

ZERO DEFECT FOR PRODUCTION THAT NEVER FAILS!

Customer satisfaction highly depends on the quality of the finished goods or the performance of the machine in use. Zero defect during production is a key criterion for success. The speed of production lines is getting increasingly faster. On the other hand the machines should never fail. But can you trust the result?

The necessity for quality inspection and control in any production process is no longer a discussion point. The cost of non quality is much higher than the investment, which pays for itself within a short time. In order to further reduce the number and cost of defective goods, there is a clear trend from having just one inspection at the end of the process towards several quality checks within or even at the beginning of the process. This effect further increases the demand for accurate, reliable and fast inspection systems.

Omron offers a complete portfolio of measurement and inspection systems using different technologies and principles, but following the same guideline: keep it simple for the user.

Quality control & Inspection – Table of contents

Inspection & Ident systems **17**

Product overview		330
Selection table		332
Inspection systems	FQ2	335
	FQ-M	345
	Xpectia FH/FZ5	353
	FlexXpect	366
Ident systems	FQ-CR1	376
	FQ-CR2	379
	FQ2-CH	382
	FQ2-S4	386
	V400-H	391
RFID systems	V680 RFID system	392

Measurement sensors **18**

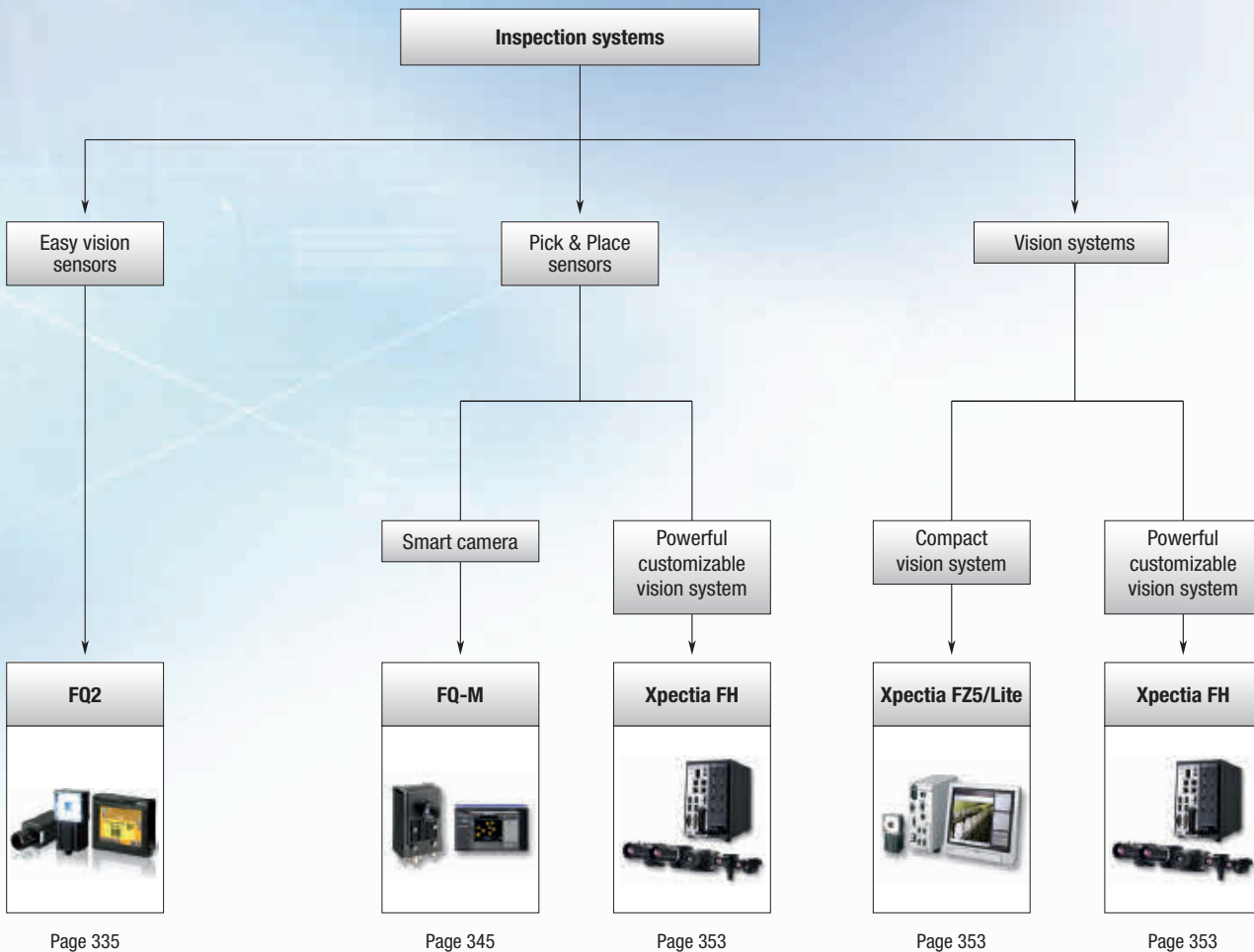
Product overview		396
Selection table		398
Laser displacement sensor	ZX1	401
	ZX2	403
	ZS-HL	406
	ZX-L	411
Confocal fiber sensor	ZW	414
Inductive displacement sensor	ZX-E	419
Contact displacement sensor	ZX-T	421
Profile sensor	ZG2	423
Laser micrometer	ZX-GT	427

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 colour – close to human eye identification and image processing



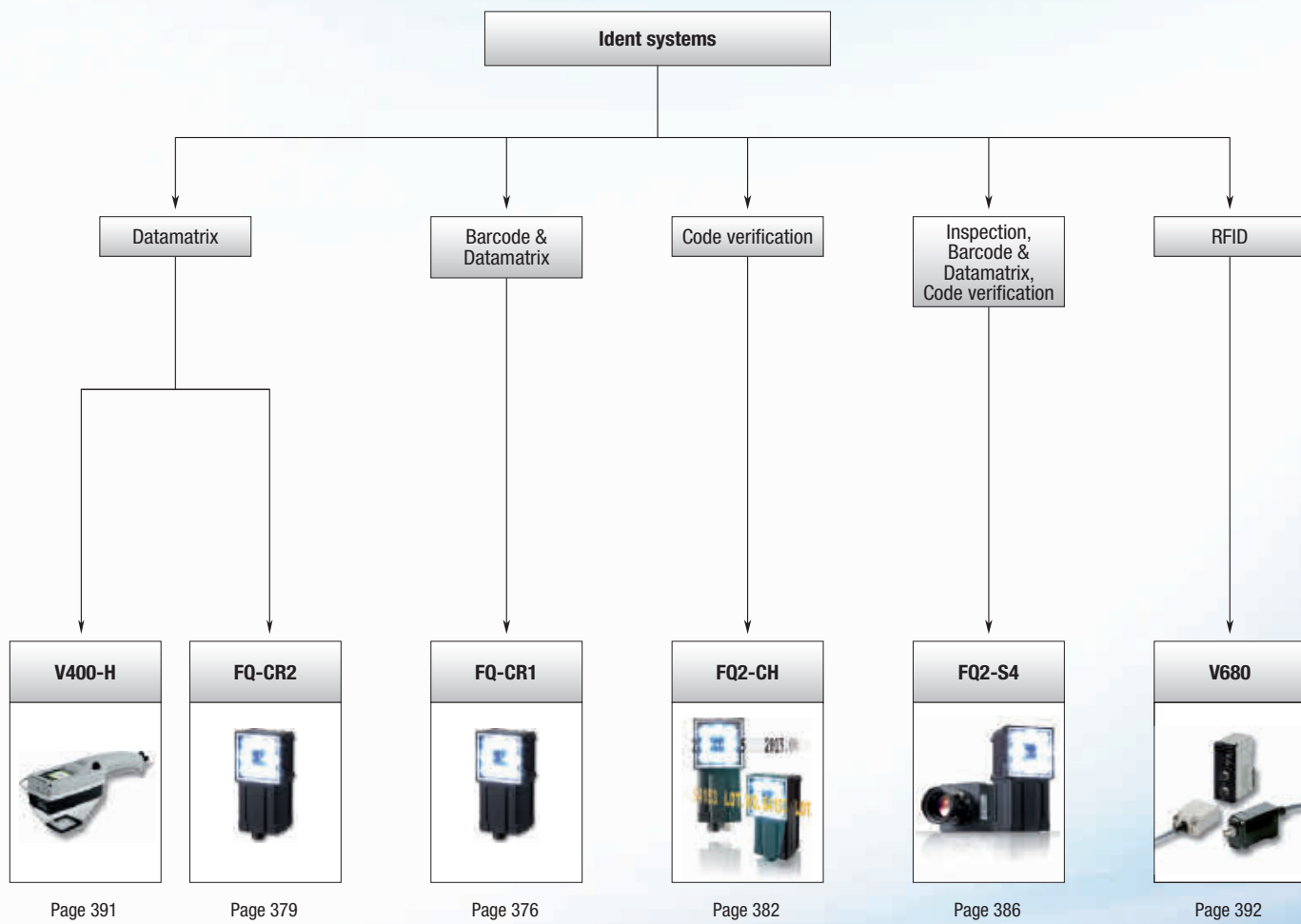
Page 335

Page 345

Page 353

Page 353

Page 353



Page 391

Page 379






Page 376

Page 382

Page 386

Page 392

Selection table

		Vision sensor	Pick & Place		Vision systems		
							
		FQ2	FQ-M	Xpectia FH	Xpectia FZ5/Lite	Xpectia FH	
Selection criteria	Model	FQ2	FQ-M	Xpectia FH	Xpectia FZ5/Lite	Xpectia FH	
	Number of connectable cameras	Smart camera	Smart camera	8	4	8	
	Camera type	Monochrome/Colour	Colour	Digital colour or black & white	Digital colour or black & white	Digital colour or black & white	
	Resolution (usable) Display dots	752 × 480 928 × 828 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	335	345	353	353	353		

		Code reader					
							
Selection criteria	Model	FQ-CR1	FQ-CR2	FQ2-CH	FQ2-S4	V400-H	
	Number of connectable cameras	Smart camera	Smart camera	Smart camera	Smart camera	1	
	Camera type	Monochrome	Monochrome	Monochrome	Monochrome/Colour	Digital black & white	
	Resolution (usable) Display dots	752 × 480	752 × 480	752 × 480	752 × 480 928 × 828 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: Data Matrix, QR Code, Micro QR Code, PDF417, Micro PDF417, GS1-Data Matrix Bar codes: JAN/EAN/UPC, Code39, Codabar (NW-7), IFT (interleaved2 of 5), Code93, Code128/ GS1-128, GS1-DataBar, GS1-128 Composite Code, Pharmacode	2D-codes: Data Matrix, QR Code	OCR - Alphabet A to Z - Number 0 to 9 - Symbol '-./' 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 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 (attach- ment), and white balance	High dynamic range (HDR), polarizing filter (attach- ment), and white balance	High dynamic range (HDR), polarizing filter (attach- ment), and white balance	High dynamic range (HDR), polarizing filter (attach- ment), 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	–	
Communication	Security tools	–	–	–	–	–	
	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	376	379	382	386	391	

■ Standard

– No/not available





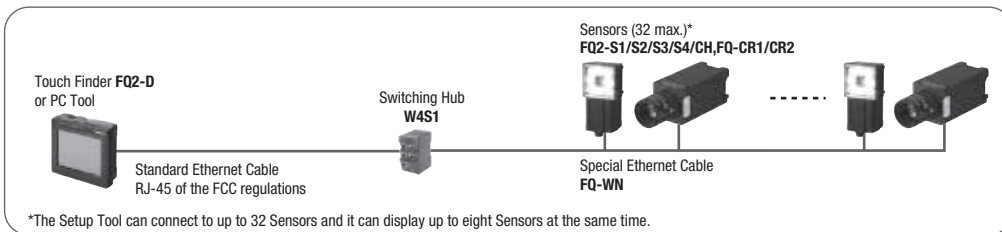
The new standard in image inspection and code verification

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

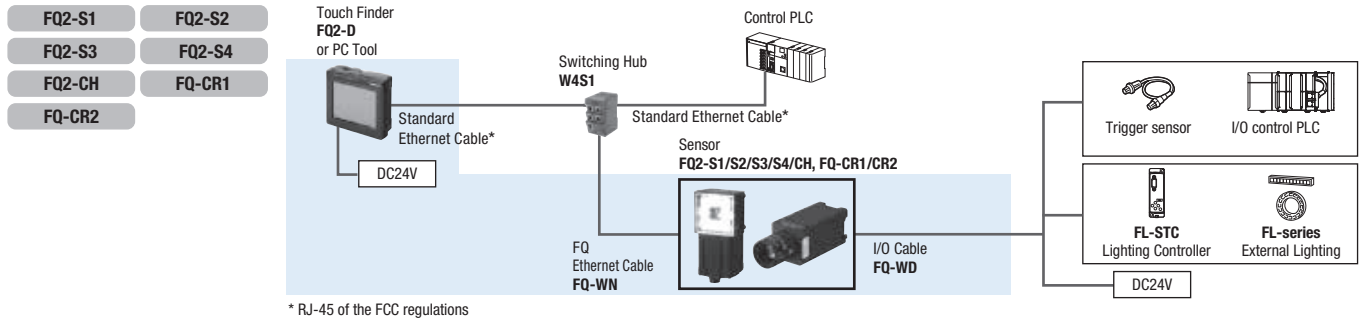
System Configuration

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.



Note: 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.

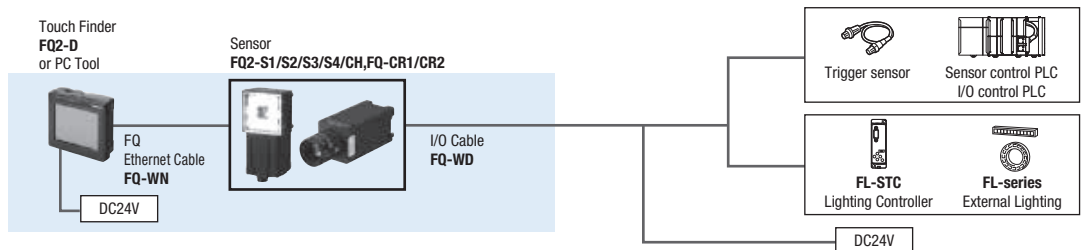
Ethernet (EtherNet/IP, No-protocol, or PLC Link) Connection



Parallel Interface Connection

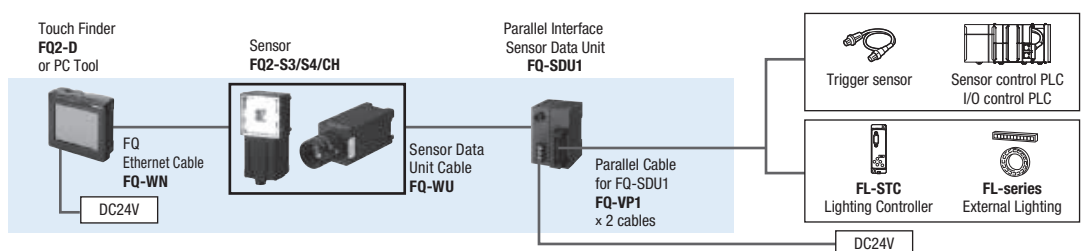
■ Connection with Standard Parallel Interface of the Sensor

- | | |
|--------|--------|
| FQ2-S1 | FQ2-S2 |
| FQ2-S3 | FQ2-S4 |
| FQ2-CH | FQ-CR1 |
| FQ-CR2 | |

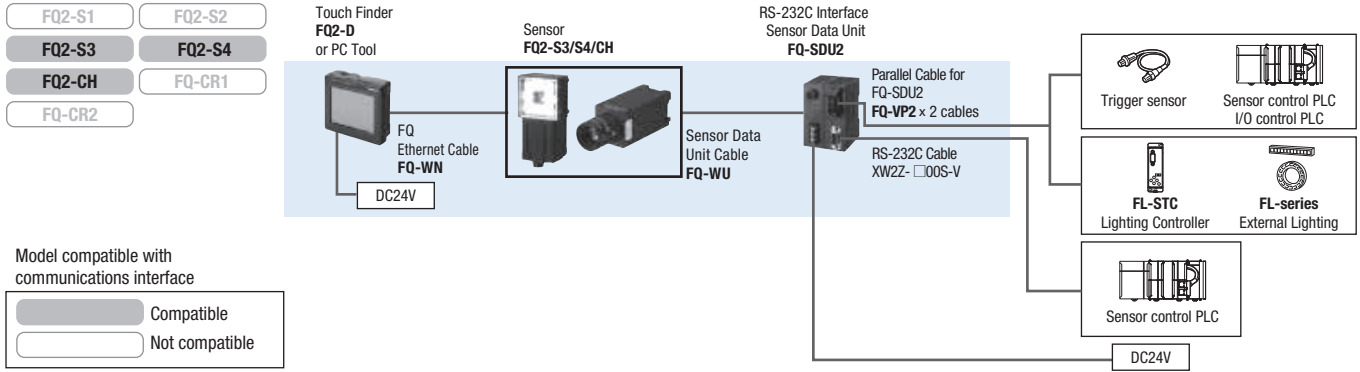


■ Connection through a Parallel Interface Sensor Data Unit

- | | |
|--------|--------|
| FQ2-S1 | FQ2-S2 |
| FQ2-S3 | FQ2-S4 |
| FQ2-CH | FQ-CR1 |
| FQ-CR2 | |



RS-232C Serial Connection



Model compatible with communications interface

Compatible (shaded box)
Not compatible (white box)

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 337.	Refer to figure 2 on page 337.	Refer to figure 3 on page 337.	Refer to figure 4 on page 337.

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 337.	Refer to figure 2 on page 337.	Refer to figure 3 on page 337.	Refer to figure 4 on page 337.

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 337.	Refer to figure 6 on page 337.	Refer to figure 7 on page 337.	Refer to figure 8 on page 337.	Refer to optical chart on p. 338

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 337.	Refer to figure 2 on page 337.	Refer to figure 3 on page 337.	Refer to figure 4 on page 337.

[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 337.	Refer to figure 6 on page 337.	Refer to figure 7 on page 337.	Refer to figure 8 on page 337.	Refer to optical chart on p. 338

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 337.	Refer to figure 2 on page 337.	Refer to figure 3 on page 337.	Refer to figure 4 on page 337.

FQ-CR1 Series [Multi Code Reader]





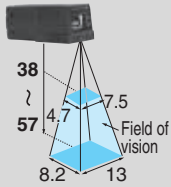
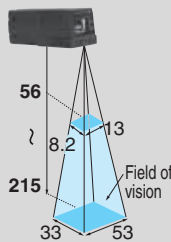
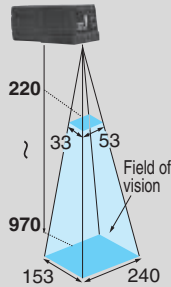
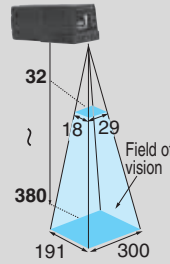
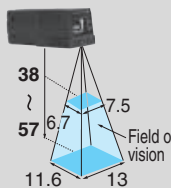
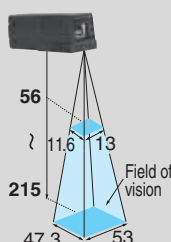
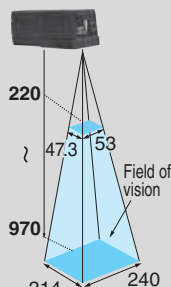
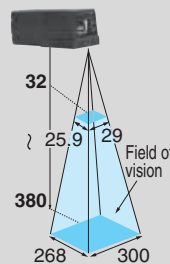
Field of vision		Narrow View	Standard View	Wide View (Long-distance)	Wide View (Short-distance)
Number of pixels		350,000 pixels			
Monochrome	NPN	FQ-CR10010F-M	FQ-CR10050F-M	FQ-CR10100F-M	FQ-CR10100N-M
	PNP	FQ-CR15010F-M	FQ-CR15050F-M	FQ-CR15100F-M	FQ-CR15100N-M
Field of vision/Installation distance		Refer to figure 1 on page 337.	Refer to figure 2 on page 337.	Refer to figure 3 on page 337.	Refer to figure 4 on page 337.

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 337.	Refer to figure 2 on page 337.	Refer to figure 3 on page 337.	Refer to figure 4 on page 337.

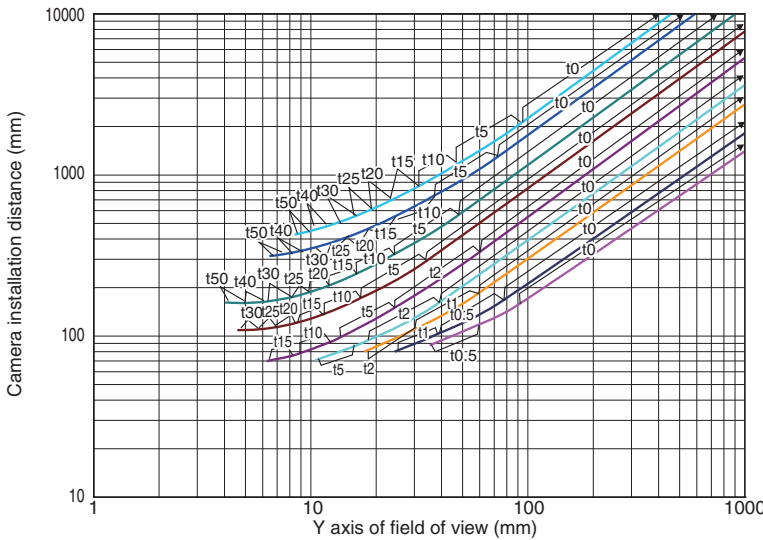
Field of vision/Installation distance

(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

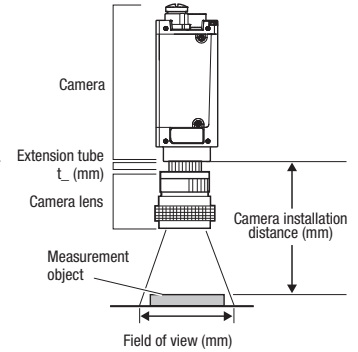
Extension tube

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	Model
DC power supply		FQ2-D30
AC/DC/battery		FQ2-D31

Cables

Type	Appearance	Cable length	Model
FQ Ethernet Cables (connect Sensor to Touch Finder, Sensor to PC)		2m	FQ-WN002
		5m	FQ-WN005
		10m	FQ-WN010
		20m	FQ-WN020
I/O Cables		2m	FQ-WD002
		5m	FQ-WD005
		10m	FQ-WD010
		20m	FQ-WD020

Sensor Data Unit (FQ2-S3/S4/CH only)

Type	Appearance	Output type	Model
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	Model
Sensor Data Unit 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
3Z4S-LT Series	Refer to 3Z4S-LT/LE Series Catalog (Q164)
FL Series	Refer to FL Series Catalog (Q181)

Accessories

Application	Appearance	Name	Model
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
		Panel Mounting Adapter	FQ-XPM
For Touch Finder		AC Adapter (for AC/DC/battery model) ^{*3}	FQ-A□
		Battery (for AC/DC/battery model)	FQ-BAT1
		Touch Pen ^{*4}	FQ-XT
		Strap	FQ-XH
		SD Card (2 GB)	HMC-SD291

^{*1} Included with Integrated Sensor.



^{*2} Included with Sensor with C-mount.

^{*3} 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	Model
A	125 V max.	PSE	FQ-AC1
		UL/CSA	FQ-AC2
	250 V max.	CCC mark	FQ-AC3
BC	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	Model
	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. 338 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 (40 mm, 20 mm, 10 mm, 5 mm, 2.0 mm, 1.0 mm, and 0.5 mm) 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. Refer to optical chart on p. 338.		
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 (360° 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 Built-in lighting OFF: 1/1 to 1/50,000			Built-in lighting ON: 1/250 to 1/60,000 Built-in lighting OFF: 1/1 to 1/60,000		1/1 to 1/60,000	
	Processing resolution	752 × 480			928 × 828		1280 × 1024	
	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) Communications trigger (Ethernet TCP no-protocol, Ethernet FINS/TCP no-protocol, EtherNet/IP, or PLC Link)							

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 Single measurement input (TRIG) Control command input (INO to IN5)					
	Output signals	3 signals Control output (BUSY) Overall judgement output (OR) Error output (ERROR) 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 FINS/TCP no-protocol, EtherNet/IP, or PLC Link					
	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 Storage: –25 to 65°C (with no icing or condensation)			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)					
	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 IP67 (Except when Polarizing Filter Attachment is mounted or connector cap is removed.)				IEC 60529 IP40	
Materials	Sensor: PBT, PC, SUS Mounting Bracket: PBT Polarizing Filter Attachment: PBT, PC Ethernet connector: Oil-resistance vinyl compound I/O connector: Lead-free heat-resistant PVC				Cover: Zinc-plated steel, Thickness: 0.6 mm Case: Aluminum diecast alloy (ADC-12) Mounting base: Polycarbonate ABS		
Weight	Narrow View/Standard View: Approx. 160 g Wide View: Approx. 150 g				Approx. 160 g without base, Approx. 185 g with base		
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				Mounting Base (FQ-XLC) (1) Mounting Screw (M3 × 8mm) (4) Instruction Manual, Quick Startup Guide 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	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. Refer to optical chart on p. 338.	
Installation distance							
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 Built-in lighting OFF: 1/1 to 1/50,000		Built-in lighting ON: 1/250 to 1/60,000 Built-in lighting OFF: 1/1 to 1/60,000		1/1 to 1/60,000	
	Processing resolution	752 × 480		928 × 828		1280 × 1024	
	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) Communications trigger (Ethernet TCP no-protocol, Ethernet FINS/TCP no-protocol, EtherNet/IP, or PLC Link)					
I/O specifications	Input signals	7 signals Single measurement input (TRIG) Control command input (IN0 to IN5)					
	Output signals	3 signals Control output (BUSY) Overall judgement output (OR) Error output (ERROR) 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 FINS/TCP no-protocol, EtherNet/IP, or PLC Link					
	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 40°C Storage: -25 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	IEC 60529 IP67 (Except when Polarizing Filter Attachment is mounted or connector cap is removed.)				IEC 60529 IP40	
Materials		Sensor: PBT, PC, SUS Mounting Bracket: PBT Polarizing Filter Attachment: PBT, PC Ethernet connector: Oil-resistance vinyl compound I/O connector: Lead-free heat-resistant PVC				Cover: Zinc-plated steel, Thickness: 0.6 mm Case: Aluminum diecast alloy (ADC-12) Mounting base: Polycarbonate ABS	
Weight		Narrow View/Standard View: Approx. 160 g Wide View: Approx. 150 g				Approx. 160 g without base, Approx. 185 g with base	
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				Mounting Base (FQ-XLC) (1) Mounting Screw (M3 × 8mm)(4) Instruction Manual, Quick Startup Guide 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 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 336. (Tolerance (field of vision): ±10% max.)		
Installation distance				
Main functions	Inspection items	OCR · Alphabet A to Z · Number 0 to 9 · Symbol ' - . : / Model dictionary	2D Code (Data Matrix(EC200), QR Code, MicroQR Code, PDF417, MicroPDF417, GS1-Data Matrix) 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 (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 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) Communications trigger (Ethernet TCP no-protocol, Ethernet FINS/TCP no-protocol, EtherNet/IP, or PLC Link)	External trigger (single or continuous)	
I/O specifications	Input signals	7 signals Single measurement input (TRIG) Control command input (IN0 to IN5)		
	Output signals	3 signals Control output (BUSY) Overall judgement output (OR) Error output (ERROR) 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 Control output (BUSY) Overall judgement output (OR) Error output (ERROR) 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 FINS/TCP no-protocol, EtherNet/IP, or PLC Link	-	
	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 (with no icing or condensation)	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)		
	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 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
	PNP	FQ2-CH15□□□□-M	FQ-CR15□□□□-M
Materials	Sensor: PBT, PC, SUS, Mounting Bracket: PBT, Polarizing Filter Attachment: PBT, PC 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	Model	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) AC adapter (manufactured by Sino-American Japan Co., Ltd) connection: 100 to 240 VAC, 50/60 Hz 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. Charging battery: 0.4 A max.		
Environmental immunity	Ambient temperature range	Operating: 0 to 50°C Storage: -25 to 65°C (with no icing or condensation)	Operating: 0 to 50°C when mounted to DIN Track or panel Operation on Battery: 0 to 40°C: -25 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	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)
		Connector 2	11 inputs (TRIG, RESET, IN0 to IN7, and DSA) 8 outputs (GATE, ACK, RUN, BUSY, OR, ERROR, STGOUT, and SHTOUT)
	RS-232C	–	6 inputs (IN0 to IN5)
	Sensor interface	FQ2-S3 connected with FQ-WU□□□□: OMRON interface *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□□□ 0.4 A max.: FQ2-S3□□-□□□□ and FQ-SDU□□□ 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

Item	Model	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 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) 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.

Windows is registered trademarks of Microsoft Corporation in the USA and other countries.
Other company names and product names in this document are the trademarks or registered trademarks of their respective companies.



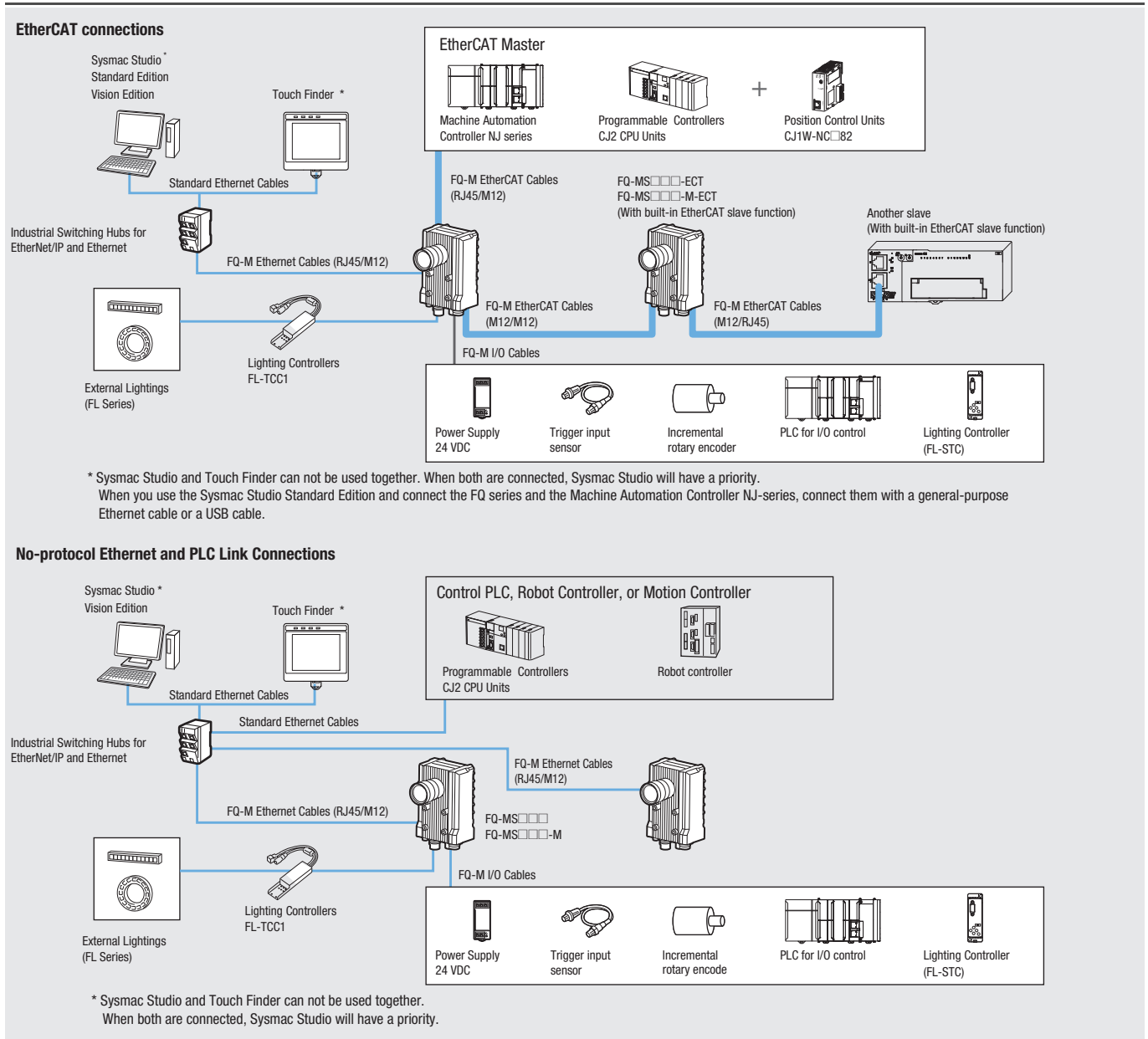
FQ-M Vision sensor

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




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.

Sysmac is a trademark or registered trademark of OMRON Corporation in Japan and other countries for OMRON factory automation products. Windows is registered trademarks of Microsoft Corporation in the USA and other countries. EtherCAT[®] is registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany. Other company names and product names in this document are the trademarks or registered trademarks of their respective companies.

Ordering Information

Sensors

Appearance	Type		Model	
	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	Model	Standards
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. Sysmac Studio runs on the following OS. Windows XP (Service Pack 3 or higher, 32-bit version) / Vista (32-bit version)/7 (32-bit/64-bit version) The Sysmac Studio Standard Edition DVD includes Support Software to set up EtherNet/IP Units, DeviceNet slaves, Serial Communications Units, and Support Software for creating screens on HMI's (CX-Designer). 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. 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	Model
	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	Model		
	For EtherCAT and Ethernet cable Angle: M12/ Straight: RJ45	Cable length: 5 m	FQ-MWNL005	
		Cable length: 10 m	FQ-MWNL010	
	For EtherCAT and Ethernet cable Straight type (M12/RJ45)	Cable length: 5m	FQ-WN005-E	
		Cable length: 10 m	FQ-WN010-E	
	For EtherCAT cable Angle type (M12/M12)	Cable length: 5 m	FQ-MWNE005	
		Cable length: 10 m	FQ-MWNE010	
	For EtherCAT cable 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		Model
	For Touch Finder	Panel Mounting Adapter	FQ-XPM
		AC Adapter (for models for DC/AC/Battery)	FQ-AC□ ^{*1}
		Battery (for models for DC/AC/Battery)	FQ-BAT1
		Touch Pen (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	Model
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	Model
	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

Appearance	Number of ports	Power supply voltage	Current consumption	Model
	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.

Cameras peripheral devices

Type	Model	
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 (μm) × 6.0 (μm)			
	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. 32000 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 Single measurement input (TRIG) Error clear input (IN0) Encoder counter reset input (IN1) Encoder input (A±, B±, Z±) ^{*2}			
	Output signals	5 signals ^{*3} OUT0 Overall judgement output (OR) OUT1 Control output (BUSY) OUT2 Error output (ERROR) OUT3 (Shutter output: SHTOUT) OUT4 (Strobe trigger output: STGOUT)			
	Ethernet specifications	100BASE-TX/10BASE-TX			
	EtherCAT specifications	-		Dedicated protocol for EtherCAT 100BASE-TX	
	Connection method	Special connector cables Power supply and I/O: 1 special connector I/O cable Touch Finder, Computer and Ethernet: 1 Ethernet cable EtherCAT: 2 EtherCAT cable			
LED display		OR: Judgment result indicator ERR: Error indicator BUSY: BUSY indicator ETN: Ethernet communications indicator			
	EtherCAT display	-		L/A IN (Link/Activity IN) × 1 L/A OUT (Link/Activity OUT) × 1 RUN × 1 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 Ω (at 250 V)			
	Current consumption	450mA max. (When the FL-series Strobe controller and lighting are used.) 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: aluminium die casting, Rear cover: aluminium 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.
	OFF voltage*2	19.2 V min.	9.6 V min.
PNP	ON voltage*1	19.2 V min.	9.6 V min.
	OFF voltage*2	4.8 V max.	2.4 V max.
Maximum response frequency*3	50 kHz (I/O cable: when the FQ-MWD005 or FQ-MWDL005 cables is used.) 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	–	
		Battery connection	–	
	Continuous operation on Battery ^{*3}	–	100 to 240 VAC, 50/60 Hz	
	Current consumption	–	FQ-BAT1 Battery (1 cell, 3.7 V)	
Insulation resistance	–	1.5 h		
Environmental immunity	Ambient temperature range	Operating: 0 to 50°C Storage: -25 to 65°C (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 Storage: -25 to 65°C (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

Item	Model	FQ-BAT1
Battery type		Secondary lithium ion battery
Nominal capacity		1800 mAh
Rated voltage		3.7 V
Dimensions		35.3 × 53.1 × 11.4 mm
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)
Charging method		Charged in Touch Finder (FQ-MD31). 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} 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. Core i5 M520 (2.4 GHz) or equivalent or faster recommended
Main memory	2GB min.
Hard disk	At least 1.6 GB of available space ^{*3}
Display	XGA 1024 × 768, 1600 million colors. WXGA 1280 × 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 E-CAT IN: EtherCAT (IN) 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

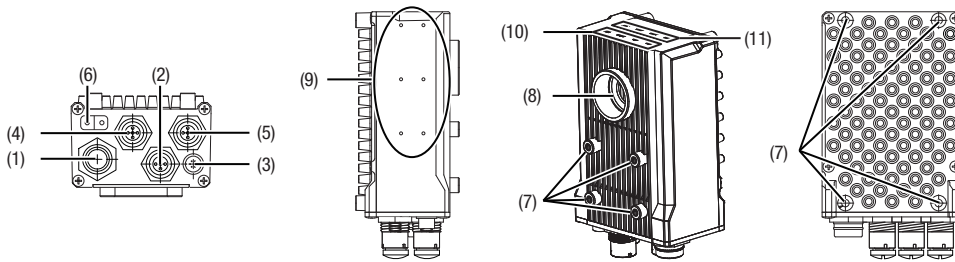
Version Information

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)	Not supported	Supported
FQ-MS□□□(-M)-ECT	Not supported	Supported

Components and Functions

Sensor

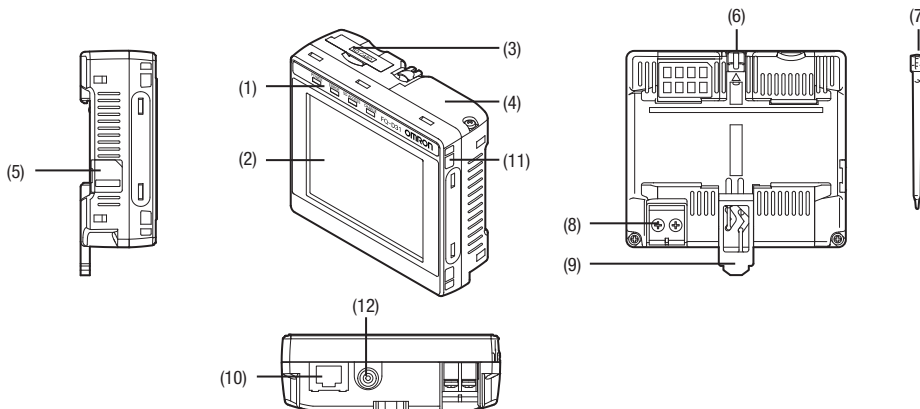


No.	Name	Description
(1)	I/O Cable connector	An I/O Cable is used to connect the Sensor to the power supply and external I/O.
(2)	Ethernet connector	An Ethernet cable is used to connect the Sensor to external devices such as PLCs, the Touch Finder, or computers.
(3)	Lighting connector	Connect an external 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.
(11)	EtherCAT Operation indicators	BUSY	Lit in green while the sensor is processing.
		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.	

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.

^{*1} Applicable to the FQ-MD31 only.



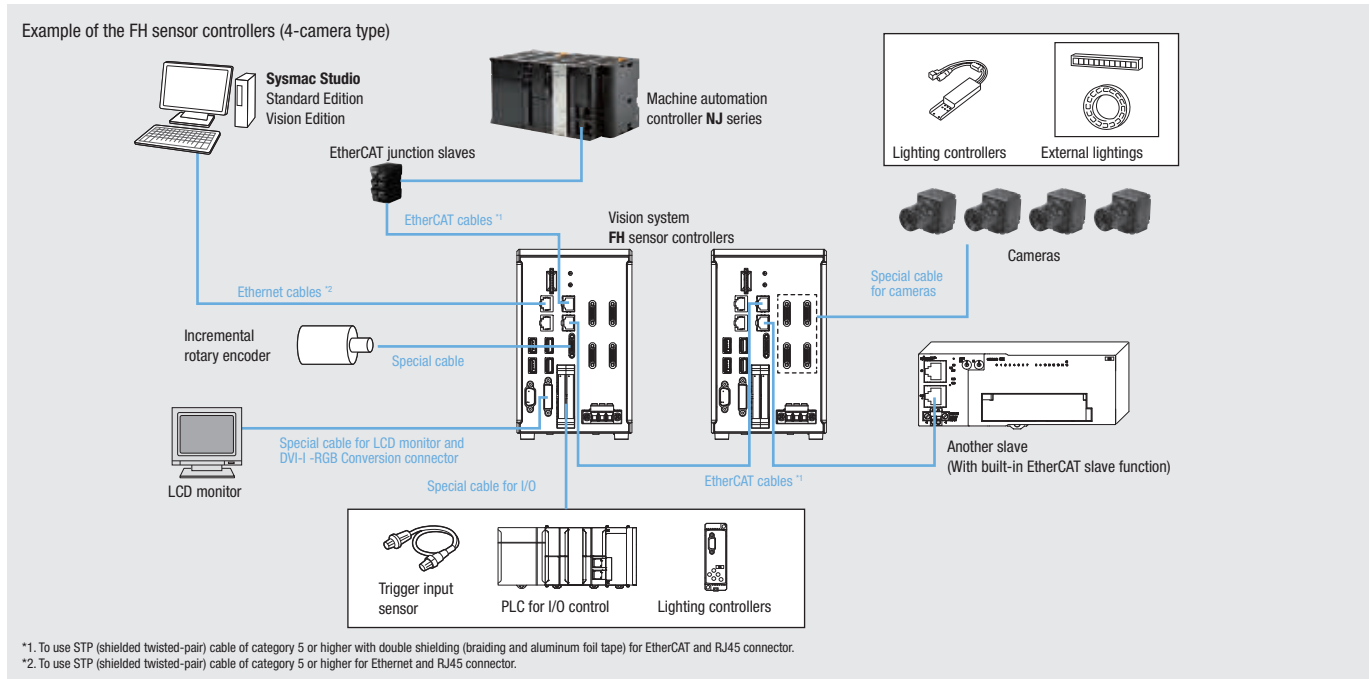
Faster machine speed and high-precision operation

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.

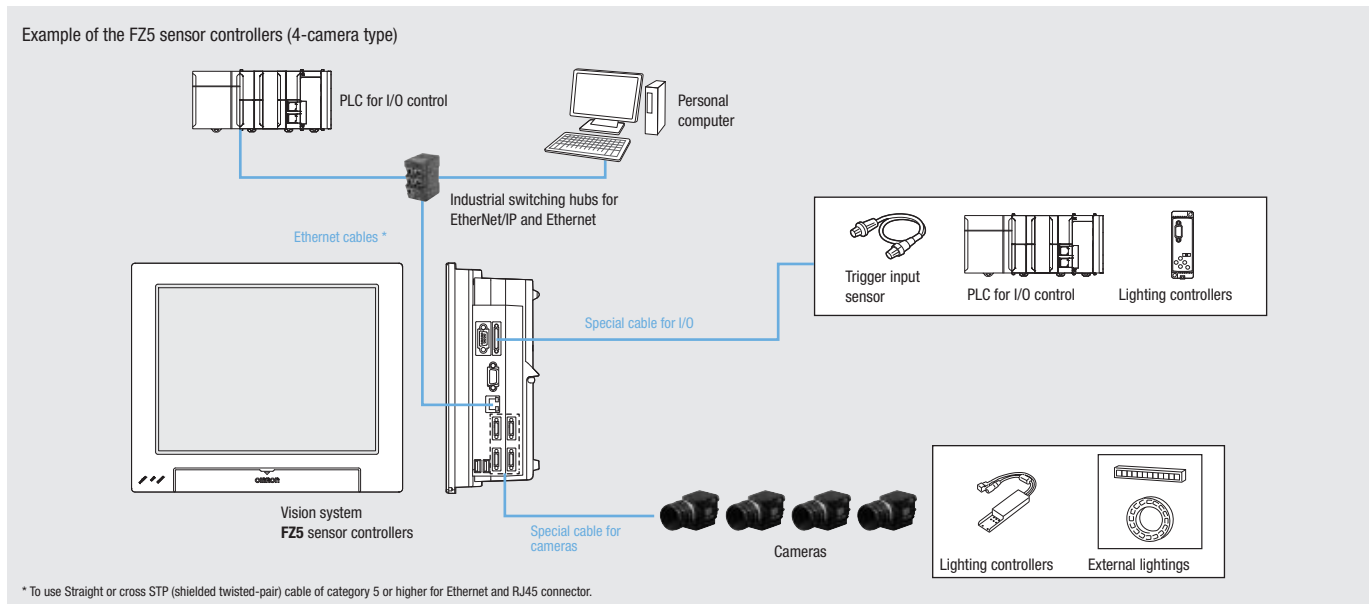
- Four-core image processing
- Fast EtherCAT communications
- Innovative Shape Search III
- Up to 8 high resolution cameras
- Supports Microsoft®.NET
- Compatible with Sysmac Studio Automation software

System configuration

EtherCAT connections for FH series




EtherNet/IP, No-protocol Ethernet and PLC Link connections for FZ5 series





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
			4	PNP	FZ5-1105
			4	NPN	FZ5-1100-10
				PNP	FZ5-1105-10
		Standard controllers	2	NPN	FZ5-600
			4	PNP	FZ5-605
			4	NPN	FZ5-600-10
				PNP	FZ5-605-10
	Box-type controllers	Lite controllers	2	NPN	FZ5-L350
			4	PNP	FZ5-L355
			4	NPN	FZ5-L350-10
				PNP	FZ5-L355-10

Cameras

Item	Descriptions	Colour/ Monochrome	Image read time	Order code			
	High-speed CMOS cameras (Lens required) For FH series only	4 million pixels	Colour	8.5 ms	FH-SC04		
		2 million pixels	Monochrome		FH-SM04		
			Colour	4.6 ms	FH-SC02		
		300,000 pixels	Monochrome		FH-SM02		
			Colour	3.3 ms	FH-SC		
	Digital CCD cameras (Lens required)	5 million pixels (When connecting FZ5-6□ or FZ5-L35□, up to two cameras can be connected.)	Colour	62.5 ms	FZ-SC5M2		
			Monochrome		FZ-S5M2		
		2 million pixels	Colour	33.3 ms	FZ-SC2M		
			Monochrome		FZ-S2M		
				300,000 pixels	Colour	12.5 ms	FZ-SC
					Monochrome		FZ-S
	High-speed CCD cameras (Lens required)	300,000 pixels	Colour	4.9 ms	FZ-SHC		
			Monochrome		FZ-SH		
	Small digital CCD cameras (Lenses for small camera required)	300,000-pixel flat type	Colour	12.5 ms	FZ-SFC		
			Monochrome		FZ-SF		
		300,000-pixel pen type	Colour	12.5 ms	FZ-SPC		
			Monochrome		FZ-SP		
	Intelligent Compact CMOS cameras (Camera + Manual focus lens + High power lighting)	Narrow view	Colour	16.7 ms	FZ-SQ010F		
		Standard view	Colour		FZ-SQ050F		
		Wide view (long-distance)	Colour		FZ-SQ100F		
		Wide view (short-distance)	Colour		FZ-SQ100N		
	Intelligent CCD cameras (Camera + Zoom, Autofocus lens + Intelligent lighting)	Wide view	Colour	12.5 ms	FZ-SLC100		
		Narrow view	Colour		FZ-SLC15		
	Autofocus CCD Cameras (Camera + Zoom, Autofocus lens)	Wide view	Colour	12.5 ms	FZ-SZC100		
		Narrow view	Colour		FZ-SZC15		

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								

Cameras peripheral devices

Item	Descriptions	Order code
–	External lighting	FL Series
	Lighting controller (Required to control external lighting from a controller) For FL-series	FL-TCC1
	Intelligent camera diffusion plate	Wide field of vision FZ-SLC100-DL Narrow field of vision FZ-SLC15-DL
	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-S5M_2	FZ-S5M-XLC
–	Mounting bracket for FZ-SH_	FZ-SH-XLC

Cables

Item	Descriptions	Order code
	Camera cable Cable length: 2 m, 5 m, or 10 m ^{*1}	FZ-VS
	Bend resistant camera cable Cable length: 2 m, 5 m, or 10 m ^{*1}	FZ-VSB
	Right-angle camera cable ^{*2} Cable length: 2 m, 5 m, or 10 m ^{*1}	FZ-VSL
	Long-distance camera cable Cable length: 15 m ^{*1}	FZ-VS2
	Long-distance right-angle camera cable Cable length: 15 m ^{*1}	FZ-VSL2
	Cable extension unit Up to two extension units and three cables can be connected. (Maximum cable length: 45 m ^{*1})	FZ-VSJ
	Monitor cable 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 For FH series only	FH-VMRGB
	Parallel I/O cable Cable length: 2 m or 5 m, For FZ series only	FZ-VP
	Parallel I/O cable for connector-terminal conversion unit Cable length: 2 m or 5 m, For FZ series only Connector-terminal block conversion units can be connected (Terminal blocks recommended products: OMRON XW2R-J50G-T, XW2R-E50G-T, XW2R-P50G-T)	FZ-VPX
	Parallel I/O cable ^{*3} Cable length: 2 m or 5 m, For FH series only	XW2Z-S013-2/-S013-5
	Encoder cable for line-driver Cable length: 1.5 m, For FH series 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 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.

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) Wire gauge and number of pairs: AWG27, 4-pair cable, cable sheath material: LSZH ^{*2} , Cable colour: Blue, Yellow, or Green, 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) Wire gauge and number of Pairs: AWG22, 2-pair cable 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) Wire gauge and number of Pairs: AWG22, 2-pair cable 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) Wire gauge and number of pairs: AWG22, 2-pair cable 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: Cables AWG24, 4-pair cable	Hitachi Cable, Ltd. NETSTAR-C5E SAB 0.5 × 4P ^{*4} Kuramo Electric Co. KETH-SB ^{*4} SWCC Showa Cable Systems Co. FAE-5004 ^{*4} Panduit Corporation MPS588-C ^{*4}
-	Wire gauge and number of pairs: Cables AWG22, 2-pair cable	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: Cables 0.5 mm, 4-pair cable	Fujikura Ltd. F-LINK-E 0.5mm × 4P ^{*6} Panduit Corporation MPS588 ^{*6}
-	RJ45 connectors	

^{*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 For Box-type controllers				FZ-M08
	USB memory		2 GB		FZ-MEM2G
			8 GB		FZ-MEM8G
	SD card		2 GB		HMC-SD291
	For FH Controller only		4 GB		HMC-SD491
	VESA attachment For installing the LCD integrated-type controller				FZ-VESA
	Desktop controller stand For installing the LCD integrated-type controller				FZ-DS
	Display/USB switcher				FZ-DU
—	Mouse recommended products Driverless wired mouse (A mouse that requires the mouse driver to be installed is not supported.)				—
	EtherCAT junction slaves 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
		Standard	License		
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. Sysmac Studio runs on the following OS. 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
		Standard	License		
Application Producer	Software components that provide a development environment to further customize the standard controller features of the FH series. System requirements: • CPU: Intel Pentium Processor (SSE2 or higher) • OS: Windows 7 Professional (32bit) or Enterprise (32bit) or Ultimate (32bit) • .NET Framework: .NET Framework 3.5 or higher • Memory: At least 2 GB RAM Available disk space: At least 2 GB • Browser: Microsoft® Internet Explorer 6.0 or later • Display: XGA (1024 × 768), True Colour (32-bit) or higher • Optical drive: CD/DVD drive The following software is required to customize the software: Microsoft® Visual Studio® 2010 Professional or Microsoft® Visual Studio® 2008 Professional	— (Media only)	—	CD	FH-AP1
		1 license	—	—	FH-AP1L

Ratings and Specifications

Controllers

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						
	High-grade processing items		No						
	No. of cameras		2	4	8	2	4	8	
	Connected camera		Can be connected to all cameras. (FZ-S series/FH-S series)						
	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		1600 (H) × 1200 (V)					
		When connected to a 5 million-pixel camera		2448 (H) × 2044 (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		2040 (H) × 1088 (V)					
		When connected to a 4 million-pixel camera		2040 (H) × 2048 (V)					
	No. of scenes		128						
	Number of logged images ¹	When connected to a intelligent compact camera		Connected to 1 camera (Colour): 232, Connected to 2 camera (Colour): 116 Connected to 3 camera (Colour): 77, Connected to 4 camera (Colour): 58 Connected to 5 camera (Colour): 46, Connected to 6 camera (Colour): 38 Connected to 7 camera (Colour): 33, Connected to 8 camera (Colour): 29					
		When connected to a 300,000-pixel camera (FZ-S/FH-S)		Connected to 1 camera (Colour): 270, Connected to 1 camera (Monochrome): 272 Connected to 2 camera (Colour): 135, Connected to 2 camera (Monochrome): 136 Connected to 3 camera (Colour/Monochrome): 90 Connected to 4 camera (Colour): 67, Connected to 4 camera (Monochrome): 68 Connected to 5 camera (Colour/Monochrome): 54 Connected to 6 camera (Colour/Monochrome): 45 Connected to 7 camera (Colour/Monochrome): 38 Connected to 8 camera (Colour): 33, Connected to 8 camera (Monochrome): 34					
		When connected to a 2 million-pixel camera (FH-S)		Connected to 1 camera (Colour/Monochrome): 37, Connected to 2 camera (Colour/Monochrome): 18 Connected to 3 camera (Colour/Monochrome): 12, Connected to 4 camera (Colour/Monochrome): 9 Connected to 5 camera (Colour/Monochrome): 7, Connected to 6 camera (Colour/Monochrome): 6 Connected to 7 camera (Colour/Monochrome): 5, Connected to 8 camera (Colour/Monochrome): 4					
		When connected to a 2 million-pixel camera (FZ-S)		Connected to 1 camera (Colour/Monochrome): 43, Connected to 2 camera (Colour/Monochrome): 21 Connected to 3 camera (Colour/Monochrome): 14, Connected to 4 camera (Colour/Monochrome): 10 Connected to 5 camera (Colour/Monochrome): 8, Connected to 6 camera (Colour/Monochrome): 7 Connected to 7 camera (Colour/Monochrome): 6, Connected to 8 camera (Colour/Monochrome): 5					
		When connected to a 4 million-pixel camera (FH-S)		Connected to 1 camera (Colour/Monochrome): 20, Connected to 2 camera (Colour/Monochrome): 10 Connected to 3 camera (Colour/Monochrome): 6, Connected to 4 camera (Colour/Monochrome): 5 Connected to 5 camera (Colour/Monochrome): 4, Connected to 6 camera (Colour/Monochrome): 3 Connected to 7 camera (Colour/Monochrome): 2, Connected to 8 camera (Colour/Monochrome): 2					
When connected to a 5 million-pixel camera (FZ-S)		Connected to 1 camera (Colour/Monochrome): 16, Connected to 2 camera (Colour/Monochrome): 8 Connected to 3 camera (Colour/Monochrome): 5, Connected to 4 camera (Colour/Monochrome): 4 Connected to 5 camera (Colour/Monochrome): 3, Connected to 6 camera (Colour/Monochrome): 2 Connected to 7 camera (Colour/Monochrome): 2, Connected to 8 camera (Colour/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) 17 inputs (STEP0/ENCTRIG_Z0, STEP1/ENCTRIG_Z1, ENCTRIG_A0 to 1, ENCTRIG_B0 to 1, DSA0 to 1, DIO to 7, DI_LINE0) 37 outputs (RUN0 to 1, READY0 to 1, BUSY0 to 1, ORO to 1, ERROR0 to 1, GATE0 to 1, STGOUT0/SHTOUT0, STGOUT1/SHTOUT1, STGOUT2 to 7, D00 to 15, ACK) (In the 5-line to 8-line random trigger mode) 19 inputs, STEP0 to 7, DI_LINE0 to 2, DIO to 7) 34 outputs (READY0 to 7, BUSY0 to 7, ORO 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 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.							
Ratings	Power supply voltage		20.4 to 26.4 VDC						
	Current consumption (at 24.0 VDC) ²	When connected to a intelligent compact camera, intelligent or autofocus 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 or 5 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)							

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						
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 strobe controller model is connected to a lamp, the current consumption is as high as when an intelligent 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	1600 (H) × 1200 (V)						
	When connected to a 5 million-pixel camera	2448 (H) × 2044 (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	Colour camera: 270, Monochrome Camera: 272		Colour camera: 250, Monochrome Camera: 252			
		Connected to 2 cameras	Colour camera: 135, Monochrome Camera: 136		Colour camera: 125, Monochrome Camera: 126			
		Connected to 3 cameras	Colour camera: 90, Monochrome Camera: 90		Colour camera: 83, Monochrome Camera: 84			
		Connected to 4 cameras	Colour camera: 67, Monochrome Camera: 68		Colour camera: 62, Monochrome Camera: 63			
	When connected to a 2 million-pixel camera	Connected to 1 camera	Colour camera: 43, Monochrome Camera: 43		Colour camera: 40, Monochrome Camera: 40			
		Connected to 2 cameras	Colour camera: 21, Monochrome Camera: 21		Colour camera: 20, Monochrome Camera: 20			
		Connected to 3 cameras	Colour camera: 14, Monochrome Camera: 14		Colour camera: 13, Monochrome Camera: 13			
		Connected to 4 cameras	Colour camera: 10, Monochrome Camera: 10		Colour camera: 10, Monochrome Camera: 10			
	When connected to a 5 million-pixel camera	Connected to 1 camera	Colour camera: 16, Monochrome Camera: 16		Colour camera: 11, Monochrome Camera: 11			
		Connected to 2 cameras	Colour camera: 8, Monochrome Camera: 8		Colour camera: 5, Monochrome Camera: 5			
		Connected to 3 cameras	Colour camera: 5, Monochrome Camera: 5		-			
		Connected to 4 cameras	Colour 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) 17 inputs (RESET, STEP0/ENCTRIG_Z0, STEP1/ENCTRIG_Z1, DSA0 to 1, ENCTRIG_A0 to 1, ENCTRIG_B0 to 1, DIO to 7), 29 outputs (RUN/BUSY1, BUSY0, GATE0 to 1, ORO to 1, READY0 to 1, ERROR, STGOUT0 to 3, DO0 to 15) (When used in other mode) 13 inputs (RESET, STEP0/ENCTRIG_Z0, DSA0, ENCTRIG_A0, ENCTRIG_B0, DIO to 7), 26 outputs (RUN, BUSY0, GATE0, ORO, READY0, ERROR, STGOUT0 to 3, DO0 to 15) STGOUT 2 to 3 only for camera 4 ch type		13 inputs (RESET, STEP0/ENCTRIG_Z0, DSA0, ENCTRIG_A0, ENCTRIG_B0, DIO to 7), 26 outputs (RUN, BUSY0, GATE0, ORO, READY0, ERROR, STGOUT0 to 3, DO0 to 15) STGOUT 2 to 3 only for camera 4 ch type		11 inputs (RESET, STEP, DSA, and DIO 0 to 7), 26 outputs (RUN, BUSY, GATE, OR, READY, ERROR, STGOUT 0 to 3, and DO 0 to 15) STGOUT 2 to 3 only for camera 4 ch type		
Monitor interface		Integrated controller and LCD 12.1 inch TFT colour 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 Storage: -20 to 65°C (with no icing or condensation)					Operating: 0 to 45°C, 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)							
Weight	Approx. 3.2 kg		Approx. 3.4 kg		Approx. 3.2 kg		Approx. 3.4 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	
Image elements	1/3-inch CMOS image elements				2/3-inch CMOS image elements				1-inch CMOS image elements			
Colour/Monochrome	Monochrome		Colour		Monochrome		Colour		Monochrome		Colour	
Effective pixels	640 (H) × 480 (V)				2040 (H) × 1088 (V)				2040 (H) × 2048 (V)			
Pixel size	7.4 (μm) × 7.4 (μm)				5.5 (μm) × 5.5 (μm)				5.5 (μm) × 5.5 (μm)			
Shutter function	Electronic shutter; Shutter speeds can be set from 20 μs to 100 ms.				Electronic shutter; Shutter speeds can be set from 25 μs to 100 ms.							
Partial function	1 to 480 lines		2 to 480 lines		1 to 1088 lines		2 to 1088 lines		1 to 2048 lines		2 to 2048 lines	
Frame rate (image read time)	308 fps (3.3 ms)				219 fps (4.6 ms) *1				118 fps (8.5 ms) *1			
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 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							
Accessories	Instruction manual											

*1 For high speed frame rate, 2 pieces of FZ-VS-_M cables are required.

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			
Colour/Monochrome	Monochrome		Colour		Monochrome		Colour		Monochrome		Colour	
Effective pixels	640 (H) × 480 (V)				1600 (H) × 1200 (V)				2448 (H) × 2044 (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 1200 lines				12 to 2044 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 Storage: -25 to 65°C (with no icing or condensation)				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. 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			
Colour/Monochrome	Monochrome	Colour	Monochrome	Colour
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) 0 to 45°C (camera head) 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, 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	
Colour/Monochrome	Monochrome	Colour
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 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			
Colour/Monochrome	Colour			
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 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

Intelligent CCD cameras, Autofocus CCD cameras

Model	FZ-SLC100	FZ-SLC15	FZ-SZC100	FZ-SZC15
Image elements	Interline transfer reading all pixels, 1/3-inch CCD image elements			
Colour/Monochrome	Colour			
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)	80 fps (12.5 ms)			
Field of vision *1	13 to 100 mm *2	2.9 to 14.9 mm *2	13 to 100 mm *2	2.9 to 14.9 mm *2
Installation distance	70 to 190 mm *2	35 to 55 mm *2	77.5 to 197.5 mm *2	47.5 to 67.5 mm
LED class *3 (lighting)	Class 2		-	
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. 670 g	Approx. 700 g	Approx. 500 g	
Accessories	Instruction sheet and hexagonal wrench			

*1 The length of the visual field is the lengths along the Y axis.

*2 Tolerance: ±5% max.

*3 Applicable standards: IEC62471-2

LCD Monitor

Model	FZ-M08
Size	8.4 inches
Type	Liquid crystal Colour 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-VS (2 m)	FZ-VSB (2 m)	FZ-VSL (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
Weight	Approx. 170 g	Approx. 220 g	Approx. 170 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)

Model	FZ-VSJ
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-VS2 (15 m)	FZ-VSL2 (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	93 mm	
Weight	Approx. 1600 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
			FH-SM/SC		FH-SM02/SC02		FH-SM04/SC04
				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-VS	2 m	Yes	Yes	Yes	Yes	Yes
	FZ-VSL	5 m	Yes	Yes	Yes	Yes	Yes
		10 m	Yes	No	Yes	No	Yes
Bend resistant camera cables	FZ-VSB	2 m	Yes	Yes	Yes	Yes	Yes
		5 m	Yes	Yes	Yes	Yes	Yes
		10 m	Yes	No	Yes	No	Yes
Long-distance camera cable Long-distance right-angle camera cable	FZ-VS2 FZVSL2	15 m	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	Intelligent CCD cameras Autofocus CCD 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□	FZ-SLC□ FZ-SZC□
Camera cables Right-angle camera cables	FZ-VS FZ-VSL	2 m	Yes	Yes	Yes	Yes	Yes	Yes	Yes
		5 m	Yes	Yes	Yes	Yes	Yes	Yes	Yes
		10 m	Yes	Yes	No	Yes	Yes	Yes	No
Bend resistant camera cables	FZ-VSB	2 m	Yes	Yes	Yes	Yes	Yes	Yes	Yes
		5 m	Yes	Yes	Yes	Yes	Yes	Yes	Yes
		10 m	Yes	Yes	No	Yes	Yes	Yes	No
Long-distance camera cable Long-distance right-angle camera cable	FZ-VS2 FZVSL2	15 m	Yes	Yes	No	Yes	Yes	Yes	No

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

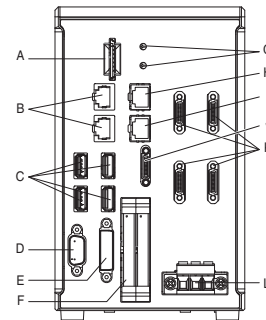
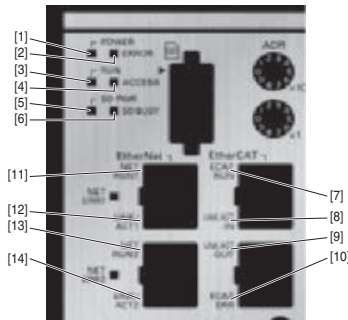
FH Series and programming devices

FH series	Required programming device	
	Sysmac Studio Standard Edition/Vision Edition	
	Ver.1.06	Ver.1.07 or higher
FH-3050 (-_)	Not supported	Supported
FH-1050 (-_)		

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

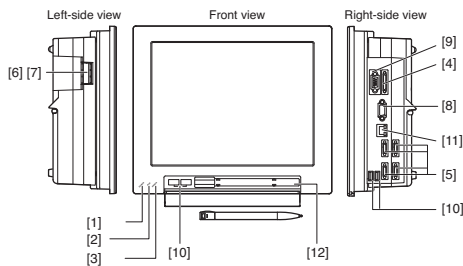
Example of the FH sensor controllers BOX type
(4-camera type)



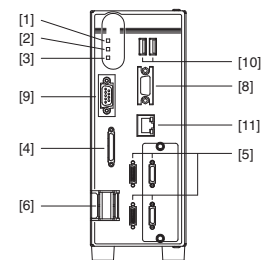
Name	Description
[1] POWER LED	Lit while power is ON.
[2] ERROR LED	Lit when an error has occurred.
[3] RUN LED	Lit while the controller is in Measurement Mode.
[4] ACCESS LED	Lit while the memory is accessed.
[5] SD POWER LED	Lit while power is supplied to the SD card and the card is usable.
[6] SD 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)



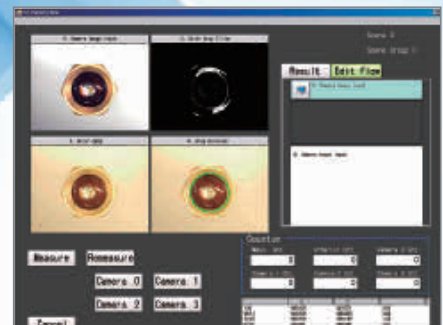
Name	Description
[1] POWER LED	Lit while power is ON.
[2] RUN LED	Lit while the controller is in Run Mode.
[3] ERROR LED	Lit when an error has occurred.
[4] I/O connector (control lines, data lines)	Connect the controller to external devices such as a sync sensor and PLC.
[5] Camera connector	Connect 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)

VISION – TAILORED AND FIT FOR INDUSTRY

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.



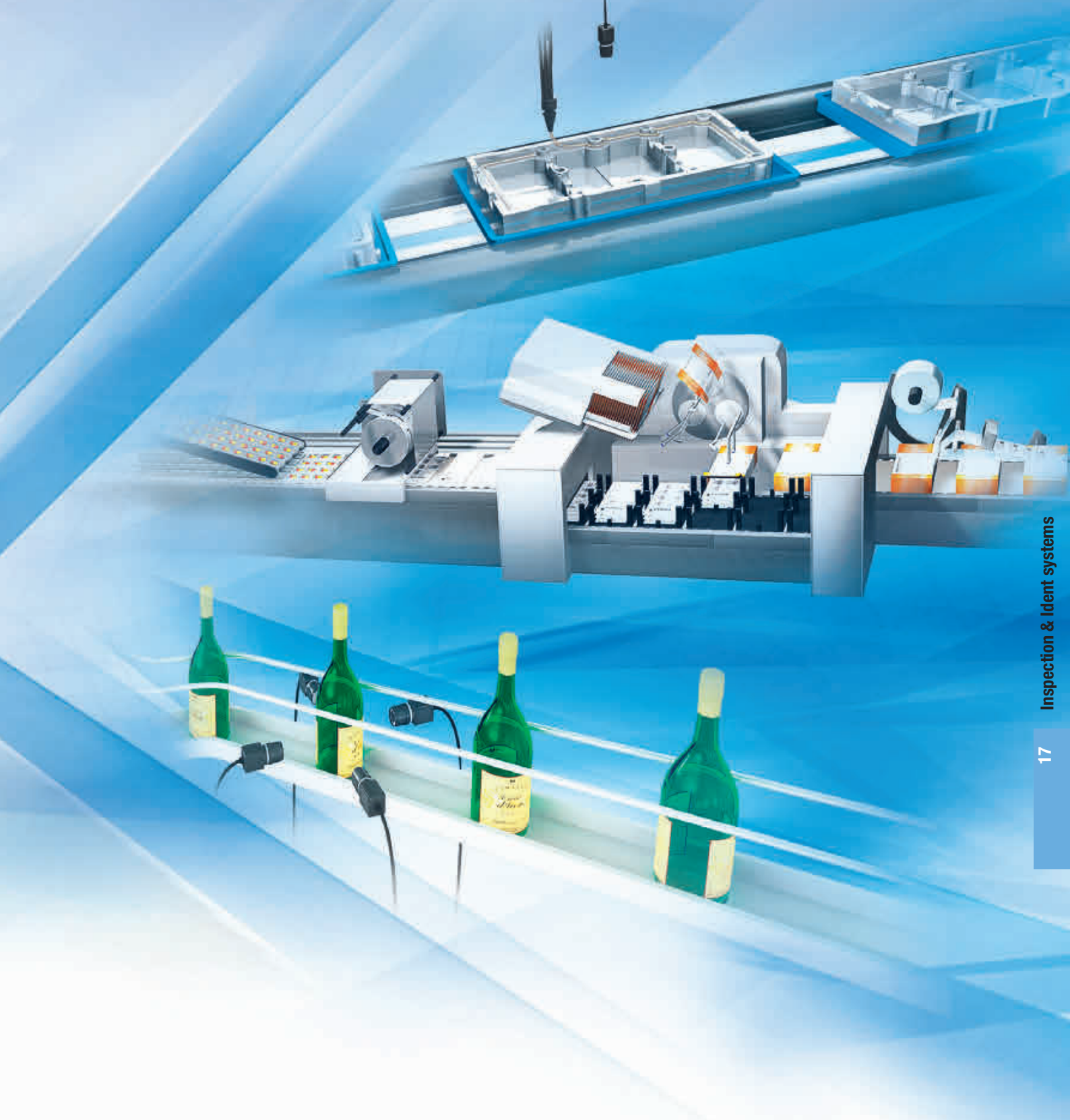
Simplicity – easy to use

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-build 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

VISION – TAILORED AND FIT FOR INDUSTRY

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:

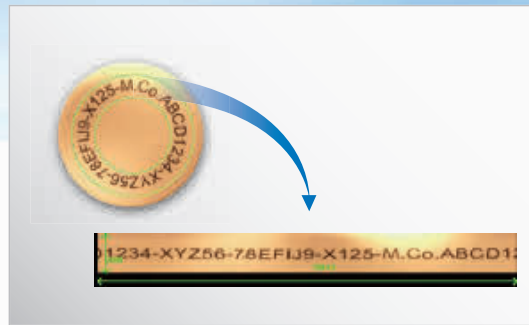
- Blister pack
- Vials
- Syringes
- Label inspection



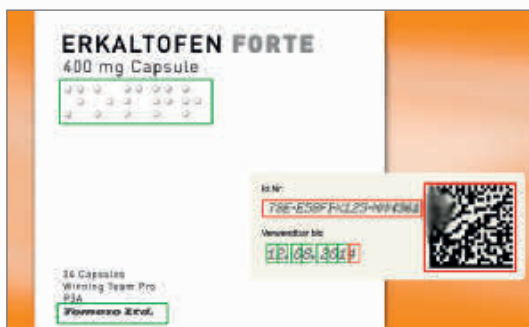
Inspect any applications in Pharma



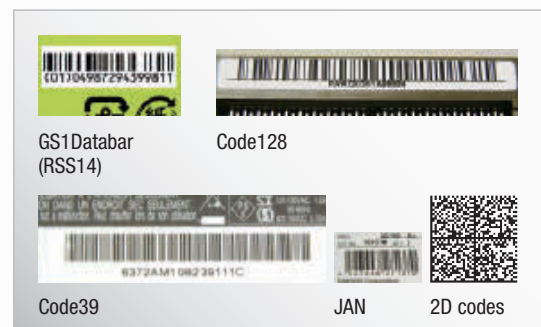
Pill inspection in blisters



Polar transformation of round strings



Date/Batch code verification (OCR/OCV)



High speed code reading

VISION – TAILORED AND FIT FOR INDUSTRY

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-Labeling 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:

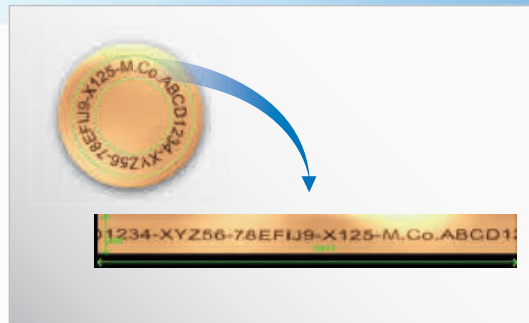
- Acquire images from up to 4x cameras
- Compensate the distortion
- Identify the overlapping areas
- Stitch the images together



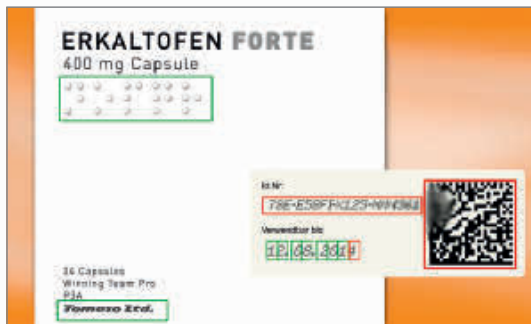
Powerful image processing tools for labelling



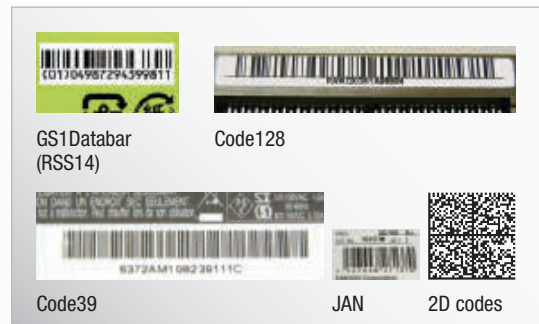
Strong OCR/OCV



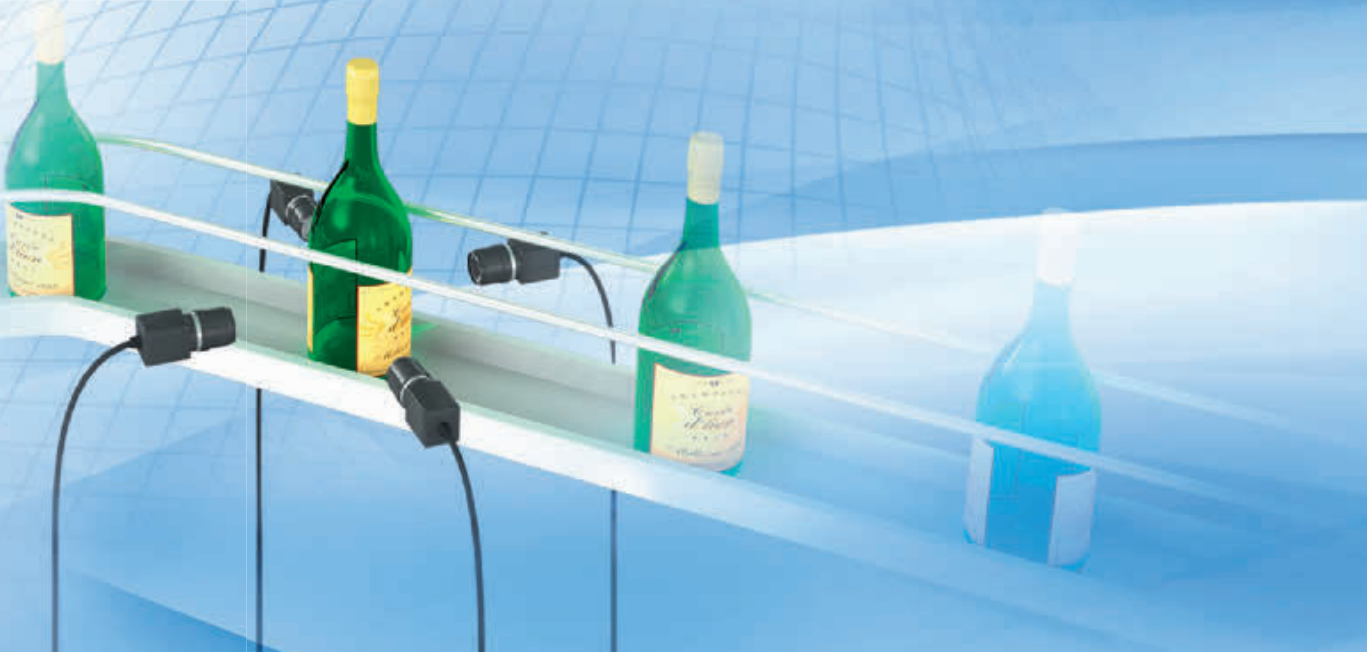
Polar transformation of round strings



Date/Batch code verification (OCR/OCV)



High speed code reading



Position and defect inspection

Produce aesthetically perfect products is a key point. FlexXpect-Labeling offers a suite of image processing tools to inspect the label for position and defects.

YOUR BENEFITS

- Strong OCR/OCV
- Code reading (Barcode, Datamatrix)
- 360° inspections of bottles
- Real colour processing items
- High resolution
- Easy & intuitive configuration



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.

FlexXpect-Labeling software module	FLEXXPECT-LABELLING
------------------------------------	---------------------

Note: FlexXpect software modules require Xpectia/FZW hardware. This is not part of the item and needs to be ordered independently.

VISION – TAILORED AND FIT FOR INDUSTRY

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.

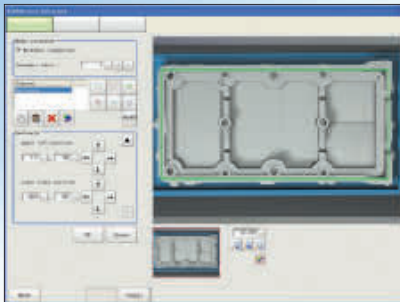
Glue Bead inspection:

- Correct path
- Thickness
- Interrupt

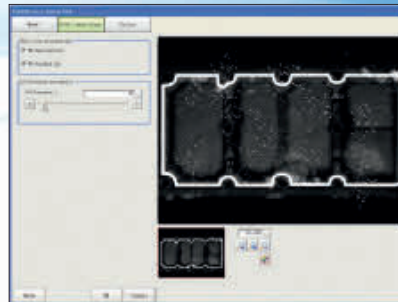


Inspect any applications in Pharma

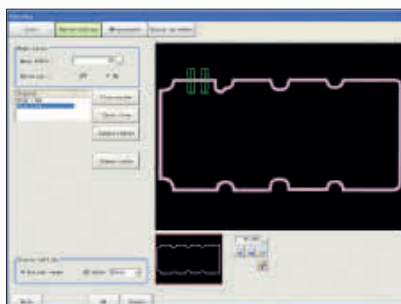
FlexXpect-Glue Bead features an intuitive and easy set-up procedure. No expert knowledge of the user is required.



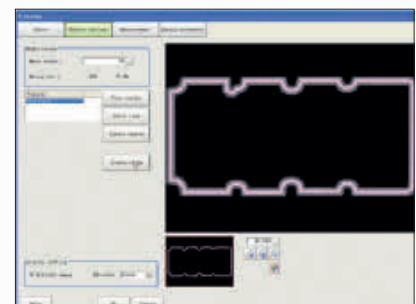
Step 1
Define inspection area.



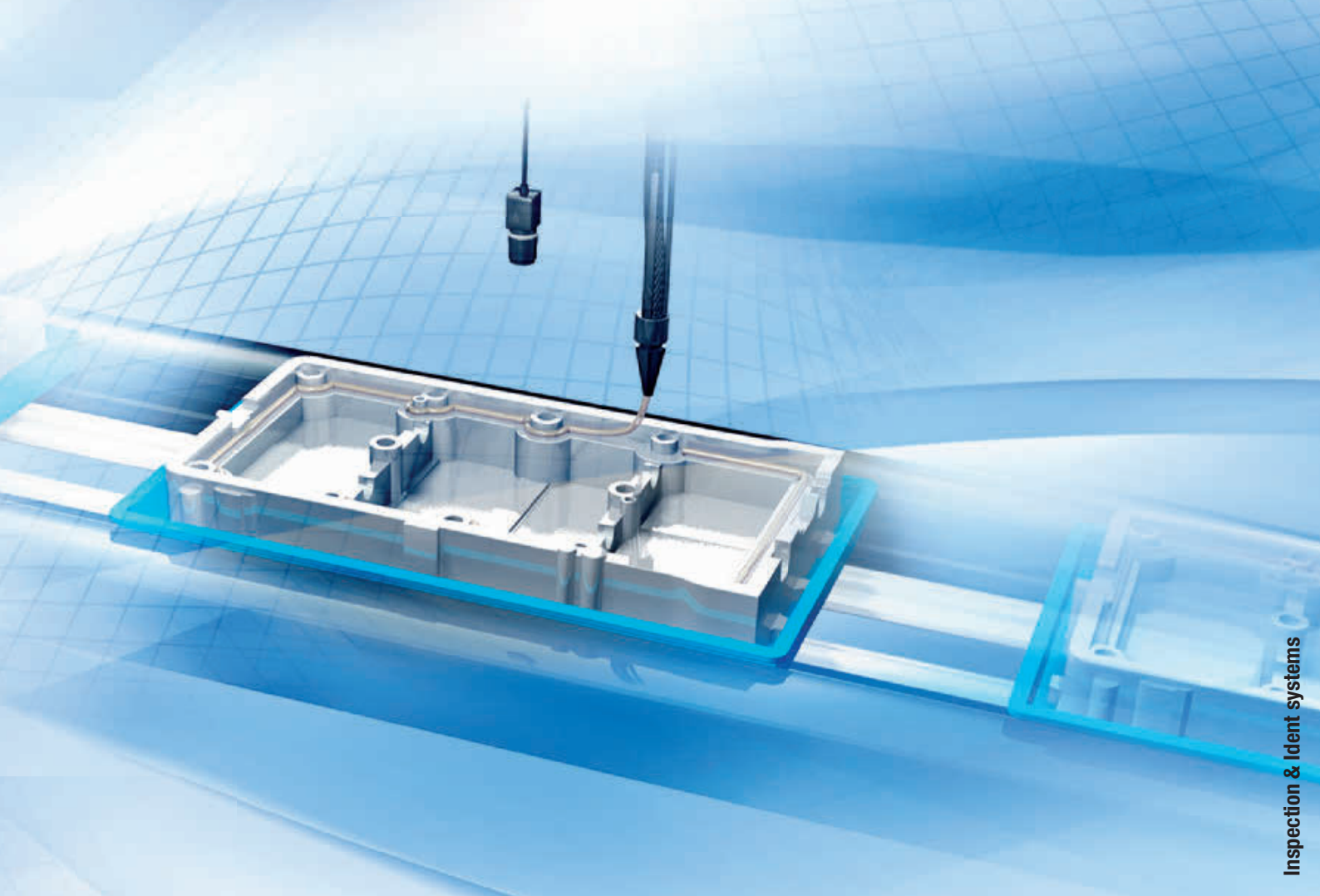
Step 2
Teach the glue.



Step 3
Define start & end point of the glue.

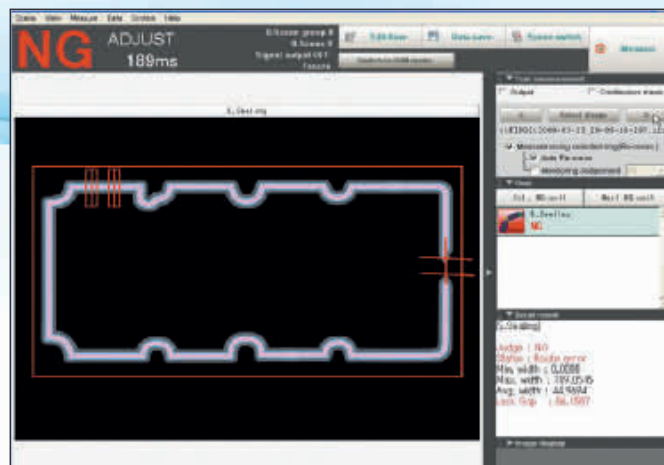
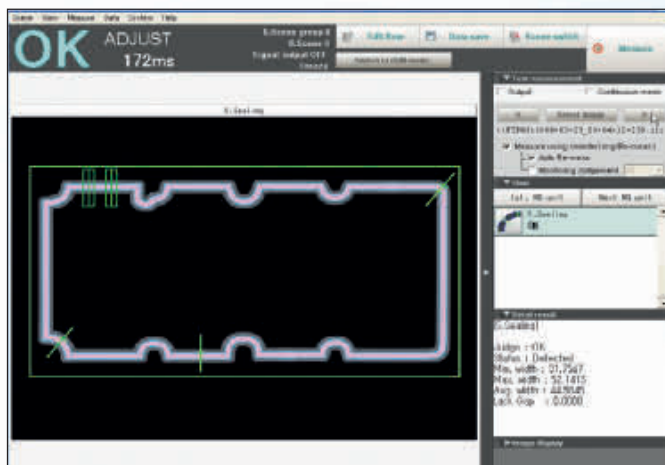


Step 4
Automatic calculation of the path of the Glue Bead.



YOUR BENEFITS

- One shot inspection of the complete path
- Easy set-up
- Automatic path calculation
- Real colour glue extraction



FlexXpect-Glue Bead software module	FLEXPECT-GLUE BEAD
-------------------------------------	--------------------

Note: FlexXpect software modules require Xpectia/FZW hardware. This is not part of the item and needs to be ordered independently.

VISION – TAILORED AND FIT FOR INDUSTRY

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.

Features of FlexXpect-PV:

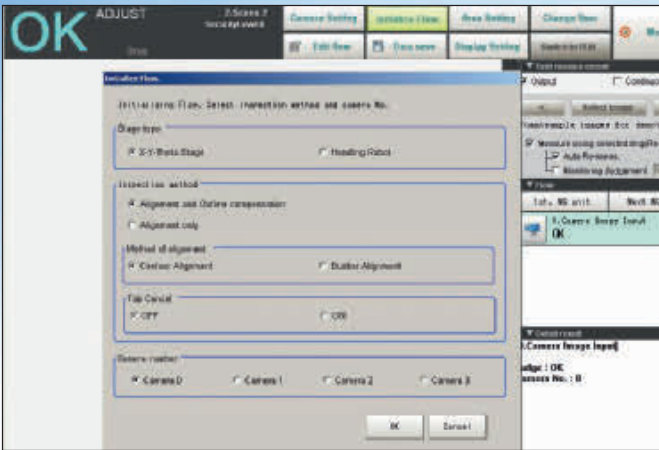
- Easy and intuitive set-up
- Automatic extraction and teaching of the PV wafer
- Precise inspections with high resolution cameras
- Automatic robot calibration
- Fade-out strings and conveyor belts

Supported PV inspections:

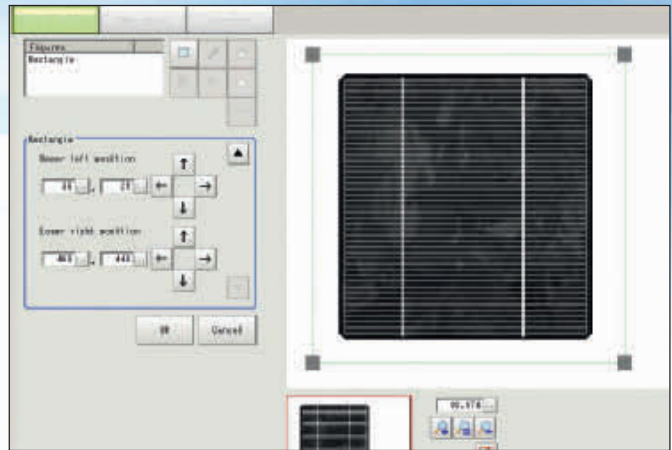
- Precise wafer and string alignment
- Accurate chamfer chip inspection
- Detection of minute edge cracks
- Bus bar alignment on the wafer



Quick set-up in simple steps:



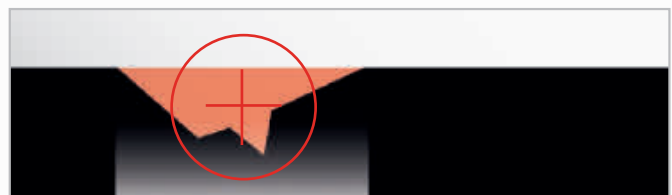
Step 1:
Select the inspection function



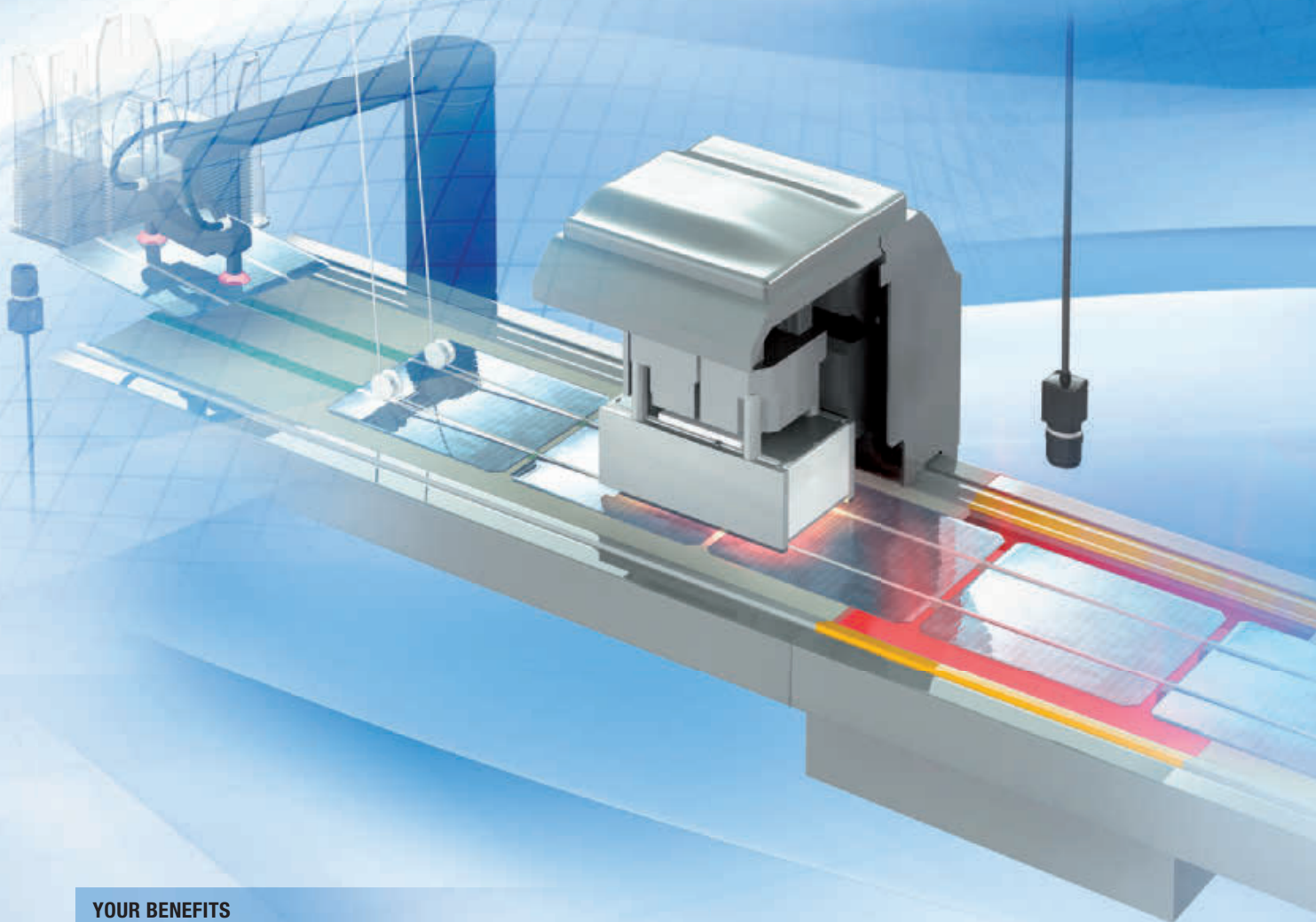
Step 2:
Draw a rectangle around the wafer



Step 3:
One step deletion of bus bars and conveyor belts (optional)

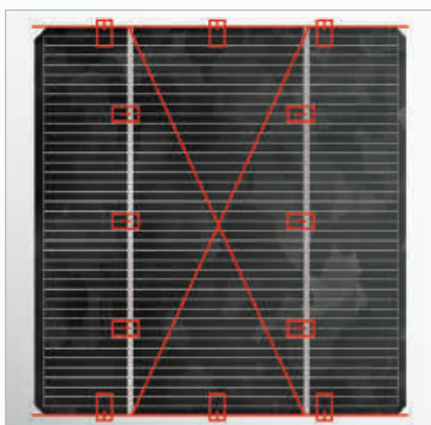


Step 4:
Start the inspection
Accurate chamfer chip inspection (0.1 mm)

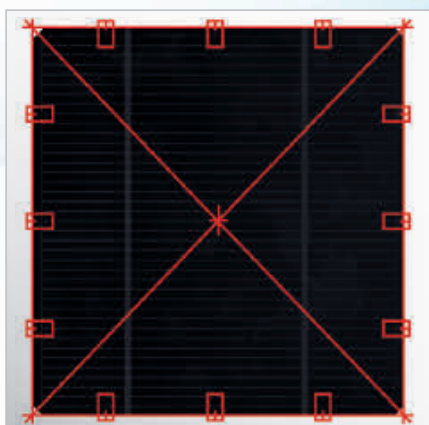


YOUR BENEFITS

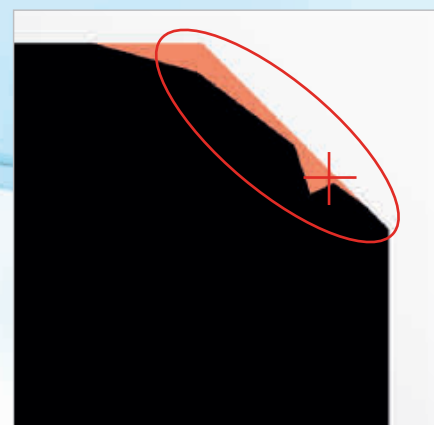
- One shot inspection of the complete path
- Easy set-up
- Automatic path calculation
- Real colour glue extraction



Bus bar alignment



Outline edge alignment



Precise detection of edge breakage

FlexXpect-PV software module	FLEXXPECT-PV
------------------------------	--------------

Note: FlexXpect software modules require Xpectia/FZW hardware. This is not part of the item and needs to be ordered independently.



All codes with one touch

The new compact FQ-CR1 code reader enables accurate, reliable and easy reading of barcodes and 2D codes, thanks to superior crystal clear imaging technology, which it shares with the other products in our highly regarded FQ family of vision sensors.

- 1D code reader
- 2D code reader
- Crystal-clear image quality
- One-touch control via simple, icon-driven menu

Ordering information

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.	Refer to figure 2.	Refer to figure 3.	Refer to figure 4.

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	<p>Figure 1</p>	<p>Figure 2</p>	<p>Figure 3</p>	<p>Figure 4</p>

Specifications

Item		Multi Code Reader
Model	NPN	FQ-CR10□□□□-M
	PNP	FQ-CR15□□□□-M
Field of view		Refer to ordering information on page 376. (Tolerance (field of vision): ±10% max.)
Installation distance		
Main functions	Inspection items	2D Code (Data Matrix(EC200), QR Code, MicroQR Code, PDF417, MicroPDF417, GS1-Data Matrix) 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))
	Image filter	None
	Verification function	Supported
	Retry function	Normal retry, Exposure retry, Scene retry, Trigger retry
	Number of simultaneous measurements	32
	Position compensation	None
	Number of registered scenes	32
	Image input	Image processing method
Image filter		High dynamic range (HDR) and polarizing filter (attachment)
Image elements		1/3-inch Monochrome CMOS
Shutter		1/250 to 1/30,000
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)
I/O specifications	Input signals	7 signals Single measurement input (TRIG) Control command input (IN0 to IN5)
	Output signals	3 signals Control output (BUSY) Overall judgement output (OR) Error output (ERROR) Note: The three output signals can be allocated for the judgements of individual inspection items.
	Ethernet specifications	100Base-TX/10Base-T
	Communications	–
	I/O expansion	–
	RS-232C	–
	Ratings	Power supply voltage
Current consumption		2.4 A max.
Environmental immunity	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)
	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 IP67 (Except when Polarizing Filter Attachment is mounted or connector cap is removed.)	
Materials		Sensor: PBT, PC, SUS, Mounting Bracket: PBT, Polarizing Filter Attachment: PBT, PC 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) AC adapter (manufactured by Sino-American Japan Co., Ltd) connection: 100 to 240 VAC, 50/60 Hz 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. Charging battery: 0.4 A max.
Environmental immunity	Ambient temperature range	Operating: 0 to 50°C Storage: –25 to 65°C (with no icing or condensation)	Operating: 0 to 50°C when mounted to DIN Track or panel Operation on Battery: 0 to 40°C:–25 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	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.

Battery

Item	Model	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 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) 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.

Windows is registered trademarks of Microsoft Corporation in the USA and other countries.
Other company names and product names in this document are the trademarks or registered trademarks of their respective companies.



Barcode & 2D code reader for challenging imprinted and molded codes

The FQ-CR2 allows the stable reading of codes that are molded or impressed into objects used e.g. in the automotive or electronic industry. The automatic adaption of settings ensures identifying the inspection conditions under which even challenging codes can be read.

- Optimized for imprinted or molded codes in metal, glass, PCB boards, etc.
- Automatic setting modification for finding best reading condition
- IP67

Ordering information

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.	Refer to figure 2.	Refer to figure 3.	Refer to figure 4.

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

Specifications

ID Model FQ-CR2 Series

Item		2D Code Reader
Model	NPN	FQ-CR20□□□□-M
	PNP	FQ-CR25□□□□-M
Field of view	Refer to ordering information on page 379. (Tolerance (field of vision): ±10% max.)	
Installation distance		
Main functions	Inspection items	2D Code (Data Matrix(EC200), QR Code)
	Image filter	Filter function (Smooth, Dilate, Erosion, Median), Code Error Correction Position Display
	Verification function	None
	Retry function	Normal retry, Exposure retry, Scene retry, Trigger retry
	Number of simultaneous measurements	32
	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	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)
I/O specifications	Input signals	7 signals Single measurement input (TRIG) Control command input (IN0 to IN5)
	Output signals	3 signals Control output (BUSY) Overall judgement output (OR) Error output (ERROR) Note: The three output signals can be allocated for the judgements of individual inspection items.
	Ethernet specifications	100Base-TX/10Base-T
	Communications	–
	I/O expansion	–
	RS-232C	–
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 50°C, Storage: –25 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	IEC 60529 IP67 (Except when Polarizing Filter Attachment is mounted or connector cap is removed.)
Materials		Sensor: PBT, PC, SUS, Mounting Bracket: PBT, Polarizing Filter Attachment: PBT, PC 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	Model with DC power supply	Model with AC/DC/battery power supply
		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) AC adapter (manufactured by Sino-American Japan Co., Ltd) 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
	Power consumption	DC power connection: 0.2 A max.	DC power connection: 0.2 A max. Charging battery: 0.4 A max.
Environmental immunity	Ambient temperature range	Operating: 0 to 50°C	Operating: 0 to 50°C when mounted to DIN Track or panel Operation on Battery: 0 to 40°C:–25 to 65°C (with no icing or condensation)
		Storage: –25 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	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.

Battery

Item	Model	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
	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) 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.

Windows is registered trademarks of Microsoft Corporation in the USA and other countries.
Other company names and product names in this document are the trademarks or registered trademarks of their respective companies.



Date & lot code verifier

The FQ2-CH is the ideal solution for date & lot code verifications in packaging lines. With double speed and recognition even of angled or difficult to read texts, the sensor helps you avoid costly product returns or the installation of costly vision systems.

- Optimized for date & lot code verification in packaging lines
- Double speed
- Position compensation for angled prints
- IP67

Ordering information

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
	PNP	FQ2-CH15010F-M	FQ2-CH15050F-M	FQ2-CH15100F-M
Field of vision/Installation distance	Refer to figure 1.	Refer to figure 2.	Refer to figure 3.	Refer to figure 4.

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	<p>Figure 1</p>	<p>Figure 2</p>	<p>Figure 3</p>	<p>Figure 4</p>

Specifications

ID Model FQ2-CH Series

Item		Optical Character Recognition Sensor
Model	NPN	FQ2-CH10□□□□-M
	PNP	FQ2-CH15□□□□-M
Field of view		Refer to ordering information on page 382. (Tolerance (field of vision): ±10% max.)
Installation distance		
Main functions	Inspection items	OCR · Alphabet A to Z · Number 0 to 9 · Symbol ' - . : / Model dictionary
	Image filter	Weak smoothing, Strong smoothing, Dilate, Erosion, Median, Extract edges, Extract horizontal edges, Extract vertical edges, Enhance edges, Background suppression
	Verification function	Supported
	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)
	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 Built-in lighting OFF: 1/1 to 1/50,000
	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) Communications trigger (Ethernet TCP no-protocol, Ethernet FINS/TCP no-protocol, EtherNet/IP, or PLC Link)
I/O specifications	Input signals	7 signals Single measurement input (TRIG) Control command input (IN0 to IN5)
	Output signals	3 signals Control output (BUSY) Overall judgement output (OR) Error output (ERROR) 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 FINS/TCP no-protocol, EtherNet/IP, or PLC Link
	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 (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 IP67 (Except when Polarizing Filter Attachment is mounted or connector cap is removed.)
Materials		Sensor: PBT, PC, SUS, Mounting Bracket: PBT, Polarizing Filter Attachment: PBT, PC 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) AC adapter (manufactured by Sino-American Japan Co., Ltd) connection: 100 to 240 VAC, 50/60 Hz 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. Charging battery: 0.4 A max.
Environmental immunity	Ambient temperature range		Operating: 0 to 50°C Storage: –25 to 65°C (with no icing or condensation)	Operating: 0 to 50°C when mounted to DIN Track or panel Operation on Battery: 0 to 40°C:–25 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		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
	NPN	FQ-SDU10	FQ-SDU20
Model	PNP	FQ-SDU15	FQ-SDU25
	I/O specifications	Parallel I/O	Connector 1
Connector 2			11 inputs (TRIG, RESET, IN0 to IN7, and DSA) 8 outputs (GATE, 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 *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□□□ 0.4 A max.: FQ2-S3□□□□□□ and FQ-SDU□□□ 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

Item	Model	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 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) 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.

Windows is registered trademarks of Microsoft Corporation in the USA and other countries.
Other company names and product names in this document are the trademarks or registered trademarks of their respective companies.



All-In-One (barcode, 2D code, text, quality inspection, positioning)

For the combination of code reading or verification tasks with quality inspection and/or positioning tasks, the FQ2-S4 is the ideal solution for all required functionalities in one compact housing. Up to 32 individual inspection tasks can be set up with the easy-to-use and detachable programming devices.

- All-in-one solution for up to 32 code reading & verification, text, quality inspection and positioning tasks
- Easy-to-use and detachable programming devices
- IP67

Ordering information

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 386.	Refer to figure 2 on page 386.	Refer to figure 3 on page 386.	Refer to figure 4 on page 386.

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 386.	Refer to figure 6 on page 386.	Refer to figure 7 on page 386.	Refer to figure 8 on page 386.	Refer to optical chart on p. 387

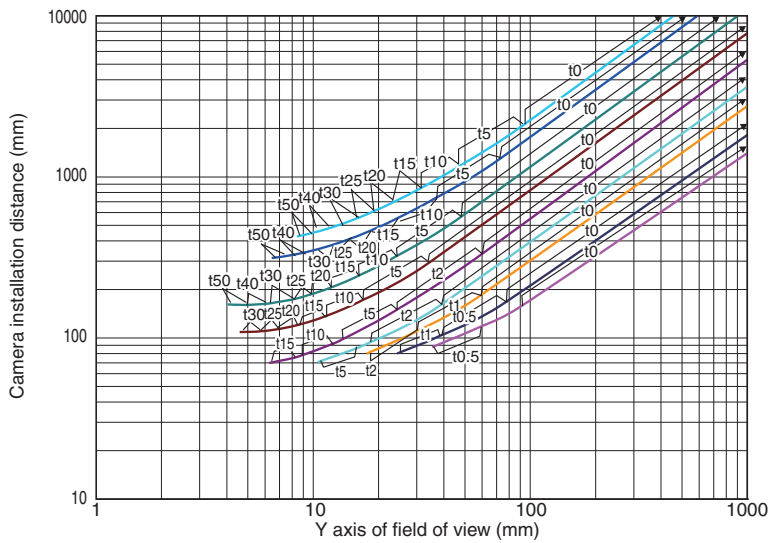
Field of vision/Installation distance

(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

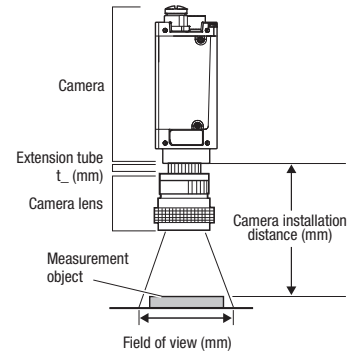
Examples

- 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.



Specifications

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		Refer to ordering information on page 386. (Tolerance (field of vision): ±10% max.)						Select a lens according to the field of vision and installation distance. Refer to optical chart on p. 387.
Installation distance								
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 Built-in lighting OFF: 1/1 to 1/50,000		Built-in lighting ON: 1/250 to 1/60,000 Built-in lighting OFF: 1/1 to 1/60,000		1/1 to 1/60,000		
	Processing resolution	752 × 480		928 × 828		1280 × 1024		
	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) Communications trigger (Ethernet TCP no-protocol, Ethernet FINS/TCP no-protocol, EtherNet/IP, or PLC Link)						

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
I/O specifications	Input signals	7 signals Single measurement input (TRIG) Control command input (INO to IN5)					
	Output signals	3 signals Control output (BUSY) Overall judgement output (OR) Error output (ERROR) 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 FINS/TCP no-protocol, EtherNet/IP, or PLC Link					
	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 40°C Storage: -25 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	IEC 60529 IP67 (Except when Polarizing Filter Attachment is mounted or connector cap is removed.)				IEC 60529 IP40	
Materials	Sensor: PBT, PC, SUS Mounting Bracket: PBT Polarizing Filter Attachment: PBT, PC Ethernet connector: Oil-resistance vinyl compound I/O connector: Lead-free heat-resistant PVC				Cover: Zinc-plated steel, Thickness: 0.6 mm Case: Aluminum diecast alloy (ADC-12) Mounting base: Polycarbonate ABS		
Weight	Narrow View/Standard View: Approx. 160 g Wide View: Approx. 150 g				Approx. 160 g without base, Approx. 185 g with base		
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				Mounting Base (FQ-XLC) (1) Mounting Screw (M3 × 8mm)(4) Instruction Manual, Quick Startup Guide 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 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.

Touch Finder

Item	Type Model	Model with DC power supply	Model with AC/DC/battery power supply
		FQ2-D30	FQ2-D31
Number of connectable Sensor		Number of sensors that can be recognized (switched): 32 max. number of 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) AC adapter (manufactured by Sino-American Japan Co., Ltd) connection: 100 to 240 VAC, 50/60 Hz 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. Charging battery: 0.4 A max.
Environmental immunity	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)
	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
	NPN	FQ-SDU10	FQ-SDU20
Model	PNP	FQ-SDU15	FQ-SDU25
I/O specifications	Parallel I/O	Connector 1	6 inputs (INO to IN5)
		Connector 2	11 inputs (TRIG, RESET, IN0 to IN7, and DSA) 8 outputs (GATE, 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 *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□□ 0.4 A max.: FQ2-S3□□□□□ and FQ-SDU□□ 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

Item	Model	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 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) 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.

Windows is registered trademarks of Microsoft Corporation in the USA and other countries.
Other company names and product names in this document are the trademarks or registered trademarks of their respective companies.



Target, “touch&go”

- Easy to use – target, “touch&go”
- Build-in LCD monitor for immediate display of results
- Accurate – reading of direct print marks
- Variable field of view

Ordering information

Main unit

Name	Communications interface	Field of vision	Remarks	Order code
2D code reader	RS-232C	5x5 to 10x10 mm	–	V400-H111
	RS-232C	15x15 to 30x30 mm	–	V400-H211

Accessories

Name	Cable length	Remarks	Order code
Contactor	–	Contactor for positioning (detachable)	V400-AC2
Communications cable	2 m	For SYSMAC series connection (with power cord)	V400-W20-2M
	5 m		V400-W20-5M
	2 m	For PC-compatible connection (with power cord)	V400-W21-2M
	5 m		V400-W21-5M
	2 m	For PC-compatible connection (when using AC adaptor)	V400-W22-2M
	5 m		V400-W22-5M
AC adaptor	–	–	V600-A22

Ratings and specifications

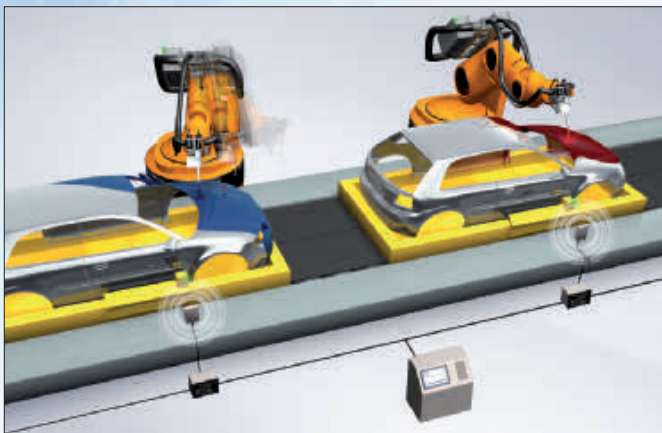
Item	V400-H111	V400-H211
Field of vision	5x5 to 10x10 mm	15x15 to 30x30 mm
Working distance	40 mm (flush when contactor is mounted)	
Power supply	5 VDC ±10%	
Current consumption	1.0 A max.	
Serial interface	RS-232C	
Applicable codes	Data matrix, ECC200, 10x10 to 64x64, 8x18 to 16x48, QR code (models 1, 2), 21x21 to 57x57 (versions 1 to 10)	
Operation method	Pressing the trigger button	
Settings	Make settings by using the manual setting window, uploading from an SD memory card, or by using support software.	
Memory card	SD memory card	
Monitor	1.8 inch TFT LCD, displaying images and read data	
Display illumination	Operation display, memory card access	
Ambient temperature	Operation: 0 to 40°C, storage: -25 to 60°C	
Ambient humidity	35 to 85% (with no condensation)	
Ambient conditions	No corrosive gases	
Vibration resistance	10 to 150 Hz, single amplitude 0.35 mm (50 m ² /s max. acceleration)	
Shock resistance	150 m ² /s in ±X, Y, and Z directions, 3 times	
Weight	Approx. 230 g	
Degree of protection	IEC 60529 IP64	
Materials	Case: ABS; optical surface: PC; display surface: PMMA	

V680 RFID SYSTEM

One for all

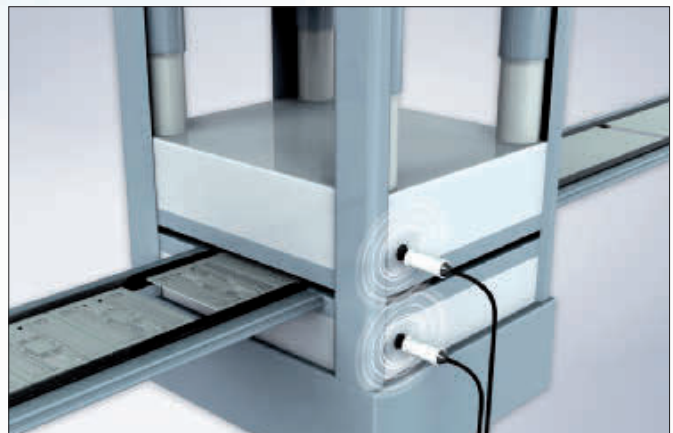
Whenever you need to have full transparency of your production process or logistic application V680 is helping you to manage your data most comfortably and reliably.

- 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 & maintenance



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.



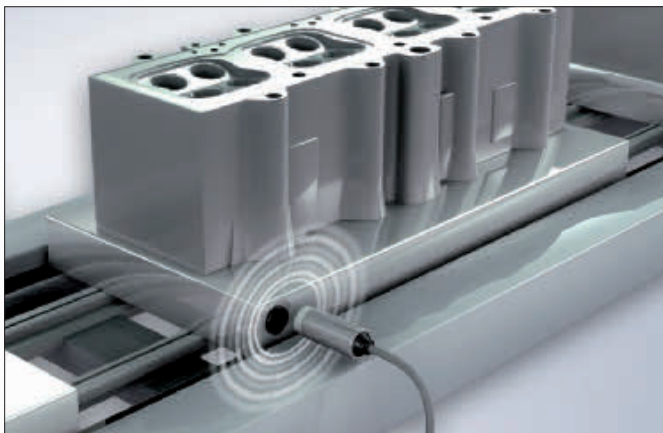
Monitoring of the moulding history

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

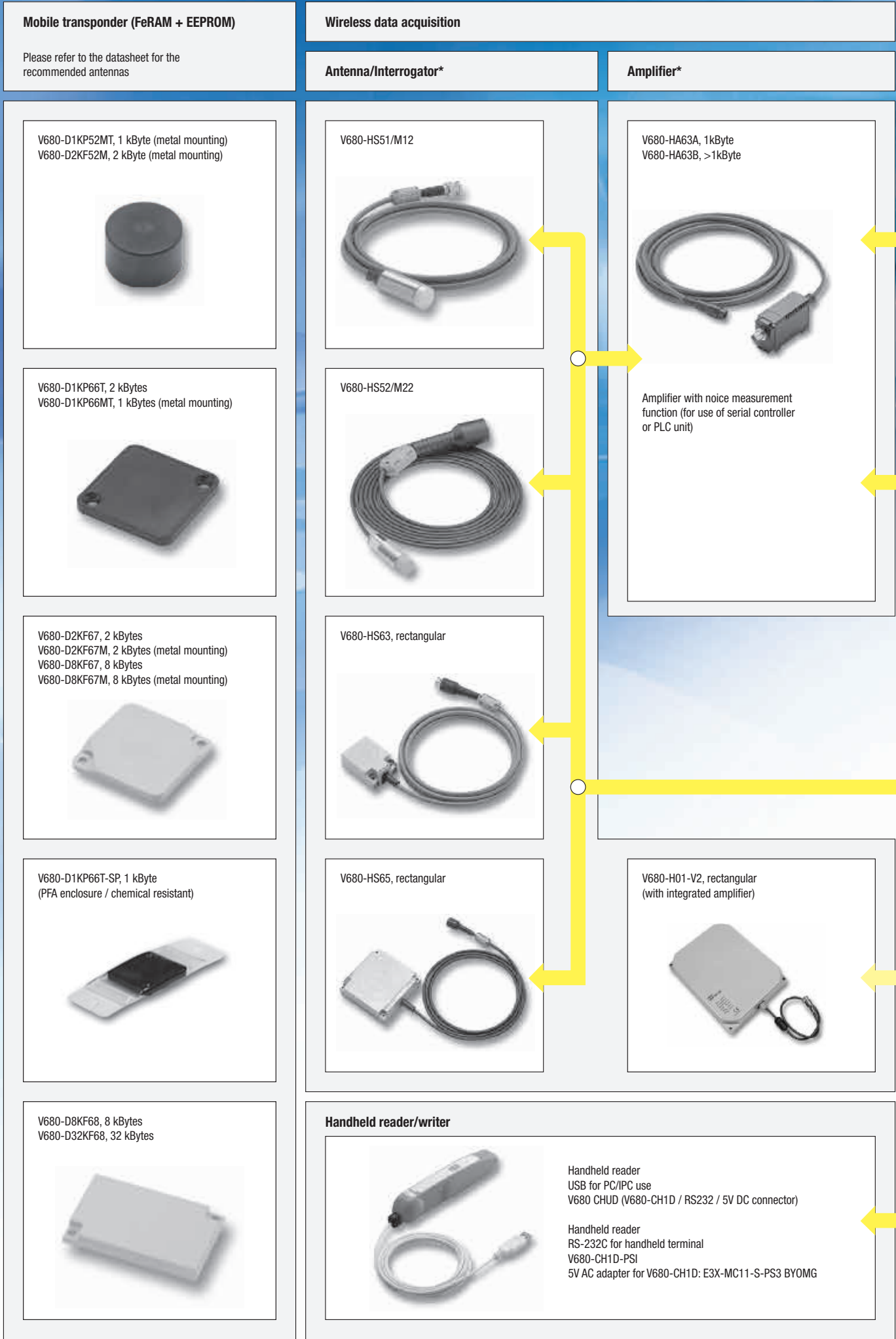
Track the parts in the production process. Process related information can be stored to guarantee high quality production.








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.

V680 RFID Platform overview



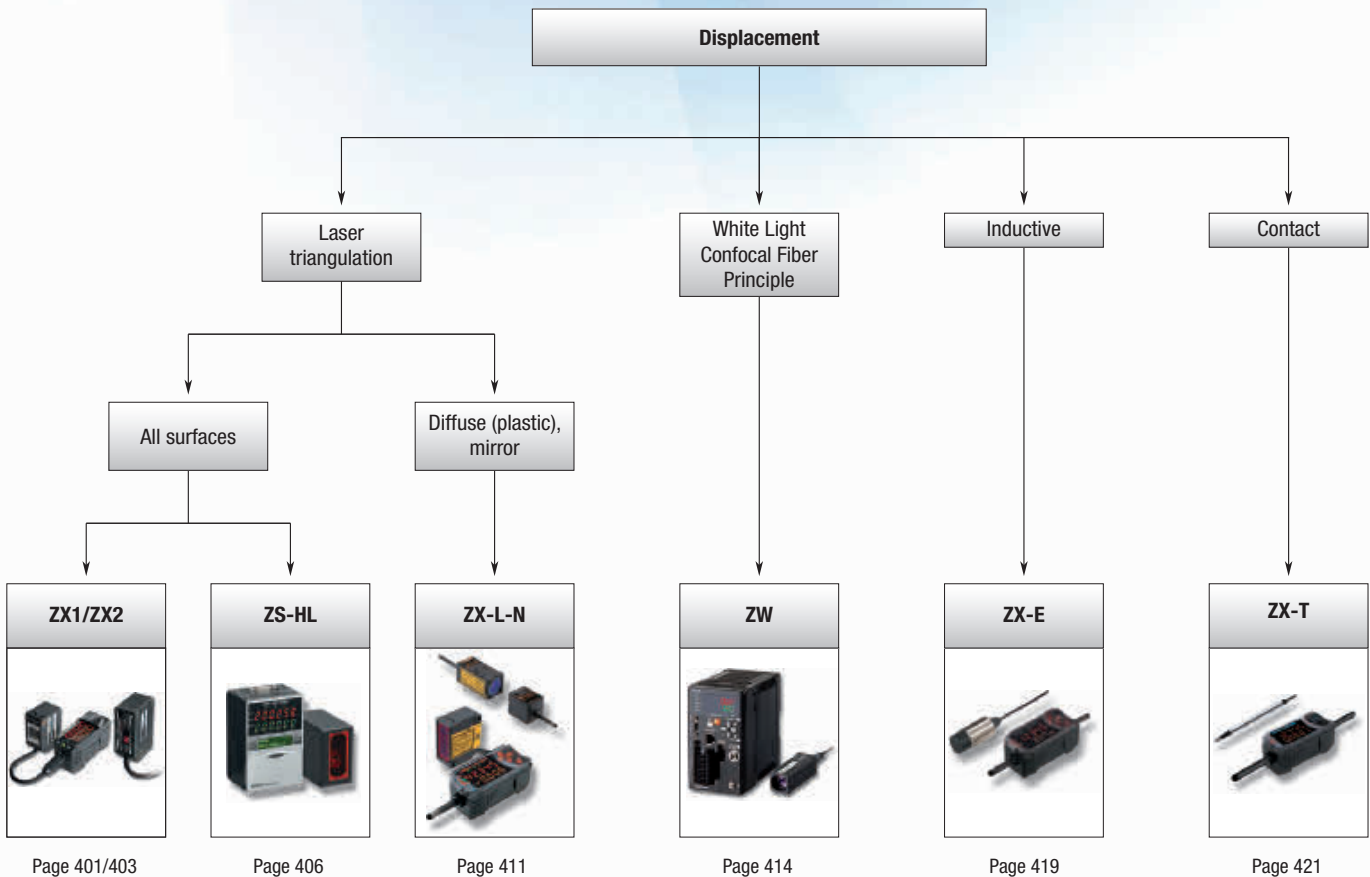
Controlling device	Feature and benefits	Communication and system integration
<p>Easy to maintain 1/2 controller for long wired serial communication V680-CA5D01-V2 (1 channel) V680-CA5D02-V2 (2 channels)</p> 	<p>High speed communication system noise and distance measurement for self diagnosis and preventive maintenance.</p> <p>Protocol analyzer function comfortable software for quick start-up and operation.</p>	<p>Serial communication for long wiring (<500 m)</p>
<p>Modular multi functional RFID communication system CJ1W-V680-C11 (1 channel) CJ1W-V680-C12 (2 channels) CS1W-V680-C11 (1 channel) CS1W-V680-C12 (2 channels)</p> 	<p>Future-proofed RFID system with enhanced connectivity and additional functionality. Up to 160 antennas can be cascaded Multi-functional intelligent controller for multi-purpose use. V680-C#-SYS can be operated as multi-tasking stand-alone system beside of existing PLC setups CX-One Software allows easy integration using function blocks.</p>	<p>Advanced modular RFID communication system:</p> <ul style="list-style-type: none"> - Ethernet IP - DeviceNet - PROFIBUS-DP - CAN - CompoBus/S
<p>V680-HAM81 PNP ID Flag Sensor V680-HAM91 NPN ID Flag Sensor</p> 	<p>Cost effective DeviceNet slave controller with integrated amplifier for direct connection to any DeviceNet nodes.</p>	<p>DeviceNet fieldbus high speed communication (integrated amplifier)</p>
<p>ID Flag Sensor (PNP/NPN) V680-HAM81/HAM91</p> 	<p>Easy to setup ID flag system addressing up to 64.000 ID's.</p>	<p>ID flag sensor communication</p>
<p>Handheld Terminal V680-A-7527S-G2-EG-S</p> 	<p>Wireless handheld to R/W data at any time in production process or logistics. Further possibility to communicate on PC/IPC platform via USB. Demosoftware is pre-installed.</p>	<p>Handheld/PLC/PC communication</p>

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





Profile

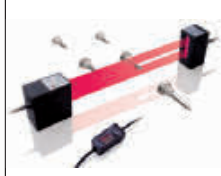
Position/
Diameter/Width

ZG2



Page 423




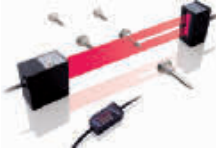
ZX-GT



Page 427

Selection table

		Laser displacement sensor			Confocal fiber sensor
					
		ZX1/ZX2	ZS-HL	ZX-L-N	ZW
Selection criteria	Model	ZX1/ZX2	ZS-HL	ZX-L-N	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	■	■	■	■
Communication	RS-232C	■	■	■	–
	USB2.0	■	■	–	–
Page	401/403	406	411	414	

		Inductive displacement sensor	Contact displacement sensor	Profile sensor	Laser micrometer	
						
		Model	ZX-E	ZX-T	ZG2	ZX-GT
Selection criteria	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	■	■	■	■	
Communication	RS-232C	■	■	■	■	
	USB2.0	■	–	■	–	
Page	419	421	423	427		

■ 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 ZX1-LD50A66	ZX1-LD100A61 ZX1-LD100A66	ZX1-LD300A61 ZX1-LD300A66	ZX1-LD600A61 ZX1-LD600A66
Item	PNP output	ZX1-LD50A81 ZX1-LD50A86	ZX1-LD100A81 ZX1-LD100A86	ZX1-LD300A81 ZX1-LD300A86	ZX1-LD600A81 ZX1-LD600A86
Measurement range		50±10 mm	100±35 mm	300±150 mm	600±400 mm
Light source (wave length)		Visible-light semiconductor laser (wavelength: 660 nm, 1 mW max., IEC/EN Class 2, FDA Class II ^{*1})			
Spot diameter (typical) (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. (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 High-speed (HS) Mode: 10 ms Standard (Std) 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. (200 to 600 mm) ±0.5% F.S. (entire range)
Resolution ^{*5}		2 μm	7 μm	30 μm	80 μm
Ambient illumination		Illumination on received light surface: 7,500 lx or less (incandescent light)		Illumination on received light surface: 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 minute ³			
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) 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 provisions of Laser Notice No. 50. Notification to CDRH planned. (Center for Devices and Radiological Health)

^{*2} Spot diameter: Defined as 1/e² (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: 1.5–5 µm
- Any surface
- High speed: 30 µs

Ordering information

Sensor heads

Optical system	Beam shape	Sensing distance	Resolution	Order code
Diffuse-reflective	Line beam	50±10 mm 40 60	1.5 µm	ZX2-LD50L
	Spot beam			ZX2-LD50
	Line beam	100±35 mm 65 135	5 µm	ZX2-LD100L
	Spot beam			ZX2-LD100
Regular reflective	Spot beam	48±5 mm 43 53	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 ZX2-LD50L ZX2-LD50		Mounting Bracket: 1 Nut plate: 1 Phillips screws (M3×30): 2	E39-L178
ZX2-LD100L 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 terephthalate), 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 terephthalate), Optical window: Glass, Cable: PVC
Accessories	Instruction sheet, Ferrite core, Laser warning label (English)

^{*1} Beam size: Defined as 1/e² (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 OFF: Open (leakage current: 0.1 mA max.)	ON: Supply voltage short-circuited or supply voltage within 1.5 V 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 terephthalate), 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 (±5V or 1 to 5V) 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 mmx20 µm	0.25 µm	ZS-HLDS2T
	25±2 mm		2.2 mmx45 µm	0.6 µm	ZS-HLDS2VT
Diffuse reflective models	50±5 mm		1.0 mmx30 µm	0.25 µm	ZS-HLDS5T
	100±20 mm		3.5 mmx60 µm	1 µm	ZS-HLDS10
	600±350 mm		16 mmx0.3 mm	8 µm	ZS-HLDS60
	1500±500 mm		40 mmx1.5 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	900x25 µm	0.25 µm	ZS-LD20T
		Spot beam	25 µm dia.		ZS-LD20ST
	40±2.5 mm	Line beam	2000x35 µm		ZS-LD40T
Diffuse reflective models	50±5 mm	Line beam	900x60 µm	0.8 µm	ZS-LD50
		Spot beam	50 µm dia.		ZS-LD50S
	80±15 mm	Line beam	900x60 µm	2 µm	ZS-LD80
	130±15 mm	Line beam	600x70 µm	3 µm	ZS-LD130
	200 ±50 mm	Line beam	900x100 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	Diffuse reflection
Measuring center distance	20 mm	5.2 mm	25 mm	44 mm	50 mm	94 mm
Measuring range	±1 mm	±1 mm	±2 mm	±4 mm	±5 mm	±16 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.		±0.2 %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/e² (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
Measuring center distance	20 mm	6.3 mm	20 mm	6.3 mm	40 mm
Measuring range	±1 mm	±1 mm	±1 mm	±1 mm	±2.5 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. 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. 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
Measuring center distance	50 mm	47 mm	50 mm	47 mm	80 mm	78 mm
Measuring range	±5 mm	±4 mm	±5 mm	±4 mm	±15 mm	±14 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.
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. 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. 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	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 NPN open collector, 30 VDC, 50 mA max., residual voltage 1.2 V max
		Linear output	Selectable from 2 types of output, voltage or current (selected by slide switch on bottom). Voltage output: .10 to 10 V, output impedance: 40 Ω 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 OFF: Open (leakage current: 0.1 mA max.)	
ON: Short-circuited to supply voltage or within 1.5 V of supply voltage. OFF: Open (leakage current: 0.1 mA max.)			
Functions	Display: Measured value, threshold value, voltage/current, received light amount, and resolution/terminal block output Sensing: Mode, gain, measurement object, head installation Measurement point: Average, peak, bottom, thickness, step, and calculations Filter: Smooth, average, and differentiation Outputs: Scaling, various hold values, and zero reset I/O settings: Linear (focus/correction), judgments (hysteresis and timer), non-measurement, and bank (switching and clear) System: Save, initialization, measurement information display, communications settings, key lock, language, and data load 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, colour 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

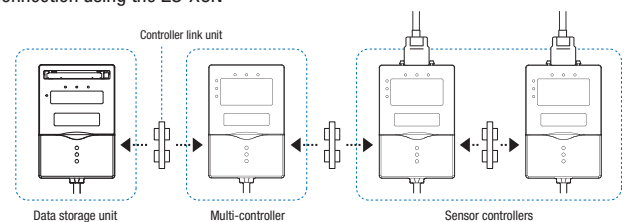
Basic specifications are the same as those for the sensor controllers.

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 sensor 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	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 NPN open-collector, 30 VDC, 50 mA max., residual voltage: 1.2 V max.	
	Inputs	ON: Short-circuited with 0V terminal or 1.5 V or less OFF: Open (leakage current: 0.1 mA max.)	
ON: Short-circuited to supply voltage or within 1.5 V of supply voltage OFF: Open (leakage current: 0.1 mA max.)			
Data resolution	32 bits		
Function s	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, colour 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 (HxWxD)	Order code
Diffuse-reflective	Spot beam	40±10 mm	2 µm	39x33x17	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	45x55x25	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 (HxWxD)		Order code
				Transmitter	Receiver	
Through-beam	1 mm dia.	0 to 2,000 mm	4 µm	15x15x34	15x15x19	ZX-LT001
	5 mm	0 to 500 mm				ZX-LT005
	10 mm			20x20x42	20x20x25	ZX-LT010
	30 mm		12 µm	64.25x70x22.6	64.25x54x22.6	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/e² (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
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.
Resolution *1	4 μm *2	–	4 μm *3	
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			Mounting Bracket
	Optical axis adjustment seal			

*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. Residual voltage: 1.2 V max.	PNP open-collector outputs, 30 VDC, 50 mA max. 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 OFF: Open (leakage current: 0.1 mA max.)	ON: Supply voltage short-circuited or supply voltage within 1.5 V 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 ZX-EDA_1 Ver. 1.100 or higher 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, spectroscopy and processor to convert reflected color light to distance
- Automation Software Sysmac Studio simplifies system operation and setting

Ordering information

Sensor heads

Measuring range	Spot diameter	Static resolution	Order code ^{*1}
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

^{*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.

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	Standards		Order code	
		Number of licenses	Media		
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. Sysmac Studio runs on the following OS. Windows XP (Service Pack 3 or higher, 32-bit version)/Vista(32-bit version)/7(32-bit/64-bit version) 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 Cable with connectors on both ends (RJ45/RJ45) Wire gauge and number of pairs: AWG27, 4-pair Cable Cable Sheath material: LSZH ^{*2} 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
Rugged type Cable with connectors on both ends (RJ45/RJ45) Wire gauge and number of pairs: 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
Rugged type Cable with connectors on both ends (M12 Straight/RJ45) Wire gauge and number of pairs: 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
Rugged type Cable with connectors on both ends (M12 Right-angle/RJ45) Wire gauge and number of pairs: 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	0.08 A	GX-JC03
6	(24 VDC -15 to 20%)	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
Measuring center distance	7 mm	20 mm	30 mm	40 mm
Measuring range	±0.3 mm	±1 mm	±3 mm	±6 mm
Static resolution ^{*1}	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
Spot diameter ^{*3}	Near	20 μm dia.	45 μm dia.	70 μm dia.
	Center	18 μm dia.	40 μm dia.	60 μm dia.
	Far	20 μm dia.	45 μm dia.	70 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 (with no icing or condensation)			
Ambient humidity range	Operating and storage: 35% to 85% (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	1.5 μm/°C	2.8 μm/°C	4.8 μm/°C
Materials	Case: Fiber cable sheath: Calibration ROM:	aluminum die-cast PVC 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
Glass	±1.0 μm	±1.2 μm	±4.5 μm	±7.0 μm
SUS BA	±1.2 μm	±1.4 μm	±5.5 μm	±8.5 μm
White ceramic	±1.6 μm	±1.7 μm	±6.4 μm	±9.5 μm

*3. Capacity value defined by 1/e² (13.5%) of the center optical intensity in the measured area.

*4. Temperature characteristic at the measurement center distance when fastened with an aluminum jig between the Sensor Head and the target and the Sensor Head and the controller are set in the same temperature environment.

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. 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. Video card: Either of the following video cards: • NVIDIA GeForce 200 Series or higher • ATI RadeonHD5000 Series or higher
Hard disk	At least 1.6 GB of available space
Display	XGA 1024 × 768, 16 million colors. 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) 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 V to +10 V, output impedance: 100 Ω
		Analog current output (OUT1A)	4 mA to 20 mA, maximum load resistance: 300 Ω
	32-pole extension connector	Judgment output (HIGH1/PASS1/LOW1)	Transistor output system Output voltage: 21.6 to 30 VDC Load current: 50 mA or less
		BUSY output (BUSY1)	Residual voltage when turning ON: 1.2 V or less Leakage voltage when turning OFF: 0.1 mA or less
		ALARM output (ALARM1)	
		ENABLE output (ENABLE)	
		LED OFF input (LED OFF1)	DC input system
		ZERO RESET input (ZERO)	Input voltage: 24 VDC -10% (21.6 to 26.4 VDC) Input current: 7 mA Typ. (24 VDC)
		TIMING output (TIMING1)	Voltage/Current when turning ON: 19 V/3 mA or more Voltage/Current when turning OFF: 5 V/1 mA or less
Bank	Selected bank output (BANK_OUT 1 to 3)	Transistor output system Output voltage: 21.6 to 30 VDC Load current: 50 mA or less Residual voltage when turning ON: 1.2 V or less Leakage voltage when turning OFF: 0.1 mA or less	
	Selected bank input (BANK_SEL 1 to 3)	DC input system Input voltage: 21.6 to 26 VDC Input current: 7 mA Typ. (24 VDC) Voltage/Current when turning ON: 19 V/3 mA or more 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 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) 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 ECAT IN: EtherCAT input 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. x 18 mm	0.5 mm	1 μm	ZX-EDR5T
	5.4 dia. x 18 mm	1 mm		ZX-ED01T*2
	8 dia. x 22 mm	2 mm		ZX-ED02T*2
Screw-shaped	M10x22 mm	2 mm		ZX-EM02T*2
	M18x46.3 mm	7 mm		ZX-EM07MT*2
Flat	30x14x4.8 mm	4 mm		ZX-EV04T*2,*3
Heat-resistant, cylindrical	M12x22 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	18x18x3 mm		30x30x3 mm	60x60x3 mm		45x45x3 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 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 M Ω 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	Brass	Stainless steel	Brass	Zinc (nickel-plated)	Brass
	Case	Heat-resistant ABS				PEEK
	Sensing surface					
	Preamplifier	PES				
Accessories	Amplifier mounting brackets (ZX-XBE1), instruction manual					

*1 Accuracy: The resolution is the deviation ($\pm 3\sigma$) 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 1/2 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 1/2 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 μ s	
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 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. Residual voltage: 1.2 V max.	PNP open-collector outputs, 30 VDC, 50 mA max. 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 OFF: Open (leakage current: 0.1 mA max.)	ON: Supply voltage short-circuited or supply voltage within 1.5 V OFF: Open (leakage current: 0.1 mA max.)
Function	<ul style="list-style-type: none"> - Measurement value display - Linearity adjustment (materials selection) - Display reverse - Number of display digit changes - Bottom hold, peak-to-peak hold - Average hold - Initial reset - OFF-delay timer - Non-measurement setting - Automatic teaching - Reset input - Linear output correction - K-(A+B) calculation^{*4} - Sensor disconnection detection - Key lock 	
	<ul style="list-style-type: none"> - set value/output value/ resolution display - display OFF mode - sample hold - self-peak hold - delay hold - linearity initialization - one-shot timer - direct threshold value setting - hysteresis width setting - judgement output hold input - (A-B) calculations^{*4} - mutual interference prevention^{*4} - zero reset memory 	
	<ul style="list-style-type: none"> - Scaling - ECO mode - peak hold - self-bottom hold - zero reset - ON-delay timer - previous value comparison - position teaching - timing inputs - monitor focus - (A+B) calculations^{*4} - 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 $\pm 20\%$ of power supply voltage	
Power supply voltage	12 to 24 VDC $\pm 10\%$, 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 M Ω 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

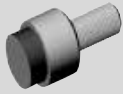

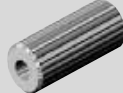

* Robot cable models are also available. The model numbers are ZX-XC_R.

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.) ZX-TDS_T	Order code
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 Measured objects: Carbide (HR90) or lower.		D5SN-TB2
Ball type (ruby)	Female screw M2.5x0.45		Measurements where abrasion resistance is critical 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.) ZX-TDS_T	Order code
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 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. Residual voltage: 1.2 V max.	PNP open-collector outputs, 30 VDC, 30 mA max. 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 OFF: Open (leakage current: 0.1 mA max.)	ON: Supply voltage short-circuited or supply voltage of 1.5 V or less OFF: Open (leakage current: 0.1 mA max.)
Function	<ul style="list-style-type: none"> - Measurement value display - Display reverse - Sample hold - Self-peak hold - Initial reset - Hysteresis width setting - Judgement output hold input - (A+B) calculations (see note 4.) - Zero reset memory - Clamp value setting - Span adjustment 	
Indicators	<ul style="list-style-type: none"> - present value/set value/output value display - ECO mode - peak hold - self-bottom hold - direct threshold value setting - timing inputs - monitor focus - sensor disconnection detection - function lock - scale inversion - warming-up display 	
Power supply voltage	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)	
Current consumption	12 to 24 VDC ±10%, ripple (p-p): 10% max.	
Ambient temperature	140 mA max. (with sensor connected), for 24-VDC power supply voltage: 140 mA max. (with sensor connected)	
Temperature characteristic	Operating and storage: 0 to 50°C (with no icing or condensation)	
Connection method	0.03% F.S./°C	
Weight (packed state)	Prewired (standard cable length: 2 m)	
Materials	Approx. 350 g	
	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

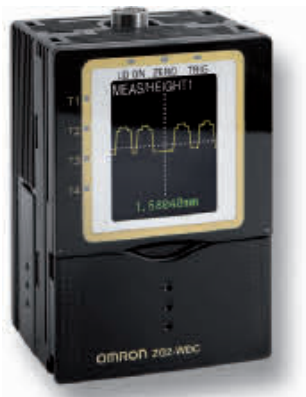
Item	ZX-TDS01T	ZX-TDS04T	ZX-TDS04T-L
Measurement range	1 mm	4 mm	
Maximum actuator travel distance	Approx. 1.5 mm	Approx. 5 mm	
Resolution*1	0.1 μm		
Linearity*2	±0.3% F.S.		
Operating force *3	Approx. 0.7 N	Approx. 0.25 N	
Degree of protection (sensor head)	IEC60529, IP67		IEC60529, IP54
Mechanical 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
	Height direction	Width direction	Height 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				
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 Class IIIB of FDA (21CFR 1040.10 and 1040.11)			Class 2 of EN60825-1 / IEC60825-1 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 determining 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 f_{Em}, 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 determining 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 aluminium jig to secure the distance between the Sensor head and the measurement object. The CCD standard mode is used.

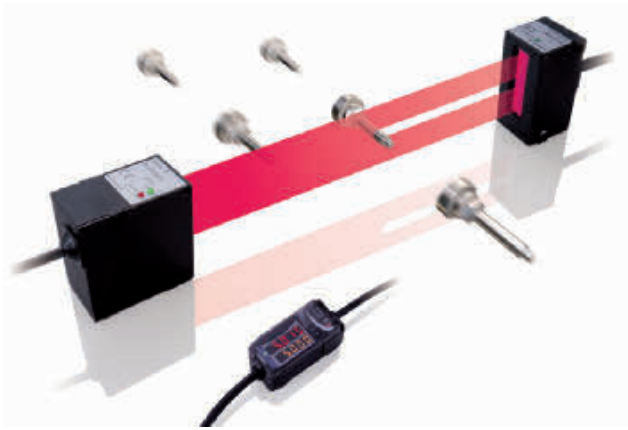
^{*4} Defined as 1/e² (13.5%) of the center light intensity. This may be influenced when light leakage also exists outside the defined area and the reflectivity of the light around the measurement object is higher than that of the measurement object.

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 colour LCD (557x234 pixels)
		LEDs	<ul style="list-style-type: none"> Judgment indicators for each task (indication colour: orange): T1, T2, T3, T4 Laser indicator (indication colour: green): LD_ON Zero reset indicator (indication colour: green): ZERO Trigger indicators (indication colour: green): TRIG
External interface	Input/output signal lines	Analog outputs	Select voltage or current (using the sliding switch on the bottom surface) <ul style="list-style-type: none"> Voltage output: .10 to 10 V, output impedance: 40 Ω Current output: 4 to 20 mA, maximum load resistance: 300 Ω
		Judgment output (ALL-PASSING/ERROR)	NPN open collector 30 VDC, 50 mA max.
		Trigger auxiliary output (ENABLE/GATE)	Residual voltage: 1.2 V max.
		Laser stop input (LD-OFF)	ON: 0 V short or 1.5 V max.
		Zero reset input (ZERO)	OFF: Open (leakage current: 0.1 mA max.)
		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), 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 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



Smart laser micrometer

- High accuracy: 5-10 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
Integrated type			40 mm		PNP	ZX-GT28S41
					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. OFF: Open (leakage current: 0.1 mA max.)		ON: Short-circuited with power supply voltage or power supply voltage -1.5 V max. OFF: Open (leakage current: 0.1 mA max.)	
Laser deterioration alarm output	NPN open-collector output 30 VDC 20 mA max. Residual voltage 1.2 V max.		PNP open-collector output 30 VDC 20 mA max. 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)) 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 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. OFF: Open (leakage current: 0.1 mA max.)	ON: short-circuited with power supply voltage or power supply voltage -1.5 V max. OFF: Open (leakage current: 0.1 mA max.)
HIGH/PASS/LOW Judgment output ^{*5} Sync output ^{*6}		NPN open-collector output 30 VDC 50 mA max. Residual voltage 1.2 V max.	PNP open-collector output 30 VDC 50 mA max. Residual voltage 2 V max.
Indicator		Judgment output indicator: HIGH (orange), PASS (green), LOW (orange) 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, 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 intensity 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	
Temperature characteristic		±0.005% F.S./°C	

Item	ZX-GTC11	ZX-GTC41
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 30 VDC 20 mA max. Residual voltage 1.2 V max.	PNP open-collector output 30 VDC 20 mA max. 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 ZX-GIF_1: Approx. 330 g	
Accessories	ZX-GIF_1A: Setup software (CD-ROM), 2 clamps, instruction sheet ZX-GIF_1: 2 clamps, instruction sheet	