

XPECTIA VISION SYSTEM

Inspection beyond expectation



» Flexible platform concept

» Intuitive user guidance

» Close to the human eye

Performance in touch with simplicity

Omron's Xpectia is defining a new class of vision systems: real colour sensing, high resolution, 3D functionality and Intuitive User guidance combined, provides you pure simplicity, no matter how complex the inspection.

Like the human eye, Xpectia can identify any object with any colour mix, at any distance and any size. It features an easy-to-use touchscreen and "Auto" functions, making vision applications simple and straightforward.

Xpectia is available with a range of controllers with and without the touchscreen, and supports up to four cameras. By combining the benefits of a compact system with the power and flexibility of an industrial PC platform, it is, quite simply, the best of both worlds.

Features

- True colour system: 16 million colours
- High resolution cameras: 5 million pixels
- 2D and 3D inspections
- Touch-screen for easy operation
- Industrial-PC platform

Benefits

- Zero defect: real colour increases the total stability of the inspection
- Economic: simple set-up and maintenance saves time
- Fit for purpose: the right hardware for the application
- Flexible: customize functionality to your needs
- Future-proof: meeting your inspection needs today and tomorrow



HIGH
3D INSPECT
SIMPLICITY OF USE



REAL COLOUR
RESOLUTION
SION



Vision performance and ease of use made compatible



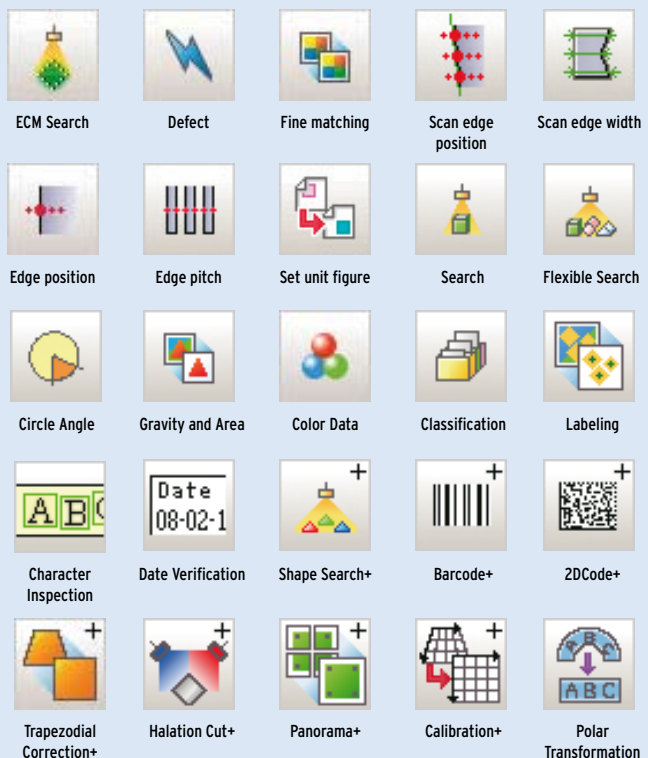
High-end vision performance and simplicity are no longer in contradiction. The powerful functions of Xpectia make all vision applications simple and straightforward: from now on, there is only one class of visual inspection. Because with Xpectia, the complexity of is hidden from the user.



- No colour filtering: objects can be inspected whatever the colour of the workpiece, using a single tool
- Simple automatic camera adjustment
- Intuitive touch-screen user interface for easy operation
- Simulation tool for testing, pre-configuration and offline maintenance

Features that make the difference:

- Inspections boosted by real colour:
 - Search
 - Edge
 - Area
 - Defect
 - OCR/OCV
- Create sequences and decision trees of inspections
- Customization: open and programmable
- Application-specific software packages
- Ethernet communication between PC and PLC using TCP/IP or EthernetIP
- High-speed 80fps cameras

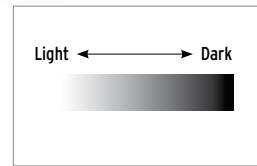


Real-colour sensing

Xpectia processes all 256 gradations of RGB colours, enabling it to sense more than 16 million colours and detect minute variations in the colour of objects. Without filtering or colour pick-up Xpectia sees like a human eye. As a result, completely stable measurements can now be made in conditions where it used to be impossible:

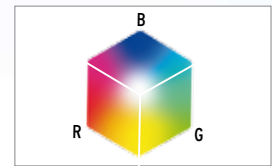
- on surfaces which require different colour filtering
- in difficult lighting conditions
- on shiny objects
- where there is low contrast between the object and the background

Standard system: 256 colours



Internal processing using the binary image

Xpectia: 16.77 million colours



Real-colour processing

Inspections: correct position of coloured objects; minute defects in objects presence, absence and positioning of printed images



Standard colour system:

Low contrast -> internal processing using a filtered monochrome image



Xpectia:

High contrast -> stable inspections using real-colour sensing

The intelligent camera offers the flexibility to change distance, size and light

- auto zoom
- auto lighting
- auto focus and iris





High resolution



To ensure the quality of a workpiece, multiple details usually have to be inspected, requiring the detection of:

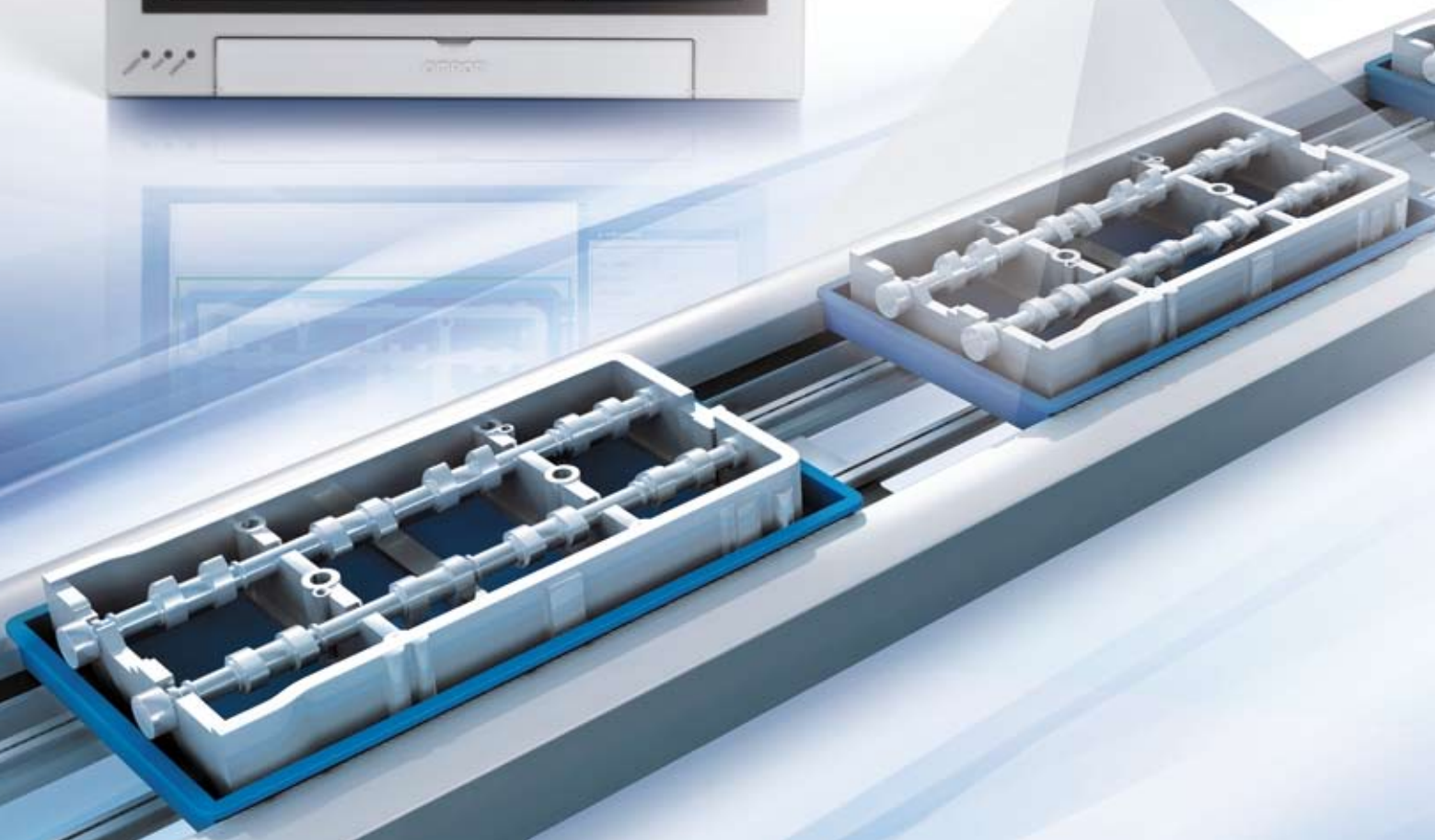
- small and large characteristics at the same time
- small defects on large objects

Meeting these requirements with the same set-up is beyond standard-resolution cameras – but well within the reach of Xpectia.

Precise inspection:

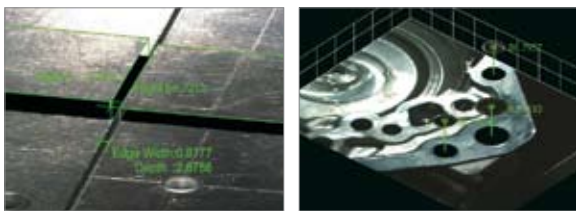
The compact and fast 2 and 5 MPixel camera (colour/monochrome) allows the inspection of:

- large objects (large field of view) with high accuracy
- small objects (small field of view) with ultra-high accuracy



3D quality inspection

Xpectia combines advanced 3D processing with a simple calibration. 3D measurements can be made over large distances (up to two metres). As a result, workpieces with complex shapes that cannot be laid horizontally are easily measured, using calculations based on stereo principles. 3D is easy to install and calibrate on Xpectia. At the same time 2D and 3D inspections can be performed.



Detect gaps and bumps

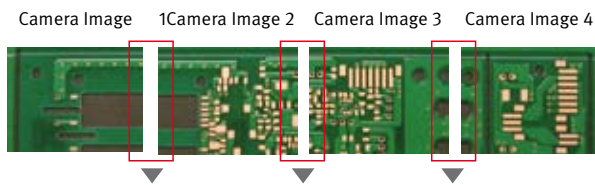
Measure component orientation

Value added image processing: Panorama and HDR

The Xpectia high-grade model features outstanding measurement items to master challenging tasks.

Panorama: stitching (synthesizing) of images

Larger field of views can be achieved by integrating several camera images into a single one.



The borders of each image are analyzed for unique characteristics.

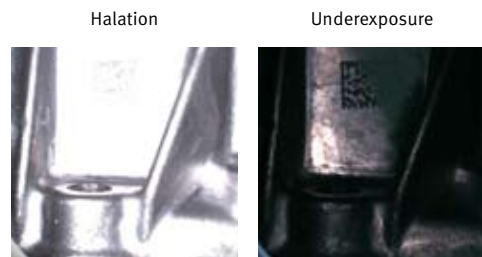


These characteristics are used to generate a seamless single image.



HDR: compensation of diverse lighting effects

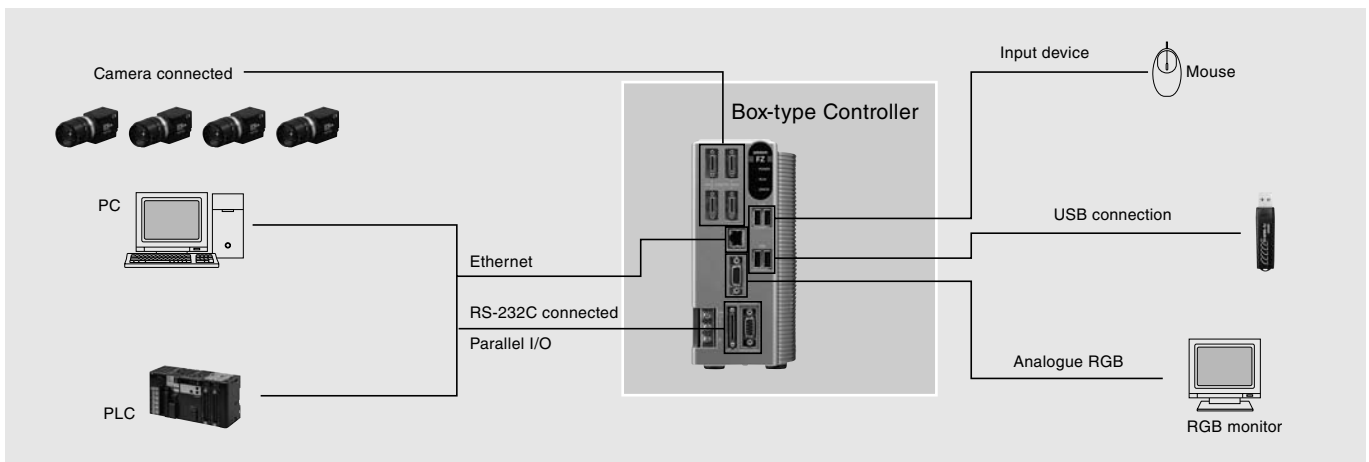
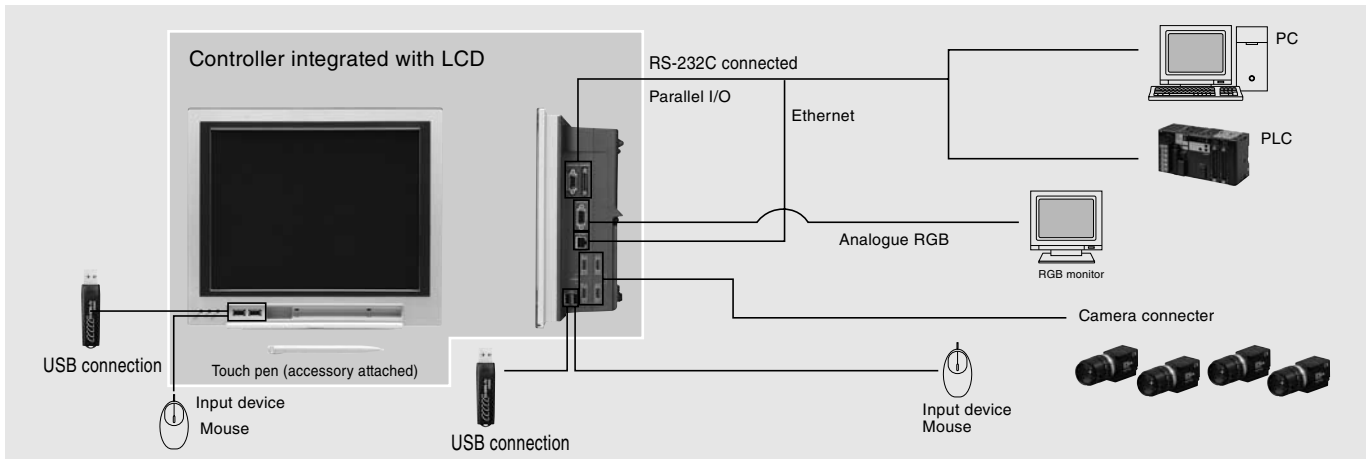
High dynamic range (HDR) minimizes the effect of over- and underexposure within the same image.



The surface of the workpiece is accurately reproduced with a sharp contrast.



System configuration



Ordering information

FZ3 series

Item	Descriptions			Model	Remarks	
Controllers	High grade, high speed controllers	Controller integrated with LCD	Two-camera controllers	PNP/NPN	FZ3-H705/FZ3-H700	With touch pen
			Four-camera controllers	PNP/NPN	FZ3-H705-10/FZ3-H700-10	
		Box-type Controller	Two-camera controllers	PNP/NPN	FZ3-H755/FZ3-H750	---
			Four-camera controllers	PNP/NPN	FZ3-H755-10/FZ3-H750-10	---
	High grade controllers	Controller integrated with LCD	Two-camera controllers	PNP/NPN	FZ3-H305/FZ3-H300	With touch pen
			Four-camera controllers	PNP/NPN	FZ3-H305-10/FZ3-H300-10	
		Box-type Controller	Two-camera controllers	PNP/NPN	FZ3-H355/FZ3-H350	---
			Four-camera controllers	PNP/NPN	FZ3-H355-10/FZ3-H350-10	---
	High speed controllers	Controller integrated with LCD	Two-camera controllers	PNP/NPN	FZ3-705/FZ3-700	With touch pen
			Four-camera controllers	PNP/NPN	FZ3-705-10/FZ3-700-10	
		Box-type Controller	Two-camera controllers	PNP/NPN	FZ3-755/FZ3-750	---
			Four-camera controllers	PNP/NPN	FZ3-755-10/FZ3-750-10	---
Standard controllers	Controller integrated with LCD	Two-camera controllers	PNP/NPN	FZ3-305/FZ3-300	With touch pen	
		Four-camera controllers	PNP/NPN	FZ3-305-10/FZ3-300-10		
	Box-type Controller	Two-camera controllers	PNP/NPN	FZ3-355/FZ3-350	---	
		Four-camera controllers	PNP/NPN	FZ3-355-10/FZ3-350-10	---	
Cameras	Intelligent cameras	Wide field of vision	Color	FZ-SLC100	Camera + Zoom, Autofocus Lens + Intelligent Lighting	
		Narrow field of vision	Color	FZ-SLC15		
	Autofocus cameras	Wide field of vision	Color	FZ-SZC100	Camera + Zoom, Autofocus Lens	
		Narrow field of vision	Color	FZ-SZC15		
	Digital cameras	300,000 Pixels	Monochrome	FZ-S	Lens required	
			Color	FZ-SC		
		2 million pixels	Monochrome	FZ-S2M		
			Color	FZ-SC2M		
		5 million pixels	Monochrome	FZ-S5M		
			Color	FZ-SC5M		
	Small digital cameras	300,000-pixel flat type	Monochrome	FZ-SF	CCTV lens required	
			Color	FZ-SFC		
300,000-pixel pen type		Monochrome	FZ-SP			
		Color	FZ-SPC			

Item	Descriptions		Model	Remarks
Cameras, peripheral devices	Intelligent camera diffusion plate	Wide field of vision	FZ-SLC100-DL	---
		Narrow field of vision	FZ-SLC15-DL	---
	CCTV Lenses		3Z4S-LE Series	---
	Extension Tubes			
	Low-distortion Lenses		FZ-LEH5/LEH8/LEH12/LEH16/LEH25/LEH35/LEH50/LEH75/LEH100	Low distortion lens for 2-million pixel cameras and 5 million-pixel cameras
	Lenses for small camera		FZ-LES3/LES6/LES16/LES30	Lens for 300,000-pixel small cameras
Cables	Extension Tubes for small camera		FZ-LESR	Extension Tubes for 300,000-pixel small cameras
	Camera Cable		FZ-VS	Cable length: 2 m, 5 m, or 10 m ^{*1}
	Bend resistant Camera Cables		FZ-VSB	Cable length: 2 m, 5 m, or 10 m ^{*2}
	Right-angle Camera Cable ^{*3}		FZ-VSL	Cable length: 2 m, 5 m, or 10 m ^{*1}
	Long-distance camera cable		FZ-VS2	Cable length: 15 m ^{*4}
	Long-distance right-angle camera cable		FZ-VSL2	Cable length: 15 m ^{*4}
	Cable extension unit		FZ-VSJ	Up to two Extension Units and three Cables can be connected. (Maximum cable length: 45 m ^{*5})
	Monitor cable		FZ-VM	Cable length: 2 m or 5 m
	Parallel cable		FZ-VP	Cable length: 2 m or 5 m
Peripheral devices	LCD monitor		FZ-M08	For Box-type Controllers
	USB memory	1GB	FZ-MEM1G	Capacity: 1 GB
	VESA attachment		FZ-VESA	For installing the LCD integrated-type controller
	Desktop controller stand		FZ-DS	For installing the LCD integrated-type controller
Mouse		---	Recommended Products (Optical Mouse) • Microsoft Corporation: Compact Optical Mouse, U81 Series	
External Lighting		3Z4S-LT Series	---	
Strobe Controller (for FZ Series Vision Sensors)		Manufactured by MORITEX Corporation 3Z4S-LT MLEK-C100E1TS2	Required to control external lighting from a Controller	
Adapter for the strobe controller designed specifically for the 5 million-pixel camera		Manufactured by MORITEX Corporation 3Z4S-LT LBK-003	Required to mount a strobe controller on a 5 million-pixel camera	

- *1. The 10-m cable cannot be used for the intelligent camera, autofocus camera and 5 million-pixel camera.
- *2. The 10-m cable cannot be used for the intelligent camera, autofocus camera 2 million-pixel camera and 5 million-pixel camera.
- *3. This Cable has an L-shaped connector on the Camera end.
- *4. The 15-m cable cannot be used for the intelligent camera, autofocus camera and 5 million-pixel camera.
- *5. 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 "Ratings and Specifications" table in page 3.

Camera connection

Type of camera	Model	Resolution	Standard controllers (FZ3-3, FZ3-3-10)	High grade controllers (FZ3-H3, FZ3-H3 -10)	High speed controllers (FZ3-7, FZ3-7 -10)	High grade, high speed controllers (FZ3-H7, FZ3-H7 -10)
Intelligent cameras	FZ-SLC100	300,000 Pixels	O	O	O	O
	FZ-SLC15	300,000 Pixels	O	O	O	O
Autofocus cameras	FZ-SZC100	300,000 Pixels	O	O	O	O
	FZ-SZC15	300,000 Pixels	O	O	O	O
Digital cameras	FZ-SC	300,000 Pixels	O	O	O	O
	FZ-S	300,000 Pixels	O	O	O	O
	FZ-SC2M	2 million pixels	X	X	O	O
	FZ-S2M	2 million pixels	X	X	O	O
	FZ-SC5M	5 million pixels	X	X	O ^{*1}	O ^{*1}
Small digital cameras	FZ-S5M	5 million pixels	X	X	O ^{*1}	O ^{*1}
	FZ-SFC	300,000 Pixels	O	O	O	O
	FZ-SF	300,000 Pixels	O	O	O	O
	FZ-SPC	300,000 Pixels	O	O	O	O
FZ-SP	300,000 Pixels	O	O	O	O	

- *1. When connecting 5 million-pixel cameras, up to two cameras can be connected.

FZD series

Item	Description	Model	Remarks
Controllers	Controller integrated with LCD	FZD-505-10/FZD-500-10	—
	Box-type Controller	FZD-555-10/FZD-550-10	
Cameras	3D Vision Camera	FZD-STC2M	Integrated Camera (installation distance: 24 cm max.)
	Digital Camera	Monochrome	FZ-S2M
Color		FZ-SC2M	2-million-pixels (lens required)
3D Camera Base Plate	Short-distance Version	FZD-CBS	Installation distance of up to 30 cm
	Medium-distance Version	FZD-CBM	Installation distance of 30 cm to 1 m
	Long-distance Version	FZD-CBL	Installation distance of 1 m to 2 m
3D Calibration Tool		FZD-CAL	—
High-luminance lighting	Line pattern	FZD-LTW	White LEDs
	Custom pattern	FZD-LTPW	White LEDs

Ratings and Specifications

Controllers

Model		NPN Output	FZ3-700	FZ3-700-10	FZ3-H700	FZ3-H700-10	FZ3-750	FZ3-750-10	FZ3-H750	FZ3-H750-10	
		PNP Output	FZ3-705	FZ3-705-10	FZ3-H705	FZ3-H705-10	FZ3-755	FZ3-755-10	FZ3-H755	FZ3-H755-10	
Connected Camera		Please refer to the "Camera connection" table in page 2.									
No. of Cameras ^{*1}		2	4	2	4	2	4	2	4		
Processing resolution	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 ^{*2}	When connected to a 300,000-pixel camera	Connected to 1 camera	Color camera: 250, Monochrome Camera: 252								
		Connected to 2 cameras	Color camera: 125, Monochrome Camera: 126								
		Connected to 3 cameras	Color camera: 83, Monochrome Camera: 84								
		Connected to 4 cameras	Color camera: 62, Monochrome Camera: 63								
	When connected to a 2 million-pixel camera	Connected to 1 camera	Color camera: 40, Monochrome Camera: 40								
		Connected to 2 cameras	Color camera: 20, Monochrome Camera: 20								
		Connected to 3 cameras	Color camera: 13, Monochrome Camera: 13								
		Connected to 4 cameras	Color camera: 10, Monochrome Camera: 10								
	When connected to a 5 million-pixel camera	Connected to 1 camera	Color camera: 11, Monochrome Camera: 11								
		Connected to 2 cameras	Color camera: 5, Monochrome Camera: 5								
	Codes that can be read with FZ3		< Bar Codes > JAN/EAN/UPC (including add-on codes), Code 39, Codabar (NW-7), ITF (Interleaved 2 of 5), Code 93, Code 128, GS1-128, GS1 DataBar (RSS-14 / RSS Limited / RSS Expanded) < 2D Codes > Data Matrix (ECC200), QR Code								
	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:1CH									
Network communications		Ethernet 100BASE-TX/10BASE-T									
Parallel I/O		11 inputs (RESET, STEP, DSA, and DI 0 to 7), 26 outputs (RUN, BUSY, GATE, OR, READY, ERROR, STGOUT 0 to 3, and DO 0 to 15)									
Monitor interface		Integrated Controller and LCD 12.1 inch TFT color LCD (Resolution: XGA 1,024 × 768 dots)					Analog RGB video output, 1 channel (Resolution: XGA 1,024 × 768 dots)				
USB interface		4 channels (supports USB 1.1 and 2.0)									
Power supply voltage		20.4 to 26.4 VDC									
Current consumption ^{*3}	When connected to a intelligent or autofocus camera	5 A max.	7.5 A max.	5 A max.	7.5 A max.	5 A max.	7.5 A max.	5 A max.	7.5 A max.		
	When connected to a 300,000-pixel camera	3.7 A max.	4.9 A max.	3.7 A max.	4.9 A max.	3.7 A max.	4.9 A max.	3.7 A max.	4.9 A max.		
	When connected to a 2 million-pixel camera										
	When connected to a 5 million-pixel camera										
Ambient temperature range		Operating: 0 to 45°C, 0 to 50°C ^{*4} , 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	Approx. 1.8 kg	Approx. 1.9 kg	Approx. 1.8 kg	Approx. 1.9 kg		
Accessories		Touch pen (one, inside the front panel), Please Read First, Instruction Manual (Setup), 6 mounting brackets				Please Read First, Instruction Manual (Setup)					

*1. When connecting 5 million-pixel cameras, up to two cameras can be connected.

*2. The number of logged images will vary when connecting multiple Cameras with different models.

*3. When the strobe controller is connected to the lights, the controller uses power as much as it does when connected to the intelligent camera.

*4. The operating mode can be switched from the Controller Menu settings.

Note: Do not install the firmware for FZ2 in any High Grade High Speed or High Grade controller of the FZ3 series. It will lead to the failure of the controller. For software download, please contact your Omron representative.

Cameras

Intelligent camera, autofocus camera

	FZ-SLC100	FZ-SLC15	FZ-SZC100	FZ-SZC15
Image elements	Interline transfer reading all pixels, 1/3-inch CCD image elements			
Color/Monochrome	Color			
Effective pixels	640(H)×480(V)			
Pixel size	7.4×7.4 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: IEC 60825-1: 1993 + A1: 1997 + A2-2001, EN 60825-1: 1994 + A1: 2002 + A2: 2001

Digital cameras

	FZ-S	FZ-SC	FZ-S2M	FZ-SC2M	FZ-S5M	FZ-SC5M
Image elements	Interline transfer reading all pixels, 1/3-inch CCD image elements		Interline transfer reading all pixels, 1/1.8-inch CCD image elements		Interline transfer reading all pixels, 2/3-inch CCD image elements	
Color/Monochrome	Monochrome	Color	Monochrome	Color	Monochrome	Color
Effective pixels	640(H)×480(V)		1600(H)×1200(V)		2448(H)×2044(V)	
Pixel size	7.4×7.4 μm		4.4×4.4 μm		3.45×3.45 μm	
Shutter function	Electronic shutter; select shutter speeds from 1/10 to 1/50,000 s		Electronic shutter; select shutter speeds from 1/10 to 1/50,000 s		Electronic shutter; select shutter speeds from 1/10 to 1/50,000 s	
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)	
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)		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 digital cameras

	FZ-SF	FZ-SFC	FZ-SP	FZ-SPC
Image elements	Interline transfer reading all pixels, 1/3-inch CCD image elements			
Color/Monochrome	Monochrome	Color	Monochrome	Color
Effective pixels	640(H)×480(V)			
Pixel size	7.4×7.4 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, 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)		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)		Operating and storage: 35% to 85% (with no condensation)	
Weight	Approx.150 g		Approx.150 g	
Accessories	Instruction manual, installation bracket, Four mounting brackets(M2)		Instruction manual	

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Authorised Distributor:

Control Systems

- Programmable logic controllers • Human-machine interfaces • Remote I/O

Motion & Drives

- Motion controllers • Servo systems • Inverters

Control Components

- Temperature controllers • Power supplies • Timers • Counters • Programmable relays
- Digital panel indicators • Electromechanical relays • Monitoring products • Solid-state relays
- Limit switches • Pushbutton switches • Low voltage switch gear

Sensing & Safety

- Photoelectric sensors • Inductive sensors • Capacitive & pressure sensors
- Cable connectors • Displacement & width-measuring sensors • Vision systems
- Safety networks • Safety sensors • Safety units/relay units • Safety door/guard lock switches

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