Power consumption (approx.) |
|---|---|---|---|---|---|
| | | % of rated voltage | | | |
| AC | 24, 50, 100 to 120, 200 to 240 | 75% max. | 15% min. | 110% | 1.8 to 2.6 VA |
| DC | 6, 12, 24, 48, 100 | | 10% min. | | 2.0 W |

### Contact ratings

| Item | 4-pole | | |
|---|---|---|---|
| | Resistive load cosφ = 1 | Inductive load cosφ = 0.4 | Resistive load |
| Rated load | NO: 25 A at 220 VAC (24 A at 230 VAC) NC: 8 A at 220 VAC (7.5 A at 230 VAC) | | NO: 25 A at 30 VDC NC: 8 A at 30 VDC |
| Rated carry current | NO: 25 A (1 A), NC: 8 A (1 A) | | |
| Max. switching voltage | 250 VAC | | 125 VDC |
| Max. switching current | NO: 25 A (1 A), NC: 8 A (1 A) | | |
| Mechanical life | 1,000,000 operations min. | | |
| Electrical life | 100,000 operations min. | | |

**Note:** Values between () indicate bifurcated contact specification.

### Technical data

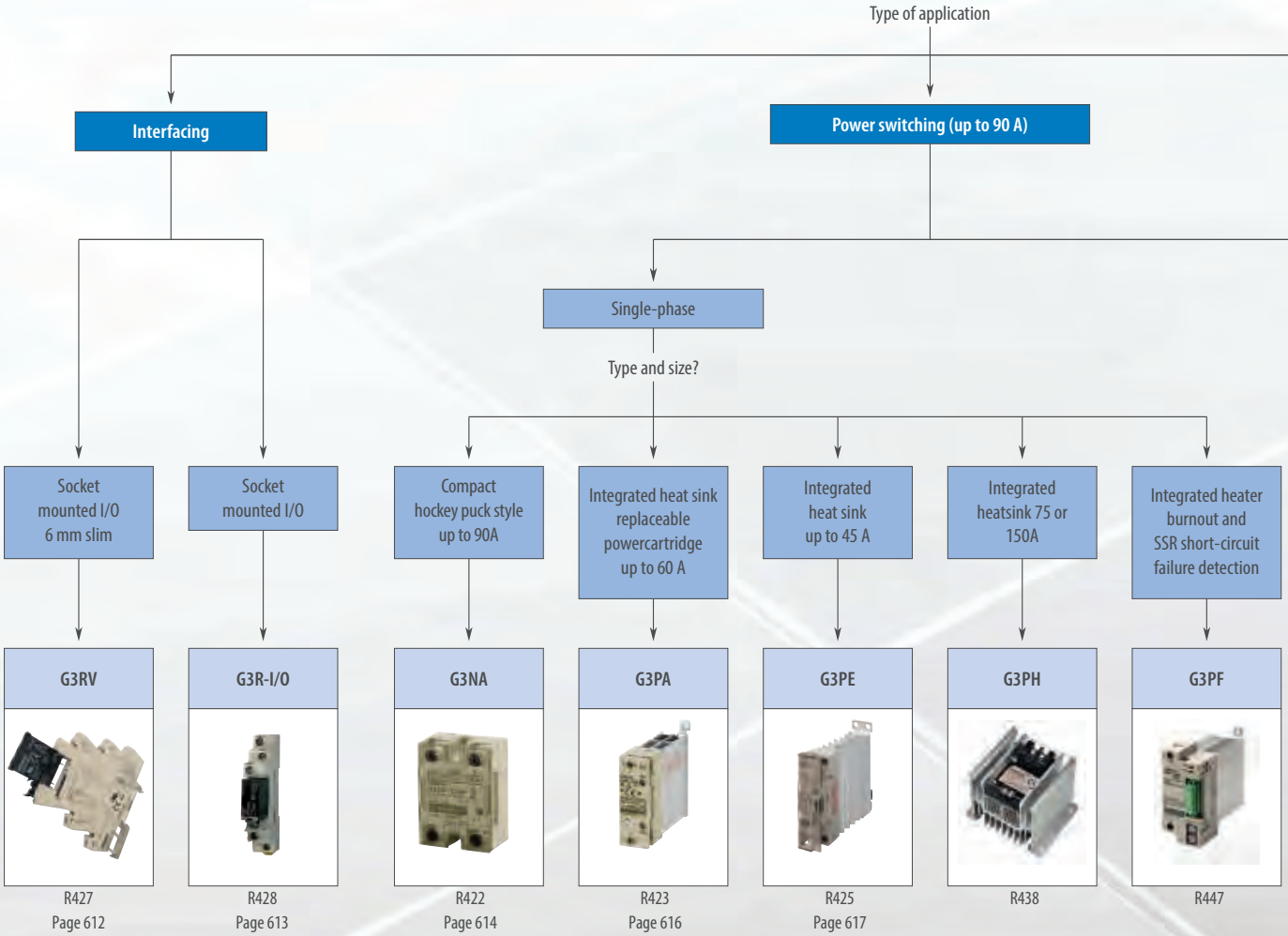
| | |
|---|---|
| Contact material | Ag alloy |
| Operating time | 50 ms max. |
| Release time | 50 ms max. |
| Dielectric strength | 4,000 VAC |
| Ambient temperature | Operating: -25 to 60°C (no icing) |

# COMPACT SOLID STATE RELAYS

## G3_ series – Reliable interfacing and power switching

With a wide variety of output currents and voltages, our control-panel mounted types of power switching SSRs are available with (G3PE & G3PH) and without (G3NA) built-in heat-sink. The compact SSRs for I/O Interfacing G3RV & G3R offer high-speed models (G3R).

- Industrial 6 mm 'slim' SSR which is G2RV compatible (G3RV)
- G2RS compatible high-speed interface solutions (G3R-I/O)
- G3NA with 5-90 A output current, G3PB up to 45 A
- Output voltages up to 480 VAC / 200 VDC available on G3NA
- Effectively absorbing of external surge thanks to the built-in varistor




**Power controlling**

- **Three-phase**
  - Integrated heat sink up to 45 A
    - **G3PE**

R425
Page 617

- **Single phase**
  - Integrated heat sink up to 60 A
    - **G3PW**

R442

- **Multi channel up to 8 solid state relays**
  - **G3ZA**

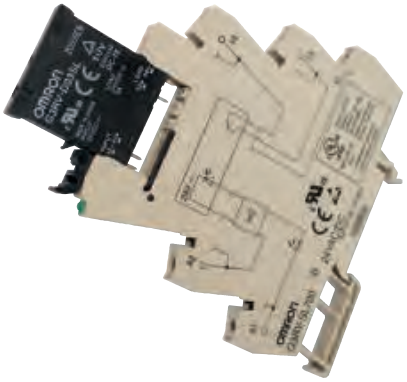
R426

# Selection table

| Category | | Control panel mounting type | | | | |
|---|---|---|---|---|---|---|
| | |  |  | |  |  |
| **Model** | | **G3RV** | **G3R-I/O** | | **G3NA** | **G3PA** |
| Selection criteria | Type of load | Output module (interface) | Input Module (interface) | Output Module (interface) | Normal resistive heaters<br>Motor control | Normal resistive heaters |
| | 1-phase control | – | – | – | ■ | ■ |
| | 2-phase control | – | – | – | – | – |
| | 3-phase control | – | – | – | – | – |
| | Function | Signal switching | Signal switching | Signal switching | Heater control, motor control | Heater control |
| | Max. current rating | 2 A (AC); 3 A (DC) | 100 mA | 2 A | 90 A | 60 A |
| Load voltage/ current [VAC] | 24 to 240 | – | – | – | ■ | ■ |
| | 100 to 240 | ■ | – | ■ | – | – |
| | 200 to 480 | – | – | – | ■ | ■ |
| Load voltage/ current [VDC] | 5 to 200 | 3 to 26.4 | 4 to 32 | ■ | ■ | – |
| Input voltages [VDC or VAC] | 5 to 24 VDC | – | ■ | ■ | ■ | ■ |
| | 12 to 24 VDC | 12 VDC ±10%; 24 VDC ±10% | ■ | – | – | ■ |
| | 24 VAC | ■ 24 VAC/DC ±10% | – | – | – | ■ |
| | 100 to 120 VAC | ■ 110 VAC ±10% | ■ | – | ■ | – |
| | 200 to 240 VAC | ■ 230 VAC ±10% | ■ | – | ■ | – |
| | Analog input | – | – | – | – | – |
| Features | Built-in heat sink | – | – | – | – | ■ |
| | Zero-cross | □ | – | □ | ■ | ■ |
| | Built-in varistor | – | – | – | ■ | ■ |
| | LED operation indicator | ■ | ■ | ■ | ■ | ■ |
| | Protective cover | NA | NA | NA | ■ | ■ |
| | 3-phase loads via 3 single-phase SSRs | NA | NA | NA | ■ | ■ |
| | Replaceable power cartridge | – | – | – | – | ■ |
| | Alarm output | NA | NA | NA | – | – |
| | Built-in failure detection | NA | NA | NA | – | – |
| | SSR open circuits detection | NA | NA | NA | – | – |
| | SSR short circuits detection | NA | NA | NA | – | – |
| Mounting | DIN-rail | ■ | – | – | ■ | ■ |
| | Screw | – | – | – | ■ | ■ |
| | Mounting socket | ■ | ■ | ■ | – | – |
| | Page/Quick Link | 612 | 613 | | 614 | 616 |

| Control panel mounting type | | | | Power regulator | |
|---|---|---|---|---|---|
|  |  |  |  |  |  |
| **G3PE** | **G3PE** | **G3PH** | **G3PF** | **G3PW** | **G3ZA** |
| Normal resistive heaters | Normal resistive heaters | Normal resistive & lamp heaters | Normal resistors | Alloy heater<br>Pure metal heater, nonmetal heater (Constant-current models recommended.) | Depends on the SSR used<br>Distributes loop/control output levels (mV%) to SSRs |
| ■ | – | ■ | ■ | ■ | Depends on the SSR used |
| – | ■ | – | – | – | Depends on the SSR used |
| – | ■ | – | – | – | Depends on the SSR used |
| Heater control | Heater control | (Lamp) heater control | Heater control and diagnostics | Single-phase power control | Intelligent power control |
| 45 A | 45 A | 150 A | 35 A | 60 A | Depends on the SSR used |
| – | – | – | – | – | – |
| ■ | ■ | ■ | ■ | ■ | ■ |
| ■ | ■ | ■ (180 to 480) | ■ | – | ■ 400 to 480 |
| – | – | – | – | – | – |
| – | – | ■ | – | – | – |
| ■ | ■ | – | ■ | – | – |
| – | – | – | – | – | – |
| – | – | ■ (100 to 240 VAC) | – | – | – |
| – | – | ■ (100 to 240 VAC) | – | – | – |
| – | – | – | – | 4 to 20 mA DC, 1 to 5 VDC | – |
| ■ | □ | ■ | ■ | ■ | – |
| □ | ■ | □ | ■ | □ | – |
| – | – | – | – | – | – |
| ■ | ■ | ■ | ■ | ■ | ■ |
| ■ | ■ | ■ | ■ | ■ | – |
| ■ | – | – | – | – | – |
| – | – | ■ | – | – | – |
| – | – | – | ■ | ■ | ■ |
| – | – | – | ■ | ■ | ■ |
| – | – | – | – | ■ | ■ |
| – | – | – | ■ | ■ | ■ |
| ■ | ■ | – | ■ | – | ■ |
| ■ | ■ | ■ | ■ | ■ | ■ |
| – | – | – | – | – | – |
| 617 | | R438 | R447 | R442 | R426 |

■ Standard □ Available – No/not available NA Not applicable



## Industrial 6 mm "slim" SSR which is G2RV compatible

As well as being slim and thus saving panel space, G3RV relays are very strong, have a large contact area and non-bendable pins. Connection to a PLC is easy and achieved faultlessly in a few seconds via click connectors. In addition, power switching in G3RV relays with DC outputs is managed by a MOSFET in the output, which has ideal heat dissipation characteristics.

- G2RV compatible
- LED indicator built in SSR
- Push-in terminals and accessories for easy wiring

## Ordering information

| Zero cross function | Input | | | | Must operate voltage | Must release voltage | Output | | | Type of connection | Order code |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Rated voltage (operating voltage) | Rated current | | | | | Rated load voltage (load voltage range) | Load current | Inrush current | | |
| | | AC | | DC | | | | | | | |
| | | 50 Hz | 60Hz | | | | | | | | |
| - | 24 VAC/DC (21.6 to 26.4 VAC/DC) | 10.7 mA | 11.1 mA | 4.3 mA | 21.6 V | 1 V | 5 to 24 VDC (3 to 26.4 VDC) | 100 µA to 3 A | 30 A (60 Hz, 1 cycle) | Screw | G3RV-SL700-D AC/DC24 |
| - | 24 VAC/DC (21.6 to 26.4 VAC/DC) | 10.7 mA | 11.1 mA | 4.3 mA | 21.6 V | 1 V | 5 to 24 VDC (3 to 26.4 VDC) | 100 µA to 3 A | 30 A (60 Hz, 1 cycle) | Push-in | G3RV-SL500-D AC/DC24 |
| Yes | 24 VAC/DC (21.6 to 26.4 VAC/DC) | 20 mA | 21 mA | 11 mA | 21.6 V | 1 V | 100 to 240 VAC (75 to 264 VAC) | 0.1 A to 2 A | 30 A (60 Hz, 1 cycle) | Screw | G3RV-SL700-A AC/DC24 |
| Yes | 24 VAC/DC (21.6 to 26.4 VAC/DC) | 20 mA | 21 mA | 11 mA | 21.6 V | 1 V | 100 to 240 VAC (75 to 264 VAC) | 0.1 A to 2 A | 30 A (60 Hz, 1 cycle) | Push-in | G3RV-SL500-A AC/DC24 |
| - | 230 VAC (207 to 253 VAC) | 6.8 mA | 8.1 mA | - | 207 V | 1 V | 5 to 24 VDC (3 to 26.4 VDC) | 100 µA to 3 A | 30 A (60 Hz, 1 cycle) | Screw | G3RV-SL700-D AC230 |
| - | 230 VAC (207 to 253 VAC) | 6.8 mA | 8.1 mA | - | 207 V | 1 V | 5 to 24 VDC (3 to 26.4 VDC) | 100 µA to 3 A | 30 A (60 Hz, 1 cycle) | Push-in | G3RV-SL500-D AC230 |

**Note:** Ratings at an ambient temperature of 25°C

### Accessories

| Type | Description | Order code |
|---|---|---|
| Cross bar | 2-pole | P2RVM-020_ |
| Cross bar | 3-pole | P2RVM-030_ |
| Cross bar | 4-pole | P2RVM-040_ |
| Cross bar | 10-pole | P2RVM-100_ |
| Cross bar | 20-pole | P2RVM-200_ |
| PLC interface | Connect 8 relays and PLC output | P2RVC-8-O-F |
| Label | Plastic, for mounting on socket | R99-15 for G2RV |
| Label (Sticker) | Paper for mounting on socket or relay | R99-16 for G2RV |
| Separating plate | Provides isolation between adjacent relays to achieve 400 V isolation | P2RV-S |

**Note:** _ Select color: R=Red, S=Blue, B=Black

## Specifications

| Order code | | G3RV-SL700/500-A | G3RV-SL700/500-D |
|---|---|---|---|
| **Isolation** | | Triac | Mosfet |
| **Output ON voltage drop** | | 1.6 V rms max. | 0.9 V max. |
| **Leakage current** | | 5 mA max. (at 200 VAC 50/60 Hz) | 10 µA max. (at 24 VDC) |
| **Operating indicator** | | Yes | |
| **Ambient temperature** | **Storage** | –30~+100°C (with no icing or condensation) | |
| | **Operating** | –30~+55°C (with no icing or condensation) | |

## Compact SSR for I/O interface with high dielectric strength requirements

High-speed models with optimum input ratings for a variety of sensors are available, as well as input and output modules that can be used instead of the G2RS. Use a coupler conforming to VDE 0884 and assuring an I/O dielectric strength of 4,000V.

- 1.5 and 2A output current
- 5 to 200VDC/100 to 240VAC output voltages
- Compatible with G2RS electromechanical relays
- DIN-rail mounting via sockets
- Operation indicator to confirm input

## Ordering information

### Input module

| Response speed | Input | | | | Output | | | |
|---|---|---|---|---|---|---|---|---|
| | Rated voltage (operating voltage) | Input current | Must operate voltage | Must release voltage | Logic level supply voltage | Logic level supply current | Size in mm (HxWxD) | Order code |
| – | 100 to 240 VAC (60 to 264 VAC) | 15 mA max. | 60 VAC max. | 20 VAC min. | 4 to 32 VDC | 0.1 to 100 mA | 29x13x28 (90.5x16x61 in combination with P2RF-05-E mounting socket) | G3R-IAZR1SN-UTU |
| High-speed (1 kHz) | 5 VDC (4 to 6 VDC) | 8 mA max. | 4 VDC max. | 1 VDC min. | | | | G3R-IDZR1SN-UTU |
| | 12 to 24 VDC (6.6 to 32 VDC) | | 6.6 VDC max. | 3.6 VDC min. | | | | |
| Low-speed (10 Hz) | 5 VDC (4 to 6 VDC) | | 4 VDC max. | 1 VDC min. | | | | G3R-IDZR1SN-1-UTU |
| | 12 to 24 VDC (6.6 to 32 VDC) | | 6.6 VDC max. | 3.6 VDC min. | | | | |

**Note:** Ratings at an ambient temperature of 25°C

### Output module

| Zero cross function | Input | | | | Output | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Rated voltage (operating voltage) | Input current | Must operate voltage | Must release voltage | Rated load voltage (load voltage range) | Load current*1 | Inrush current | Size in mm (HxWxD) | Order code |
| Yes | 5 to 24 VDC (4 to 32 VDC) | 15 mA max. | 4 VDC max. | 1 VDC min. | 100 to 240 VAC (75 to 264 VAC) | 0.05 to 2 A | 30 A (60 Hz, 1 cycle) | 29x13x28 (90.5x16x61 in combination with P2RF-05-E mounting socket) | G3R-OA202SZN-UTU |
| No | | | | | | | | | G3R-OA202SLN-UTU |
| – | | 8 mA max. | | | 5 to 48 VDC (4 to 60 VDC) | 0.01 to 2 A | 8 A (10 ms) | | G3R-ODX02SN-UTU |
| – | | | | | 48 to 200 VDC (40 to 200 VDC) | 0.01 to 1.5 A | 8 A (10 ms) | | G3R-OD201SN-UTU |

**Note:** Ratings at an ambient temperature of 25°C

*1 The minimum current value is measured at 10°C min.

### Socket & accessories

| Order code | | | | | | |
|---|---|---|---|---|---|---|
| DIN rail | | | | | | PCB |
| Screwless clamp | | | | | Screw | Soldering |
| Socket | Clip | Cross bar AC type | Cross bar DC type | Name plate | Socket | Socket |
| P2RF-05-S | P2CM-S | P2RM-SR | P2RM-SB | R99-11 | P2RF-05-E | P2R-05P |

## Specifications

| | Input module | | | Output module | | | |
|---|---|---|---|---|---|---|---|
| Order code | G3R-IAZR1SN-UTU | G3R-IDZR1SN-UTU | G3R-IDZR1SN-1-UTU | G3R-OA202SZN-UTU | G3R-OA202SLN-UTU | G3R-ODX02SN-UTU | G3R-OD201SN-UTU |
| Isolation | Photocoupler | | | Phototriac | | Photocoupler | |
| Operate time | 20 ms max. | 0.1 ms max. | 15 ms max. | 1/2 of load power source cycle + 1 ms max. | 1 ms max. | 1 ms max. | 1 ms max. |
| Release time | 20 ms max. | 0.1 ms max. | 15 ms max. | 1/2 of load power source cycle + 1 ms max. | | 2 ms max. | 2 ms max. |
| Response frequency | 10 Hz | 1 kHz | 10 Hz | 20 Hz | 20 Hz | 100 Hz | 100 Hz |
| Output ON voltage drop | 1.6 V max. | 1.6 V max. | 1.6 V max. | 1.6 V max. | 1.6 V max. | 1.6 V max. | 2.5 V max. |
| Leakage current | 5 μA max. | 5 μA max. | 5 μA max. | 1.5 mA max. | 1.5 mA max. | 1 mA max. | 1 mA max. |
| Operation indicator | Yes | | | | | | |
| Ambient temperature | Operating: -30 to 80°C (with no icing) | | | | | | |


## Hockey puck style SSR with 5-90 A output currents

All models feature the same compact dimensions to provide a uniform mounting pitch. A built-in varistor effectively absorbs external surges. The operation indicator enables monitoring operation.

- 5-90 A output current
- 24-480 VAC/5-200VDC output voltages
- Built-in varistor
- Operation indicator (red LED)
- Protective cover for greater safety

## Ordering information

| Applicable output load | | Zero cross function | Isolation | Rated input voltage | Must operate voltage | Must release voltage | Load current with/ without heatsink at 40 °C | Size in mm (H×W×D) | Order code |
|---|---|---|---|---|---|---|---|---|---|
| 24 to 240 VAC | 5 A | Yes | Phototriac | 5 to 24 VDC | 4 VDC max. | 1 VDC min. | 0.1 to 5 A/0.1 to 3 A | 58×43×27 | G3NA-205B-UTU DC5-24 |
| | | | Photocoupler | 100 to 120 VAC | 75 VAC max. | 20 VAC min. | | | G3NA-205B-UTU AC100-120 |
| | | | | 200 to 240 VAC | 150 VAC max. | 40 VAC min. | | | G3NA-205B-UTU AC200-240 |
| | 10 A | | Phototriac | 5 to 24 VDC | 4 VDC max. | 1 VDC min. | 0.1 to 10 A/0.1 to 4 A | 58×43×27 | G3NA-210B-UTU DC5-24 |
| | | | Photocoupler | 100 to 120 VAC | 75 VAC max. | 20 VAC min. | | | G3NA-210B-UTU AC100-120 |
| | | | | 200 to 240 VAC | 150 VAC max. | 40 VAC min. | | | G3NA-210B-UTU AC200-240 |
| | 20 A | | Phototriac | 5 to 24 VDC | 4 VDC max. | 1 VDC min. | 0.1 to 20 A/0.1 to 4 A | 58×43×27 | G3NA-220B-UTU DC5-24 |
| | | | Photocoupler | 100 to 120 VAC | 75 VAC max. | 20 VAC min. | | | G3NA-220B-UTU AC100-120 |
| | | | | 200 to 240 VAC | 150 VAC max. | 40 VAC min. | | | G3NA-220B-UTU AC200-240 |
| | 40 A | | Phototriac | 5 to 24 VDC | 4 VDC max. | 1 VDC min. | 0.1 to 40 A/0.1 to 6 A | 58×43×27 | G3NA-240B-UTU DC5-24 |
| | | | Photocoupler | 100 to 120 VAC | 75 VAC max. | 20 VAC min. | | | G3NA-240B-UTU AC100-120 |
| | | | | 200 to 240 VAC | 150 VAC max. | 40 VAC min. | | | G3NA-240B-UTU AC200-240 |
| | 50 A | | Phototriac | 5 to 24 VDC | 4 VDC max. | 1 VDC min. | 0.1 to 50 A/0.1 to 6 A | 58×43×27 | G3NA-250B-UTU DC5-24 |
| | | | Photocoupler | 100 to 120 VAC | 75 VAC max. | 20 VAC min. | | | G3NA-250B-UTU AC100-120 |
| | | | | 200 to 240 VAC | 150 VAC max. | 40 VAC min. | | | G3NA-250B-UTU AC200-240 |
| | 75 A | | Phototriac | 5 to 24 VDC | 4 VDC max. | 1 VDC min. | 1 to 75 A/1 to 7 A | 58×43×30 | G3NA-275B-UTU-2 DC5-24 |
| | | | Photocoupler | 100 to 240 VAC | 75 VAC max. | 20 VAC min. | | | G3NA-275B-UTU-2 AC100-240 |
| | 90 A | | Phototriac | 5 to 24 VDC | 4 VDC max. | 1 VDC min. | 1 to 90 A/1 to 7 A | 58×43×30 | G3NA-290B-UTU-2 DC5-24 |
| | | | Photocoupler | 100 to 240 VAC | 75 VAC max. | 20 VAC min. | | | G3NA-290B-UTU-2 AC100-240 |
| 5 to 200 VDC | 10 A | No | Photocoupler | 5 to 24 VDC | 4 VDC max. | 1 VDC min. | 0.1 to 10 A/0.1 to 4 A | 58×43×27 | G3NA-D210B-UTU DC5-24 |
| | | | | 100 to 240 VAC | 75 VAC max. | 20 VAC min. | | | G3NA-D210B-UTU AC100-240 |
| 200 to 480 VAC | 10 A | Yes | | 5 to 24 VDC | 4 VDC max. | 1 VDC min. | 0.2 to 10 A/0.2 to 4 A | 58×43×27 | G3NA-410B-UTU DC5-24 |
| | | | | 100 to 240 VAC | 75 VAC max. | 20 VAC min. | | | G3NA-410B-UTU AC100-240 |
| | 25 A | | | 5 to 24 VDC | 4 VDC max. | 1 VDC min. | 0.2 to 20 A/0.2 to 4 A | 58×43×27 | G3NA-425B-UTU-2 DC5-24 |
| | | | | 100 to 240 VAC | 75 VAC max. | 20 VAC min. | | | G3NA-425B-UTU-2 AC100-240 |
| | 50 A | | | 5 to 24 VDC | 4 VDC max. | 1 VDC min. | 0.2 to 40 A/0.2 to 6 A | 58×43×30 | G3NA-450B-UTU-2 DC5-24 |
| | | | | 100 to 240 VAC | 75 VAC max. | 20 VAC min. | | | G3NA-450B-UTU-2 AC100-240 |
| | 75 A | | | 5 to 24 VDC | 4 VDC max. | 1 VDC min. | 1 to 75 A/1 to 7 A | 58×43×30 | G3NA-475B-UTU-2 DC5-24 |
| | | | | 100 to 240 VAC | 75 VAC max. | 20 VAC min. | | | G3NA-475B-UTU-2 AC100-240 |
| | 90 A | | | 5 to 24 VDC | 4 VDC max. | 1 VDC min. | 1 to 90 A/1 to 7 A | 58×43×30 | G3NA-490B-UTU-2 DC5-24 |
| | | | | 100 to 240 VAC | 75 VAC max. | 20 VAC min. | | | G3NA-490B-UTU-2 AC100-240 |

## Accessories

| Name | Applicable SSRs | Size in mm (H×W×D)*1 | Order code |
|---|---|---|---|
| One-touch mounting plates | – | NA | R99-12 FOR G3NA |
| Mounting bracket | G3NA-240B-UTU | NA | R99-11 FOR G3NA |
| Slim heat sink enabling DIN-rail mounting | G3NA-205B-UTU, G3NA-210B-UTU, G3NA-D210B-UTU, G3NA-410B-UTU | 100×47×51 | Y92B-N50 |
| | G3NA-220B-UTU, G3NA-425B-UTU(-2) | 100×75×100 | Y92B-N100 |
| | G3NA-240B-UTU, G3NA-250B-UTU | 100×104×100 | Y92B-N150 |
| | G3NA-450B-UTU(-2) | 190.5×130.5×100 | Y92B-P250 |
| | G3NA-275B-UTU(-2), G3NA-290B-UTU(-2), G3NA-475B-UTU(-2), G3NA-490B-UTU(-2) | 172×110×150 | Y92B-P250NF |
| Low-cost heat sink | G3NA-205B-UTU, G3NA-210B-UTU, G3NA-D210B-UTU, G3NA-220B-UTU, G3NA-410B-UTU, G3NA-425B-UTU(-2) | 100×102×60 | Y92B-A100 |
| | G3NA-240-B-UTU | 150×102×60 | Y92B-A150N |

*1 Size includes heat sink + G3NA SSR

## Specifications

| | |
|---|---|
| **Operating voltage range** | 5 to 24 VDC: 4 to 32 VDC<br>100 to 120 VAC: 75 to 132 VAC<br>200 to 240 VAC: 150 to 264 VAC |
| **Output ON voltage drop** | G3NA-2: 1.6 V (RMS) max.<br>G3NA-4: 1.8 V (RMS) max.<br>G3NA-D2: 1.5 V max. |
| **Leakage current** | 5 mA (100 V)/10 mA (200 V)<br>G3NA-D2: 5 mA max. (200 VDC) |
| **Load voltage range** | 200 to 480 VAC: 180 to 528 VAC<br>24 to 240 VAC: 19 to 264 VAC<br>5 to 200 VDC: 4 to 220 VDC |
| **Ambient temperature** | Operating: –30 to 80°C |
| **Operate & release time** | 1/2 of load power source cycle + 1 ms max. (DC input)<br>1/2 of load power source cycle + 1 ms max. (DC input) |
| **G3NA-D2** | 1 ms max. (DC input; release 5 ms),<br>30 ms max. (AC input) |

## Solid State Relays with exchangeable power cartridge

Optimum design of the heat sink has contributed to the downsizing of this product. The power element cartridges of the G3PA are easily replaceable for easy maintenance. G3PA can be mounted on a DIN-rail or using screws.

- 10-60 A output current
- 24-480 VAC output voltages
- Applicable with 3-phase loads
- Replaceable power element cartridges

## Ordering information

| Rated output load | | Zero cross function | Rated input voltage | Operating voltage range | Input current impedance | Voltage level | | Size in mm (H×W×D) | Order code |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Must operate voltage | Must release voltage | | |
| 24 to 240 VAC | 10 A | Yes | 5 to 24 VDC | 4 to 30 VDC | 7 mA max. | 4 VDC max. | 1 VDC min. | 100×27×100 | G3PA-210B-VD DC5-24 |
| | 20 A | | | | | | | 100×37×100 | G3PA-220B-VD DC5-24 |
| | 40 A | | | | | | | 100×47×100 | G3PA-240B-VD DC5-24 |
| | 60 A | | | | | | | 100×110×100 | G3PA-260B-VD DC5-24 |
| | 10 A | | 24 VAC | 19.2 to 26.4 VAC | 1.4 kΩ ±20% | 19.2 VAC max. | 4.8 VAC min. | 100×27×100 | G3PA-210B-VD AC24 |
| | 20 A | | | | | | | 100×37×100 | G3PA-220B-VD AC24 |
| | 40 A | | | | | | | 100×47×100 | G3PA-240B-VD AC24 |
| | 60 A | | | | | | | 100×110×100 | G3PA-260B-VD AC24 |
| 180 to 400 VAC | 20 A | | 12 to 24 VDC | 9.6 to 30 VDC | 7 mA max. | 9.2 VDC max. | 1 VDC min. | 100×37×100 | G3PA-420B-VD DC12-24 |
| | 30 A | | | | | | | 100×47×100 | G3PA-430B-VD DC12-24 |
| 200 to 480 VAC | 20 A | | | | | | | 100×37×100 | G3PA-420B-VD-2 DC12-24 |
| | 30 A | | | | | | | 100×47×100 | G3PA-430B-VD-2 DC12-24 |
| | 50 A | | | | | | | 100×110×100 | G3PA-450B-VD-2 DC12-24 |

### Accessories

| Replacement parts: Power device cartridges | | | |
|---|---|---|---|
| Load voltage range | Carry current | Applicable SSR | Order code |
| 19 to 264 VAC | 10 A | G3PA-210B-VD DC5-24 | G32A-A10-VD DC5-24 |
| | | G3PA-210B-VD AC24 | G32A-A10-VD AC24 |
| | 20 A | G3PA-220B-VD DC5-24 | G32A-A20-VD DC5-24 |
| | | G3PA-220B-VD AC24 | G32A-A20-VD AC24 |
| | 40 A | G3PA-240B-VD DC5-24 | G32A-A40-VD DC5-24 |
| | | G3PA-240B-VD AC24 | G32A-A40-VD AC24 |
| | 60 A | G3PA-260B-VD DC5-24 | G32A-A60-VD DC5-24 |
| | | G3PA-260B-VD AC24 | G32A-A60-VD AC24 |
| 150 to 440 VAC | 20 A | G3PA-420B-VD DC12-24 | G32A-A420-VD DC12-24 |
| | 30 A | G3PA-430B-VD DC12-24 | G32A-A430-VD DC12-24 |
| 180 to 528 VAC | 20 A | G3PA-420B-VD-2 DC12-24 | G32A-A420-VD-2 DC12-24 |
| | 30 A | G3PA-430B-VD-2 DC12-24 | G32A-A430-VD-2 DC12-24 |
| | 50 A | G3PA-450B-VD-2 DC12-24 | G32A-A450-VD-2 DC12-24 |

| G32A-D_ _ enables 2 line switching of 3 phase configurations | | |
|---|---|---|
| Current flow | Applicable SSR | Order code |
| 10 A | G3PA-210B-VD, G3PA-210BL-VD, G3PA-220B-VD, G3PA-220BL-VD, G3PA-420B-VD, G3PA-420B-VD-2 | G32A-D20 |
| 20 A | | |
| 30 A | G3PA-430B-VD, G3PA-430B-VD-2, G3PA-240B-VD, G3PA-240BL-VD | G32A-D40 |
| 40 A | | |

## Specifications

| | |
|---|---|
| **Isolation** | Phototriac coupler |
| **Indicator** | Yes |
| **Ambient temperature** | Operating: –30 to 80°C |
| **Load voltage range** | 200 to 480 VAC: 180 to 528 VAC<br>24 to 240 VAC: 19 to 264 VAC<br>180 to 400 VAC: 150 to 440 VAC |
| **Output ON drop** | 1.6 V (RMS) max. |
| **Operate time** | 0.5 of load power source cycle + 1 ms max. (DC input, -B models)<br>1.5 of load power source cycle + 1 ms max. (AC input)<br>1 ms max. (-BL models) |
| **Release time** | 0.5 of load power source cycle + 1 ms max. (DC input)<br>1.5 of load power source cycle + 1 ms max. (AC input) |

## Omron's G3PE compact industrial SSR with outstanding surge endurance

The G3PE features an original surge-pass circuit that gives outstanding surge endurance and protects the semiconductor device against voltages in excess of 30 kV.

- Single and three phase, 15-45 A output current
- 100-240 VAC and 200-480 VAC output voltages
- Models available without zero cross
- Improved surge dielectric strength for output circuits
- Terminal cover with finger protection
- Mount to DIN track or with screws

## Ordering information

| Phases | Rated voltage (operating voltage) | Rated output load | Permissible $I^2t$ (half 60 Hz wave) | Applicable heater capacity AC1: resistive load) | Size in mm (H×W×D) | Number of poles | Order code |
|---|---|---|---|---|---|---|---|
| 1 | 100 to 240 VAC (75 to 264 VAC) | 15 A (at 40°C) | 121 $A^2s$ | 3 kW (at 200 VAC) | 100×22.5×100 | 1 | G3PE-215B DC12-24 |
| | | 25 A (at 40°C) | 260 $A^2s$ | 5 kW (at 200 VAC) | | 1 | G3PE-225B DC12-24 |
| | | 35 A | 1,260 $A^2s$ | 7 kW (at 200 VAC) | 100×44.5×100 | 1 | G3PE-235B DC12-24 |
| | | 45 A | | 9 kW (at 200 VAC) | | 1 | G3PE-245B DC12-24 |
| | 200 to 480 VAC (180 to 528 VAC) | 15 A (at 40°C) | 128 $A^2s$ | 6 kW (at 400 VAC) | 100×22.5×100 | 1 | G3PE-515B DC12-24 |
| | | 25 A (at 40°C) | 1,350 $A^2s$ | 10 kW (at 400 VAC) | | 1 | G3PE-525B DC12-24 |
| | | 35 A | | 14 kW (at 400 VAC) | 100×44.5×100 | 1 | G3PE-535B DC12-24 |
| | | 45 A | 6,600 $A^2s$ | 18 kW (at 400 VAC) | | 1 | G3PE-545B DC12-24 |
| 3 | 200 to 480 VAC (180 to 528 VAC) | 15 A (at 40°C) | 260 $A^2s$ | 12.5 kW (at 480 VAC) | 100×80×155 | 3 | G3PE-515B-3N DC12-24 |
| | | | | | | 2 | G3PE-515B-2N DC12-24 |
| | | 25 A (at 40°C) | | 20.7 kW (at 480 VAC) | 120×80×155 | 3 | G3PE-525B-3N DC12-24 |
| | | | | | 100×80×155 | 2 | G3PE-525B-2N DC12-24 |
| | | 35 A | 1,260 $A^2s$ | 29 kW (at 480 VAC) | 140×80×155 | 3 | G3PE-535B-3N DC12-24 |
| | | | | | 120×80×155 | 2 | G3PE-535B-2N DC12-24 |
| | | 45 A | | 37.4 kW (at 480 VAC) | 140×110×155 | 3 | G3PE-545B-3N DC12-24 |
| | | | | | 140×80×155 | 2 | G3PE-545B-2N DC12-24 |

## Specifications

| | |
|---|---|
| **Rated input voltage** | 12 to 24 VDC |
| **Operating voltage range** | 9.6 to 30 VDC |
| **Rated input current (impedance)** | 7 mA max. (zero cross models); 15 mA max. (models without zero cross) |
| **Zero cross function** | Yes |
| **Must operate voltage** | 9.6 VDC max. |
| **Must release voltage** | 1 VDC min. |
| **Isolation method** | Phototriac coupler |
| **Operation indicator** | Yes (yellow) |
| **Load voltage range** | 200 to 480 VAC models: 180 to 528 VAC<br>100 to 240 VAC models: 75 to 264 VAC |
| **Operate time** | 1/2 of load power source cycle +1 ms max. |
| **Release time** | 1/2 of load power source cycle +1 ms max. |
| **Leakage current** | 10 mA (at 200 VAC) |
| **Ambient temperature** | Operating: –30 to 80°C |

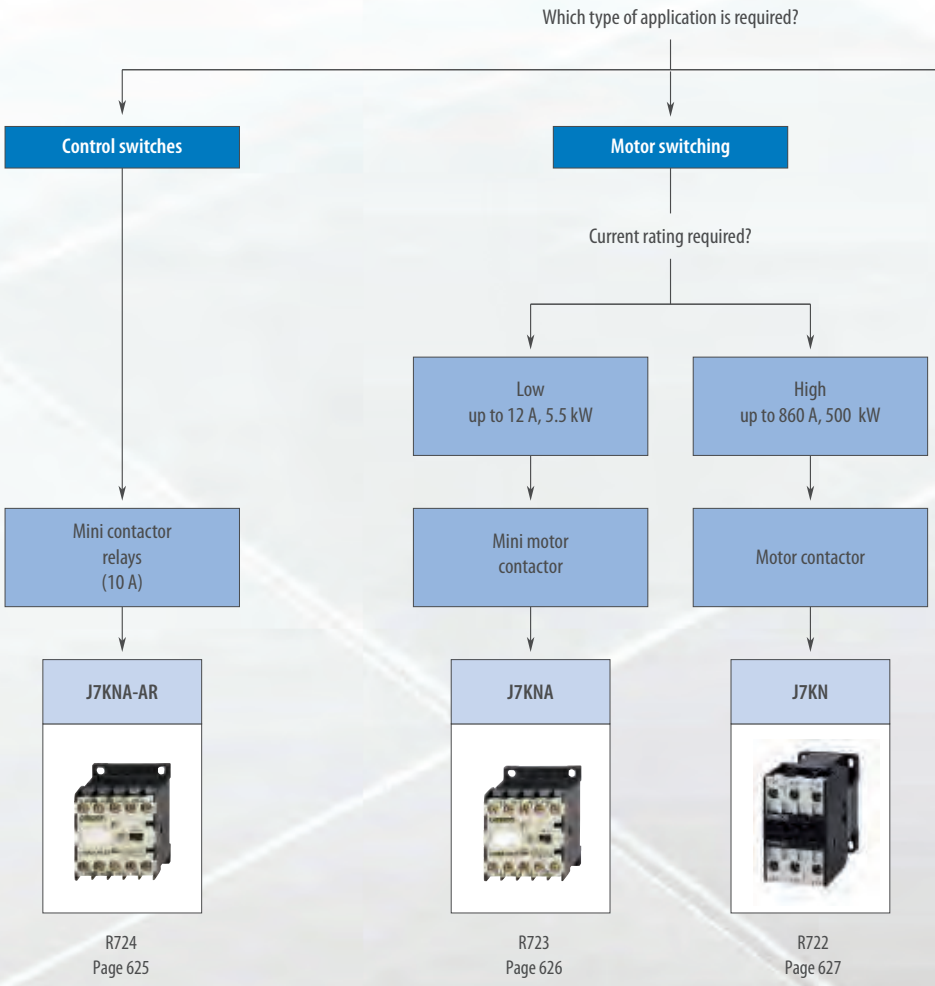
# J7KN MOTOR CONTACTOR

## J7KN – Motor contactors

The popular J7KN series offers many outstanding benefits, such as space-saving, small footprint, great reliability, and an ambient temperature rating up to +90˚C. But now we've replaced it with a completely new design that extends its application range and will make your life even easier.

The new J7KN 10D to 22D series has the same footprint and severe ambient temperature rating, but has an improved design affording better protection, easier maintenance plus an integrated auxiliary double contact suitable for switching electronic circuits (17 V, 5 mA).

- Basic units can be combined with auxiliary contacts (top/side mounting)
- 3-main-pole and 4-main-pole versions are possible
- The power range covers 4 to 500 kW
- Different coil voltages (AC and DC)
- J7KN-10D to J7KN-22D models have integrated auxiliary contact for electronic circuits (3-pole versions)






**Motor protection**

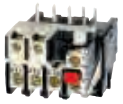
Which kind of protection is needed?

| Protection with fuse | Fuseless |
|---|---|
| Thermal overload relays (0.12 to 180 A) | Motor protection circuit breakers (0.16 to 100 A) |
| **J7TKN** | **J7MN** |
|  |  |
| R726<br>Page 629 | R725<br>Page 631 |

# Selection table

| MPCB | | | |
|---|---|---|---|
| **Category** | | | **Motor protection circuit breaker** |
| | | |   |
| | **Type** | | **J7MN-3P/3R** |
| | **Setting range current** | | 0.16 - 32 A |
| | **Number of ranges** | | 16 |
| | **Auxiliary contact external** | | front 1 NO and 1 NC or 2 NO,<br>side 1 NO and NC or 2 NO or 2 NC |
| | **Page/Quick Link** | | 631 |

| Contactors | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Category** | | | **Contactors** | | | | |
| | | |  |  |  | |  |
| | **Type** | | **J7KNA-AR** | **J7KNA-09/12** | **J7KN(G)-10(D)** | **J7KN(G)-14(D)** | **J7KN(G)-18(D)** | **J7KN(G)-22(D)** |
| | **Maximum power AC3-380/415 V** | | – | 4 kW or 5 kW | 4 kW | 5.5 kW | 7.5 kW | 11 kW |
| | **Rated current AC3-380/415 V** | | 10 A th | 9/12 A | 10 A | 14 A | 18 A | 22 A |
| | **Main contacts** | | 4 in 4 configurations | 3 or 4 | 3 or 4 | | | |
| | **Auxiliary contacts** | **Included** | – | 1 | 1 NO or 1 NC | | | |
| | | **External** | 4 in different combinations | | 4 contacts [*1] | | | |
| | **Page/Quick Link** | | 625 | 626 | 627 | | 627 | |

| Thermal overload | | | | |
|---|---|---|---|---|
| **Category** | | | **Thermal overload** | |
| | | |  |  |
| | **Type** | | **J7TKN-A** | **J7TKN-B** |
| | **Setting range D.O.L.** | | 0.12 - 14 A | 0.12 - 32 A |
| | **Number of ranges** | | 13 | 16 |
| | **Auxiliary contacts included** | | 1 NO and 1 NC | 1 NO and 1 NC |
| | **Page/Quick Link** | | 629 | 629 |

[*1] Using J7KN with DC double wiring coils results in 1 aux. less

| | Motor protection circuit breaker | |
|---|---|---|
| J7MN-6R<br>Over lapping area<br>J7MN-3P/3R |  |  |
| | **J7MN-6R** | **J7MN-9R** |
| | 26 - 63 A | 63 - 100 A |
| | 5 | 4 |
| front 1 NO and 1 NC or 2 NO,<br>side 1 NO and NC or 2 NO or 2 NC | | |
| | 631 | |

| Contactors | | | | | | | |
|---|---|---|---|---|---|---|---|
|  |  | |  | | |  | |
| **J7KN(G)-24** | **J7KN(G)-32** | **J7KN(G)-40** | **J7KN-50** | **J7KN-62** | **J7KN-74** | **J7KN-90** | **J7KN-115** |
| 11 kW | 15 kW | 18.5 kW | 22 kW | 30 kW | 37 kW | 45 kW | 55 kW |
| 24 A | 32 A | 40 A | 50 A | 62 A | 74 A | 90 A | 115 A |
| 3 | | | 3 | | | 3 | |
| – | | | – | | | – | |
| front and side 8-contacts[*1] | | | front and side 8-contacts[*1] | | | front and side 11-contacts | |
| 627 | | | 627 | | | 627 | |

| Thermal overload | | |
|---|---|---|
|  |  |  |
| **J7TKN-C** | **J7TKN-D** | **J7TKN-E** |
| 28 - 42 A | 40 - 74 A | 60 - 120 A |
| 1 | 3 | 2 |
| 1 NO and 1 NC | 1 NO and 1 NC | 1 NO and 1 NC |
| 629 | 629 | 629 |

[*1] Using J7KN with DC double wiring coils results in 1 aux. less

| Category | | | Contactors | | | |
|---|---|---|---|---|---|---|
| Contactors | | |  | |  | |
| | Type | | J7KN-151 | J7KN-176 | J7KN-210 | J7KN-260 |
| | Maximum power AC3-380/415 V | | 75 kW | 90 kW | 110 kW | 132 kW |
| | Rated current AC3-380/415 V | | 150 A | 175 A | 210 A | 260 A |
| | Main contacts | | 3 or 4 | | 3 | |
| | Auxiliary contacts | Included | – | | – | |
| | | External | front and side 6-contacts | | front and side 8-contacts | |
| | Page/Quick Link | | 627 | | | |

| Category | | Thermal overload | | |
|---|---|---|---|---|
| Thermal overload | |  |  |  |
| | Type | J7TKN-E | J7TKN-F | J7TKN-G |
| | Setting range D.O.L. | 60 - 120 A | 120 - 180 A | 144 - 320 A |
| | Number of ranges | 2 | 1 | 2 |
| | Auxiliary contacts included | 1 NO and 1 NC | 1 NO and 1 NC | 1 NO and 1 NC |
| | Page/Quick Link | 629 | | |

## Contactors

| J7KN-316 | J7KN-450-22 | J7KN-550-22 | J7KN-700-22 | J7KN-860-22 |
|---|---|---|---|---|
| 160 kW | 250 kW | 300 kW | 400 kW | 500 kW |
| 315 A | 450 A | 550 A | 700 A | 860 A |
| 3 | 3 | 3 | 3 | 3 |
| – | 4 | 4 | 4 | 4 |
| front and side 8-contacts | front 4-contacts | front 4-contacts | front 4-contacts | front 4-contacts |
| 627 | | | | |

## Thermal overload

| J7TKN-G | J7TKN-H |
|---|---|
| 144 - 320 A | 240 - 800 A |
| 2 | 3 |
| 1 NO and 1 NC | 1 NO and 1 NC |
| 629 | |


## Main mini contactor relay, 4-pole

Three basic units can be combined with different additional auxiliary contacts. 4-pole, 6-pole and 8-pole versions in different configurations are possible as well as different coil voltages (AC and DC). Accessories such as suppressors are available.

- Mirror contacts
- Screw fixing and snap fitting (35 mm DIN-rail)
- Rated current = 10 A ($I_{th}$)
- Suitable for electronic devices (DIN 19240)
- Finger proof (BGV A2)

## Ordering information

| Operation | Contacts | | Distinctive number according to DIN EN 50011 | Ratings | | Thermal rated current | Order code | Coil voltage *1, replace ___ with: | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | NO | NC | | AC15 230 V A | 400 V A | $I_{th}$, A | | | | | | |
| 4-pole, with screw terminals | | | | | | | | VAC | | | VDC | |
| AC | 4 | 0 | 40 E | 3 | 2 | 10 | J7KNA-AR-40___ | 24 | 110 | 230 | – | – |
| | 3 | 1 | 31 E | 3 | 2 | 10 | J7KNA-AR-31 ___ | 24 | 110 | 230 | – | – |
| | 2 | 2 | 22 E | 3 | 2 | 10 | J7KNA-AR-22 ___ | 24 | 110 | 230 | – | – |
| DC solenoid | 4 | 0 | 40 E | 3 | 2 | 10 | J7KNA-AR-40 ___ | – | – | – | 24D | 110D |
| | 3 | 1 | 31 E | 3 | 2 | 10 | J7KNA-AR-31 ___ | – | – | – | 24D | 110D |
| | 2 | 2 | 22 E | 3 | 2 | 10 | J7KNA-AR-22 ___ | – | – | – | 24D | 110D |
| DC solenoid with diode | 4 | 0 | 40 E | 3 | 2 | 10 | J7KNA-AR-40 ____ | – | – | – | 24VS | – |
| | 3 | 1 | 31 E | 3 | 2 | 10 | J7KNA-AR-31 ____ | – | – | – | 24VS | – |
| | 2 | 2 | 22 E | 3 | 2 | 10 | J7KNA-AR-22 ____ | – | – | – | 24VS | – |

*1 Other coil voltages available on request

### Accessories

| Contacts | | Ratings | | Thermal rated current | Order code |
|---|---|---|---|---|---|
| NO | NC | AC15 230 V A | 400 V A | $I_{th}$, A | |
| 1 | 1 | 3 | 2 | 10 | J73KN-A-11 |
| 0 | 2 | 3 | 2 | 10 | J73KN-A-02 |
| 4 | 0 | 3 | 2 | 10 | J73KN-A-40 |
| 2 | 2 | 3 | 2 | 10 | J73KN-A-22 |
| 0 | 4 | 3 | 2 | 10 | J73KN-A-04 |

## Specifications

| Suffix to contactor type e.g. J7KNA-09-10-24 | Voltage marking at the coil for | | Rated control voltage $U_s$ range for | | | |
|---|---|---|---|---|---|---|
| | 50 Hz | 60 Hz | 50 Hz | | 60 Hz | |
| | V | V | min. V | max. V | min. V | max. V |
| **24** | 24 | 24 | 22 | 24 | 24 | 24 |
| **110** | 110 to 115 | 120 to 125 | 110 | 115 | 120 | 125 |
| **230** | 220 to 230 | 240 | 220 | 230 | 240 | 250 |


## Motor contactors from 4 to 5.5 kW for normal duty switching

This modular system consists of main contactors and additional contact blocks. The basic units can be combined with auxiliary contacts (top mounting). Reversed versions, including integrated mechanical interlock, are available as well as 3-main-pole and 4-main-pole versions.

- 4 kW and 5.5 kW versions are available
- Different coil voltages (AC and DC)
- Mini and normal-size versions are available
- The contactors can be mounted with screw fixing and snap fitting on a DIN-rail
- All components are finger proof

## Ordering information

| Operation | Poles | Rating AC2, AC3 | | | Rated current | | Auxiliary contact | | Overload relay | Size in mm (H×W×D) | Order code | Coil voltage[*1], replace ___ with: | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 380 V 400 V 415 V kW | 500 V kW | 660 V 690 V kW | AC3 400 V A | AC1 690 V A | NO | NC | | | | VAC | | | | VDC |
| AC/DC solenoid | 3 | 4 | 4 | 4 | 9 | 20 | 1 | 0 | J7TKN-A | 57.5×45×49 | J7KNA-09-10___ | 24 | 110 | 230 | 400 | 24D |
| | | | | | | | 0 | 1 | J7TKN-A | | J7KNA-09-01___ | 24 | 110 | 230 | 400 | 24D |
| | | 5.5 | 5.5 | 5.5 | 12 | 20 | 1 | 0 | J7TKN-A | | J7KNA-12-10___ | 24 | 110 | 230 | 400 | 24D |
| | | | | | | | 0 | 1 | J7TKN-A | | J7KNA-12-01___ | 24 | 110 | 230 | 400 | 24D |
| | 4 | 4 | 4 | 4 | 9 | 20 | 0 | 0 | J7TKN-A | | J7KNA-09-4___ | 24 | 110 | 230 | 400 | 24D |
| DC solenoid with diode | 3 | 4 | 4 | 4 | 9 | 20 | 1 | 0 | J7TKN-A | | J7KNA-09-10___ | – | – | – | – | 24VS |
| | | | | | | | 0 | 1 | J7TKN-A | | J7KNA-09-01___ | – | – | – | – | 24VS |
| | | 5.5 | 5.5 | 5.5 | 12 | 20 | 1 | 0 | J7TKN-A | | J7KNA-12-10___ | – | – | – | – | 24VS |
| | | | | | | | 0 | 1 | J7TKN-A | | J7KNA-12-01___ | – | – | – | – | 24VS |
| AC/DC solenoid | 3 reversing contactors | 4 | 4 | 4 | 9 | 20 | 0 | 1 | J7TKN-A | 57.5×94.5×50 | J7KNA-09-01 R___ | 24 | 110 | 230 | 400 | 24D |
| | | 5.5 | 5.5 | 5.5 | 12 | 20 | 0 | 1 | J7TKN-A | | J7KNA-12-01 R___ | 24 | 110 | 230 | 400 | 24D |
| DC solenoid with diode | | 4 | 4 | 4 | 9 | 20 | 0 | 1 | J7TKN-A | | J7KNA-09-01 R___ | – | – | – | – | 24VS |
| | | 5.5 | 5.5 | 5.5 | 12 | 20 | 0 | 1 | J7TKN-A | | J7KNA-12-01 R___ | – | – | – | – | 24VS |

[*1] Other coil voltages available on request

### Accessories

| Auxiliary contacts | | | | |
|---|---|---|---|---|
| Contacts | | Rated current | | Order code |
| NO | NC | AC15 230 V | 400 V | |
| 1 | 1 | 3 A | 2 A | J73KN-AM-11 |
| 0 | 2 | 3 A | 2 A | J73KN-AM-02 |
| 2 | 2 | 3 A | 2 A | J73KN-AM-22 |
| **Auxiliary contacts for reversing contactors** | | | | |
| 1 | 1 | 3 A | 2 A | J73KN-AM-11V |
| 1 | 1 | 3 A | 2 A | J73KN-AM-11X |
| **Link modules between MPCB & contactors** | | | | |
| For MPCB J7MN-3P/J7MN-3R | | | | J77MN-VKA-3 |
| **Insulated wiring system for J7KNA-09-01-R...(D) and J7KNA-12-01-R...(D)** | | | | |
| Reversing Starter Connector for Mini Reversing Contactors, mechanical interlocked | | | | J74-WKR-A |

## Specifications

| Suffix to contactor type e.g. J7KNA-09-10-24 | Voltage marking at the coil for | | Rated control voltage $U_s$ range for | | | |
|---|---|---|---|---|---|---|
| | 50 Hz | 60 Hz | 50 Hz | | 60 Hz | |
| | V | V | min. V | max. V | min. V | max. V |
| **24** | 24 | 24 | 22 | 24 | 24 | 24 |
| **110** | 110 to 115 | 120 to 125 | 110 | 115 | 120 | 125 |
| **230** | 220 to 230 | 240 | 220 | 230 | 240 | 250 |

| Main contacts | | J7KNA-09-___ | J7KNA-12-___ |
|---|---|---|---|
| Rated insulation voltage $U_i$ | | 690 VAC | 690 VAC |
| Making capacity Ieff | at $U_e$ = 690 VAC | 165 A | 165 A |
| Breaking capacity $I_{eff}$ cosϕ = 0,65 | 400 VAC | 100 A | 100 A |
| | 500 VAC | 90 A | 90 A |
| | 690 VAC | 80 A | 80 A |
| Mechanical life AC operated | | 5 × 106 | 5 × 106 |
| DC operated | | 15 × 106 | 15 × 106 |
| Short time current | 10 s current | 96 A | 120 A |


## Motor contactors from 4–500 kW for normal and heavy-duty switching

This modular system consists of main contactors and additional contact blocks. The basic units can be combined with auxiliary contacts. DC-DC versions, integrated mechanical interlock, are available as well as 3-main-pole and 4-main-pole versions.

- Basic units can be combined with auxiliary contacts (top/side mounting)
- 3-main-pole and 4-main-pole versions are possible
- The power range covers 4 to 500 kW
- Different coil voltages (AC and DC)
- J7KN-10D to J7KN-22D models have integrated auxiliary contact for electronic circuits (3-pole versions)

## Ordering information

| Operation | Poles | AC3 400 V rated motor current | Rating AC2, AC3 | | | Rated current | Auxiliary contact | | Overload relay | Size in mm (H × W × D) | Order code | Coil voltage[*1], replace ___ with: | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 380 V 400 V 415 V kW | 500 V kW | 660 V 690 V kW | AC1 690 V A | NO | NC | | | | VAC | | | | VDC | |
| AC or DC | 3 | 10 A | 4 | 5.5 | 5.5 | 25 | 1 | 0 | J7TKN-B | 67 × 45 × 82.5 | J7KN-10D-10___ | 24 | 110 | 230 | 400 | 24D | 110D |
| | | | 4 | 5.5 | 5.5 | 25 | 0 | 1 | | | J7KN-10D-01___ | 24 | 110 | 230 | 400 | 24D | 110D |
| | | 14 A | 5.5 | 7.5 | 7.5 | 25 | 1 | 0 | | | J7KN-14D-10___ | 24 | 110 | 230 | 400 | 24D | 110D |
| | | | 5.5 | 7.5 | 7.5 | 25 | 0 | 1 | | | J7KN-14D-01___ | 24 | 110 | 230 | 400 | 24D | 110D |
| | | 18 A | 7.5 | 10 | 10 | 32 | 1 | 0 | | | J7KN-18D-10___ | 24 | 110 | 230 | 400 | 24D | 110D |
| | | | 7.5 | 10 | 10 | 32 | 0 | 1 | | | J7KN-18D-01___ | 24 | 110 | 230 | 400 | 24D | 110D |
| | | 22 A | 11 | 10 | 10 | 32 | 1 | 0 | | | J7KN-22D-10___ | 24 | 110 | 230 | 400 | 24D | 110D |
| | | | 11 | 10 | 10 | 32 | 0 | 1 | | | J7KN-22D-01___ | 24 | 110 | 230 | 400 | 24D | 110D |
| | | 24 A | 11 | 15 | 15 | 50 | 0 | 0 | J7TKN-C | 78 × 45 × 104.5 | J7KN-24___ | 24 | 110 | 230 | 400 | 24D | 110D |
| | | 32 A | 15 | 18.5 | 18.5 | 65 | 0 | 0 | | | J7KN-32___ | 24 | 110 | 230 | 400 | 24D | 110D |
| | | 40 A | 18.5 | 18.5 | 18.5 | 80 | 0 | 0 | | | J7KN-40___ | 24 | 110 | 230 | 400 | 24D | 110D |
| | | 50 A | 22 | 30 | 30 | 110 | 0 | 0 | J7TKN-D | 112 × 60 × 113 | J7KN-50___ | 24 | 110 | 230 | 400 | 24D | 110D |
| | | 62 A | 30 | 37 | 37 | 120 | 0 | 0 | | | J7KN-62___ | 24 | 110 | 230 | 400 | 24D | 110D |
| | | 74 A | 37 | 45 | 45 | 130 | 0 | 0 | | | J7KN-74___ | 24 | 110 | 230 | 400 | 24D | 110D |
| AC and DC[*2] | | 90 A | 45 | 55 | 55 | 160 | 0 | 0 | J7TKN-E | 155 × 90 × 136 | J7KN-90___[*2] | 24 | 110 | 230 | 400 | 24 | 110 |
| | | 115 A | 55 | 75 | 55 | 200 | 0 | 0 | | | J7KN-115___[*2] | 24 | 110 | 230 | 400 | 24 | 110 |
| | | 150 A | 75 | 75 | 75 | 230 | 0 | 0 | J7TKN-F | 290 × 110 × 162 | J7KN-151___[*2] | 24 | 110 | 230 | 400 | 24 | 110 |
| | | 175 A | 90 | 90 | 90 | 250 | 0 | 0 | | | J7KN-176___[*2] | 24 | 110 | 230 | 400 | 24 | 110 |
| | | 210 A | 110 | 160 | 160 | 350 | 0 | 0 | J7TKN-G | 200 × 145 × 208 | J7KN-210___[*2] | 24 | 110 | 230 | 400 | 24 | 110 |
| | | 260 A | 132 | 210 | 210 | 450 | 0 | 0 | | | J7KN-260___[*2] | 24 | 110 | 230 | 400 | 24 | 110 |
| | | 315 A | 160 | 250 | 250 | 500 | 0 | 0 | | | J7KN-316___[*2] | 24 | 110 | 230 | 400 | 24 | 110 |
| | | 450 A | 250 | 375 | 375 | 600 | 2 | 2 | J7TKN-H | 258 × 220 × 225 | J7KN-450-22___[*2] | 24 | 110 | 230 | 400 | 24 | 110 |
| | | 550 A | 300 | 475 | 475 | 760 | 2 | 2 | | | J7KN-550-22___[*2] | 24 | 110 | 230 | 400 | 24 | 110 |
| | | 700 A | 400 | 630 | 630 | 1000 | 2 | 2 | | 310 × 280 × 291 | J7KN-700-22___[*2] | 24 | 110 | 230 | 400 | 24 | 110 |
| | | 860 A | 500 | 700 | 700 | 1100 | 2 | 2 | | 361 × 280 × 291 | J7KN-860-22___[*2] | 24 | 110 | 230 | 400 | 24 | 110 |
| DC operated solenoid motor contactor | | 10 A | 4 | 5.5 | 5.5 | 25 | 1 | 0 | J7TKN-B | 67 × 45 × 82.5 | J7KNG-10-10___ | – | – | – | – | 24D | 110D |
| | | | 4 | 5.5 | 5.5 | 25 | 0 | 1 | | | J7KNG-10-01___ | – | – | – | – | 24D | 110D |
| | | 14 A | 5.5 | 7.5 | 7.5 | 25 | 1 | 0 | | | J7KNG-14-10___ | – | – | – | – | 24D | 110D |
| | | | 5.5 | 7.5 | 7.5 | 25 | 0 | 1 | | | J7KNG-14-01___ | – | – | – | – | 24D | 110D |
| | | 18 A | 7.5 | 10 | 10 | 32 | 1 | 0 | | | J7KNG-18-10___ | – | – | – | – | 24D | 110D |
| | | | 7.5 | 10 | 10 | 32 | 0 | 1 | | | J7KNG-18-01___ | – | – | – | – | 24D | 110D |
| | | 22 A | 11 | 10 | 10 | 32 | 1 | 0 | | | J7KNG-22-10___ | – | – | – | – | 24D | 110D |
| | | | 11 | 10 | 10 | 32 | 0 | 1 | | | J7KNG-22-01___ | – | – | – | – | 24D | 110D |
| | | 24 A | 11 | 15 | 15 | 50 | 0 | 0 | J7TKN-B J7TKN-C | 78 × 45 × 104.5 | J7KNG-24___ | – | – | – | – | 24D | 110D |
| | | 32 A | 15 | 18.5 | 18.5 | 65 | 0 | 0 | | | J7KNG-32___ | – | – | – | – | 24D | 110D |
| | | 40 A | 18.5 | 18.5 | 18.5 | 80 | 0 | 0 | | | J7KNG-40___ | – | – | – | – | 24D | 110D |

[*1] Other coil voltages available on request
[*2] Universal current (AC and DC)

| Operation | Poles | AC3 400 V rated motor current | Rating AC2, AC3 | | Rated current | Auxiliary contact | | Overload relay | Size in mm (H × W × D) | Order code | Coil voltage *1, replace ___ with: | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 380 V 400 V 415 V kW | AC1 400 V kW | AC1 690 V A | NO | NC | | | | VAC | | | | VDC | |
| AC | 4 | 10 A | 4 | 17.5 | 25 | 0 | 0 | – | 67 × 45 × 82.5 | J7KN-10D-4___ | 24 | 110 | 230 | 400 | – | |
| | | 14 A | 5.5 | 17.5 | 25 | 0 | 0 | | | J7KN-14D-4___ | 24 | 110 | 230 | 400 | | |
| | | 18 A | 7.5 | 22 | 32 | 0 | 0 | | | J7KN-18D-4___ | 24 | 110 | 230 | 400 | | |
| | | 22 A | 11 | 22 | 32 | 0 | 0 | | | J7KN-22D-4___ | 24 | 110 | 230 | 400 | | |
| DC solenoid motor contactor | | 10 A | 4 | 17.5 | 25 | 0 | 0 | | 67 × 45 × 82.5 | J7KNG-10-4___ | – | | | | 24D | 110D |
| | | 14 A | 5.5 | 17.5 | 25 | 0 | 0 | | | J7KNG-14-4___ | | | | | 24D | 110D |
| | | 18 A | 7.5 | 22 | 32 | 0 | 0 | | | J7KNG-18-4___ | | | | | 24D | 110D |
| | | 22 A | 11 | 22 | 32 | 0 | 0 | | | J7KNG-22-4___ | | | | | 24D | 110D |
| AC and DC*2 | | 150 A | 75 | 159 | 230 | 0 | 0 | | 170 × 110 × 162 | J7KN-151-4___ *2 | 24 | 110 | 230 | 400 | 24 | 110 |
| | | 175 A | 90 | 173 | 250 | 0 | 0 | | | J7KN-176-4___ *2 | 24 | 110 | 230 | 400 | 24 | 110 |

*1 Other coil voltages available on request
*2 Universal current (AC and DC)

## Accessories

| Auxiliary contact blocks | Rated operational current | | | Contacts | | Order code |
|---|---|---|---|---|---|---|
| Suitable for: | AC15 230 V A | AC15 400 V A | AC1 690 V A | NO | NC | |
| J7KN-10D… to -74… | 3 | 2 | 10 | 1 | – | J73KN-B-10 |
| | 3 | 2 | 10 | – | 1 | J73KN-B-01 |
| | 3 | 2 | 10 | 1 | – | J73KN-B-10U |
| | 3 | 2 | 10 | – | 1 | J73KN-B-01U |
| | 6 | 4 | 25 | 1 | – | J73KN-B-10A |
| | 6 | 4 | 25 | – | 1 | J73KN-B-01A |
| J7KN-24… to -115… | 3 | 3 | 10 | 1 | 1 | J73KN-C-11S |
| J7KN-151… to -316… | 3 | 2 | 10 | 1 | 1 | J73KN-D-11F |
| | 3 | 2 | 10 | 2 | 2 | J73KN-D-22F |
| | 3 | 2 | 10 | 1 | 1 | J73KN-D-11S |
| J7KN-450… to -860… | 3 | 2 | 10 | 2 | 2 | J73KN-E-22F |

| Pneumatic timers | Function | | Time range | Contacts | | Order code |
|---|---|---|---|---|---|---|
| Suitable for: | | | | | | |
| J7KN-10D… to -74… | 3 | 2 | 10 | 1 | – | J73KN-B-10 |
| | 3 | 2 | 10 | – | 1 | J73KN-B-01 |
| | 3 | 2 | 10 | 1 | – | J73KN-B-10U |
| | 3 | 2 | 10 | – | 1 | J73KN-B-01U |
| | 6 | 4 | 25 | 1 | – | J73KN-B-10A |
| | 6 | 4 | 25 | – | 1 | J73KN-B-01A |
| J7KN-24… to -115… | 3 | 3 | 10 | 1 | 1 | J73KN-C-11S |
| J7KN-151… to -316… | 3 | 2 | 10 | 1 | 1 | J73KN-D-11F |
| | 3 | 2 | 10 | 2 | 2 | J73KN-D-22F |
| | 3 | 2 | 10 | 1 | 1 | J73KN-D-11S |
| J7KN-450… to -860… | 3 | 2 | 10 | 2 | 2 | J73KN-E-22F |

| Mechanical interlocks | Interlocks contactor with contactor | Order code |
|---|---|---|
| Mounting | Order code + Order code | |
| Horizontal | J7KN(G)-10D to -40 + J7KN(G)-10D to -40 | J74KN-B-ML |
| | J7KN-24 to -74 + J7KN-24 to -74 | J74KN-C-ML |
| | J7KN-90 to -115 + J7KN-90 to -115 | J74KN-D2-ML |
| | J7KN-151 to -316 + J7KN-151 to -316 | J74KN-E-ML |

| Suppressor units | Type | | Applicable coil voltage | Order code |
|---|---|---|---|---|
| Suitable for contactors | | | | |
| J7KNA(-AR) | AC/DC | RC-unit snap-on contactor | 12 to 48 V | J74KN-D-RC24 |
| | AC/DC | | 48 to 127 V | J74KN-D-RC110 |
| | AC/DC | | 110 to 250 V | J74KN-D-RC230 |
| J7KN-10D to -74 | AC/DC | RC-unit snap-on contactor | 12 to 48 V | J74KN-C2-RC24 |
| | AC/DC | | 48 to 127 V | J74KN-C2-RC110 |
| | AC/DC | | 110 to 230 V | J74KN-C2-RC230 |
| | AC/DC | | 230 to 415 V | J74KN-C2-RC400 |

| Additional terminals single pole | Cable cross-sections to clamp (mm²) | | | Order code |
|---|---|---|---|---|
| Suitable for contactors | Solid or stranded | Flexible | Flexible with multi-core cable end | |
| J7KN-50 to -74 | 4 to 35 | 6 to 25 | 4 to 25 | J74KN-LG-9030 |
| J7KN-151 to -176 | 16 to 120 | – | 16 to 95 | J74KN-LG-11224 |

| Terminal covers | Specification | Order code |
|---|---|---|
| Suitable for contactors | | |
| J7KN-151 to -176 | One unit for 3 terminals, 2 units for one contactor | J74KN-LG-10404 |
| J7KN-210 to -316 | | J74KN-LG-11457 |

| Marking systems | Specification | Order code |
|---|---|---|
| Description | | |
| Marking plate | 2-section without marking, divisible | J74KN-P487-1 |
| Marking plate | 4-section without marking, divisible | J74KN-P245-1 |

| Insulated wiring systems | Suitable for contactors | Max. current (A) | Order code |
|---|---|---|---|
| Function | | | |
| For reversing contactors (2 parts) | J7KN-10D to -22D | 22 | J74-WKR-B2 |
| | J7KN-24 to -40 | 40 | J74-WKR-C |
| For star-delta combination (4 parts) | J7KN-10D to -22D | 22 | J74-WKSD-B2 |
| | J7KN-24 to -40 | 40 | J74-WKSD-C |

## Specifications

| Coil voltages | Suffix to contactor type: | | | | | | |
|---|---|---|---|---|---|---|---|
| Contactor type | 24 | 48 | 110 | 180 | 230 | 400 | 500 |
| J7KN-10D to J7KN-74 | yes | yes | yes | yes | yes | yes | yes |
| J7KN-90 to J7KN-860 | yes | yes | yes | – | yes | yes | – |


## Thermal overload relays for J7KN(A) contactors

J7TKN relays protect motors against thermal overload. They can be mounted on the contactor or separately. The relays comply with IEC 60947 (single-phase sensitivity).

- Series of overload relays covering a setting range from 0.12 A to 800 A (D.O.L.)
- Manual and/or auto reset models available

## Ordering information

| Applicable contactors | Setting range | | Size in mm (H × W × D) (incl. standard J7KN[A] contactor) | Order code |
|---|---|---|---|---|
| | D.O.L. (A) | Star-delta (A) | | |
| J7KNA-09…, J7KNA-12… | 0.12 to 0.18 | – | 95 × 48.5 × 77 | J7TKN-A-E18 |
| | 0.18 to 0.27 | – | | J7TKN-A-E27 |
| | 0.27 to 0.4 | – | | J7TKN-A-E4 |
| | 0.4 to 0.6 | – | | J7TKN-A-E6 |
| | 0.6 to 0.9 | – | | J7TKN-A-E9 |
| | 0.8 to 1.2 | – | | J7TKN-A-1E2 |
| | 1.2 to 1.8 | – | | J7TKN-A-1E8 |
| | 1.8 to 2.7 | – | | J7TKN-A-2E7 |
| | 2.7 to 4 | – | | J7TKN-A-4 |
| | 4 to 6 | 7 to 10.5 | | J7TKN-A-6 |
| | 6 to 9 | 10.5 to 15.5 | | J7TKN-A-9 |
| | 8 to 11 | 14 to 19 | | J7TKN-A-11 |
| | 10 to 14 | 18 to 24 | | J7TKN-A-14 |
| J7KN-10D… to J7KN-40… | 0.12 to 0.18 | – | 126.5 × 45 × 70 (J7KN-10D to J7KN-22D); 141.5 × 45 × 87.5 (J7KN-24 to J7KN-40) | J7TKN-B-E18 |
| | 0.18 to 0.27 | – | | J7TKN-B-E27 |
| | 0.27 to 0.4 | – | | J7TKN-B-E4 |
| | 0.4 to 0.6 | – | | J7TKN-B-E6 |
| | 0.6 to 0.9 | – | | J7TKN-B-E9 |
| | 0.8 to 1.2 | – | | J7TKN-B-1E2 |
| | 1.2 to 1.8 | – | | J7TKN-B-1E8 |
| | 1.8 to 2.7 | – | | J7TKN-B-2E7 |
| | 2.7 to 4 | – | | J7TKN-B-4 |
| | 4 to 6 | 7 to 10.5 | | J7TKN-B-6 |
| | 6 to 9 | 10.5 to 15.5 | | J7TKN-B-9 |
| | 8 to 11 | 14 to 19 | | J7TKN-B-11 |
| | 10 to 14 | 18 to 24 | | J7TKN-B-14 |
| | 13 to 18 | 23 to 31 | | J7TKN-B-18 |
| | 17 to 24 | 30 to 41 | | J7TKN-B-24 |
| | 23 to 32 | 40 to 55 | | J7TKN-B-32 |
| J7KN-24… to J7KN-40… | 28 to 42 | 48 to 73 | 136 × 67 × 96.5 | J7TKN-C-42 |
| J7KN-50… to J7KN-74… | 40 to 52 | 70 to 90 | 180 × 69 × 108 | J7TKN-D-52 |
| | 52 to 65 | 90 to 112 | | J7TKN-D-65 |
| | 60 to 74 | 104 to 128 | | J7TKN-D-74 |
| J7KN-90… to J7KN-115… | 60 to 90 | 104 to 156 | 260 × 107 × 120 | J7TKN-E-90 |
| | 80 to 120 | 140 to 207 | | J7TKN-E-120 |
| J7KN-151… to J7KN-176… | 120 to 180 | 208 to 312 | 290 × 110 × 162 | J7TKN-F-180 |
| J7KN-210… to J7KN-316… | 144 to 216 | 250 to 374 | 362 × 145 × 208 | J7TKN-G-216 |
| | 216 to 320 | 374 to 554 | | J7TKN-G-320 |
| J7KN-450… to J7KN-860… | 240 to 360 | 416 to 623 | 372 × 1246 × 1225 (J7KN-450) 395 × 1246 × 1225 (J7KN-550) 487 × 1280 × 1291 (J7KN-700) 540 × 1280 × 1291 (J7KN-860) | J7TKN-H-360 |
| | 360 to 540 | 623 to 935 | | J7TKN-H-540 |
| | 540 to 800 | 935 to 1385 | | J7TKN-H-800 |

## Accessories

### Sets for single mounting

| For overload relays | Cable cross-section to clamp ($mm^2$) | | | Order code |
|---|---|---|---|---|
| | Solid or stranded | Flexible | Flexible with multi-core cable | |
| J7TKN-AB | 0.75 to 6 | 0.75 to 4 | 0.5 to 4 | J74TK-M-AB |
| J7TKN-B | 0.75 to 6 | 0.75 to 4 | 0.5 to 4 | J74TK-SM |

### Busbar sets for thermal overload relays

| For overload relays | For motor contactors | Order code |
|---|---|---|
| J7TKN-H-360/540 | J7KN-450/550 | J74TK-SU-550 |
| J7TKN-H-540/800 | J7KN-700/860 | J74TK-SU-860 |

## Specifications

| Type | | J7TKN-A | J7TKN-B | J7TKN-C | J7TKN-D | J7TKN-E | J7TKN-F | J7TKN-G | J7TKN-H |
|---|---|---|---|---|---|---|---|---|---|
| Rated insulation voltage $U_i$ | | 690 VAC | | | | 750 VAC | 1000 VAC | | |
| Permissible ambient temperature | Operation | –25 to 60°C | | | | | | | –25 to 55°C |
| | Storage | –50 to 70°C | | | | | | | –40 to 70°C |
| Trip class according to IEC 947-4-1 | | 10 A | | | | 20 A | 10 A | | |
| Cable cross-section Main connector | Solid or stranded $mm^2$ | 0.75 to 6<br>0.75 to 2.5 | 0.75 to 6 | 0.75 to 10 | 4 to 35 | Without terminals, suitable for bushing one connector 70 $mm^2$ (stranded) per phase | Busbar 18×4 Screw M8 | Busbar 25×6 Screw M10 | See accessories |
| | Flexible $mm^2$ | 0.75 to 4<br>0.5 to 2.5 | 1 to 4 | 0.75 to 6 | 6 to 25 | | | | |
| | Flexible with multi-core cable end $mm^2$ | 0.5 to 2.5<br>0.5 to 1.5 | 0.75 to 4 | 0.75 to 6 | 4 to 25 | | | | |
| Cables per clamp | Number | 1 + 1 | 2 | 2 | 1 | – | 1 | 1 | 1 |
| Auxiliary connector | Solid $mm^2$ | 0.75 to 2.5 | | | | | | | 1 to 2.5 |
| | Flexible $mm^2$ | 0.5 to 2.5 | | | | | | | 1 to 2.5 |
| | Flexible with multi-core cable end $mm^2$ | 0.5 to 1.5 | | | | | | | 1 to 2.5 |
| Cables per clamp | Number | 2 | | | | | | | |
| **Auxiliary contacts** | | | | | | | | | |
| Rated insulation voltage $U_i$ | same potential | 690 VAC | | | | | | | 500 VAC |
| | different potential | 440 VAC | | 250 VAC | | 440 VAC | | | 500 VAC |
| Rated operational current $I_e$ Utilization category AC15 | 24 V | 5 A | 3 A | 4 A | | 5 A | 3 A | | 4 A |
| | 230 V | 3 A | 2 A | 2.5 A | 2.5 A | 3 A | 2 A | | 2.5 A |
| | 400 V | 2 A | 1 A | 1.5 A | 1.5 A | 2 A | 1 A | | 1.5 A |
| | 690 V | 0.6 A | 0.5 A | 0.6 A | | | 0.5 A | | 0.6 A |
| Rated operational current $I_e$ Utilization category DC13 | 24 V | 1.2 A | 1 A | 1.2 A | | | | | |
| | 110 V | 0.15 A | | | | | | | |
| | 220 V | 0.1 A | | | | | | | |
| Short circuit protection (without welding 1 kA) | Highest fuse rating gL (gG) | 6 A | 4 A | 6 A | | | 4 A | | 6 A |
| Setting range | | to 23 A | All | 28 to 42 A | 52 to 65 A | All | – | – | – |
| Power loss per current path (max.) | Minimum setting value | 1.1 W | 1.1 W | 1.3 W | 2.9 W | 1.1 W | – | – | – |
| | Maximum setting value | 2.3 W | 2.3 W | 3.3 W | 4.5 W | 2.5 W | – | – | – |

## J7MN motor protection circuit breakers from 0.10 A to 100 A

J7MN starters protect motors against thermal overload and short circuit. The J7MN can be equipped with additional auxiliary contacts, tripping indicator (alarm), undervoltage release and/or shunt release. All models can be locked for safe maintenance.

- Rated operational currents of 32 A for the rocker type
- Rated operational currents of 32 A, 63 A and 100 A for the rotary types
- Switching capacity is 100 kA/415 V up-to 13 A and 50 kA/415 V up-to 100 A
- Electrical/mechanical link modules available up-to 11 kW motor protection units
- All components are finger proof

## Ordering information

| Rated current in A | Suitable for motors 3 ~ 400 V kW | Current setting range | | Short-circuit breaking capacity at 3 ~ 400 V kA | Size in mm (H × W × D) | Order code |
|---|---|---|---|---|---|---|
| | | Thermal overload release A | Instantaneous short-circuit release A | | | |
| 0.16 | – | 0.10– 0.16 | 2.1 | 100 | 98 × 45 × 75 | J7MN-3P-E16 |
| 0.25 | 0.06 | 0.16–0.25 | 3.3 | 100 | | J7MN-3P-E25 |
| 0.4 | 0.09 | 0.25–0.4 | 5.2 | 100 | | J7MN-3P-E4 |
| 0.63 | 0.18 | 0.4–0.63 | 8.2 | 100 | | J7MN-3P-E63 |
| 1 | 0.25 | 0.63–1 | 13 | 100 | | J7MN-3P-1 |
| 1.6 | 0.55 | 1–1.6 | 20.8 | 100 | | J7MN-3P-1E6 |
| 2.5 | 0.75 | 1.6–2.5 | 32.5 | 100 | | J7MN-3P-2E5 |
| 4 | 1.5 | 2.5–4 | 52 | 100 | | J7MN-3P-4 |
| 6 | 2.2 | 4–6 | 78 | 100 | | J7MN-3P-6 |
| 8 | 3 | 5–8 | 104 | 100 | | J7MN-3P-8 |
| 10 | 4 | 6–10 | 130 | 50 | | J7MN-3P-10 |
| 13 | 5.5 | 9–13 | 169 | 50 | | J7MN-3P-13 |
| 17 | 7.5 | 11–17 | 221 | 20 | | J7MN-3P-17 |
| 22 | 7.5 | 14–22 | 286 | 15 | | J7MN-3P-22 |
| 26 | 11 | 18–26 | 338 | 15 | | J7MN-3P-26 |
| 32 | 15 | 22–32 | 416 | 15 | | J7MN-3P-32 |
| 0.16 | – | 0.10–0.16 | 2.1 | 100 | 98 × 45 × 100 | J7MN-3R-E16 |
| 0.25 | 0.06 | 0.16–0.25 | 3.3 | 100 | | J7MN-3R-E25 |
| 0.4 | 0.09 | 0.25–0.4 | 5.2 | 100 | | J7MN-3R-E4 |
| 0.63 | 0.18 | 0.4–0.63 | 8.2 | 100 | | J7MN-3R-E63 |
| 1 | 0.25 | 0.63–1 | 13 | 100 | | J7MN-3R-1 |
| 1.6 | 0.55 | 1–1.6 | 20.8 | 100 | | J7MN-3R-1E6 |
| 2.5 | 0.75 | 1.6–2.5 | 32.5 | 100 | | J7MN-3R-2E5 |
| 4 | 1.5 | 2.5–4 | 52 | 100 | | J7MN-3R-4 |
| 6 | 2.2 | 4–6 | 78 | 100 | | J7MN-3R-6 |
| 8 | 3 | 5–8 | 104 | 100 | | J7MN-3R-8 |
| 10 | 4 | 6–10 | 130 | 100 | | J7MN-3R-10 |
| 13 | 5.5 | 9–13 | 169 | 100 | | J7MN-3R-13 |
| 17 | 7.5 | 11–17 | 221 | 50 | | J7MN-3R-17 |
| 22 | 7.5 | 14–22 | 286 | 50 | | J7MN-3R-22 |
| 26 | 11 | 18–26 | 338 | 50 | | J7MN-3R-26 |
| 32 | 15 | 22–32 | 416 | 50 | | J7MN-3R-32 |
| 26 | 12.5 | 18–26 | 338 | 50 | 140 × 55 × 144 | J7MN-6R-26 |
| 32 | 15 | 22–32 | 416 | 50 | | J7MN-6R-32 |
| 40 | 18.5 | 28–40 | 520 | 50 | | J7MN-6R-40 |
| 50 | 22 | 34–50 | 650 | 50 | | J7MN-6R-50 |
| 63 | 30 | 45–63 | 819 | 50 | | J7MN-6R-63 |
| 63 | 30 | 45–63 | 819 | 50 | 165 × 70 × 171 | J7MN-9R-63 |
| 75 | 37 | 55–75 | 975 | 50 | | J7MN-9R-75 |
| 90 | 45 | 70–90 | 1170 | 50 | | J7MN-9R-90 |
| 100 | – | 80–100 | 1300 | 50 | | J7MN-9R-100 |

## Accessories

| Description | Version | | For circuit breaker | Order code |
|---|---|---|---|---|
| **Transverse auxiliary contact block** | | | | |
| Contact block | 1 NO + 1 NC | | All | J7MN-11F |
| | 2NO | | | J7MN-20F |
| | 2NC | | | J7MN-02F |
| **Auxiliary contact block for left hand side mounting (max. 2 pc. per circuit breaker)** | | | | |
| Contact block (9 mm) | 1 NO + 1 NC | | All | J7MN-11S |
| | 2NO | | | J7MN-20S |
| | 2NC | | | J7MN-02S |
| **Signalling switch for left hand side mounting (max. 1 pc. per circuit breaker)** | | | | |
| Signalling switch (18 mm) | 1 NO + 1 NC any tripping condition | | J7MN-3P/-3R | J7MN-TA-11S |
| | | | J7MN-6R/-9R | J7MN-TB-11S |
| | 1 NO + 1 NC short circuit tripping condition | | All | J7MN-T-11S |
| **Undervoltage releases for right hand side mounting (max 1 pc. per circuit breaker)** | | | | |
| | **AC 50 Hz** | **AC 60 Hz** | | |
| Trips the circuit breaker when the voltage is interrupted. Prevents the motor from being restarted accidentally when the voltage is restored, suitable for EMERGENCY STOP according to VDE 0113 | 24 V | 28 V | All | J7MN-U-24 |
| | 110–127 V | 120 V | | J7MN-U-110 |
| | 220–230 V | 240–260 V | | J7MN-U-230 |
| | 240 V | 277 V | | J7MN-U-240 |
| | 380–400 V | 440–460 V | | J7MN-U-400 |
| | 415–440 V | 460–480 V | | J7MN-U-415 |
| **Shunt releases for right hand side mounting (max 1 pc. per circuit breaker)** | | | | |
| | **AC 50 Hz** | **AC 60 Hz** | | |
| Trips the circuit breaker when the release coil is energized | 24 V | 28 V | All | J7MN-S-24 |
| | 110–127 V | 120 V | | J7MN-S-110 |
| | 220–230 V | 240–260 V | | J7MN-S-230 |
| | 240 V | 277 V | | J7MN-S-240 |
| | 380–400 V | 440–460 V | | J7MN-S-400 |
| | 415–440 V | 460–480 V | | J7MN-S-415 |
| **Terminal block** | | | | |
| Terminal block | Up to 600 V according to UL 489 not for transverse auxiliary contact block | | J7MN-3R | J7MN-TB32 |
| | | | J7MN-9R | J7MN-TB100 |

## Insulated 3-Phase Busbar System IP20

| Description | Connection type | Version | For Units (MPCB) | Order code |
|---|---|---|---|---|
| 3-phase busbars;<br>modular spacing = 45 mm | Spade | for 2 units | J7MN-3P; J7MN-3R | J7MN-CPM-3-45-2S |
| | | for 3 units | | J7MN-CPM-3-45-3S |
| | | for 4 units | | J7MN-CPM-3-45-4S |
| | | for 5 units | | J7MN-CPM-3-45-5S |
| Line side terminal 3-pole,<br>connection from above;<br>conductor cross-section solid or stranded 6–25 $mm^2$<br>with end sleeve 4–16 $mm^2$ | Spade | acc. IEC/EN 60947-1, 60947-2, 60947-4-1 and VDE 0660 | J7MN-3P; J7MN-3R | J7MN-BTC-63-SE |
| Line side terminal 3-pole,<br>connection from above;<br>conductor cross-section solid or stranded 6–25 $mm^2$<br>with end sleeve 4–16 $mm^2$ | Spade | up to 600 V acc. UL 489 | J7MN-3P; J7MN-3R | J7MN-BTC-63-SEV |
| Shrouds for unused terminals on busbar system | Spade | | J7MN-3P; J7MN-3R | J7MN-TA-63S |

## Specifications

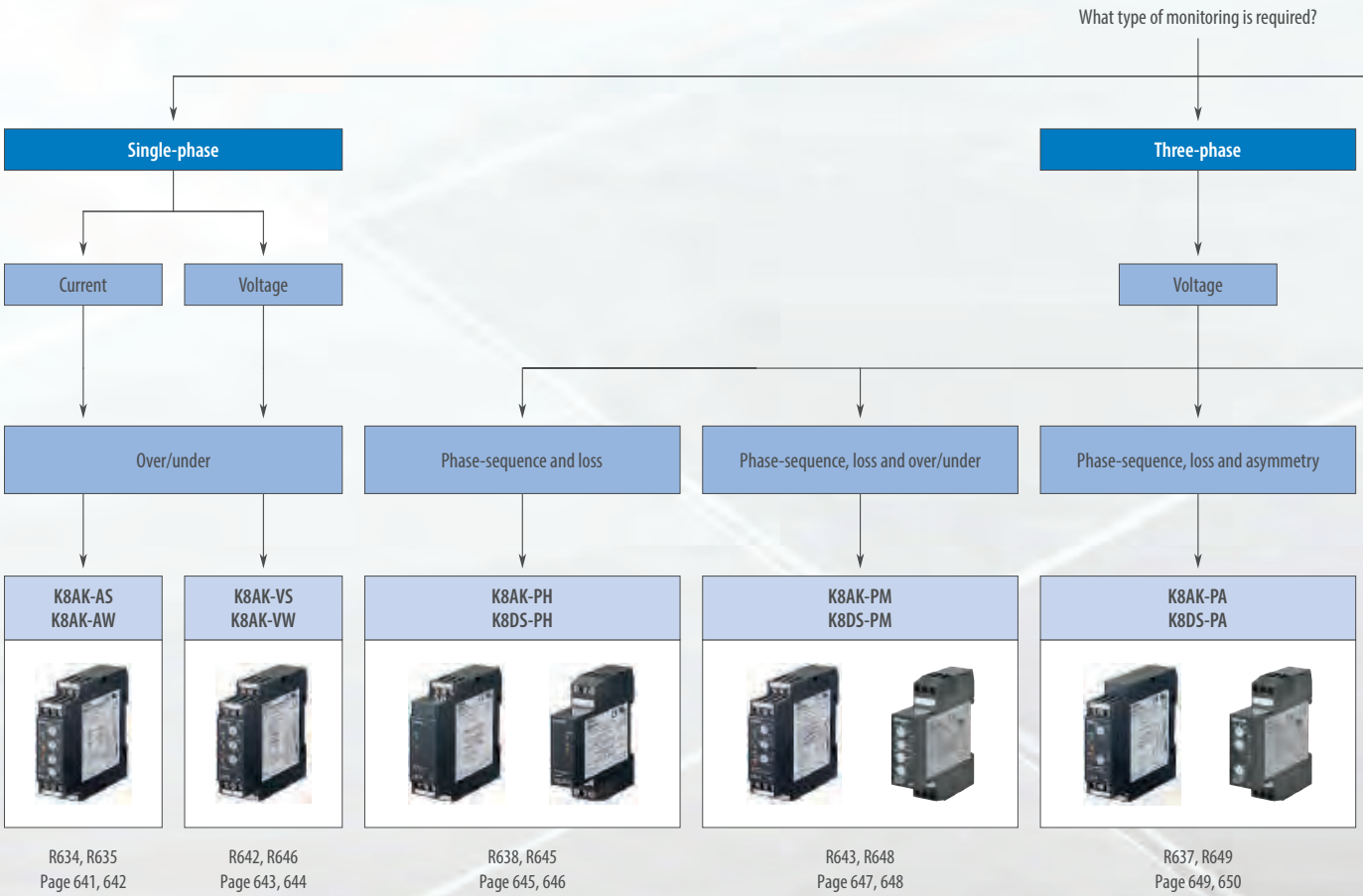
| Type | | J7MN-3P | J7MN-3R | J7MN-6R | J7MN-9R |
|---|---|---|---|---|---|
| Number of poles | | 3 | 3 | 3 | 3 |
| Max. rated current Inmax (= max. rated operational current $I_e$) | A | 32 | 32 | 63 | 100 |
| Permissible ambient temperature | Storage/transport | –50 to 80°C | | | |
| | Operation | –20 to 60°C | | | |
| Rated operational voltage $U_e$ | V | 690 | | | |
| Rated frequency | Hz | 50/60 | | | |
| Rated insulation voltage $U_i$ | V | 690 | | | |
| Rated impulse withstand voltage $U_{imp}$ | kV | 6 | | | |
| Utilization category | IEC 60 947-2 (circuit breaker) | A | | | |
| | IEC 60 947-4-1 (motor starter) | AC-3 | | | |
| Class | According to IEC 60 947-4-1 | 10 | | | |
| Degree of protection | According to IEC 60 529 | IP20 | IP20 | IP20 | IP20 |
| Phase failure sensitivity | According to IEC 60 947-4-1 | Yes | | | |
| Explosion protection | According to EC Directive 94191EC | Yes | | | |
| Isolator characteristics | According to IEC 60 947-3 | Yes | | | |
| Main and EM. STOP switch characteristics | According to IEC 60 204-1 (VDE113) | Yes | | | |
| Safe isolation between main and auxiliary circuits According to DIN VDE 0106 Part 101 | Up to 400 V + 10% | Yes | | | |
| | Up to 415 V + 5% | Yes | | | |
| Mechanical endurance | Operating cycles | 100,000 | 100,000 | 50,000 | 50,000 |
| Electrical endurance | | 100,000 | 100,000 | 25,000 | 25,000 |
| Max. operating frequency per hour (motor starts) | 1/h | 25 | 25 | 25 | 25 |

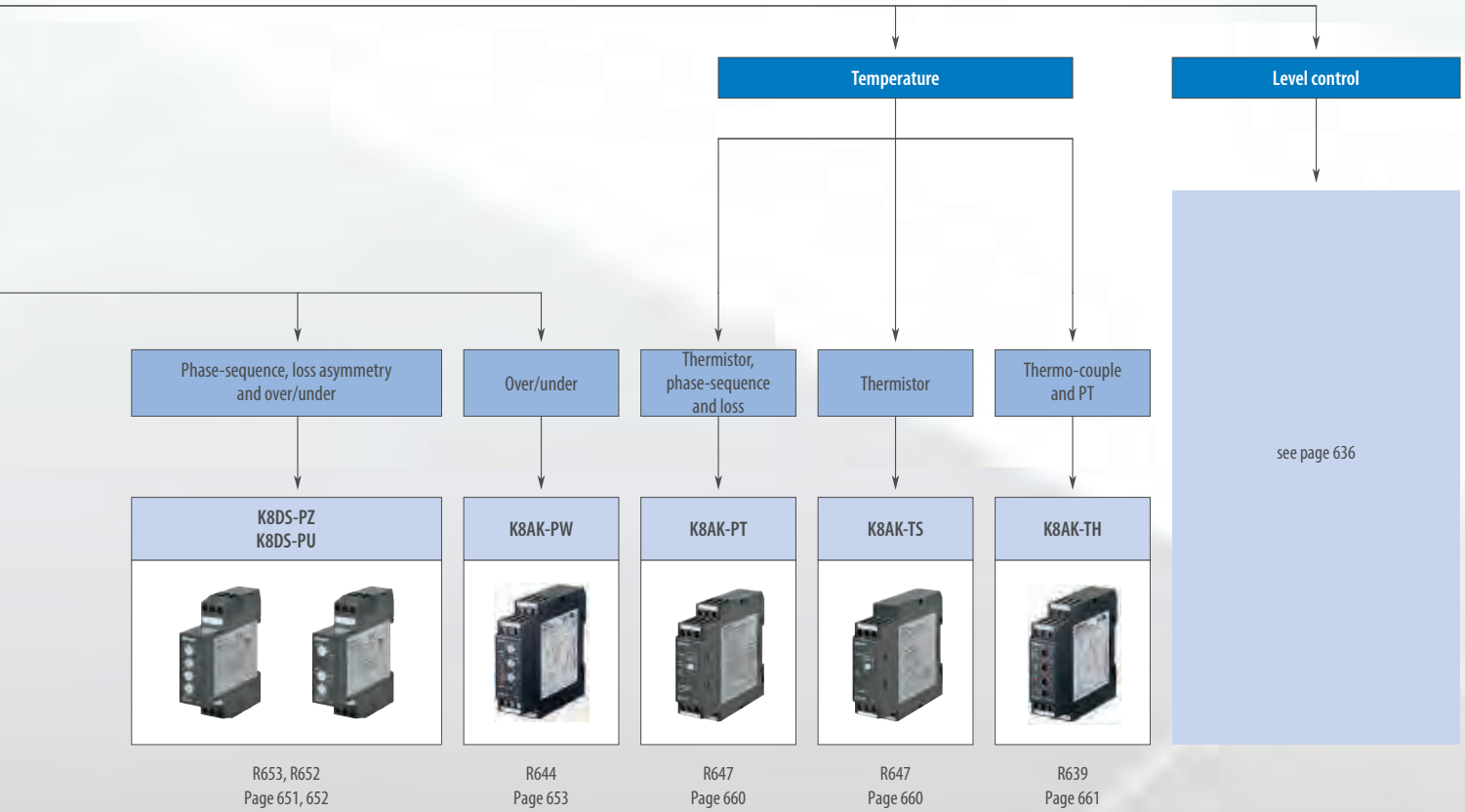
# THE COMPLETE MONITORING RANGE

## K8 series – The smart way to protect your system

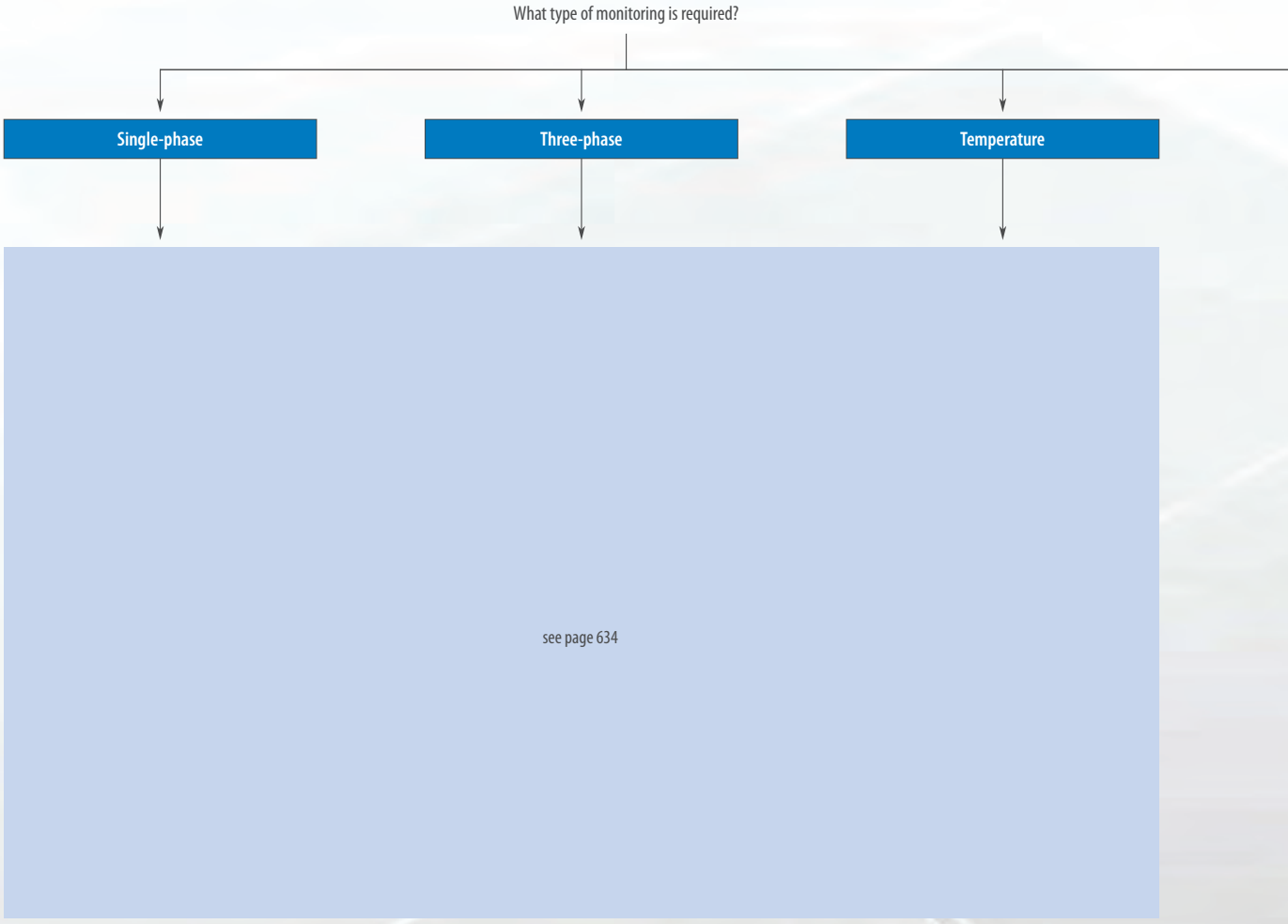
The K8 series offers you a flexible and complete one-stop shopping solution!
This monitoring range can be split into models for single-phase current and single-phase voltage, three-phase voltage, conductive level and a temperature alarm unit.

- 1-phase: full-span of range setting, all models with timer function
- 3-phase: wide range of global voltage settings
- Temperature monitoring relay: wide temperature range with precision increased
- Easy-to-set parameters

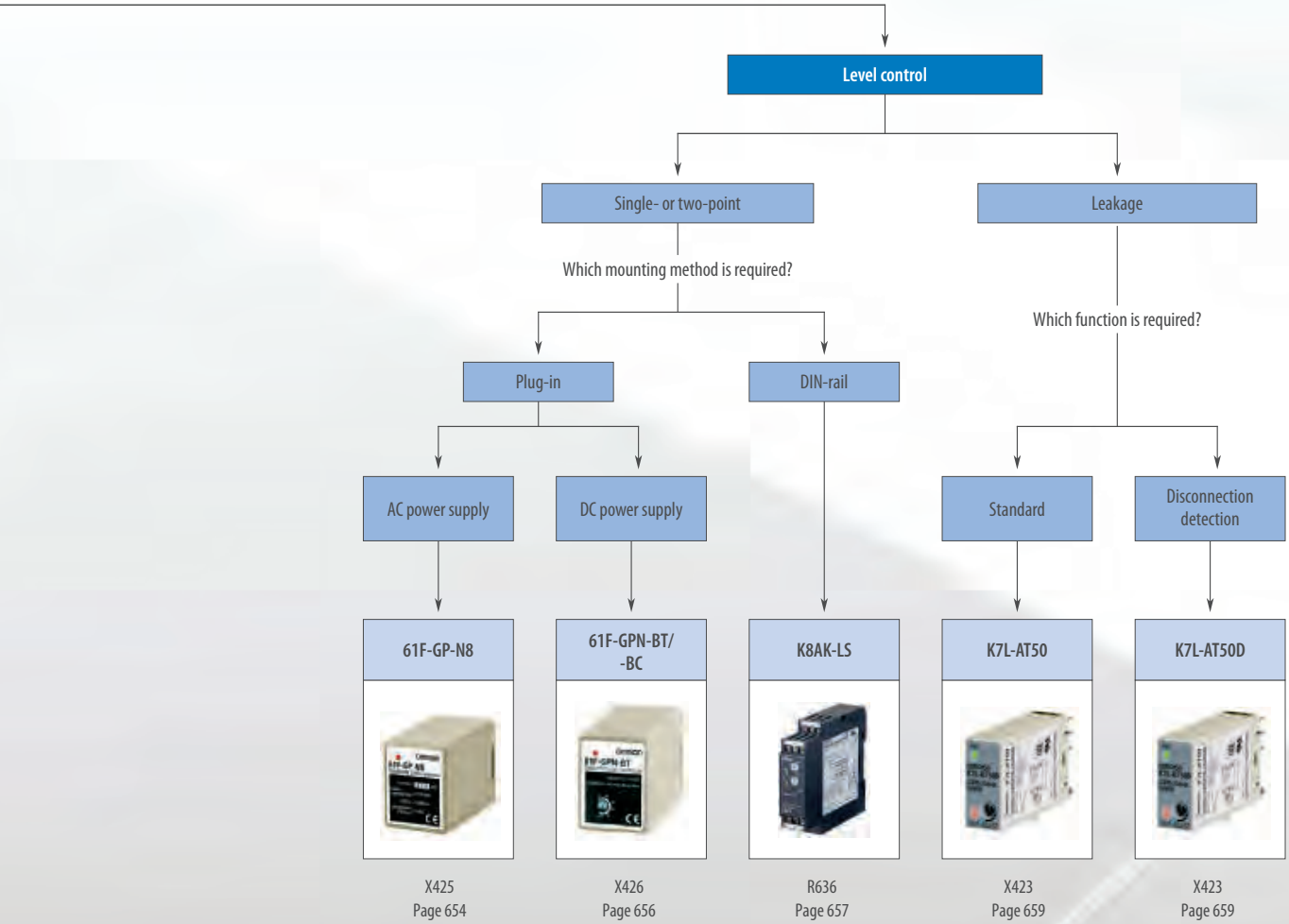



Temperature
Level control
Phase-sequence, loss asymmetry and over/under
Over/under
Thermistor, phase-sequence and loss
Thermistor
Thermo-couple and PT
see page 636
K8DS-PZ
K8DS-PU
K8AK-PW
K8AK-PT
K8AK-TS
K8AK-TH
R653, R652
Page 651, 652
R644
Page 653
R647
Page 660
R647
Page 660
R639
Page 661

# Monitoring products




OMRON
61F-GP-N8
FLOATLESS LEVEL SWITCH
SOURCE : 230 VAC
FREQ. : 50/60Hz
SECONDARY VOLTAGE : 8 VAC
OMRON
K8AK
LS


Level control
Single- or two-point
Leakage
Which mounting method is required?
Which function is required?
Plug-in
DIN-rail
AC power supply
DC power supply
Standard
Disconnection detection
61F-GP-N8
61F-GPN-BT/ -BC
K8AK-LS
K7L-AT50
K7L-AT50D
X425 Page 654
X426 Page 656
R636 Page 657
X423 Page 659
X423 Page 659

# Selection table

| Category | | 1-phase current | | 1-phase voltage | | 3-phase voltage phase-sequence/phase-loss | | 3-phase voltage phase-sequence/phase-loss over/under | |
|---|---|---|---|---|---|---|---|---|---|
| | |  | |  | |  |  |  |  |
| **Model** | | **K8AK-AS** | **K8AK-AW** | **K8AK-VS** | **K8AK-VW** | **K8AK-PH** | **K8DS-PH** | **K8AK-PM** | **K8DS-PM** |
| Selection criteria | **Specialty** | Ideal for current monitoring for industrial heaters and motors. | | Ideal for voltage monitoring for industrial facilities and equipment. | | Ideal for phase-sequence and phase-loss monitoring for industrial facilities and equipment. | | Ideal for monitoring 3-phase power supplies for industrial facilities and equipment. | |
| | **Sensing range (configurable)** | 20 mA to 8 A, 100 or 200 A with current transformer | | 1 to 600 V | | Same as supply voltage | | | |
| Supply voltage AC | **24 VAC** | ■ | ■ | ■ | ■ | – | – | – | – |
| | **100 VAC** | – | – | – | – | – | – | – | – |
| | **110 VAC** | – | – | – | – | – | – | – | – |
| | **115 VAC** | – | – | – | – | – | – | – | – |
| | **120 VAC** | – | – | – | – | – | – | – | – |
| | **200 VAC** | – | – | – | – | – | – | – | – |
| | **220 VAC** | – | – | – | – | – | – | – | – |
| | **230 VAC** | – | – | – | – | – | – | – | – |
| | **240 VAC** | – | – | – | – | – | – | – | – |
| | **100 to 240 VAC** | ■ | ■ | ■ | ■ | – | – | – | – |
| | **200 to 480 VAC** | – | – | – | – | ■ | ■ | – | – |
| | **200 to 240 VAC** | – | – | – | – | – | – | ■ (-PM1, 3-wire) | ■ |
| | **115 to 138 VAC** | – | – | – | – | – | – | ■ (-PM1, 4-wire) | – |
| | **380 to 480 VAC** | – | – | – | – | – | – | ■ (-PM2, 3-wire) | ■ |
| | **220 to 277 VAC** | – | – | – | – | – | – | ■ (-PM2, 4-wire) | – |
| Supply voltage DC | **24 VDC** | ■ | ■ | ■ | ■ | – | – | – | – |
| | **12 to 24 VDC** | – | – | – | – | – | – | – | – |
| Control output | **Transistor NPN** | – | – | – | – | – | – | – | – |
| | **Transistor PNP** | – | – | – | – | – | – | – | – |
| | **Relay** | ■ (1 SPDT) | ■ (2 SPDT) | ■ (1 SPDT) | ■ (2 SPDT) | ■ (1 DPDT) | ■ (1 SPDT) | ■ (2 SPDT) | ■ (1 SPDT) |
| Features | **LED operation indicator** | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | **Adjustable sensitivity** | – | – | – | – | – | – | – | – |
| | **Electrode types** | – | – | – | – | – | – | – | – |
| | **Page/Quick Link** | 641 | 642 | 643 | 644 | 645 | 646 | 647 | 648 |

| 3-phase voltage phase-sequence, loss and asymmetry | | 3-phase voltage phase-sequence, loss, asymmetry and over/under | | 3-phase voltage over/under | Temperature thermistor, phase-sequence and loss | Temperature thermistor | Temperature thermo-couple and PT |
|---|---|---|---|---|---|---|---|
|  |  |  |  |  |  |  |  |
| **K8AK-PA** | **K8DS-PA** | **K8DS-PZ** | **K8DS-PU** | **K8AK-PW** | **K8AK-PT** | **K8AK-TS** | **K8AK-TH** |
| Ideal for 3-phase voltage asymmetry monitoring for industrial facilities and equipment. | | Ideal for monitoring 3-phase power supplies for industrial facilities and equipment | | Ideal for monitoring 3-phase power supplies for industrial facilities and equipment. | Monitor temperature rise through internal motor | | Compact and slim relay ideal for temperature alarms and monitoring |
| Same as supply voltage | | | | | 100 to 240 VAC<br>24 VAC/DC | | 100 to 240 VAC<br>24 VAC/DC |
| – | – | – | – | – | ■ | ■ | ■ |
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| – | – | – | – | – | – | – | – |
| ■ (-PA1, 3-wire) | ■ | ■ | ■ | ■ (-PW1, 3-wire) | – | – | – |
| ■ (-PA1, 4-wire) | – | – | – | ■ (-PW1, 4-wire) | – | – | – |
| ■ (-PA2, 3-wire) | ■ | ■ | ■ | ■ (-PW2, 3-wire) | – | – | – |
| ■ (-PA2, 4-wire) | – | – | – | ■ (-PW2, 4-wire) | – | – | – |
| – | – | – | – | – | ■ | ■ | ■ |
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| – | – | – | – | – | – | – | – |
| ■<br>(1 SPDT) | ■<br>(1 SPDT) | ■<br>(1 SPDT) | ■<br>(1 SPDT) | ■<br>(2 SPDT) | ■<br>(1 SPDT) | ■<br>(1 SPDT) | ■<br>(1 SPDT) |
| ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| – | – | – | – | – | – | – | – |
| – | – | – | – | – | – | – | – |
| 649 | 650 | 651 | 652 | 653 | 660 | 660 | 661 |

■ Standard □ Available – No/not available

| Conductive level controller | | | | Liquid leakage sensor amplifier | |
|---|---|---|---|---|---|
|  |  |  |  |  | |
| **61F-GP-N8** | **61F-GPN-BT** | **61F-GPN-BC** | **K8AK-LS** | **K7L-AT50** | **K7L-AT50D** |
| Single or two-point | AC sine wave between electrodes for stable detection with no electrolysis | AC sine wave between electrodes for stable detection with no electrolysis | Ideal for level control for industrial facilities and equipment | Sensor amplifier, AC sine wave between electrodes for stable detection with no electrolysis | Sensor amplifier with disconnection detection function |
| 4 to 50 kΩ | 0 to 100 kΩ | 1 to 100 kΩ | 10 to 100 kΩ | 0 to 50 MΩ | 1 to 50 MΩ |
| ☐ | – | – | ☐ | – | – |
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| – | – | – | – | ☐ | ☐ |
| – | – | ■ | – | ■ | ■ |
| | – | – | – | ■ | ■ |
| ■ | ■ | ■ | ■ (1 SPDT) | – | – |
| ■ | ■ | ■ | ■ | ■ | ■ |
| – | ■ | ■ | – | ■ | ■ |
| Electrode holder: PS-_S, PS-31, BF-1 and BS-1 | | | – | Liquid leakage sensor band F03-16PE | |
| 654 | 656 | | 657 | 659 | |

■ Standard ☐ Available – No/not available

## Single-phase current relay

These single-phase current relays monitor over- and undercurrents. Manual resetting and automatic resetting are supported by one relay. The start-up lock and operating time can be set separately. The relay warning status is easily monitored with the LED indicator.

- Single-phase current relay
- In 22.5 mm wide industrial housing
- Under or over control
- Supply voltages: 24 VAC/DC, 100 to 240 VAC
- Easy wiring with ferrules

## Ordering information

| Measuring current | Supply voltage | Order code |
|---|---|---|
| 2 to 20 mA AC/DC,<br>10 to 100 mA AC/DC,<br>50 to 500 mA AC/DC | 24 VAC/DC | K8AK-AS1 24 VAC/DC |
| | 100 to 240 VAC | K8AK-AS1 100-240 VAC |
| 0.1 to 1 A AC/DC,<br>0.5 to 5 A AC/DC,<br>0.8 to 8 A AC/DC | 24 VAC/DC | K8AK-AS2 24 VAC/DC |
| | 100 to 240 VAC | K8AK-AS2 100-240 VAC |
| 10 to 100 A AC,<br>20 to 200 A AC | 24 VAC/DC | K8AK-AS3 24 VAC/DC |
| | 100 to 240 VAC | K8AK-AS3 100-240 VAC |

### Accessories

| Current transformer | Input range | Applicable relay | Order code |
|---|---|---|---|
|  | 10 to 100 A AC, 20 to 200 A AC | K8AK-AS3 | K8AC-CT200L |

**Note:** The K8AK-AS3 is designed to be used in combination with the K8AC-CT200L (direct input not possible)

## Specifications

| | | |
|---|---|---|
| Ambient operating temperature | | –20 to 60°C (with no condensation or icing) |
| Storage temperature | | –25 to 65°C (with no condensation or icing) |
| Operating voltage range | | 85% to 110% of rated operating voltage |
| Rated power supply frequency | | 50/60 Hz±5 Hz (AC power supply) |
| Output relays (1 × SPDT, normally closed operation) | Resistive load | 5 A at 250 VAC or at 30 VDC |
| | Maximum contact voltage | 250 VAC or 30 VDC |
| | Maximum contact current | 5 A |
| | Maximum switching capacity | 1,250 VA, 150 W |
| Mechanical life | | 10,000,000 operations |
| Electrical life | | 50,000 operations at 5 A, 250 VAC or 30 VDC |
| Degree of protection | | Terminal section: IP20 |
| Case material | | PC and ABS |
| Weight | | Approx. 150 g |
| Operating power | Isolated power supply | 2.0 VA/1.1 W max. at 24 VAC/DC, 4.6 VA max. at 100 to 240 VAC |
| Operate (SV) | Operating value setting range | 10% to 100% of maximum measuring current |
| | Operating value | 100% operation at set value |
| Reset (HYS.) | Hysteresis | 5% to 50% of operating value |
| | Resetting method | Manual reset/automatic reset (switchable)<br>Manual reset: Turn OFF operating power for 1 s or longer |
| Operating time (T) | | 0.1 to 30 s |
| Operating power ON lock (LOCK) | | 0 to 30 s (The startup lock timer starts when the input has reached approximately 30% or more of the set value.)<br>Note: Enabled only for overcurrent operation |
| Repeat error | Operating value | ±0.5% full scale (at 25°C and 65% humidity, rated power supply voltage, DC or 50/60 Hz sine wave input) |
| | Operating time | ±50 ms (at 25°C and 65% humidity, rated power supply voltage) |
| Input frequency range | K8AK-AS1/-AS2 | DC input or AC input (45 to 65 Hz) |
| | K8AK-AS3 | AC input (45 to 65 Hz) |
| Overload capacity | K8AK-AS1/-AS2 | Continuous input at 120% of maximum input, 1 s at 150% |
| | K8AK-AS3 | Continuous input at 120%, 30 s at 200%, and 1 s at 600% with an OMRON CT (K8AC-CT200L) |
| Indicators | | Power (PWR): Green LED, relay output (RY): Yellow LED, alarm outputs (ALM): Red LED |
| Applicable standards | Conforming standards | EN 60947-5-1<br>Installation environment (pollution level 2, installation category III) |
| | EMC | EN 60947-5-1 |
| | Safety standards | UL 508 (Recognition), Korean Radio Waves Act (Act 10564), CSA and CCC |
| Size in mm (H × W × D) | | 90 × 22.5 × 100 |

## Single-phase current relay, window type

These single-phase current relays monitor over- and undercurrents. Manual resetting and automatic resetting are supported by one relay. The start-up lock and operating time can be set separately. The relay warning status is easily monitored with the LED indicator.

- Single-phase current window relay
- In 22.5 mm wide industrial housing
- Under and over control
- Supply voltages: 24 VAC/DC, 100 to 240 VAC
- Easy wiring with ferrules

## Ordering information

| Measuring current | Supply voltage | Order code |
|---|---|---|
| 2 to 20 mA AC/DC,<br>10 to 100 mA AC/DC,<br>50 to 500 mA AC/DC | 24 VAC/DC | K8AK-AW1 24 VAC/DC |
| | 100 to 240 VAC | K8AK-AW1 100-240 VAC |
| 0.1 to 1 A AC/DC,<br>0.5 to 5 A AC/DC | 24 VAC/DC | K8AK-AW2 24 VAC/DC |
| | 100 to 240 VAC | K8AK-AW2 100-240 VAC |
| 10 to 100 A AC,<br>20 to 200 A AC | 24 VAC/DC | K8AK-AW3 24 VAC/DC |
| | 100 to 240 VAC | K8AK-AW3 100-240 VAC |

### Accessories

| Current transformer | Input range | Applicable relay | Order code |
|---|---|---|---|
|  | 10 to 100 A AC, 20 to 200 A AC | K8AK-AW3 | K8AC-CT200L |

**Note:** The K8AK-AW3 is designed to be used in combination with the K8AC-CT200L (direct input not possible)

## Specifications

| | | |
|---|---|---|
| Ambient operating temperature | | –20 to 60°C (with no condensation or icing) |
| Storage temperature | | –25 to 65°C (with no condensation or icing) |
| Operating voltage range | | 85% to 110% of rated operating voltage |
| Rated power supply frequency | | 50/60 Hz±5 Hz (AC power supply) |
| Output relays (1 × SPDT, normally closed operation) | Resistive load | 5 A at 250 VAC or at 30 VDC |
| | Maximum contact voltage | 250 VAC or 30 VDC |
| | Maximum contact current | 5 A |
| | Maximum switching capacity | 1,250 VA, 150 W |
| Mechanical life | | 10,000,000 operations |
| Electrical life | | 50,000 operations at 5 A, 250 VAC or 30 VDC |
| Degree of protection | | Terminal section: IP20 |
| Case material | | PC and ABS |
| Weight | | Approx. 150 g |
| Operating power | Isolated power supply | 2.0 VA/1.1 W max. at 24 VAC/DC, 4.6 VA max. at 100 to 240 VAC |
| Operate (SV) | Operating value setting range | 10% to 100% of maximum measuring current |
| | Operating value | 100% operation at set value |
| Reset (HYS.) | Hysteresis | 5% of operating value (fixed) |
| | Resetting method | Manual reset/automatic reset (switchable)<br>Manual reset: Turn OFF operating power for 1 s or longer |
| Operating time (T) | | 0.1 to 30 s |
| Operating power ON lock (LOCK) | | 0 to 30 s (The startup lock timer starts when the input has reached approximately 30% or more of the set value.)<br>Note: Enabled only for overcurrent operation |
| Repeat error | Operating value | ±0.5% full scale (at 25°C and 65% humidity, rated power supply voltage, DC or 50/60 Hz sine wave input) |
| | Operating time | ±50 ms (at 25°C and 65% humidity, rated power supply voltage) |
| Input frequency range | K8AK-AW1/-AW2 | DC input or AC input (45 to 65 Hz) |
| | K8AK-AW3 | AC input (45 to 65 Hz) |
| Overload capacity | K8AK-AW1/-AW2 | Continuous input at 120% of maximum input, 1 s at 150% |
| | K8AK-AW3 | Continuous input at 120%, 30 s at 200%, and 1 s at 600% with an OMRON CT (K8AC-CT200L) |
| Indicators | | Power (PWR): Green LED, relay output (RY): Yellow LED, alarm outputs (ALM): Red LED |
| Applicable standards | Conforming standards | EN 60947-5-1<br>Installation environment (pollution level 2, installation category III) |
| | EMC | EN 60947-5-1 |
| | Safety standards | UL 508 (Recognition), Korean Radio Waves Act (Act 10564), CSA and CCC |
| Size in mm (H × W × D) | | 90 × 22.5 × 100 |

## Single-phase voltage relay

These single-phase voltage relays are for monitoring over- and undervoltages. Manual resetting and automatic resetting are supported by one relay. Relay warning status can easily be monitored using the LED indicator.

- Single-phase voltage relay
- In 22.5 mm wide industrial housing
- Under or over control
- Supply voltages: 24 VAC/DC, 100 to 240 VAC
- Easy wiring with ferrules

## Ordering information

| Measuring current | Supply voltage | Order code |
|---|---|---|
| 1 to 10 VAC/DC,<br>3 to 30 VAC/DC,<br>15 to 150 VAC/DC | 24 VAC/DC | K8AK-VS2 24 VAC/DC |
| | 100 to 240 VAC | K8AK-VS2 100-240 VAC |
| 20 to 200 VAC/DC,<br>30 to 300 VAC/DC,<br>60 to 600 VAC/DC | 24 VAC/DC | K8AK-VS3 24 VAC/DC |
| | 100 to 240 VAC | K8AK-VS3 100-240 VAC |

## Specifications

| | | |
|---|---|---|
| **Ambient operating temperature** | | −20 to 60°C (with no condensation or icing) |
| **Storage temperature** | | −25 to 65°C (with no condensation or icing) |
| **Operating voltage range** | | 85% to 110% of rated operating voltage |
| **Rated power supply frequency** | | 50/60 Hz±5 Hz ( AC power supply) |
| **Output relays (1 × SPDT, normally closed operation)** | **Resistive load** | 5 A at 250 VAC or at 30 VDC |
| | **Maximum contact voltage** | 250 VAC or 30 VDC |
| | **Maximum contact current** | 5 A |
| | **Maximum switching capacity** | 1,250 VA, 150 W |
| | **Mechanical life** | 10,000,000 operations |
| | **Electrical life** | 50,000 operations at 5 A, 250 VAC or 30 VDC |
| **Degree of protection** | | Terminal section: IP20 |
| **Case material** | | PC and ABS |
| **Weight** | | Approx. 150 g |
| **Operating power** | **Isolated power supply** | 2.0 VA/1.1 W max. at 24 VAC/DC, 4.6 VA max. at 100 to 240 VA |
| **Operate (SV)** | **Operating value setting range** | 10% to 100% of maximum measuring voltage |
| | **Operating value** | 100% operation at set value |
| **Reset (HYS.)** | **Hysteresis** | 5% to 50% of operating value |
| | **Resetting method** | Manual reset/automatic reset (switchable)<br>Manual reset: Turn OFF operating power for 1 s or longer |
| **Operating time (T)** | | 0.1 to 30 s |
| **Power ON lock (LOCK)** | | 1 s or 5 s (Switched using DIP switch)<br>(value when input rapidly changes from 0 to 100%. The operating time is the shortest at this point) |
| **Repeat accuracy** | **Operating value** | ±0.5% full scale (at 25°C and 65% humidity, rated power supply voltage, DC or 50/60 Hz sine wave input) |
| | **Operating time** | ±50 ms (at 25°C and 65% humidity, rated power supply voltage) |
| **Input frequency** | | 40 to 500 Hz |
| **Overload capacity** | | Continuous input at 115% of maximum input, 10 s at 125% (up to 600 VAC) |
| **Indicators** | | LED power (PWR): Green LED, relay output (RY): Yellow LED, alarm output (ALM): Red LED |
| **Applicable standards** | **Conforming standards** | EN 60947-5-1<br>Installation environment (pollution level 2, installation category III) |
| | **EMC** | EN 60947-5-1 |
| | **Safety standards** | UL 508 (Recognition), Korean Radio Waves Act (Act 10564), CSA and CCC |
| **Size in mm (H × W × D)** | | 90 × 22.5 × 100 |

## Single-phase voltage relay, window type

For monitoring over- and undervoltages simultaneously. Manual resetting and automatic resetting are supported by one relay. Separate settings and outputs are supported for over- and undervoltages. Relay warning status can easily be monitored with the LED indicator.

- Single-phase voltage window relay
- In 22.5 mm wide industrial housing
- Under and over, low/low or high/high control
- Supply voltages: 24 VAC/DC, 100 to 240 VAC
- Easy wiring with ferrules

## Ordering information

| Measuring current | Supply voltage | Order code |
|---|---|---|
| 1 to 10 VAC/DC,<br>3 to 30 VAC/DC,<br>15 to 150 VAC/DC | 24 VAC/DC | K8AK-VW2 24 VAC/DC |
| | 100 to 240 VAC | K8AK-VW2 100-240 VAC |
| 20 to 200 VAC/DC,<br>30 to 300 VAC/DC,<br>60 to 600 VAC/DC | 24 V AC/DC | K8AK-VW3 24 VAC/DC |
| | 100 to 240 VAC | K8AK-VW3 100-240 VAC |

## Specifications

| | | |
|---|---|---|
| Ambient operating temperature | | –20 to 60°C (with no condensation or icing) |
| Storage temperature | | –25 to 65°C (with no condensation or icing) |
| Operating voltage range | | 85% to 110% of rated operating voltage |
| Rated power supply frequency | | 50/60 Hz±5 Hz (AC power supply) |
| Output relays (2 × SPDT, normally closed operation) | Resistive load | 5 A at 250 VAC or at 30 VDC |
| | Maximum contact voltage | 250 VAC or 30 VDC |
| | Maximum contact current | 5 A |
| | Maximum switching capacity | 1,250 VA, 150 W |
| | Mechanical life | 10,000,000 operations |
| | Electrical life | 50,000 operations at 5 A, 250 VAC or 30 VDC |
| Degree of protection | | Terminal section: IP20 |
| Case material | | PC and ABS |
| Weight | | Approx. 150 g |
| Operating power | Isolated power supply | 2.0 VA/1.1 W max. at 24 VAC/DC, 4.6 VA max. at 100 to 240 VAC |
| Operation (AL1 and AL2) | Operating value setting range | 10% to 100% of maximum measuring voltage |
| | Operating value | 100% operation at set value |
| Reset (HYS.) | Hysteresis | 5% of operating value (fixed) |
| | Resetting method | Manual reset/automatic reset (switchable)<br>Manual reset: Turn OFF operating power for 1 s or longer |
| Operating time (T) | | 0.1 to 30 s |
| Power ON lock (LOCK) | | 1 s or 5 s (Switched using DIP switch) |
| Indicators | | Power (PWR): Green LED, relay output (RY): Yellow LED, alarm outputs (ALM 1/2): Red LED |
| Repeat accuracy | Operating value | ±0.5% full scale (at 25°C and 65% humidity, rated power supply voltage, DC or 50/60 Hz sine wave input) |
| | Operating time | ±50 ms (at 25°C and 65% humidity, rated power supply voltage) |
| Input frequency | | 40 to 500 Hz |
| Overload capacity | | Continuous input at 115% of maximum input, 10 s at 125% (up to 600 VAC) |
| Applicable standards | Conforming standards | EN 60947-5-1<br>Installation environment (pollution level 2, installation category III) |
| | EMC | EN 60947-5-1 |
| | Safety standards | UL 508 (Recognition), Korean Radio Waves Act (Act 10564), CSA and CCC |
| Size in mm (H × W × D) | | 90 × 22.5 × 100 |

## 3-phase sequence, phase loss relay

The K8AK-PH1 monitoring relay is designed to monitor 3-phase 3-wire supplies. It simultaneously monitors phase sequence and phase loss during start up as well as phase loss during operation. The output relay releases when alarm conditions are detected, and the warning status can easily be monitored using the LED indicator. Suitable for industrial facilities and equipment.

- Monitors phase sequence and phase-loss simultaneously
- Measuring range: 200 to 480 VAC
- Power supply voltage is the same as measuring voltage
- Operation reaction time: 0.1 s maximum

## Ordering information

| Rated input voltage | Order code |
|---|---|
| 200 to 480 VAC | K8AK-PH1 |

## Specifications

| | | |
|---|---|---|
| Ambient operating temperature | | –20 to 60°C (with no condensation or icing) |
| Storage temperature | | –25 to 65°C (with no condensation or icing) |
| Altitude | | 2,000 m max. |
| Input frequency | | 50/60 Hz (AC power supply) |
| Output relays (1 × DPDT, normally closed operation) | Resistive load | 5 A at 250 VAC or at 30 VDC |
| | Maximum contact voltage | 250 VAC or 30 VDC |
| | Maximum contact current | 5 A |
| | Maximum switching capacity | 1,250 VA, 150W |
| | Mechanical life | 10,000,000 operations |
| | Electrical life | 50,000 operations at 5 A, 250 VAC or 30 VDC |
| Degree of protection | | Terminal section: IP20 |
| Case material | | PC and ABS |
| Weight | | Approx. 130 g |
| Rated input voltage | | Three-phase, three-wire mode, 200 to 480 VAC |
| Reversed phase and phase loss operating time | | 0.1 s max. |
| Resetting method | | Automatic reset |
| Overload capacity | | Continuous input: 528 VAC |
| Indicators | | Power (PWR): Green LED, relay output (RY): Yellow LED |
| Applicable standards | Conforming standards | EN 60947-5-1<br>Installation environment (pollution level 2, installation category III) |
| | EMC | EN 60947-5-1 |
| | Safety standards | UL 508 (Recognition), Korean Radio Waves Act (Act 10564), CSA and CCC |
| Size in mm (H × W × D) | | 90 × 22.5 × 100 |


## 3-phase voltage, phase-sequence/phase loss relay

The K8DS-PH1 is a monitoring relay designed at 17.5 mm slim by simplified functions for 3-phase 3 wire supplies. It simultaneously monitors phase sequence and phase loss during start up as well as phase loss during operation. The output relay releases when alarm conditions are detected, and the warning status can easily be monitored using the LED indicator.

- Monitors phase sequence and phase-loss simultaneously
- Measuring range: 200 to 480 VAC
- Power supply voltage is the same as measuring voltage
- Operation reaction time: 0.1 s maximum

## Ordering information

| Rated input voltage | Order code |
|---|---|
| 200 to 480 VAC | K8DS-PH1 |

## Specifications

| | | |
|---|---|---|
| Ambient operating temperature | | –20 to 60°C (with no condensation or icing) |
| Storage temperature | | –25 to 65°C (with no condensation or icing) |
| Altitude | | 2,000 m max. |
| Input frequency | | 50/60 Hz (AC power supply) |
| Output relays (1 × SPDT, normally closed operation) | Resistive load | 5 A at 250 VAC or at 30 VDC |
| | Maximum contact voltage | 250 VAC or 30 VDC |
| | Maximum contact current | 5 A |
| | Maximum switching capacity | 1,250 VA, 150 W |
| | Mechanical life | 10,000,000 operations |
| | Electrical life | 50,000 operations at 5 A, 250 VAC or 30 VDC |
| Degree of protection | | Terminal section: IP20 |
| Case material | | PC UL 94 V-0 |
| Weight | | Approx. 60 g |
| Rated input voltage | | Three-phase, three-wire mode, 200 to 480 VAC |
| Reversed phase and phase loss operating time | | 0.1 s max. |
| Resetting method | | Automatic reset |
| Overload capacity | | Continuous input: 500 VAC |
| Indicators | | Power (PWR): Green LED, relay output (RY): Yellow LED |
| Applicable standards | Conforming standards | EN 60947-5-1<br>Installation environment (pollution level 2, installation category III) |
| | EMC | EN 60947-5-1 |
| | Safety standards | UL 508 (Recognition), Korean Radio Waves Act (Act 10564), CSA and CCC |
| Size (H × W × D) | | 80 × 17.5 × 74 mm |

## 3-phase voltage, phase sequence, phase loss relay

K8AK-PM monitors overvoltages, undervoltages, phase sequence and phase loss for 3-phase, 3-wire or 4-wire power supplies, in one unit. This relay features a switch setting for 3-phase, 3-wire or 3-phase, 4-wire power supply.

- Worldwide power specifications supported by one unit
- Phase sequence, phase loss: Operation reaction time 0.1 s maximum
- Overvoltages or undervoltages: Operation time setting from 0.1 to 30 s
- Relay warning status can easily be monitored using the LED indicator
- Easy wiring with ferrules

## Ordering information

| Rated input | | Order code |
|---|---|---|
| 3-phase 3-wire mode | 200, 220, 230, 240 VAC | K8AK-PM1 |
| 3-phase 4-wire mode | 115, 127, 133, 138 VAC | |
| 3-phase 3-wire mode | 380, 400, 415, 480 VAC | K8AK-PM2 |
| 3-phase 4-wire mode | 220, 230, 240, 277 VAC | |

## Specifications

| | | |
|---|---|---|
| Ambient operating temperature | | –20 to 60°C (with no condensation or icing) |
| Storage temperature | | –25 to 65°C (with no condensation or icing) |
| Input frequency | | 50/60 Hz (AC power supply) |
| Output relays (2 × SPDT, normally closed operation) | Resistive load | 5 A at 250 VAC or at 30 VDC |
| | Maximum contact voltage | 250 VAC or 30 VDC |
| | Maximum contact current | 5 A |
| | Maximum switching capacity | 1,250 VA, 150 W |
| | Mechanical life | 10,000,000 operations |
| | Electrical life | 50,000 operations at 5 A, 250 VAC or 30 VDC |
| Degree of protection | | Terminal section: IP20 |
| Case material | | PC and ABS |
| Weight | | Approx. 150 g |
| Rated input voltage | K8AK-PM1 | 3-phase, 3-wire mode: 200, 220, 230, 240 VAC, 3-phase, 4-wire mode: 115, 127, 133, 138 VAC |
| | K8AK-PM2 | 3-phase, 3-wire mode: 380, 400, 415, 480 VAC, 3-phase, 4-wire mode: 220, 230, 240, 277 VAC |
| Operation (overvoltage or undervoltage) | Operating value setting range | Overvoltage = –30% to 25% of maximum rated input voltage[*1]<br>Undervoltage = –30% to 25% of maximum rated input voltage[*1] |
| | Operating value | 100% operation at set value |
| Reset (HYS.) | Hysteresis | 5% of operating value (fixed) |
| | Resetting method | Automatic reset |
| Operating time (T) | Overvoltage/undervoltage | 0.1 to 30 s |
| | Phase-sequence, phase-loss | 0.1 s max. |
| Power ON lock (LOCK) | | 1 s or 5 s (Changed with the DIP switch) |
| Overload capacity | | Continuous input at 115% of maximum input, 10 s at 125% (up to 600 VAC) |
| Repeat accuracy | Operating value | ±0.5% full scale (at 25°C and an ambient humidity of 65% at the rated power supply voltage, DC or 50/60 Hz sine wave input) |
| | Operating time | ±50 ms (at 25°C and 65% humidity, rated power supply voltage) |
| Indicators | | Power (PWR): Green LED, relay output (RY): Yellow LED, alarm outputs (ALM 1/2): Red LED |
| Applicable standards | Conforming standards | EN 60947-5-1<br>Installation environment (pollution level 2, installation category III) |
| | EMC | EN 60947-5-1 |
| | Safety standards | UL 508 (Recognition), Korean Radio Waves Act (Act 10564), CSA and CCC |
| Size in mm (H × W × D) | | 90 × 22.5 × 100 |

[*1] The rated input voltage is switched with a switch

## 3-Phase voltage, phase sequence, phase-loss and over-/undervoltage relay

The K8DS-PM is the simplified 3-phase monitoring relay, 3-wire circuits with one unit. It can monitor undervoltages, overvoltages, phase sequence and phase-loss.

- Greater resistance to inverter noise
- One SPDT output relay, 5 A at 250 VAC (resistive load)
- World-wide power specifications supported by one unit (Set with a rotary switch)
- Relay status can be monitored using LED indicator

## Ordering information

| Rated input | | Order code |
|---|---|---|
| 3-phase 3-wire mode | 200, 220, 230, 240 VAC | K8DS-PM1 |
| 3-phase 3-wire mode | 380, 400, 415, 480 VAC | K8DS-PM2 |

## Specifications

| | | |
|---|---|---|
| **Ambient operating temperature** | | –20 to 60°C (with no condensation or icing) |
| **Storage temperature** | | –25 to 65°C (with no condensation or icing) |
| **Input frequency** | | 50/60 Hz (AC power supply) |
| **Output relays (1 × SPDT, normally closed operation)** | **Resistive load** | 5 A at 250 VAC or at 30 VDC |
| | **Maximum contact voltage** | 250 VAC or 30 VDC |
| | **Maximum contact current** | 5 A |
| | **Maximum switching capacity** | 1,250 VA, 150 W |
| | **Mechanical life** | 10,000,000 operations |
| | **Electrical life** | 50,000 operations at 5 A, 250 VAC |
| **Degree of protection** | | Terminal section: IP20 |
| **Case material** | | PC UL94 V-0 |
| **Weight** | | Approx. 65 g |
| **Rated input voltage** | **K8DS-PM1** | 3-phase, 3-wire mode: 200, 220, 230, 240 VAC |
| | **K8DS-PM2** | 3-phase, 3-wire mode: 380, 400, 415, 480 VAC |
| **Operation (overvoltage or undervoltage)** | **Operating value setting range** | Overvoltage = –30% to 25% of maximum rated input voltage<br>Undervoltage = –30% to 25% of maximum rated input voltage |
| | **Operating value** | 100% operation at set value |
| **Reset (HYS.)** | **Hysteresis** | 5% of operating value (fixed) |
| | **Resetting method** | Automatic reset |
| **Operating time (T)** | **Overvoltage/undervoltage** | 0.1 to 30 s |
| | **Phase-sequence, phase-loss** | 0.1 s max. |
| **Power ON lock (LOCK)** | | 1 s ±0.5 s |
| **Overload capacity** | | Continuous input: 500 V |
| **Repeat accuracy** | **Operating value** | ±0.5% full scale (at 25°C and an ambient humidity of 65% at the rated power supply voltage, 50/60 Hz sine wave input) |
| | **Operating time** | ±50 ms (at 25°C and 65% humidity, rated power supply voltage) |
| **Indicators** | | Power (PWR): Green, Relay output (RY): Yellow LED, OVER/UNDER: Red |
| **Applicable standards** | **Conforming standards** | EN 60947-5-1<br>Installation environment (pollution level 2, installation category III) |
| | **EMC** | EN 60947-5-1 |
| | **Safety standards** | UL 508 (Recognition), Korean Radio Waves Act (Act 10564), CSA and CCC |
| **Size in mm (H × W × D)** | | 80 × 17.5 × 74 |

## 3-phase asymmetry, phase sequence, phase loss relay

Monitors voltage asymmetry, phase sequence and phase loss for 3-phase 3-wire or 4-wire power supplies, in one unit.

- Worldwide power specifications supported by one unit
- Phase sequence, phase loss: Operation reaction time 0.1 s maximum
- Asymmetry: Operation time setting from 0.1 to 30 s
- Reset method: Automatic
- Power ON lock: 1 s or 5 s

## Ordering information

| Rated input | | Order code |
|---|---|---|
| 3-phase 3-wire mode | 200, 220, 230, 240 VAC | K8AK-PA1 |
| 3-phase 4-wire mode | 115, 127, 133, 138 VAC | |
| 3-phase 3-wire mode | 380, 400, 415, 480 VAC | K8AK-PA2 |
| 3-phase 4-wire mode | 220, 230, 240, 277 VAC | |

## Specifications

| | | |
|---|---|---|
| Ambient operating temperature | | –20 to 60°C (with no condensation or icing) |
| Storage temperature | | –25 to 65°C (with no condensation or icing) |
| Altitude | | 2,000 m max. |
| Input frequency | | 50/60 Hz (AC power supply) |
| Output relays (1 × SPDT, normally closed operation) | Resistive load | 5 A at 250 VAC or at 30 VDC |
| | Maximum contact voltage | 250 VAC or 30 VDC |
| | Maximum contact current | 5 A |
| | Maximum switching capacity | 1,250 VA, 150 W |
| | Mechanical life | 10,000,000 operations |
| | Electrical life | 50,000 operations at 5 A, 250 VAC or 30 VDC |
| Degree of protection | | Terminal section: IP20 |
| Case material | | PC and ABS |
| Weight | | Approx. 130 g |
| Rated input voltage | K8AK-PA1 | 3-phase, 3-wire mode: 200, 220, 230, 240 VAC, 3-phase, 4-wire mode: 115, 127, 133, 138 VAC |
| | K8AK-PA2 | 3-phase, 3-wire mode: 380, 400, 415, 480 VAC, 3-phase, 4-wire mode: 220, 230, 240, 277 VAC |
| Asymmetry operation (ASY.) | Operating value setting range | Asymmetry rate: 2% to 22% |
| | Operating value | 100% operation at set value<br>Asymmetry operating value = rated input voltage x asymmetry set value [%]<br>The asymmetry operation will function when the difference between the highest and lowest voltage phases equals or exceeds the asymmetry operating value |
| Reset (HYS.) | Hysteresis | 5% of operating value (fixed) |
| | Resetting method | Automatic reset |
| Operating time (T) | Asymmetry | 0.1 s to 30 s |
| | Phase-sequence, phase-loss | 0.1 s max. |
| Power ON lock (LOCK) | | 1 s or 5 s (Changed with the DIP switch) |
| Overload capacity | | Continuous input at 115% of maximum input, 10 s at 125% (up to 600 VAC) |
| Repeat accuracy | Operating value | ±0.5% full scale (at 25°C and an ambient humidity of 65% at the rated power supply voltage, DC or 50/60 Hz sine wave input) |
| | Operating time | ±50 ms (at 25°C and 65% humidity, rated power supply voltage) |
| Indicators | | Power (PWR): Green LED, relay output (RY): Yellow LED, alarm outputs (ALM 1/2): Red LED |
| Applicable standards | Conforming standards | EN 60947-5-1<br>Installation environment (pollution level 2, installation category III) |
| | EMC | EN 60947-5-1 |
| | Safety standards | UL 508 (Recognition), Korean Radio Waves Act (Act 10564), CSA and CCC |
| Size in mm (H × W × D) | | 90 × 22.5 × 100 |

## 3-Phase voltage, phase sequence, loss and asymmetry

The K8DS-PA is the simplified 3-phase monitoring relay, 3-wire circuits with one unit. It can monitor voltage asymmetry with 3-phase sequence and loss at the same time.

- Greater resistance to inverter noise
- One SPDT output relay, 5 A at 250 VAC (resistive load)
- World-wide power specifications supported by one unit (Set with a rotary switch)
- Relay status can be monitored using LED indicator

## Ordering information

| Rated input | | Order code |
|---|---|---|
| 3-phase 3-wire mode | 200, 220, 230, 240 VAC | K8DS-PA1 |
| 3-phase 3-wire mode | 380, 400, 415, 480 VAC | K8DS-PA2 |

## Specifications

| | | |
|---|---|---|
| **Ambient operating temperature** | | –20 to 60°C (with no condensation or icing) |
| **Storage temperature** | | –25 to 65°C (with no condensation or icing) |
| **Altitude** | | 2,000 m max. |
| **Input frequency** | | 50/60 Hz (AC power supply) |
| **Output relays (1 × SPDT, normally closed operation)** | **Resistive load** | 5 A at 250 VAC or at 30 VDC |
| | **Maximum contact voltage** | 250 VAC or 30 VDC |
| | **Maximum contact current** | 5 A |
| | **Maximum switching capacity** | 1,250 VA, 150 W |
| | **Mechanical life** | 10,000,000 operations |
| | **Electrical life** | 50,000 operations at 5 A, 250 VAC or 30 VDC |
| **Degree of protection** | | Terminal section: IP20 |
| **Case material** | | PC UL94 V-0 |
| **Weight** | | Approx. 65 g |
| **Rated input voltage** | **K8DS-PA1** | 3-phase, 3-wire mode: 200, 220, 230, 240 VAC |
| | **K8DS-PA2** | 3-phase, 3-wire mode: 380, 400, 415, 480 VAC |
| **Asymmetry operation (ASY.)** | **Operating value setting range** | Asymmetry rate: 2% to 22% |
| | **Operating value** | 100% operation at set value<br>Asymmetry operating value = rated input voltage x asymmetry set value [%]<br>The asymmetry operation will function when the difference between the highest and lowest voltage phases equals or exceeds the asymmetry operating value |
| **Reset (HYS.)** | **Hysteresis** | 5% of operating value (fixed) |
| | **Resetting method** | Automatic reset |
| **Operating time (T)** | **Asymmetry** | 0.1 to 30 s |
| | **Phase-sequence** | 0.1 s ±0.5 s |
| | **Phase-loss** | 0.1 s max. |
| **Power ON lock (LOCK)** | | 1 s ±0.5 s |
| **Overload capacity** | | Continuous input: 500 V |
| **Repeat accuracy** | **Operating value** | ±0.5% full scale (at 25°C and an ambient humidity of 65% at the rated power supply voltage, 50/60 Hz sine wave input) |
| | **Operating time** | ±50 ms (at 25°C and 65% humidity, rated power supply voltage) |
| **Indicators** | | Power (PWR): Green, Relay output (RY): Yellow, Alarm outputs (ALM): Red |
| **Applicable standards** | **Conforming standards** | EN 60947-5-1<br>Installation environment (pollution level 2, installation category III) |
| | **EMC** | EN 60947-5-1 |
| | **Safety standards** | UL 508 (Recognition), Korean Radio Waves Act (Act 10564), CSA: C22.2 No. 14, CCC: GB14048.5 |
| **Size (H × W × D)** | | 80 × 17.5 × 74 mm |

## 3-Phase asymmetry, phase sequence, phase-loss and over-/undervoltage relay

The K8DS-PZ is the simplified 3-phase monitoring relay, 3-wire circuits with one unit. It can monitor undervoltages, overvoltages, voltage asymmetry, phase sequence and phase-loss.

- Greater resistance to inverter noise
- One SPDT output relay, 5 A at 250 VAC (resistive load)
- World-wide power specifications supported by one unit (Set with a rotary switch)
- Relay status can be monitored using LED indicator

## Ordering information

| Rated input | | Order code |
|---|---|---|
| 3-phase 3-wire mode | 200, 220, 230, 240 VAC | K8DS-PZ1 |
| 3-phase 3-wire mode | 380, 400, 415, 480 VAC | K8DS-PZ2 |

## Specifications

| | | |
|---|---|---|
| **Ambient operating temperature** | | –20 to 60°C (with no condensation or icing) |
| **Storage temperature** | | –25 to 65°C (with no condensation or icing) |
| **Altitude** | | 2,000 m max. |
| **Input frequency** | | 50/60 Hz (AC power supply) |
| **Output relays (1 × SPDT, normally closed operation)** | **Resistive load** | 5 A at 250 VAC or at 30 VDC |
| | **Maximum contact voltage** | 250 VAC or 30 VDC |
| | **Maximum contact current** | 5 A |
| | **Maximum switching capacity** | 1,250 VA, 150 W |
| | **Mechanical life** | 10,000,000 operations |
| | **Electrical life** | 50,000 operations at 5 A, 250 VAC |
| **Degree of protection** | | Terminal section: IP20 |
| **Case material** | | PC UL94 V-0 |
| **Weight** | | Approx. 65 g |
| **Rated input voltage** | **K8DS-PZ1** | 3-phase, 3-wire mode: 200, 220, 230, 240 VAC |
| | **K8DS-PZ2** | 3-phase, 3-wire mode: 380, 400, 415, 480 VAC |
| **Operation (overvoltage or undervoltage)** | **Operating value setting range** | Overvoltage/undervoltage: 2% to 30% of rated input voltage |
| | **Operating value** | 100% operation at set value |
| **Asymmetry operation (ASY.)** | **Operating value setting range** | Asymmetry rate: 5% to 22% |
| | **Operating value** | 100% operation at set value<br>Asymmetry operating value = rated input voltage x asymmetry set value [%]<br>The asymmetry operation will function when the difference between the highest and lowest voltage phases equals or exceeds the asymmetry operating value |
| **Reset (HYS.)** | **Hysteresis** | 5% of operating value (fixed) |
| | **Resetting method** | Automatic reset |
| **Operating time (T)** | **Asymmetry** | 0.1 to 30 s |
| | **Overvoltage/undervoltage** | 0.1 to 30 s |
| | **Phase-sequence, phase-loss** | 0.1 s ±0.05 s, 0.1 s max. |
| **Power ON lock (LOCK)** | | 1 s ±0.5 s |
| **Overload capacity** | | Continuous input: 500 V |
| **Repeat accuracy** | **Operating value** | ±0.5% full scale (at 25°C and an ambient humidity of 65% at the rated power supply voltage, 50/60 Hz sine wave input) |
| | **Operating time** | ±50 ms (at 25°C and 65% humidity, rated power supply voltage) |
| **Indicators** | | Power (PWR): Green, Relay output (RY): Yellow LED, Alarm output: Red LED |
| **Applicable standards** | **Conforming standards** | EN 60947-5-1<br>Installation environment (pollution level 2, installation category III) |
| | **EMC** | EN 60947-5-1 |
| | **Safety standards** | UL 508 (Recognition), Korean Radio Waves Act (Act 10564), CSA: C22.2 No.14 |
| **Size in mm (H × W × D)** | | 80 × 17.5 × 74 |

## 3-phase voltage asymmetry, phase-sequence, phase-loss and undervoltage relay

The K8DS-PU is the simplified 3-phase monitoring relay, 3-wire circuits with one unit. It can monitor undervoltages, asymmetry, phase sequence and phase loss.

- Greater resistance to inverter noise
- One SPDT output relay, 5 A at 250 VAC (resistive load)
- World-wide power specifications supported by one unit (Set with a rotary switch)
- Relay status can be monitored using LED indicator

## Ordering information

| Rated input | | Order code |
|---|---|---|
| 3-phase 3-wire mode | 200, 220, 230, 240 VAC | K8DS-PU1 |
| 3-phase 3-wire mode | 380, 400, 415, 480 VAC | K8DS-PU2 |

## Specifications

| | | |
|---|---|---|
| **Ambient operating temperature** | | –20 to 60°C (with no condensation or icing) |
| **Storage temperature** | | –25 to 65°C (with no condensation or icing) |
| **Altitude** | | 2,000 m max. |
| **Voltage fluctuation range (UNDER)** | | Undervoltage 30 to 25% of rated input voltage |
| **Input frequency** | | 50/60 Hz (AC power supply) |
| **Output relays (1× SPDT, normally closed operation)** | **Resistive load** | 5 A at 250 VAC or at 30 VDC |
| | **Maximum contact voltage** | 250 VAC or 30 VDC |
| | **Maximum contact current** | 5 A |
| | **Maximum switching capacity** | 1,250 VA, 150 W |
| | **Mechanical life** | 10,000,000 operations |
| | **Electrical life** | 50,000 operations at 5 A, 250 VAC |
| **Degree of protection** | | Terminal section: IP20 |
| **Case material** | | PC UL94 V-0 |
| **Weight** | | Approx. 65 g |
| **Rated input voltage** | **K8DS-PU1** | 3-phase, 3-wire mode: 200, 220, 230, 240 VAC |
| | **K8DS-PU2** | 3-phase, 3-wire mode: 380, 400, 415, 480 VAC |
| **Operation (overvoltage or undervoltage)** | **Operating value setting range** | Undervoltage = –30% to 25% of maximum rated input voltage |
| | **Operating value** | 100% operation at set value |
| **Reset (HYS.)** | **Hysteresis** | 5% of operating value (fixed) |
| | **Resetting method** | Automatic reset |
| **Operating time (T)** | **Asymmetry** | 0.1 to 30 s |
| | **Phase-sequence** | 0.1 s ±0.5 s |
| | **Phase-loss** | 0.1 s ±0.05 s |
| **Power ON lock (LOCK)** | | 0.1 s ±0.5 s |
| **Overload capacity** | | Continuous input: 500 V |
| **Repeat accuracy** | **Operating value** | ±0.5% full scale (at 25°C and an ambient humidity of 65% at the rated power supply voltage, 50/60 Hz sine wave input) |
| | **Operating time** | ±50 ms (at 25°C and 65% humidity, rated power supply voltage) |
| **Indicators** | | Power (PWR): Green LED, relay output (RY): Yellow LED, UNDER: Red |
| **Applicable standards** | **Conforming standards** | EN 60947-5-1<br>Installation environment (pollution level 2, installation category III) |
| | **EMC** | EN 60947-5-1 |
| | **Safety standards** | UL 508 (Recognition), Korean Radio Waves Act (Act 10564), CSA and CCC |
| **Size in mm (H × W × D)** | | 80 × 17.5 × 74 |

## 3-phase voltage relay

Monitors overvoltages and undervoltages for 3-phase 3-wire or 4-wire power supplies, in one unit. Switch setting for 3-phase 3-wire or 3-phase 4-wire power supply.

- Overvoltages or undervoltages: Operation time setting from 0.1 to 30 s
- Relay warning status can easily be monitored using the LED indicator
- Separate outputs possible for overvoltages and undervoltages
- Reset method: Automatic
- Power ON lock: 1 s or 5 s

## Ordering information

| Rated input | | Order code |
|---|---|---|
| 3-phase 3-wire mode | 200, 220, 230, 240 VAC | K8AK-PW1 |
| 3-phase 4-wire mode | 115, 127, 133, 138 VAC | |
| 3-phase 3-wire mode | 380, 400, 415, 480 VAC | K8AK-PW2 |
| 3-phase 4-wire mode | 220, 230, 240, 277 VAC | |

## Specifications

| | | |
|---|---|---|
| **Ambient operating temperature** | | –20 to 60°C (with no condensation or icing) |
| **Storage temperature** | | –25 to 65°C (with no condensation or icing) |
| **Altitude** | | 2,000 m max. |
| **Voltage fluctuation rang** | | 85% to 110% of rated input voltage |
| **Input frequency** | | 50/60 Hz (AC power supply) |
| **Output relays (2 × SPDT, normally closed operation)** | **Resistive load** | 5 A at 250 VAC or at 30 VDC |
| | **Maximum contact voltage** | 250 VAC or 30 VDC |
| | **Maximum contact current** | 5 A |
| | **Maximum switching capacity** | 1,250 VA, 150 W |
| | **Mechanical life** | 10,000,000 operations |
| | **Electrical life** | 50,000 operations at 5 A, 250 VAC or 30 VDC |
| **Degree of protection** | | Terminal section: IP20 |
| **Case material** | | PC and ABS |
| **Weight** | | Approx. 150 g |
| **Rated input voltage** | **K8AK-PW1** | 3-phase, 3-wire mode: 200, 220, 230, 240 VAC, 3-phase, 4-wire mode: 115, 127, 133, 138 VAC |
| | **K8AK-PW2** | 3-phase, 3-wire mode: 380, 400, 415, 480 VAC, 3-phase, 4-wire mode: 220, 230, 240, 277 VAC |
| **Operation (overvoltage and undervoltage)** | **Operating value setting range** | Overvoltage = –30% to 25% of maximum rated input voltage[*1]<br>Undervoltage = –30% to 25% of maximum rated input voltage[*1] |
| | **Operating value** | 100% operation at set value |
| **Reset (HYS.)** | **Hysteresis** | 5% of operating value (fixed) |
| | **Resetting method** | Automatic reset |
| **Operating time (T)** | **Overvoltage/undervoltage** | 0.1 to 30 s |
| **Power ON lock (LOCK)** | | 1 s or 5 s (Changed with the DIP switch) |
| **Overload capacity** | | Continuous input at 115% of maximum input, 10 s at 125% (up to 600 VAC) |
| **Repeat accuracy** | **Operating value** | ±0.5% full scale (at 25°C and an ambient humidity of 65% at the rated power supply voltage, DC or 50/60 Hz sine wave input) |
| | **Operating time** | ±50 ms (at 25°C and 65% humidity, rated power supply voltage) |
| **Indicators** | | Power (PWR): Green LED, relay output (RY): Yellow LED, alarm outputs (ALM 1/2): Red LED |
| **Applicable standards** | **Conforming standards** | EN 60947-5-1<br>Installation environment (pollution level 2, installation category III) |
| | **EMC** | EN 60947-5-1 |
| | **Safety standards** | UL 508 (Recognition), Korean Radio Waves Act (Act 10564), CSA and CCC |
| **Size in mm (H × W × D)** | | 90 × 22.5 × 100 |

[*1] The rated input voltage is switched with a switch


## Compact plug-in (8-pin) level controller

The 61F-GP-N8 can be used for single- or two-point level control of conductive materials, both liquids and solids. These products are equipped with a red LED operation indicator.

- Low-voltage (AC) electrodes (8 VAC or 24 VAC)
- Operation range: 4 to 15 kΩ, 70 to 300 kΩ
- Detection method: Conductive
- Probes need to be ordered separately
- Conforms to EMC and LVD directives, UL/CSA approved

## Ordering information

| Application | Type | | Order code |
|---|---|---|---|
| Ordinary purified water or sewage water | General purpose type | | 61F-GP-N8 24AC |
| | | | 61F-GP-N8 110AC |
| | | | 61F-GP-N8 230AC |
| Ordinary purified water, where the distance between sewage pumps and water tanks or between receiver tanks and supply tanks is long or where remote control is required | Long-distance type | 2 km | 61F-GP-N8L 24AC 2KM |
| | | | 61F-GP-N8L 110AC 2KM |
| | | | 61F-GP-N8L 230AC 2KM |
| | | 4 km | 61F-GP-N8L 24AC 4KM |
| | | | 61F-GP-N8L 110AC 4KM |
| | | | 61F-GP-N8L 230AC 4KM |
| Liquids with high specific resistance such as distilled water | High sensitivity type | | 61F-GP-N8H 24AC |
| | | | 61F-GP-N8H 110AC |
| | | | 61F-GP-N8H 230AC |
| Liquids with low specific resistance such as salt water, sewage water, acid chemicals, alkali chemicals | Low sensitivity type | | 61F-GP-N8D 24AC |
| | | | 61F-GP-N8D 110AC |
| | | | 61F-GP-N8D 230AC |
| Ordinary purified or sewage water, with two-wired-type electrode holder (incorporating a resistor of 6.8 kΩ) | Two-wired type | | 61F-GP-N8R 24AC |
| | | | 61F-GP-N8R 110AC |
| | | | 61F-GP-N8R 230AC |
| DIN-rail mounting socket | | | PF083A-E |
| Back-connecting socket | | | PL08 |

### Accessories

**Electrode holders**

| Applications | Mounting style | Insulator material | Max. temperature | Number of electrodes | Order code |
|---|---|---|---|---|---|
| For city water and other general use. Easy-to-replace separate versions for maintenance. | Flange | Phenol resin | 70°C | 3 | PS-3S |
| When mounting space is limited. Special 3-pole holder of small size and light weight. | Screw | Phenol resin | | 3, 300 mm<br>3, 1,000 mm | PS-31-300MM<br>PS-31-1000MM |
| Use for sewage, sea water, etc., having a low specific resistance. | Flange | PPS | 150°C (without water drips or vapour on the electrode holder surface) | 1 | BF-1 |
| For resistance to high pressure. Use in tanks with high temperature or pressure. | Screw | PFA | 250°C (without water drips or vapour on the surface of the electrode holder) | 1 | BS-1 |

**Electrode separators**

| Number of electrodes | Order code |
|---|---|
| 1 | F03-14 1P |
| 3 | F03-14 3P |

**Electrodes, connecting, and lock nuts**

| Applicable liquids | Material | Component | Indication mark | Inscription | Order code |
|---|---|---|---|---|---|
| Purified city water, industrial water, sewage | Equivalent to SUS 304 (AISI-304) | Electrode (1 m long) | 1 line | – | F03-01 SUS201 |
| | | Connecting nut | – | – | F03-02 SUS201 |
| | | Lock nut | – | – | F03-03 SUS201 |
| Purified city water, industrial water, sewage, dilute alkaline solution | SUS316 (AISI-316) | Electrode (1 m long) | 2 lines | – | F03-01 SUS316 |
| | | Connecting nut | – | 6 | F03-02 SUS316 |
| | | Lock nut | – | 316 | F03-03 SUS316 |

## Specifications

| Item | 61F-GP-N8 | 61F-GP-N8L | 61F-GP-N8H | 61F-GP-N8D | 61F-GP-N8R |
|---|---|---|---|---|---|
| Supply voltage | 24, 100, 110, 120, 200, 220, 230 or 240 VAC; 50/60 Hz | | | | |
| Operating voltage range | 85 to 110% of rated voltage | | | | |
| Interelectrode voltage | 8 VAC | | 24 VAC | 8 VAC | |
| Interelectrode current | Approx. 1 mA AC max. | | Approx. 0.4 mA AC max. | Approx. 1 mA AC max. | |
| Power consumption | Approx. 3.5 VA max. | | | | |
| Response time | Operate: 80 ms max., release: 160 ms max. | | | | |
| Cable length | 1 km max. | 2 km max. 4 km max. | 50 m max. | 1 km max. | 800 m max. |
| Control output | 1 A, 250 VAC (inductive load: Cosϕ = 0.4), 3 A, 250 VAC (resistive load) | | | | |
| Ambient temperature | Operating: -10 to 55°C | | | | |
| Life expectancy | Electrical: 100,000 operations min., mechanical: 5,000,000 operations min | | | | |
| Size in mm (HxWxD) | 49.9x38x70 | | | | |


## Compact plug-in (11-pin) level controller (DC supply)

This controller is for single- or two-point level control. 24 VDC supply allows for usage in locations without AC power supply. Relay contact chattering usually caused by waves has been eliminated by using open collector output, reducing contact wear.

- Adjustable sensitivity: Operation range: 0 to 100 kΩ
- Red LED for operation indicator
- Conforms to EMC and LVD directives
- UL/CSA approved
- Probes need to be ordered separately

## Ordering information

| Product name | Output | Order code |
|---|---|---|
| Conductive level controller | Open collector (NPN) | 61F-GPN-BT 24VDC |
| | Relay contact (SPST-NO) | 61F-GPN-BC 24VDC |
| Front socket | | PF113A-E |

### Accessories

**Electrode holders**

| Applications | Mounting style | Insulator material | Max. temperature | Number of electrodes | Order code |
|---|---|---|---|---|---|
| For city water and other general use.<br>Easy-to-replace separate versions for maintenance. | Flange | Phenol resin | 70°C | 3 | PS-3S |
| When mounting space is limited.<br>Special 3-pole holder of small size and light weight. | Screw | Phenol resin | | 3, 300 mm<br>3, 1000 mm | PS-31-300MM<br>PS-31-1000MM |
| Use for sewage, sea water, etc.,<br>having a low specific resistance. | Flange | PPS | 150°C (without water drips or vapour on the electrode holder surface) | 1 | BF-1 |
| For resistance to high pressure.<br>Use in tanks with high temperature or pressure. | Screw | PFA | 250°C (without water drips or vapour on the surface of the electrode holder) | 1 | BS-1 |

| Electrode separators | Number of electrodes | Order code |
|---|---|---|
| | 1 | F03-14 1P |
| | 3 | F03-14 3P |

**Electrodes, connecting, and lock nuts**

| Applicable liquids | Material | Component | Indication mark | Inscription | Order code |
|---|---|---|---|---|---|
| Purified city water, industrial water, sewage | Equivalent to SUS 304 (AISI-304) | Electrode (1 m long) | 1 line | – | F03-01 SUS201 |
| | | Connecting nut | – | – | F03-02 SUS201 |
| | | Lock nut | – | – | F03-03 SUS201 |
| Purified city water, industrial water, sewage, dilute alkaline solution | SUS316 (AISI-316) | Electrode (1 m long) | 2 lines | – | F03-01 SUS316 |
| | | Connecting nut | – | 6 | F03-02 SUS316 |
| | | Lock nut | – | 316 | F03-03 SUS316 |

## Specifications

| Item | 61F-GPN-BT | 61 F-GPN-BC |
|---|---|---|
| Rated voltage | 24 VDC | |
| Allowable voltage range | 85 to 110% of the rated voltage | |
| Interelectrode voltage | 5 VAC max. | |
| Error | For scale of 0: +10 kΩ, for scale of 100: ±10 kΩ | |
| Release resistance | 200% max. of the operation resistance | |
| Switching between supply and drainage | Terminals 7 and 8 open: Automatic drainage operation; terminals 7 and 8 shorted: Automatic supply operation | |
| Output specifications | Open collector (NPN) 30 VDC, 100 mA max. | SPST-NO; 5 A, 240 VAC (resistive load)<br>2 A, 240 VAC (inductive load: cosϕ = 0.4) |
| Life expectancy | – | Electrical: 100,000 operations min.<br>Mechanical: 20,000,000 operations min. |
| Wiring distance | 100 m max. | |
| Ambient operating temperature | –10 to 55°C | |
| Response time | Operating: 1.5 s max., releasing: 3.0 s max. | |
| Size in mm (HxWxD) | 49.9x38x70 | |

## 22.5 mm wide conductive level controller

The K8AK-LS1 is a conductive level controller in a 22.5 mm wide industrial housing. Via DIP switches its function (supply or drainage) can be selected. This product is for single- or two-point level control.

- Time delay function up to 10 s
- Supply voltages: 24 VAC/DC and 100 to 240 VAC
- Control output: Relay 5 A at 250 VAC resistive load
- Probes cable length: Max. 100 m from controller
- LED indicator: Green for power ON, yellow for output relay

## Ordering information

| Supply voltage | Order code |
|---|---|
| 24 VAC/VDC | K8AK-LS1 24VAC/DC |
| 100 to 240 VAC | K8AK-LS1 100-240 VAC |

### Accessories

**Electrode holders**

| Applications | Mounting style | Insulator material | Max. temperature | Number of electrodes | Order code |
|---|---|---|---|---|---|
| For city water and other general use.<br>Easy-to-replace separate versions for maintenance. | Flange | Phenol resin | 70°C | 3 | PS-3S |
| When mounting space is limited.<br>Special 3-pole holder of small size and light weight. | Screw | Phenol resin | | 3, 300 mm<br>3, 1000 mm | PS-31-300MM<br>PS-31-1000MM |
| Use for sewage, sea water, etc.,<br>having a low specific resistance. | Flange | PPS | 150°C (without water drips or vapour on the electrode holder surface) | 1 | BF-1 |
| For resistance to high pressure.<br>Use in tanks with high temperature or pressure. | Screw | Fluoro resin | 250°C (without water drips or vapour on the surface of the electrode holder) | 1 | BS-1 |

| Electrode separators | Number of electrodes | Order code |
|---|---|---|
| | 1 | F03-14 1P |
| | 3 | F03-14 3P |

**Electrodes, connecting, and lock nuts**

| Applicable liquids | Material | Component | Indication mark | Inscription | Order code |
|---|---|---|---|---|---|
| Purified city water, industrial water, sewage | Equivalent to SUS304 (AISI-304) | Electrode (1 m long) | 1 line | – | F03-01 SUS201 |
| | | Connecting nut | – | – | F03-02 SUS201 |
| | | Lock nut | – | – | F03-03 SUS201 |
| Purified city water, industrial water, sewage, dilute alkaline solution | SUS316 (AISI-316) | Electrode (1 m long) | 2 lines | – | F03-01 SUS316 |
| | | Connecting nut | – | 6 | F03-02 SUS316 |
| | | Lock nut | – | 316 | F03-03 SUS316 |

## Specifications

| Item | | K8AK-LS |
|---|---|---|
| Ambient operating temperature | | –20 to 60°C (with no condensation or icing) |
| Storage temperature | | –25 to 65°C (with no condensation or icing) |
| Operating voltage range | | 85% to 110% of rated operating voltage |
| Rated power supply frequency | | 50/60 Hz (AC power supply) |
| Output relays | Resistive load | 5 A at 250 VAC or at 30 VDC |
| | Maximum contact voltage | 250 VAC or 30 VDC |
| | Maximum contact current | 5 A |
| | Maximum switching capacity | 1,250 VA, 150 W |
| | Mechanical life | 10,000,000 operations |
| | Electrical life | 50,000 operations at 5 A, 250 VAC or 30 VDC |
| Degree of protection | | Terminal section: IP20 |
| Case material | | PC and ABS |
| Weight | | Approx. 150 g |
| Operating resistance | | 10 kΩ to 100 kΩ (variable) |
| Reset resistance | | 250 kΩ max. |
| Response time | | Approx. 0.1 to 10 s (variable) |
| Cable length | | 100 m max. with completely insulated (600 V) cabtire cable with 3 conductors (0.75 $mm^2$) |
| Indicators | | Green LED: Power, Yellow LED: Control output |
| Applicable standards | Conforming standards | EN 61010-1<br>Installation environment (pollution level 2, installation category II) |
| | EMC | EN 61326-1 |
| | Safety standards | EN 60664-1UL 508 (Recognition), Korean Radio Waves Act (Act 10564), CSA and CCC |
| Size in mm (H × W × D) | | 90 × 22.5 × 100 |


## Ultra-miniature liquid leakage sensor amplifier

This very compact plug-in leakage controller fits into Omron's G2R 8-pin sockets (P2RF-08-E). K7L detects a wide variety of liquids, ranging from water to liquid chemicals with low conductivity.

- Operation range: Up to 50 MΩ
- Four sensing ranges available
- Detection method: Conductive
- Two LEDs: Green for power supplied, red for output indication
- Conforms to EMC and LVD Directives, UL/CSA approved

## Ordering information

| Product name | Characteristics | Order code |
|---|---|---|
| Liquid leakage sensor amplifier | Standard | K7L-AT50 |
| | With disconnection function set | K7L-AT50D |
| | With disconnection function sensor amplifier only | K7L-AT50D-S |

| Product name | | Characteristics | Order code |
|---|---|---|---|
| Sensors | Sensing band | Standard model (material: Polyethylene) | F03-16PE 5M |
| | | For temperature and chemical resistance (material: Polyethylene PTFE) | F03-16PT 5M |
| | | For flexibility and superior workability (material: Plastic fiber braided cable) | F03-16SF 5M |
| | | For flexibility and visual confirmation of leakage (material: Plastic fiber braided cable) | F03-16SFC 5M |
| | Point sensor | Easier to wipe off than the band type | F03-16PS |
| | | Electrodes have PTFE coating to resist chemicals | F03-16PS-F |

### Accessories

| Product name | Characteristics | Order code |
|---|---|---|
| Terminal blocks (10 pcs) | | F03-20 |
| DIN-rail mounted socket | With finger protection | P2RF-08-E |
| | Without finger protection | P2RF-08 |

| Product name | | Characteristics | Order code |
|---|---|---|---|
| Mounting brackets and stickers | Sensing band stickers | Used for F03-16SF(C) | F03-25 |
| | | Used for F03-16PE (adhesive tape) | F03-26PES |
| | | Used for F03-16PE (screws) (30 pcs) | F03-26PEN |
| | | Used for F03-16PT (screws) | F03-26PTN |
| | Point sensor mounting brackets | Used for F03-16PS | F03-26PS |

## Specifications

| | |
|---|---|
| **Rated power supply voltage** | 12 to 24 VDC (allowable voltage fluctuation range: 10 to 30 VDC) |
| **Operate resistance** | 0 Ω to 50 MΩ, variable<br>Range 0: 0 to 250 kΩ<br>Range 1: 0 to 600 kΩ<br>Range 2: 0 to 5 MΩ<br>Range 3: 0 to 50 MΩ |
| **Release resistance** | 105% min. of operate resistance |
| **Output configuration** | NPN open-collector transistor output with 100 mA at 30 VDC max. |
| **Wiring distance** | Connecting cable: 50 m max.<br>Sensing band length: 10 m max. |
| **Ambient temperature** | Operating: –10 to 55°C |
| **Power consumption** | 1 W max. |
| **Response time** | Operate: 800 ms max., release: 800 ms max. |
| **Weight** | Approx. 14 g |
| **Disconnection detection function (K7L-AT50D & K7L-AT50D-S only)** | Detection signal: 10 VDC max., 200 ms, detection time: 10 s max.<br>Release: By resetting the power supply |
| **Size in mm (H×W×D)** | 28.8×12.8×46 |

## Thermistor motor protection relay

The K8AK-TS is the temperature monitoring relay based on the thermistor detection and can protect the motor from overheating.
The K8AK-PT gives further functionalities such as temperature, 3-phase sequence and loss monitoring and contributes to the overall safety 3-phase motor's operation.

- DIN 22.5-mm-sized K8AK-PT relays
- Side-by-side mounting of K8AK-PT relays
- Specially designed for internal motor monitoring, no setting required
- Test/Reset button for confirmation of output operation
- Monitoring also performed for thermistor disconnections and short circuits
- Manual or automatic resetting with the same relay

## Ordering information

| Rated input | | Order code |
|---|---|---|
| Temperature monitoring | 24 VAC/DC | K8AK-TS1 24 VAC/DC |
| Phase sequence, phase loss and temperature monitoring | 100 to 240 VAC | K8AK-PT1 100-240 VAC |
| | | K8AK-TS1 100-240 VAC |

## Specifications

| | | |
|---|---|---|
| **Ambient operating temperature** | | –20 to 60°C (with no condensation or icing) |
| **Storage temperature** | | –25 to 65°C (with no condensation or icing) |
| **Input frequency** | | 50/60 Hz (AC power supply) |
| **Output relays (2 × SPDT, normally closed operation)** | **Resistive load** | 5 A at 250 VAC or at 30 VDC |
| | **Maximum contact voltage** | 250 VAC or 30 VDC |
| | **Maximum contact current** | 5 A |
| | **Maximum switching capacity** | 1,250 VA, 150 W |
| | **Mechanical life** | 10,000,000 operations |
| | **Electrical life** | 50,000 operations at 250 VAC or 30 VDC |
| **Degree of protection** | | Terminal section: IP20 |
| **Case material** | | PC and ABS UL94 V-0 |
| **Weight** | | Approx. 150 g |
| **Rated input voltage** | | 3-phase, 3-wire mode: 200 to 480 VAC |
| **Reset method** | | Manual reset/automatic reset (switchable)*1 |
| **Operating time (T)** | **Phase-sequence on three-phase voltage input** | 0.1 s ±0.05 s |
| | **Phase loss on three-phase voltage input** | 0.1 s max. (when the voltage changes rapidly from 100 to 0% of rated voltage) |
| | **PTC thermistor input** | 0.2 s max. |
| **Overload capacity** | | Continuous input: 528 V |
| **Indicators** | | Power (PWR): Green, PH alarm outputs (ALM): Red, TS alarm outputs (ALM): Red |
| **Applicable standards** | **Conforming standards** | EN 60947-5-1<br>Installation environment (pollution level 2, installation category III) |
| | **EMC** | EN 60947-5-1 |
| | **Safety standards** | UL 508 (Recognition), Korean Radio Waves Act (Act 10564), CSA and CCC |
| **Size in mm (H × W × D)** | | 90 × 22.5 × 100 |

*1 Manual reset method: Press the TEST/RESET button.

## Protect your heating application

This temperature monitoring relay was designed specially for monitoring abnormal temperatures to prevent excessive temperature increase and to protect equipment. K8AK-TH provides temperature monitoring in a slim design with a width of just 22.5 mm.

- Simple function settings using DIP switch
- Selectable alarm latch and SV setting protection
- Multi-input support for thermocouple or Pt100 and Pt1000 sensor input
- Changeover relay: fail-safe selectable
- Alarm status identification with LED

## Ordering information

| Input type | Temperature setting range | Setting unit | Supply voltage | Size in mm (H×W×D) | Order code |
|---|---|---|---|---|---|
| Thermocouple/ Pt100 and Pt1000 | 0 to 999°C/F | 1°C/F | 100 to 240 VAC | 90×22.5×100 | K8AK-TH11S AC100-240 |
| | | | 24 VAC/VDC | | K8AK-TH11S AC/DC24 |
| Thermocouple | 0 to 1,800°C<br>0 to 3,200 °F *1 | 10°C/F | 100 to 240 VAC | | K8AK-TH12S AC100-240 |
| | | | 24 VAC/VDC | | K8AK-TH12S AC/DC24 |

*1 Setting range depending on sensor type selected

## Specifications

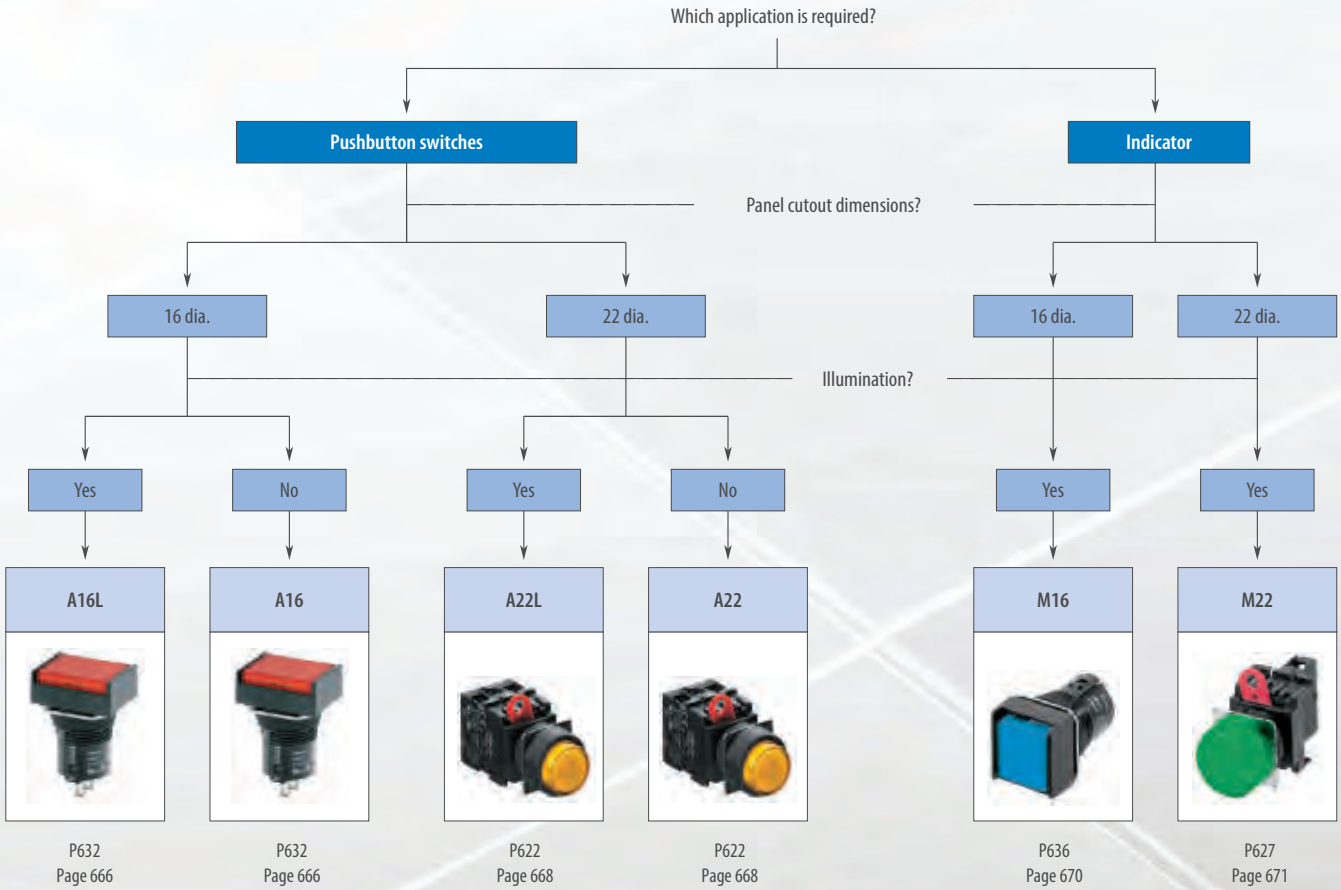
| Item | | 100 to 240 VAC 50/60 Hz | 24 VAC 50/60 Hz or 24 VDC |
|---|---|---|---|
| Allowable voltage range | | 85 to 110% of power supply voltage | |
| Power consumption | | 5 VA max. | 2 W max. (24 VDC), 4 VA max. (24 VAC) |
| Sensor inputs | K8AK-TH11S | Thermocouple: K, J, T, E; platinum-resistance thermometer: Pt100, Pt1000 | |
| | K8AK-TH12S | Thermocouple: K, J, T, E, B, R, S, PLII | |
| Output relay | | One SPDT relay (5 A at 250 VAC, resistive load) | |
| External inputs (for latch setting) | Contact input | ON: 1 kΩ max., OFF: 100 kΩ min. | |
| | Non-contact input | ON residual voltage: 1.5 V max., OFF leakage current: 0.1 mA max. | |
| | | Leakage current: Approx. 10 mA | |
| Setting method | | Rotary switch setting (set of three switches) | |
| Indicators | | Power (PWR): Green LED, relay output (ALM): Red LED | |
| Other functions | | Alarm mode (upper limit/lower limit), output normally ON/OFF selection, output latch, setting protection, fail-safe operation selectable, temperature unit °C/°F | |
| Ambient operating temperature | | –20 to 55°C (with no condensation or icing) | |
| Storage temperature | | –25 to 65°C (with no condensation or icing) | |
| Setting accuracy | | ±1% of full scale | |
| Hysteresis width | | 2°C | |
| Output relays (1 × SPDT, normally closed operation) | Resistive load | 5 A at 250 VAC or at 30 VDC | |
| | Maximum contact voltage | 250 VAC or 30 VDC | |
| | Maximum contact current | 5 A | |
| | Maximum switching capacity | 1,250 VA, 150 W | |
| | Mechanical life | 10,000,000 operations | |
| | Electrical life | 50,000 operations at 5 A, 250 VAC or 30 VDC | |
| Sampling cycle | | 100 ms | |
| Weight | | 160 g | |
| Degree of protection | | IP20 | |
| Memory protection | | Non-volatile memory (number or writes: 1,000,000) | |
| Safety standards | Approved standards | EN 61010-1 (Pollution level 2, overvoltage category II) | |
| | Application standards | EN 61326-1, UL 61010-1, Korean Radio Waves Act (Act 10564), CSA:CAN/CSA C22.2 No.14, CCC: GB14048.5 | |
| Crimp terminals | | Two solid wires of 2.5 $mm^2$ or two ferrules of 1.5 $mm^2$ with insulation sleeves can be tightened together | |
| Case material | | PC and ABS | |
| Mounting | | Mounted to DIN-rail | |
| Size in mm (H×W×D) | | 90×22.5×100 | |

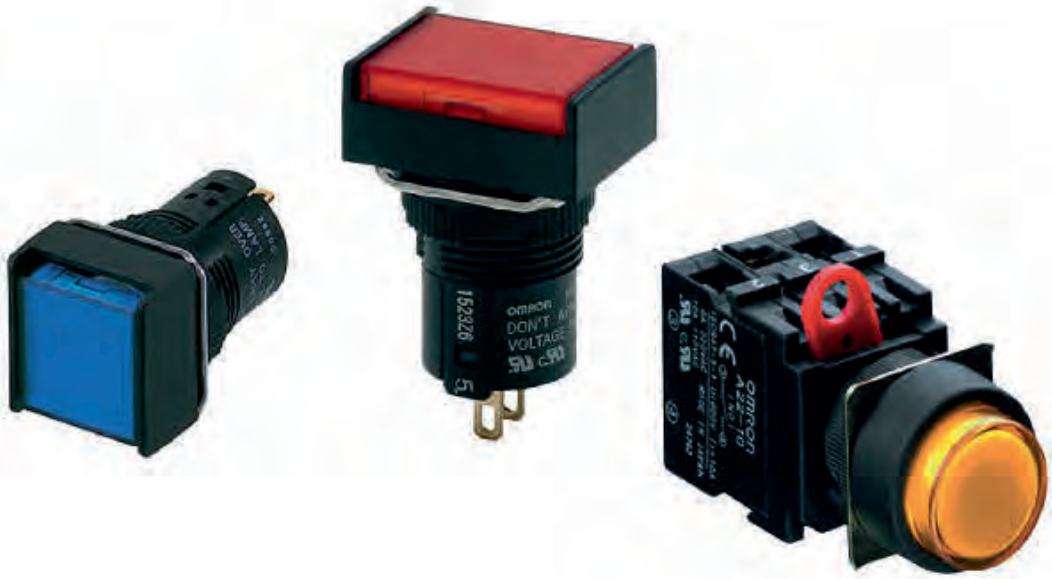
# 16 MM SUB-ASSEMBLED PUSHBUTTON SWITCHES

## A165 – Full range with IP65 rating

All our 16 mm pushbuttons are upgraded to IP65 rating. This will increase the reliability of your application. The pushbuttons are very easy to assemble due to their modular construction: Pushbutton + case + lamp (if applicable) + switch.

- Wide range of models: rectangular, square & round
- With or without lamp
- Easy assembly and installation

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| Category | | Pushbutton switch | | Indicator | |
|---|---|---|---|---|---|
| | |  |  |  |  |
| **Model** | | **A16** | **A22** | **M16** | **M22** |
| Selection criteria | Mounting | Nut-mounting | | | |
| | Size | 16 mm | 22 mm | 16 mm | 22 mm |
| | Shape | ▭ □ ○ | ▭ □ ○ | ▭ □ ○ | ▭ □ ○ |
| Pushbutton color – Incandescent lamp-lighted | Red | ■ | ■ | ■ | ■ |
| | Yellow | ■ | ■ | ■ | ■ |
| | Pure yellow | ■ | | ■ | – |
| | Green | ■ | ■ | ■ | ■ |
| | White | ■ | ■ | ■ | ■ |
| | Blue | ■ | ■ | ■ | ■ |
| Pushbutton color – LED-lighted | Red | ■ | ■ | ■ | ■ |
| | Yellow | ■ | ■ | ■ | ■ |
| | Pure yellow | ■ | | ■ | – |
| | Green | ■ | ■ | ■ | ■ |
| | White | ■ | ■ | ■ | ■ |
| | Blue | ■ | ■ | ■ | ■ |
| Pushbutton color – Non-lighted | Red | ■ | ■ | – | – |
| | Yellow | ■ | ■ | – | – |
| | Green | ■ | ■ | – | – |
| | White | ■ | ■ | – | – |
| | Blue | ■ | ■ | – | – |
| | Black | ■ | ■ | – | – |
| Features | Momentary operation | ■ | ■ | – | – |
| | Self-holding | ■ | ■ | – | – |
| | Number of contacts | 2 | 6 | – | – |
| | IP rating | IP65 | | | |
| | Legend plate | ■ | ■ | ■ | ■ |
| Switch ratings [A] | 125 VAC | 5 | 10 | – | – |
| | 250 VAC | 3 | 6 | – | – |
| | 30 VDC | 3 | 10 | – | – |
| | Rated load | 5 A at 125 VAC,<br>3 A at 250 VAC,<br>3 A at 30 VDC | 10 A at 110 VAC,<br>6 A at 220 VAC | – | – |
| Terminals | Solder | ■ | – | ■ | – |
| | PCB | – | – | ■ | – |
| | Screw-less Clamp | – | – | ■ | – |
| Operating voltage | 5 VDC | ■ | ■ | ■ | ■ |
| | 12 VDC | ■ | ■ | ■ | ■ |
| | 24 VDC | ■ | ■ | ■ | ■ |
| Form | SPDT | ■ | – | – | – |
| | DPDT | ■ | – | – | – |
| | SPST-NO | – | ■ | – | – |
| | SPST-NC | – | ■ | – | – |
| | SPST-NO + SPST-NC | – | ■ | – | – |
| | DPST-NO | – | ■ | – | – |
| | DPST-NC | – | ■ | – | – |
| | Page/Quick Link | 666 | 668 | 670 | 671 |

■ Standard □ Available – No/not available

## 16 mm pushbutton switch

These sub-assembled pushbutton switches have a modular construction: pushbutton + case + lamp (if applicable) + switch. A16 is a nut-mounted pushbutton switch with a short mounting depth of less than 28.5 mm below panel.

- Wide variety of control and signal devices: lighted, non-lighted and buzzer
- Quick and easy assembly, snap-in switch
- Wide range of switching capacity from standard load to micro load
- High reliability, IP65
- UL, cUL, CSA and VDE approved, conforms to EN60947-5-1 and IEC947-5-1

## Ordering information

| Type | Color | Order code | | |
|---|---|---|---|---|
| | | Degree of protection: Oil-resistant IP65 | | |
| | | Rectangular | Square | Round |
| Non-lighted<br>LED<br>Incandescent lamp | Red | A165L-JR | A165L-AR | A165L-TR |
| | Yellow | A165L-JY | A165L-AY | A165L-TY |
| | Pure yellow | A165L-JPY | A165L-APY | A165L-TPY |
| | White | A165L-JW | A165L-AW | A165L-TW |
| | Blue | A165L-JA | A165L-AA | A165L-TA |
| Non-lighted | Black | A165L-JB | A165L-AB | A165L-TB |
| LED | Green | A165L-JGY | A165L-AGY | A165L-TGY |
| Non-lighted/incandescent lamp | Green | A165L-JG | A165L-AG | A165L-TG |

### Cases

| Appearance | Classification | | Order code |
|---|---|---|---|
| | | | Oil-resistant IP65 |
|  | Momentary operation | Rectangular (2-way guard) | A165-CJM |
| | | Square | A165-CAM |
| | | Round | A165-CTM |
| | Alternate operation | Rectangular (2-way guard) | A165-CJA |
| | | Square | A165-CAA |
| | | Round | A165-CTA |

### Switches

| Appearance | Classification | | | | Order code |
|---|---|---|---|---|---|
|  | Lighted/ non-lighted (common use) | Standard load/ microload (common use) | SPDT | Solder terminal | A16-1 |
| | | | DPDT | | A16-2 |
|  | | | SPDT | PCB terminal | A16-1P |
| | | | DPDT | | A16-2P |
|  | | | DPDT | Screw-less clamp | A16-2S |

### Switches with reduced voltage lighting

| Appearance | Classification | | | | Order code |
|---|---|---|---|---|---|
|  | 100 V | Standard load/ microload (common use) | SPDT | Solder terminal | A16-T1-1 |
| | | | DPDT | | A16-T1-2 |
|  | 100 V | | DPDT | Screw-less clamp | A16-T1-2S |
| | 200 V | | | | A16-T2-2S |

### Lamps

| Type | Color | Order code | | |
|---|---|---|---|---|
| | | 5 VDC | 12 VDC | 24 VDC |
| LED | Red | A16-5DSR | A16-12DSR | A16-24DSR |
| | Yellow | A16-5DSY | A16-12DSY | A16-24DSY |
| | Green | A16-5DSG | A16-12DSG | A16-24DSG |
| | White *1 | A16-5DSW | A16-12DSW | A16-24DSW |
| | Blue | A16-5DA | A16-12DA | A16-24DA |
| Type | | 5 VAC/VDC | 12 VAC/VDC | 24 VAC/VDC |
| Incandescent lamp | | A16-5 | A16-12 | A16-24 |

*1 Use the white LED together with white or pure yellow pushbuttons.

## Accessories

| Name | Appearance | Classification | Remarks | Order code |
|---|---|---|---|---|
| Switch guards |  | For rectangular models | Cannot be used with the dust cover | A16ZJ-5050 |
| | | For square and round models | | A16ZA-5050 |
| Dust covers |  | For rectangular models | Cannot be used with the switch guard | A16ZJ-5060 |
| | | For square models | | A16ZA-5060 |
| | | For round models | | A16ZT-5060 |
| Panel plugs |  | For rectangular models | Used for covering the panel cutouts for future panel expansion | A16ZJ-3003 |
| | | For square models | | A16ZA-3003 |
| | | For round models | | A16ZT-3003 |

## Specifications

| | | |
|---|---|---|
| **Allowable operating frequency** | **Mechanical** | Momentary operation: 120 operations/minute max.<br>Alternate operation: 60 operations/minute max. |
| | **Electrical** | 20 operations/minute max. |
| **Durability** | **Mechanical** | Momentary operation: 2,000,000 operations min.<br>Alternate operation: 200,000 operations min. |
| | **Electrical** | 100,000 operations min. |
| **Ambient temperature** | | Operating: −10 to 55°C (with no icing or condensation)<br>Storage: −25 to 65°C (with no icing or condensation) |
| **Weight** | | Approx. 10 g (in the case of a lighted DPDT switch with solder terminals) |
| **Size in mm (H×W×D)** | | Round/square: 18×18×28.5<br>rectangular: 18×24×28.5 |

| Operating characteristics | Pushbutton switch | |
|---|---|---|
| | Oil-resistant IP65 | |
| | SPDT | DPDT |
| **Operating force (OF) max.** | 2.94 N | 4.91 N |
| **Releasing force (RF) min.** | 0.29 N | |
| **Total travel (TT)** | Approx. 3 mm | |
| **Pretravel (PT) max.** | 2.5 mm | |
| **Lock stroke (LTA) min.** | 0.5 mm | |

| Item | | Screw-less clamp | | | |
|---|---|---|---|---|---|
| **Recommended wire size** | | 0.5 $mm^2$ twisted wire or 0.8 mm dia. solid wire | | | |
| **Usable wires and tensile strength** | **Twisted wire** | 0.3 $mm^2$ | 0.5 $mm^2$ | 0.75 $mm^2$ | 1.25 $mm^2$ |
| | **Solid wire** | 0.5 mm dia. | 0.8 mm dia. | 1.0 mm dia. | |
| | **Tensile strength** | 10 N | 20 N | 30 N | 40 N |
| **Length of exposed wire** | | 10 ±1 mm | | | |

## 22 mm pushbutton switch

The A22 comes in a wide variety of shapes and colors and is installable in 22-dia. or 25-dia. panel cutouts. The switch unit can be easily mounted. A22 is mounted using either open-type (fork-type) or closed-type (round-type) crimp terminals.

- Finger-protection mechanism on the switch unit are provided as a standard feature
- Increased wiring efficiency with three-row mounting of switch blocks
- IP65 oil-resistant (non-lighted models), IP65 (lighted models)
- Lighted and non-lighted, flat, projection and half- and full-guard versions
- EN60947-5-1, UL and cUL approved

## Ordering information

### Pushbutton

| Illumination | Color | Order code | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Flat type | Projection type | Full-guard type | Half-guard type | Square/ projection type | Square/ full-guard type | Round/ mushroom type (30-dia. head) | Round/ mushroom type (40-dia. head) |
| | |  |  |  |  |  |  |  |  |
| Non-lighted | Red | A22-FR | A22-TR | A22-GR | A22-HR | A22-CR | A22-DR | A22-SR | A22-MR |
| | Green | A22-FG | A22-TG | A22-GG | A22-HG | A22-CG | A22-DG | A22-SG | A22-MG |
| | Yellow | A22-FY | A22-TY | A22-GY | A22-HY | A22-CY | A22-DY | A22-SY | A22-MY |
| | White | A22-FW | A22-TW | A22-GW | A22-HW | A22-CW | A22-DW | A22-SW | A22-MW |
| | Blue | A22-FA | A22-TA | A22-GA | A22-HA | A22-CA | A22-DA | A22-SA | A22-MA |
| | Black | A22-FB | A22-TB | A22-GB | A22-HB | A22-CB | A22-DB | A22-SB | A22-MB |
| Lighted | Red | – | A22L-TR | A22L-GR | A22L-HR | A22L-CR | A22L-DR | – | – |
| | Green | – | A22L-TG | A22L-GG | A22L-HG | A22L-CG | A22L-DG | – | – |
| | Yellow | – | A22L-TY | A22L-GY | A22L-HY | A22L-CY | A22L-DY | – | – |
| | White | – | A22L-TW | A22L-GW | A22L-HW | A22L-CW | A22L-DW | – | – |
| | Blue | – | A22L-TA | A22L-GA | A22L-HA | A22L-CA | A22L-DA | – | – |
| Buttonsize in mm | | 29.7 dia. × 12D | 29.7 dia. × 19D | 29.7 dia. × 19D | 29.7 dia. × 12/18.5D | 29.8 $mm^2$ × 18D | 29.8 $mm^2$ × 18D | 30 dia. × 32D | 40 dia. × 32D |

### Switches

| Switch operation | Contacts | Oder code | | | |
|---|---|---|---|---|---|
| | | Non-lighted models | Lighted models | | |
| | | | Without voltage reduction unit | With voltage reduction unit | |
| | | | | 110 VAC | 220 VAC |
| | |  |  |  |  |
| Momentary | SPST-NO | A22-10M | A22L-10M | A22L-10M-T1 | A22L-10M-T2 |
| | SPST-NC | A22-01M | A22L-01M | A22L-01M-T1 | A22L-01M-T2 |
| | SPST-NO + SPST-NC | A22-11M | A22L-11M | A22L-11M-T1 | A22L-11M-T2 |
| | DPST-NO | A22-20M | A22L-20M | A22L-20M-T1 | A22L-20M-T2 |
| | DPST-NC | A22-02M | A22L-02M | A22L-02M-T1 | A22L-02M-T2 |
| Alternate | SPST-NO | A22-10A | A22L-10A | A22L-10A-T1 | A22L-10A-T2 |
| | SPST-NC | A22-01A | A22L-01A | A22L-01A-T1 | A22L-01A-T2 |
| | SPST-NO + SPST-NC | A22-11A | A22L-11A | A22L-11A-T1 | A22L-11A-T2 |
| | DPST-NO | A22-20A | A22L-20A | A22L-20A-T1 | A22L-20A-T2 |
| | DPST-NC | A22-02A | A22L-02A | A22L-02A-T1 | A22L-02A-T2 |

### Switch blocks

| | Standard load | Order code |
|---|---|---|
| Switch blocks | SPST-NO | A22-10 |
|  | SPST-NC | A22-01 |
| | DPST-NO | A22-20 |
| | DPST-NC | A22-02 |

### Lamp – LED

| AC/DC | LED light | Order code | | | |
|---|---|---|---|---|---|
| | | Operating voltage | | | |
| | | 6 V | 12 V | 24 V | 24 V superbright |
| DC | Red | A22-6DR | – | – | – |
| | Green | A22-6DG | – | – | – |
| | Yellow *1 | A22-6DY | – | – | – |
| | Blue | A22-6DA | – | – | – |
| AC | Red | A22-6AR | – | – | – |
| | Green | A22-6AG | – | – | – |
| | Yellow *1 | A22-6AY | – | – | – |
| | Blue | A22-6AA | – | – | – |
| AC and DC | Red | – | A22-12AR | A22-24AR | A22-24ASR |
| | Green | – | A22-12AG | A22-24AG | A22-24ASG |
| | Yellow *1 | – | A22-12AY | A22-24AY | A22-24ASY |
| | Blue | – | A22-12AA | A22-24AA | A22-24ASA |

*1 Used when the pushbutton color is yellow or white

### Lamp - incandescent lamp

| Order code | | |
|---|---|---|
| Operating voltage | | |
| 5 VAC/VDC | 12 VAC/VDC | 24 VAC/VDC |
| A22-5 | A22-12 | A22-24 |

## Accessories

| Item | | | | Remarks | Order code |
|---|---|---|---|---|---|
| Lamp sockets | Direct lighting | | | Used when changing the lighting method (LED only) | A22-TN |
| | Voltage-reduction lighting | | 220 VAC | | A22-T2 |
| Mounting latches | For momentary models | | | Order mounting latches only when mounting switch blocks or lamp sockets are purchased individually | A22-3200 |
| Legend plate frames | Large size | With snap-in legend plate, without text, black | | Snap-in legend plate is acrylic | A22Z-3333 |
| | | Without snap-in legend plate | | | A22Z-3330 |
| Sealing caps | For projection models | | | Used to prevent dust or water from entering the operation unit (pushbutton, etc.), color: Opaque, material: Silicon | A22Z-3600T |
| Three-throw spacer | | | | Used when mounting three non-lighted switches | A22Z-3003 |
| Control boxes (enclosures) | Exclusively for A22 | | One hole | Do not use DPST-NO or DPST-NC switches, material: Polycarbonate resin | A22Z-B101 |
| | | | Two holes | | A22Z-B102 |
| | | | Three holes | | A22Z-B103 |
| Snap-in legend plates | Standard size | Without text | White | Attached to the standard-size legend plate frame, material: Acrylic | A22Z-3443W |
| | | | Transparent | | A22Z-3443C |
| | | White text on black background | ON | | A22Z-3443B-5 |
| | | | OFF | | A22Z-3443B-6 |
| | | | DOWN | | A22Z-3443B-8 |
| | | | POWER ON | | A22Z-3443B-9 |
| | Large size | Without text | White | Attached to the large-size legend plate frame, material: Acrylic | A22Z-3453W |
| | | | Transparent | | A22Z-3453C |
| | For emergency stop switch | 60-dia. round plate with black letters on a yellow background | | "EMERGENCY STOP" is engraved on the plate. Used as an emergency stop switch legend plate | A22Z-3466-1 |
| | | 90-dia. round plate with black letters on a yellow background | | | A22Z-3476-1 |
| Lamp extractor | | | | Rubber tool used to easily replace lamps | A22Z-3901 |
| Tightening wrench | | | | Tool used to tighten nuts from the back of the panel | A22Z-3905 |

## Specifications

| Recognized organization | Standards | File number |
|---|---|---|
| UL, cUL | UL508 | E41515 |
| – | EN60947-5-1 | – |

### Contact ratings (standard load)

| Rated carry current (A) | Rated voltage | Rated current (A) | | | |
|---|---|---|---|---|---|
| | | AC15 (inductive load) | AC12 (resistive load) | DC13 (inductive load) | DC12 (resistive load) |
| 10 | 24 VAC | 10 | 10 | – | – |
| | 110 VAC | 5 | 10 | – | – |
| | 220 VAC | 3 | 6 | – | – |
| | 380 VAC | 2 | 3 | – | – |
| | 440 VAC | 1 | 2 | – | – |
| | 24 VDC | – | – | 1,5 | 10 |
| | 110 VDC | – | – | 0,5 | 2 |
| | 220 VDC | – | – | 0,2 | 0,6 |
| | 380 VDC | – | – | 0,1 | 0,2 |

### Contacts (microload)

| Rated applicable load | Minimum applicable load |
|---|---|
| 50 mA at 5 VDC (resistive load) | 1 mA at 5 VDC |

### LED indicators without voltage reduction unit

| Rated voltage | Rated current | Operating voltage |
|---|---|---|
| 6 VDC | 60 mA (20 mA) | 6 VDC ±5% |
| 6 VAC | 60 mA (20 mA) | 6 VAC/VDC ±5% |
| 12 VAC/VDC | 30 mA (10 mA) | 12 VAC/VDC ±5% |
| 24 VAC/VDC | 15 mA (10 mA) | 24 VAC/VDC ±5% |

### Super-bright LED indicator

| Rated voltage | Rated current | Operating voltage |
|---|---|---|
| 24 VAC/VDC | 15 mA | 24 VAC/VDC ±5% |

### Incandescent lamp

| Rated voltage | Rated current | Operating voltage |
|---|---|---|
| 6 VAC/VDC | 200 mA | 5 VAC/VDC |
| 14 VAC/VDC | 80 mA | 12 VAC/VDC |
| 28 VAC/VDC | 40 mA | 24 VAC/VDC |
| 130 VAC/VDC | 20 mA | 100 VAC/VDC |

### Voltage-reduction lighting

| Rated voltage | Operating voltage | Applicable lamp (BA8S/13_ gold) |
|---|---|---|
| 110 VAC | 95 to 115 VAC | LED Lamp (A22-24A_) |
| 220 VAC | 190 to 230 VAC | |

| Item | | Pushbutton switches | | Emergency stop switches | | Knob-type selector switches | | Key-type selector switch |
|---|---|---|---|---|---|---|---|---|
| | | Non-lighted | Lighted | Non-lighted | Lighted | Non-lighted | Lighted | Non-lighted |
| Allowable operating frequency | Mechanical | Momentary operation: 60 operations/minute max. | | 30 operations/minute max. | | Manual release: 30 operations/minute max., automatic release: 30 operations/minute max. | | |
| | Electrical | 30 operations/minute max. | | | | 30 operations/minute max. | | |
| Durability (number of operations min.) | Mechanical | Momentary operation: 5,000,000 | | Momentary operation: 300,000 | | 500,000 | 100,000 | 500,000 |
| | Electrical | 500,000 | | 300,000 | | 500,000 | 100,000 | 500,000 |
| Ambient temperature | Operating | –20 to 70°C | –20 to 55°C | –20 to 70°C | –20 to 55°C | –20 to 70°C | –20 to 55°C | –20 to 70°C |
| | Storage | –40 to 70°C | –40 to 70°C | –40 to 70°C | –40 to 70°C | –40 to 70°C | –40 to 70°C | –40 to 70°C |
| Degree of protection | | IP65 (oil-resistant) | IP65 | IP65 (oil-resistant) | IP65 | IP65 (oil-resistant) | IP65 | IP65 (oil-resistant) |
| Size in mm (in-panel only) | | 34H × 34W × 54.7D, 34H × 34W × 72.7D for DPST switches | | | | | | |

## Indicators with a mounting aperture of 16 mm

The M16 series of nut-mounted indicators comes in rectangular, square and round versions. Due to its modular construction, assembly is quick and easy. M16 comes in a wide variety of control and signal devices with a wide range of switching capacities, from general load to micro load.

- LED, incandescent and neon lamp
- Snap-in switch unit
- Short mounting depth, less than 28.5 mm below panel
- High reliability, IP65
- UL, CSA and VDE approved, conforms to EN60947-5-1

## Ordering information

### Pushbutton

| Type | Display color | Order code | | |
|---|---|---|---|---|
| | | IP65 oil-resistant | | |
| | | Rectangular | Square | Round |
| LED Incandescent lamp | Red | A165L-JR | A165L-AR | A165L-TR |
| | Yellow | A165L-JY | A165L-AY | A165L-TY |
| | Pure yellow | A165L-JPY | A165L-APY | A165L-TPY |
| | White | A165L-JW | A165L-AW | A165L-TW |
| | Blue | A165L-JA | A165L-AA | A165L-TA |
| LED Incandescent lamp | Green | A165L-JGY | A165L-AGY | A165L-TGY |
| | Green | A165L-JG | A165L-AG | A165L-TG |

### Lamp

| Type | Color | Order code | | |
|---|---|---|---|---|
| | | Operating voltage | | |
| | | 5 VDC | 12 VDC | 24 VDC |
| LED | Red | A16-5DSR | A16-12DSR | A16-24DSR |
| | Yellow | A16-5DSY | A16-12DSY | A16-24DSY |
| | Green | A16-5DSG | A16-12DSG | A16-24DSG |
| | White | A16-5DSW | A16-12DSW | A16-24DSW |
| | Blue | A16-5DA | A16-12DA | A16-24DA |
| **Type** | | **5 VAC/VDC** | **12 VAC/VDC** | **24 VAC/VDC** |
| Incandescent lamp | | A16-5 | A16-12 | A16-24 |

### Case

| Classification | | Order code |
|---|---|---|
| IP65 oil-resistant | Rectangular | A165-CJM |
| | Square | A165-CAM |
| | Round | A165-CTM |

### Socket

| Classification | | | Order code |
|---|---|---|---|
| Solder terminals | | | M16-0 |
| PCB terminals | | | M16-0P |
| Screw-less clamp | | | M16-S |
| Solder terminals | Voltage-reduction lighting | 100 V | M16-T1 |
| Screw-less clamp | | 100 V | M16-T1-S |
| | | 200 V | M16-T2-S |

## Specifications

| | | |
|---|---|---|
| **Allowable operating frequency** | **Mechanical** | Momentary operation: 120 operations/minute max., alternate operation: 60 operations/minute max. |
| | **Electrical** | 20 operations/minute max. |
| **Durability** | **Mechanical** | Momentary operation: 2,000,000 operations min., alternate operation: 200,000 operations min. |
| | **Electrical** | 100,000 operations min. |
| **Degree of contamination** | | 3 (IEC947-5-1) |
| **Ambient temperature** | | Operating: –10 to 55°C (with no icing or condensation)<br>Storage: –25 to 65°C (with no icing or condensation) |
| **Weight** | | Approx. 10 g (in the case of a lighted DPDT switch with solder terminals) |
| **Size in mm** | | Round/square:18Hx18Wx28.5D<br>rectangular:18Hx24Wx28.5D |

| Agency | Standards | File number |
|---|---|---|
| **UL, cUL** | UL508 | E41515 |

### Ratings

| Superbright LED | | | |
|---|---|---|---|
| **Rated voltage** | **Rated current** | **Operating voltage** | **Built-in limiting resistance** |
| **5 VDC** | 30 mA (15 mA) | 5 VDC ±5% | 33 Ω (68 Ω) |
| **12 VDC** | 15 mA | 12 VDC ±5% | 270 Ω (560 Ω) |
| **24 VDC** | 10 mA | 24 VDC ±5% | 1,600 Ω (2,000 Ω) |

| Incandescent lamp | | |
|---|---|---|
| **Rated voltage** | **Rated current** | **Operating voltage** |
| **6 VAC/VDC** | 60 mA | 5 VAC/VDC |
| **14 VAC/VDC** | 40 mA | 12 VAC/VDC |
| **28 VAC/VDC** | 24 mA | 24 VAC/VDC |

## Nut-mounted, 22 mm indicator, with high visibility, illuminated buttons

The M22 series of indicators comes in 22 or 25 mm-diameter round versions.
They can be easily mounted and removal of the socket unit is also easy.
The finger protection mechanism on the lamp is provided as a standard feature.
M22 indicators can be equipped with an LED or incandescent lamp.

- Available in 5 colors
- Super-bright LEDs for all versions
- Lamp sockets with or without transformers
- UL and cUL approved

## Ordering information

### Display

| Appearance | IP65 oil-resistant | |
|---|---|---|
| | Color of display | Order code |
| Round/flat | Red | M22-FR |
| | Green | M22-FG |
| | Yellow | M22-FY |
| | White | M22-FW |
| | Blue | M22-FA |
| Square/projection | Red | M22-CR |
| | Green | M22-CG |
| | Yellow | M22-CY |
| | White | M22-CW |
| | Blue | M22-CA |

### Socket unit

| Order code | |
|---|---|
| Voltage-reduction circuits | |
| Without voltage reduction unit | With voltage reduction unit (220 VAC) |
| M22-00 | M22-00-T2 |

### Lamp

| AC/DC | LED light | Operating voltage | | | |
|---|---|---|---|---|---|
| | | 6 V | 12 V | 24 V | 24 V superbright |
| AC | Red | A22-6DR | – | – | – |
| | Green | A22-6DG | – | – | – |
| | Yellow | A22-6DY | – | – | – |
| | Blue | A22-6DA | – | – | – |
| DC | Red | A22-6AR | – | – | – |
| | Green | A22-6AG | – | – | – |
| | Yellow | A22-6AY | – | – | – |
| | Blue | A22-6AA | – | – | – |
| AC and DC | Red | – | A22-12AR | A22-24AR | A22-24ASR |
| | Green | – | A22-12AG | A22-24AG | A22-24ASG |
| | Yellow | – | A22-12AY | A22-24AY | A22-24ASY |
| | Blue | – | A22-12AA | A22-24AA | A22-24ASA |

| Incandescent lamp | 6 VAC/VDC | 12 VAC/VDC | 24 VAC/VDC | 100 VAC/VDC |
|---|---|---|---|---|
| | A22-5 | A22-12 | A22-24 | A22-H1 |

### Accessories

M22 uses the same accessories as A22. Please refer to the relevant information in the corresponding section for the A22.

## Specifications

| Recognized organization | Standards | File number |
|---|---|---|
| UL, cUL | UL508 | E41515 |

### LED lamp

| Rated voltage | Rated current | Operating voltage |
|---|---|---|
| 6 VDC | 60 mA (20 mA) | 6 VDC ±5% |
| 6 VAC | 60 mA (20 mA) | 6 VAC ±5% |
| 12 VAC/VDC | 30 mA (10 mA) | 12 VAC/VDC ±5% |
| 24 VAC/VDC | 15 mA (10 mA) | 24 VAC/VDC ±5% |

### Incandescent lamp

| Rated voltage | Rated current | Operating voltage |
|---|---|---|
| 6 VAC/VDC | 200 mA | 5 V |
| 14 VAC/VDC | 80 mA | 12 V |
| 28 VAC/VDC | 40 mA | 24 V |
| 130 VAC/VDC | 20 mA | 100 V |

### Superbright LED indicator

| Rated voltage | Rated current | Operating voltage |
|---|---|---|
| 24 VAC/VDC | 15 mA | 24 VAC/VDC ±5% |

### Voltage-reduction lighting

| Rated voltage | Rated current | Operating voltage |
|---|---|---|
| 110 VAC | 95 to 115 VAC | LED lamp (A22-24_) |
| 220 VAC | 190 to 230 VAC | |

| | |
|---|---|
| Ambient temperature | Operating: –20 to 55°C, storage: –40 to 70°C |
| Degree of protection | IP65 |
| Electric shock protection class | Class II |
| PTI (tracking characteristic) | 175 |
| Degree of contamination | 3 (IEC947-5-1) |
| Size in mm | Button: 29.7 dia. × 16D, switch: 34H × 34W × 54.7D |

# Software

## Find information fast!

Quick Links shortens your search. Quick Links are unique codes assigned to Omron products listed in this guide. Enter Quick Link codes in the search box on industrial.omron.eu to access detailed information on products in this guide.

Content

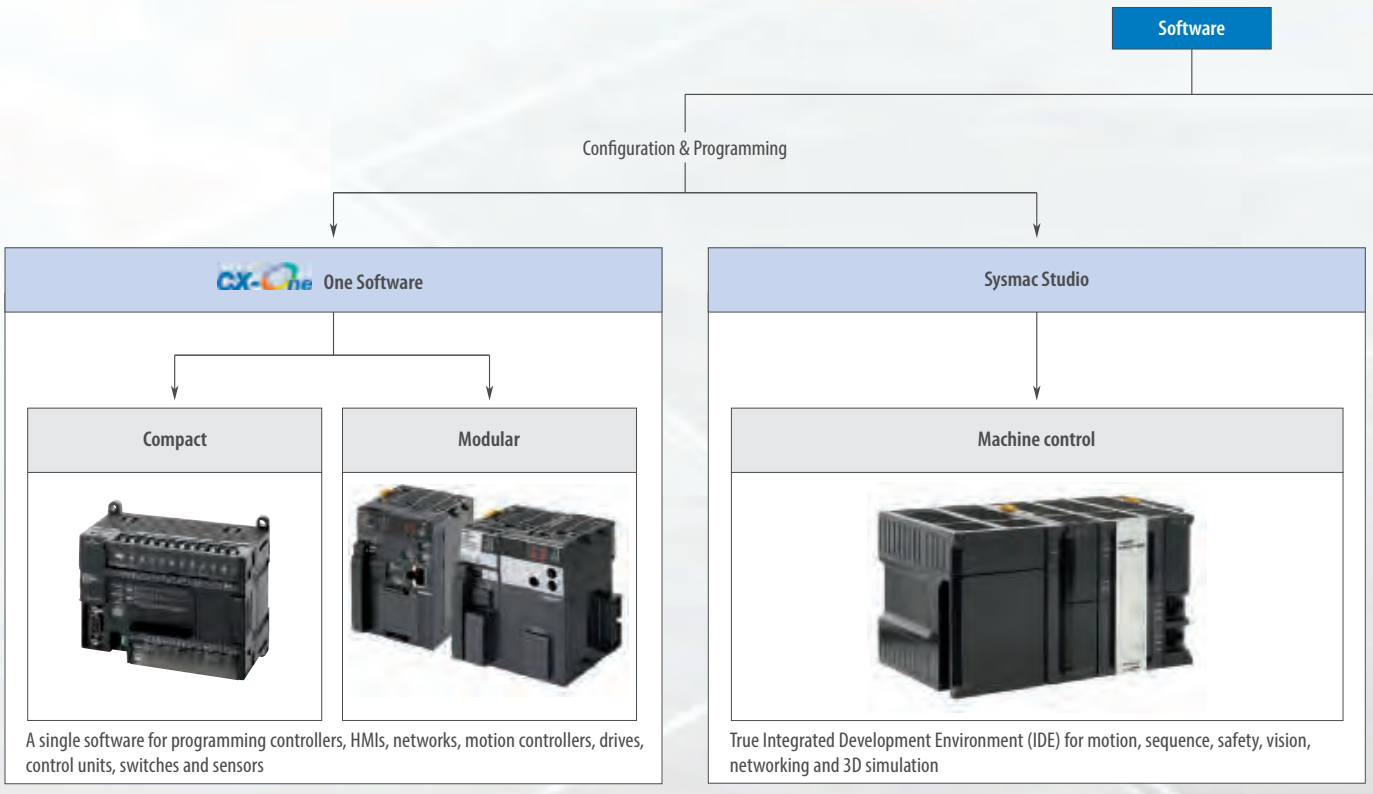
# Software

## Software

# ONE SOFTWARE-ONE CONNECTION-ONE MINUTE

## One software for all your automation needs

"One Software" is a key component of the overall architecture of Omron software. Whether for our Compact & Modular range or our new Sysmac platform, integration of software technologies brings value direct to the customer. These softwares integrate configuration, programming and monitoring in packages designed for those platforms. Integrated software gives you the power and efficiency to develop and create like never before.




L422
Page 676

L432
Page 679

Visualisation

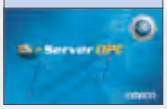
CX-Supervisor

L429
Page 677

CX-Server LITE

L434
Page 678

CX-Server OPC



L426
Page 678


## Integrated "One software" that covers all your requirements for complete machine automation

This single programming and configuration environment is an integrated software management tool called CX-One that enables the user to build, configure and program networks, PLCs, HMIs, motion control systems, drives, temperature controllers and sensors. The result of a single software is to reduce complexity of the configuration and allow automation systems to be programmed or configured with minimal training.
By registering a licence number at www.omron-industrial.com, users can benefit from free updates to their version of CX-One for 12 months free of charge. An automatic update service can notify users as soon as relevant updates are available.
CX-One is available as two types. FULL supporting all PLCs or LITE designed for our compact PLC range. Thus our integrated "One Software" applies to our complete portfolio.

## Ordering information

| CX-One FULL | Media | Order code |
|---|---|---|
| Single licence | Licence Only | CXONE-AL01-EV_ |
| Three user licence | Licence Only | CXONE-AL03-EV_ |
| Ten user licence | Licence Only | CXONE-AL010-EV_ |
| Thirty user licence | Licence Only | CXONE-AL030-EV_ |
| Fifty user licence | Licence Only | CXONE-AL050-EV_ |
| Site licence | Licence Only | CXONE-AL0XX-EV_ |
| Software on CDs | CD | CXONE-CD-EV_ |
| Software on a DVD | DVD | CXONE-DVD-EV_ |

| CX-One LITE | Media | Order code |
|---|---|---|
| Single user licence | Licence Only | CXONE-LT01-EV_ |
| Software on CD | CD | CXONE-LTCD-EV_ |

## Specifications

| Subject | Indicator | Description |
|---|---|---|
| Programming | CX-Programmer | CX-Programmer provides one common PLC software platform for all types of Omron PLC controllers – from micro PLC's up to Duplex processor systems. It allows easy conversion and re-use of PLC code between different PLC types, and the full re-use of control programs created by older generation PLC programming software. |
| | CX-Simulator | A debugging environment equivalent to the actual PLC system environment can be achieved by simulating the operation of a CS/CJ Series PLC with a virtual PLC in the computer. CX-Simulator makes it possible to evaluate program operation, check the cycle time and reduce debugging time before the actual equipment is assembled. |
| | CX-Designer | CX-Designer is used to create screen data for NS-series Programmable Terminals. CX-Designer can also check the operation of the created screen data on the computer. CX-Designer enables efficient development process for screen creation, simulation and project deployment. Users can develop screens more efficiently with Easy-to-use Support Software. CX-Designer has about 1,000 standard functional objects with associated graphics and advanced functions, so even first-time users can create screens easily just by arranging functional objects in a screen. |
| Networks | CX-Integrator | CX-Integrator is the main configuration software for CX-One. It enables easy performance of many operations, such as monitoring the connection status of various networks, setting parameters, and diagnosing networks. |
| | CX-ConfiguratorFDT | Based on FDT/DTM technology, CX-ConfiguratorFDT can be used to configure devices from any vendor connected to a PROFIBUS network. This concept will later be expanded to support many more networks using this technology. |
| Motion & Drives | CX-Motion | CX-Motion can be used to create, edit, and print the various parameters, position data, and motion control programs (G code) required to operate Motion Controllers, transfer the data to the Motion Control units, and monitor operation of the Motion Control units. Increase productivity in every step of the motion control process, from development of the motion control program to system operation. |
| | CX-Drive | The complete current range of Omron Yaskawa inverters and servos is covered in this software with full access to all parameters (with 3 different operator levels available). An easy overview of parameters is also included which includes filters to show values that are: different from default, different from inverter, invalid setting. Graphical overviews are available to further assist with configuration of some more detailed parameters such as jump frequencies, v/f profiles and analog setting. |
| | CX-Position | CX-Position simplifies every aspect of position control, from creating/editing the data used in Position Control units (NC units) to communicating online and monitoring operation. The software is equipped with functions that can improve productivity, such as automatically generating project data and reusing existing data. |
| Regulation and Switching | CX-Thermo | Omron's CX-Thermo support software has been specially developed for use with the company's E5CN, E5EN, E5GN, E5AN, E5CN-H, E5EN-H, E5AN-H, E5ZN, E5AR, E5ER and CelciuX° temperature controllers. CX-Thermo enables faster parameter set-up, easier device adjustment and simpler maintenance. It dramatically reduces the time and effort needed to set and manage temperature control parameters. |
| | CX-Process | CX-Process simplifies every aspect of loop control, from creating/transferring function blocks to running the Boards/units and debugging (tuning PID parameters, etc.) operation. Function block programs can be created easily by pasting function blocks in the window and making software connections with the mouse. |
| Sensing | CX-Sensor | CX-Sensor allows configuration and monitoring of Omron's ZX range of sensors via a series of easy to use displays. The graphing dialog allows the outputs from several sensors to be reviewed and compared simultaneously, allowing configuration of complex processes. The software also includes a driver that allows sensor data to be accessed via an Omron serial control unit (SCU) and from other Omron applications such as CX-Supervisor. With the aid of Omron's CX-Server OPC application it is even possible to monitor sensor data in real time from Microsoft Excel. |


## Powerful Machine Visualisation

CX-Supervisor is dedicated to the design and operation of PC visualisation and machine control. It is not only simple to use for small supervisory and control tasks, but also offers a wealth of power for the design of the most sophisticated applications.
CX-Supervisor boasts powerful functions for a wide range of PC based HMI requirements. Simple applications can be created rapidly with the aid of a large number of predefined functions and libraries, and even very complex applications can be generated with a powerful programming language or VBScript™. CX-Supervisor has an extremely simple, intuitive handling and high user friendliness. Importing ActiveX® components makes it possible to create flexible applications and extend functionality.

CX-Supervisor now comes in two editions:
**CX-Supervisor Machine Edition** is the perfect choice for almost all machine visualization requirements. Supporting connection of up to 15 devices and up to 500 user definable points (array = 1 point), it is flexible and powerful enough for the control and supervision of a complete machine or an entire manufacturing process. And its easy-to-use Windows® Explorer-style development environment makes building the most sophisticated graphic interfaces simple.

**CX-Supervisor PLUS** is for those exceptional cases where an application demands a higher number of devices or points than can be handled by CX-Supervisor Machine Edition. It otherwise shares all of the same power and features.

## Ordering information

| Description | Media | Order code |
|---|---|---|
| Developer & runtime (no protection included) | CD | CX-SUPERVISOR-V_ _ |
| Developer upgrade (no protection included, requires licence of previous version) | CD | CX-SUPERVISOR-UPGR-V_ _ |
| Machine Edition runtime including USB dongle protection | CD | CX-SUPERVISOR-RUN-ME-V_ _ |
| PLUS Edition runtime including USB dongle protection | CD | CX-SUPERVISOR-RUN-PLUS-V_ _ |

## Specifications

| Feature | Supervisor | |
|---|---|---|
| | Machine Edition | Plus |
| ActiveX | Yes | Yes |
| VBScript | Yes | Yes |
| Recipes | Yes | Yes |
| Alarms | 300 | 3000 |
| Animation | Yes | Yes |
| Max Devices (PLCs etc) | 20 | 256 |
| OPC Connections | Yes | Yes |
| Max Points | 500 | 8000 |
| Max Regular Interval Scripts | 10 | 100 |
| Max Num Pages | 100 | 500 |
| Databases supported | MS Access | MS Access SQL, ODBC, MS Access, MS Excel. dBase, CSV |


## Omron's devices meet 'Open Integration'

CX-Server OPC provides a connection between the industry standard OPC interface specification and Omron's network architecture and controllers. CX-Server OPC allows any OPC compliant client software to interface easily with Omron.
The multi-vendor connectivity and information exchange capability of CX-Server OPC eliminates driver development issues.
CX-Server OPC includes an ActiveX OPC client control and a set of graphical components. Linking the graphical controls can be done without a single line of script. No programming knowledge is required!

### Ordering information

| Description | Media | Order code |
|---|---|---|
| CX-Server OPC | CD & Licence | CX-OPC-EV_ |

# CX-Server LITE


## Simple but effective connectivity

As a pair to our OPC product, CX-Server LITE is designed to meet a wide variety of programmers' needs from the simple to the advanced. Used to create PC-based simple HMI projects, CX-Server LITE allows designers of custom programs to send and receive PLC data and manipulate controllers within Omron networks.
Based on ActiveX technology, it is easy to add a communications control to a VB project or an Excel spreadsheet. Live data can be updated directly into a cell or range of cells.
CX-Server LITE includes a set of graphical components designed to connect to the communications control. Linking the graphical controls can be done without a single line of script. No programming knowledge is required!

### Ordering information

| Description | Media | Order code |
|---|---|---|
| CX-Server LITE | CD & Licence | CX-LITE-EV_ |


## Sysmac Studio for machine creators

The Sysmac Studio provides one design and operation environment for configuration, programming, simulation and monitoring.

- One software for servo, inverter, vision and I/O
- Fully compliant with open standard IEC 61131-3
- Supports Ladder, Structured text and In-Line ST programming with a rich instruction set
- CAM editor for easy programming of complex motion profiles
- One simulation tool for sequence and motion in a 3D environment
- Advanced security function with 32 digit security password

## Ordering information

### Automation software

Please purchase a DVD and licenses the first time you purchase the Sysmac Studio. DVDs and licenses are available individually.
The license does not include the DVD.

| Product | Specifications | | | Order code |
|---|---|---|---|---|
| | Description | Number of licenses | Media | |
| Sysmac Studio Standard Edition Ver. 1.□□ | The Sysmac Studio provides an integrated development environment to set up, program, debug and maintain NJ-series controllers and other machine automation controllers, as well EtherCAT slaves<br><br>Sysmac Studio runs on the following OS:<br>Windows XP (Service Pack 3 or higher, 32-bit version)/ Vista (32-bit version)/7 (32-bit/64-bit version) | – (Media only) | DVD*1 | SYSMAC-SE200D |
| | | 1 license | – | SYSMAC-SE201L |
| | | 3 licenses | – | SYSMAC-SE203L |
| | | 10 licenses | – | SYSMAC-SE210L |
| | | 30 licenses | – | SYSMAC-SE230L |
| | | 50 licenses | – | SYSMAC-SE250L |
| Sysmac Studio Vision Edition Ver. 1.□□*2 | Sysmac Studio Vision Edition is a limited license that provides selected functions required for FQ-M series vision sensor settings | 1 license | – | SYSMAC-VE001L |
| Sysmac Studio Measurement Sensor Edition Ver. 1.□□*3,*4 | Sysmac Studio Measurement Sensor Edition is a limited license that provides selected functions required for ZW-series displacement sensor settings | 1 license | – | SYSMAC-ME001L |
| | | 3 licenses | – | SYSMAC-ME003L |

*1 The same media is used for both the Standard Edition and the Vision Edition.
*2 With the Vision Edition, you can use only the setup functions for FQ-M series vision sensors.
*3 With the Measurement Sensor Edition, you can use only the setup functions for ZW-series displacement sensors.
*4 This product is a license only. You need the Sysmac Studio Standard Edition DVD media to install it.

**Note:** Site licenses are available for users who will run Sysmac Studio on multiple computers. Ask your OMRON sales representative for details.

### Components

#### DVD (SYSMAC-SE200D)

| Components | Details |
|---|---|
| Introduction | An introduction about components, installation/uninstallation, user registration and auto update of the Sysmac Studio is provided |
| Setup disk (DVD-ROM) | 1 |

#### License (SYSMAC-SE2□□L/VE0□□L/ME0□□L)

| Components | Details |
|---|---|
| License agreement | The license agreement gives the usage conditions and warranty for the Sysmac Studio |
| License card | A model number, version, license number and number of licenses are described |
| User registration card | Two cards are contained. One is for users in Japan and the other is for users in other countries |

### Included support software

DVD media of Sysmac Studio includes the following support software:

| Included support software | | Outline |
|---|---|---|
| CX-Designer | Ver. 3.□□ | The CX-Designer is used to create screens for NS-series PTs |
| CX-Integrator | Ver. 2.□□ | The CX-Integrator is used to set up FA networks |
| CX-Protocol | Ver. 1.□□ | The CX-Protocol is used for protocol macros for serial communications units |
| Network Configurator | Ver. 3.□□ | The Network Configurator is used for tag data links on the built-in EtherNet/IP port |

# Outline of Major Standards

## International Standards

International standards consist of the IEC standards related to electricity and the ISO standards related to other areas (e.g., machines and management.)

### IEC (International Electrotechnical Commission)

The IEC is a standardization commission founded in 1908 to promote unification and coordination of international standards relating to electricity. It is headquartered in Geneva, Switzerland.
Based on reports from member nations on the latest science technologies in those nations, IEC standards are issued as technological standards relating to electricity. Established international safety standards provided by various countries and accepted worldwide are based on IEC standards.
The IEC standards committees includes the CISPR (International Special Committee on Radio Interference) that makes standards for EMC (Electromagnetic Compatibility).
To simplify certification procedures for electrical devices and promote smooth international trade, there is an international scheme called CB Scheme (Certification Body Scheme), which is authorized by IEC standards. Based on the CB Scheme, safety tests on electrical devices are conducted and certificates are issued if the devices are proved to meet IEC standards.

### ISO (International Organization for Standardization)

ISO is a standardization organization that started official activities in 1947 to promote international standards in all areas (e.g., machines and management) except for electricity, which is covered by the IEC, by issuing ISO standards. It is headquartered in Geneva, Switzerland.

## North America

### UL Standards (Underwriters Laboratories INC.)

LISTING MARK

A nonprofit organization established in 1894 by the American association of fire insurance companies. Underwriters Laboratories (abbreviated to UL hereafter) conducts certification testing on all kinds of electrical products. In many U.S. cities and states, UL certification is legally required on all electrical items sold. To obtain UL certification on an electrical product, all major internal components also require UL certification. UL offers two classifications of certification, the listing mark and the recognition mark.
A Listing Mark constitutes the entire certification of a product. Products display the Listing Mark shown below.

RECOGNITION MARK

The Recognition Mark applies to the components used in a product, and therefore constitutes a more conditional approval of a product. Use of the Recognition Mark is not required for non-specified parts (e.g., specified parts such as microswitches) Products display the Recognition Mark shown below.

Since October 1992, UL has been recognized as a CO (council organization) and TO (test organization) by the SCC (Standard Council of Canada). This authorizes UL to conduct safety tests and certify products conforming to Canadian standards. The above marks are UL marks for products certifying that the products meet Canadian standards.
The designs of the listing marks and recognition marks have been revised as shown below. These marks have been effective since January 1998. The previous marks are valid until November 2007.

### Standards (Canadian Standards Association)

This association descended from a nonprofit, non-government standardization organization established in 1919. In addition to industrial standardization, the association now carries out safety testing on electrical products.
Standard development: The Canadian Standards Association
Product testing and certification: CSA International
This process is known as "certification," and consequently, CSA-certified equipment displays the mark shown below.

For detailed information please refer to:
http://www.ia.omron.com/support/models/outline

## Europe

**EN (European Norm) Standards**

Of the EN standards related to electricity, standards beginning with "EN6" are based on IEC standards and those beginning with "EN55" are based on IEC-CISPR standards. Standards beginning with "EN5" are unique EU standards that do not exist in the IEC standards.
The following marks of recognition are used by the Certification Bodies in European countries in accordance with EN standards.

**Germany**

VDE (Prüf- und Zertifizierungsinstitut GmbH)

TÜV Rheinland (Industrie Service GmbH)

TÜV product services

**Denmark**

DEMKO (Danmarks Elektriske Materielkontrol)

**Norway**

NEMKO (Norges Elektriske Materiellkontroll)

**Finland**

FIMKO (Finlands Material Kontroll)

**United Kingdom**

BSI (British Standards Institution, applicable to industrial products)

BEAB (British Electrotechnical Approvals Board, applicable to home electronics products)

ASTA (ASTA Certification Services, applicable to general products)

**The Netherlands**

KEMA (Keuring van Electrotechnische Materialen Nederland B. V.)

**France**

UTE (Union Technique De Electricite)

**Italy**

IMQ (Istituto Italiano del Marchio di Qualita)

**Russia**

GOST-R

TR CU certificate and declaration

**Sweden**

Intertek

**Switzerland**

SEV (Schweizerischer Electrotechnischer Verein)

**EC (European Communities) Directives**

In the EU (European Union), EC Directives are announced to instruct the creation of laws in the EU member countries. A product can display the CE Marking only when it conforms to all of the directives applicable to it, such as the New Approach Directives, which cover the Machinery Directive, Low Voltage Directive, and the EMC Directive. As a rule, EN standards announced as Harmonized Standards in the Official Journal of the European Communities are used to evaluate directive compliance.

## China

**CCC (China Compulsory Certification) Mark**

As a result of China joining the WTO (World Trade Organization) in 2001, the previous Safety License System for Import Commodities and the Compulsory Supervision System for Product Safety Certification were combined to form the CCC. The change was announced on 3 December 2001 and implemented from 1 May 2002. Starting 1 August 2003, any products that have not received the CCC Mark are prohibited from import to or sale in China.
Products Subject to CCC Mark: 19 product sections consisting of 132 product categories
Applicable Standards: National Standards (GB: Guojia Biaozhun) (Standards related to electricity were based on IEC standards.)
CCC Mark: Display of the CCC Mark is legally required.

## Japan

**Electrical Appliance and Material Safety Law of Japan**

Accompanying revisions to laws related to electrical appliances, the Electrical Appliance and Material Safety Law was switched to on 1 April 2001 and the previous Electrical Appliance and Material Control Law was abolished. New marks were also created for the Electrical Appliance and Material Safety Law.
The law covers 112 specified electrical appliances and materials and 340 non-specified electrical appliances and materials.
Article 2 of the Ordinance Concerning Technical Requirements for Electrical Appliances and Materials specifies technical requirements (IEC-J standards) harmonized with IEC standards.

## Industry specific certifications

## Marine Standards

There are more than 20 classification societies worldwide that individually work to create regulations and certify compliance. The IACS (International Association of Classification Societies) works as an international body currently consisting of 10 member classification societies plus 2 associate classification societies. The classification societies in the IACS certify and register 90% of the world's ships. The option to be classified is made by the owner of the ship; classification certification is undertaken by the shipyard at the request of the owner.
Classification certification has a close relationship to maritime insurance. Insurance underwriters will as a rule insure only ships that have been classified and refuse those without a certified classification. Therefore, automation devices used on ships must conform to classification standards of individual countries if so requested by the owner.
Although classification societies will often recognize portions of inspection data that have the same requirement from other classification societies, requirements and standards differ among the classification societies. Classification societies therefore they do not recognize certification from other classification societies. It is thus necessary to comply with the classification standards of the required classification society. If registration is required in more than one classification, then certification is required for both.

**IACS Member Classification Societies**

ABS (American Bureau of Shipping), BV (Bureau Veritas, France's classification society), CCS (China Classification Society), DNV (Det Norske Veritas, Norway's classification society), GL (Germanischer Lloyd, Germany's classification society), KR (Korean Register of Shipping), LR (Lloyd's Register of Shipping, Britain's classification society), NK (Nippon Kaiji Kyokai, Japan's classification society), RINA (Registro Italiano Navale, Italy's classification society), RS (Russian Maritime Register of Shipping)

**IACS Associate Classification Societies**

IRS (Indian Register of Shipping)

**Other Classification Societies**

CR (China Corporation Register of Shipping, Taiwan's classification society)

## Food, Beverage and Pharma

For more information on standards used in the food, beverage and pharmaceutical industries refer to industrial.omron.eu.

# Index

## M



## N



## O



## P



## R



## S



## T



## V



## W



## X



## Z

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