

The OMRON logo is displayed in a bold, blue, sans-serif font. The letters are thick and rounded, with a consistent blue color throughout. The logo is centered horizontally within a light yellow rectangular background.

Automatización Eléctrica
Especialistas en Automatización

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FH series

Vision system

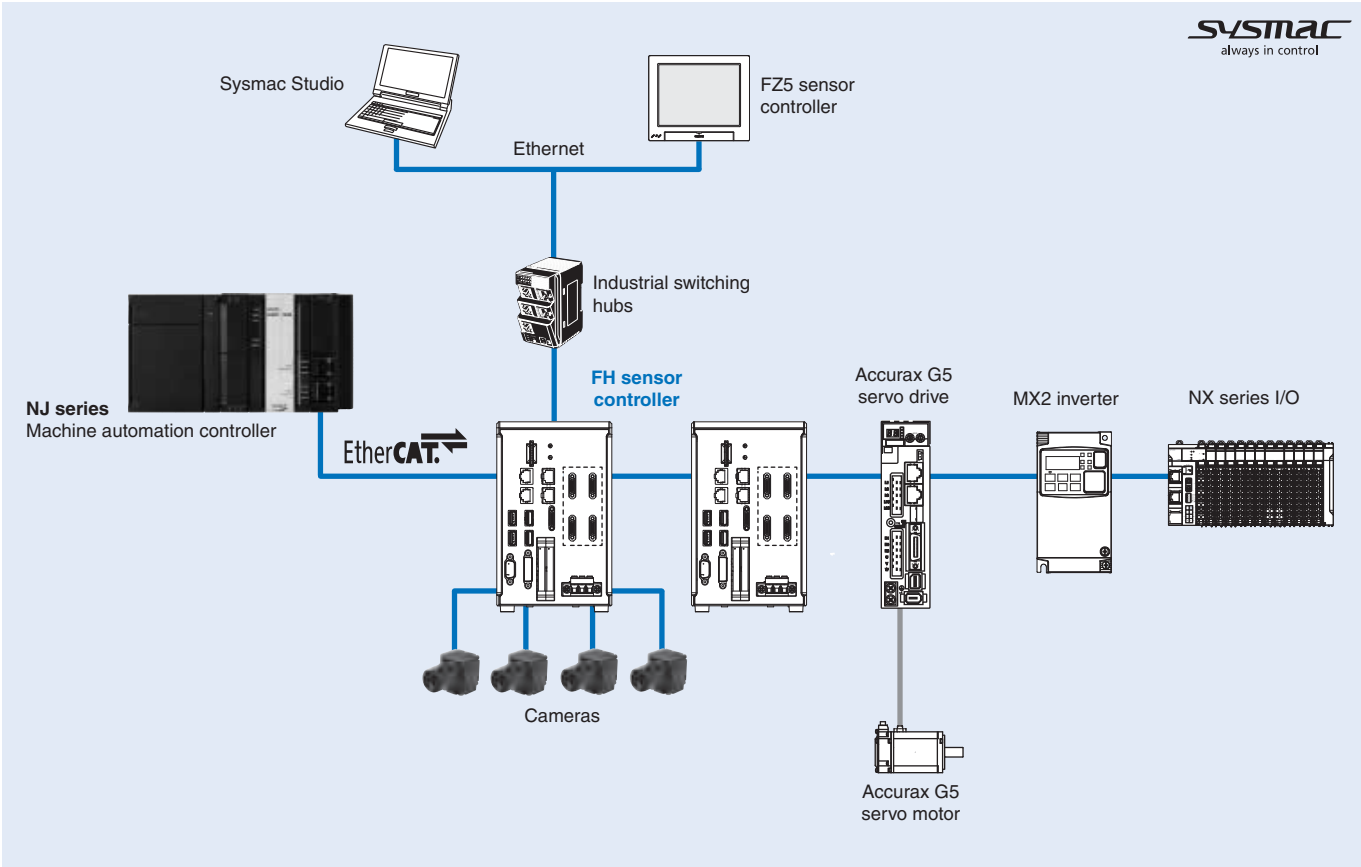
Flexible solution for machine vision

The FH vision systems are specifically intended for seamless integration with PLC's, motion controllers and robotic control systems increasing the overall machine performance.

- Powerful 4-core i7 parallel processor
- Fast EtherCAT communications
- The new Shape Search III processing item enables fast, precise and stable measurements
- 24 types of camera with up to 12 Mpixel
- Over 100 processing items including 1D code, 2D code and OCR
- Easy integration into an machine monitor with .NET user interface controls



System configuration



Specifications

FH sensor controller specifications

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	
	Processing resolution	Connected to a 300,000-pixel camera		640 (H) x 480 (V)					
		Connected to a 2 million-pixel camera		2040 (H) x 1088 (V)					
		Connected to a 4 million-pixel camera		2040 (H) x 2048 (V)					
		Connected to a 12 million-pixel camera		4084 (H) x 3072 (V)					
	No. of scenes		128						
	Number of logged images ^{*1}	Connected to an intelligent compact camera		Connected to 1 camera (color): 232, Connected to 2 camera (color): 116 Connected to 3 camera (color): 77, Connected to 4 camera (color): 58 Connected to 5 camera (color): 46, Connected to 6 camera (color): 38 Connected to 7 camera (color): 33, Connected to 8 camera (color): 29					
		Connected to a 300,000-pixel camera		Connected to 1 camera (color): 270, Connected to 1 camera (monochrome): 272 Connected to 2 camera (color): 135, Connected to 2 camera (monochrome): 136 Connected to 3 camera (color/monochrome): 90 Connected to 4 camera (color): 67, Connected to 4 camera (monochrome): 68 Connected to 5 camera (color/monochrome): 54 Connected to 6 camera (color/monochrome): 45 Connected to 7 camera (color/monochrome): 38 Connected to 8 camera (color): 33, Connected to 8 camera (monochrome): 34					
		Connected to a 2 million-pixel camera		Connected to 1 camera (color/monochrome): 37, Connected to 2 camera (color/monochrome): 18 Connected to 3 camera (color/monochrome): 12, Connected to 4 camera (color/monochrome): 9 Connected to 5 camera (color/monochrome): 7, Connected to 6 camera (color/monochrome): 6 Connected to 7 camera (color/monochrome): 5, Connected to 8 camera (color/monochrome): 4					
		Connected to a 4 million-pixel camera		Connected to 1 camera (color/monochrome): 20, Connected to 2 camera (color/monochrome): 10 Connected to 3 camera (color/monochrome): 6, Connected to 4 camera (color/monochrome): 5 Connected to 5 camera (color/monochrome): 4, Connected to 6 camera (color/monochrome): 3 Connected to 7 camera (color/monochrome): 2, Connected to 8 camera (color/monochrome): 2					
		Connected to a 12 million-pixel camera		Connected to 1 camera (color/monochrome): 6, Connected to 2 camera (color/monochrome): 3 Connected to 3 camera (color/monochrome): 2, Connected to 4 camera (color/monochrome): 2					
	Operation		Mouse or similar device						
	Settings		Create series of processing steps by editing the flowchart (help messages provided)						
External interface	Serial communications		RS-232C: 1 CH						
	Ethernet communications		No protocol (TCP/UDP) 1000BASE-T						
			1 port	2 port	2 port	1 port	2 port	2 port	
	EtherNet/IP communications		Ethernet port baud rate: 1 Gbps (1000BASE-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, DI0 to 7, DL_LINE0) 37 outputs (RUN0 to 1, READY 0 to 1, BUSY0 to 1, OR0 to 1, ERROR0 to 1, GATE0 to 1, STGOUT0/SHTOUT0, STGOUT1/SHTOUT1, STGOUT2 to 7, DO0 to 15, ACK) (In the 5-line to 8-line random trigger mode) 19 inputs (STEP0 to 7, DI_LINE0 to 2, DI0 to 7) 34 outputs (READY0 to 7, BUSY0 to 7, OR0 to 7, ACK, ERROR, STGOUT/SHTOUT0 to 7)						
	Encoder interface		RS422-A line driver level Phase A/B: single-phase 4 MHz (multiplying phase difference of 1MHz by 4 times) Phase Z: 1 MHz						
	Monitor interface		DVI-I output IF x 1ch						
	USB interface		4 channels (supports USB 1.1 and 2.0)						
	SD card interface		SDHC card of Class 4 or higher rating is recommended						
Ratings	Power supply voltage		20.4 to 26.4 VDC						
	Current consumption (at 24 VDC) ^{*2}	Connected to an intelligent compact camera	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.
			4 cameras	-	7.0 A max.	8.1 A max.	-	6.5 A max.	7.5 A max.
			8 cameras	-	-	11.5 A max.	-	-	10.9 A max.
		Connected to a 300,000-pixel camera, 2/4/5/12 million-pixel camera	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.
			4 cameras	-	4.8 A max.	5.6 A max.	-	4.3 A max.	5.0 A max.
			8 cameras	-	-	6.8 A max.	-	-	6.2 A max.
Insulation resistance		Between DC power supply and controller FG: 20 MΩ or higher (rated voltage 250 V)							
Operation environment	Noise immunity	Fast transient burst	DC power supply I/O line	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					
				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						

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						
Dimensions	Dimensions	190 x 115 x 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: aluminium (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), (8, FH-3050-20 and FH-1050-20)					

*1. The image logging capacity changes when multiple cameras of different types are connected at the same time.

*2. The current consumption when the maximum number of cameras supported by each controller are connected. If a lighting controller model is connected to a lamp, the current consumption is as high as when an intelligent compact CMOS camera is connected.

Camera specifications

High-speed CMOS camera

Model	FH-SM	FH-SC	FH-SM02	FH-SC02	FH-SM04	FH-SC04	FH-SM12	FH-SC12
Image elements	1/3-inch CMOS image elements		2/3-inch CMOS image elements		1-inch CMOS image elements		1.76-inch CMOS image elements	
Color/Monochrome	Monochrome	Color	Monochrome	Color	Monochrome	Color	Monochrome	Color
Effective pixels	640 (H) x 480 (V)		2040 (H) x 1088 (V)		2040 (H) x 2048 (V)		4084 (H) x 3072 (V)	
Imaging area H x V (opposing corner)	4.8 x 3.6 (6.0 mm)		11.26 x 5.98 (12.76 mm)		11.26 x 11.26 (15.93 mm)		22.5 x 16.9 (28.14 mm)	
Pixel size	7.4 (μm) x 7.4 (μm)		5.5 (μm) x 5.5 (μm)		5.5 (μm) x 5.5 (μm)		5.5 (μm) x 5.5 (μm)	
Electronic shutter function	Shutter speeds can be set from 20 μs to 100 ms		Shutter speeds can be set from 25 μs to 100 ms				Shutter speeds can be set from 60 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	4 to 3072 lines (4-line increments)	
Frame rate (image read time)	308 fps (3.3 ms)		219 fps (4.6 ms) ¹		118 fps (8.5 ms) ¹		38.9 fps (25.7 ms) ¹	
Lens mounting	C mount						M42 mount	
Field of vision, installation distance	Selecting a lens according to the field of vision and installation distance							
Ambient temperature range	Operating: 0 to 40°C Storage: -25 to 65°C (with no icing or condensation)							
Ambient humidity range	Operating and storage: 35% to 85% (with no condensation)							
Weight	Approx. 105 g		Approx. 110 g				Approx. 320 g	
Accessories	Instruction manual							

*1. Frame rate in high speed mode when the camera is connected using two camera cables.

Digital CCD camera

Model	FZ-S	FZ-SC	FZ-S2M	FZ-SC2M	FZ-S5M2	FZ-SC5M2
Image elements	Interline transfer reading all pixels 1/3-inch CCD image elements		Interline transfer reading all pixels 1/1.8-inch CCD image elements		Interline transfer reading all pixels 2/3-inch CCD image elements	
Color/Monochrome	Monochrome	Color	Monochrome	Color	Monochrome	Color
Effective pixels	640 (H) x 480 (V)		1600 (H) x 1200 (V)		2448 (H) x 2044 (V)	
Imaging area H x V (opposing corner)	4.8 x 3.6 (6.0 mm)		7.1 x 5.4 (8.9 mm)		8.4 x 7.1 (11 mm)	
Pixel size	7.4 (μm) x 7.4 (μm)		4.4 (μm) x 4.4 (μm)		3.45 (μm) x 3.45 (μm)	
Electronic shutter function	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 digital CCD camera

Model	FZ-SF	FZ-SFC	FZ-SP	FZ-SPC
Image elements	Interline transfer reading all pixels, 1/3-inch CCD image elements			
Color/Monochrome	Monochrome	Color	Monochrome	Color
Effective pixels	640 (H) x 480 (V)			
Imaging area H x V (opposing corner)	4.8 x 3.6 (6.0 mm)			
Pixel size	7.4 (μm) x 7.4 (μm)			
Electronic shutter function	Select shutter speeds from 20 μs 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 camera

Model	FZ-SH	FZ-SHC
Image elements	Interline transfer reading all pixels, 1/3-inch CCD image elements	
Color/Monochrome	Monochrome	Color
Effective pixels	640 (H) x 480 (V)	
Imaging area H x V (opposing corner)	4.8 x 3.6 (6.0 mm)	
Pixel size	7.4 (μm) x 7.4 (μm)	
Electronic shutter function	Select shutter speeds from 1/10 to 1/50,000 s	
Partial function	12 to 480 lines	
Frame rate (image read time)	204 fps (4.9 ms)	
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 camera

Model	FZ-SQ010F	FZ-SQ050F	FZ-SQ100F	FZ-SQ100N
Image elements	1/3-inch CMOS image elements			
Color/Monochrome	Color			
Effective pixels	752 (H) x 480 (V)			
Imaging area H x V (opposing corner)	4.51 x 2.88 (5.35 mm)			
Pixel size	6.0 (μm) x 6.0 (μm)			
Shutter function	1/250 to 1/32,258			
Partial function	8 to 480 lines			
Frame rate (image read time)	60 fps			
Field of vision	7.5 x 4.7 to 13 x 8.2 mm	13 x 8.2 to 53 x 33 mm	53 x 33 to 240 x 153 mm	29 x 18 to 300 x 191 mm
Installation distance	38 to 60 mm	56 to 215 mm	220 to 970 mm	32 to 380 mm
LED class ^{**1}	Risk Group 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	Instruction manual, mounting bracket (FQ-XL), polarizing filter attachment (FQ-XF1) and warning label			

*1. Applicable standards: IEC62471-2.

LCD monitor specifications

Model	FZ-M08
Size	8.4 inches
Type	Liquid crystal color TFT
Resolution	1,024 x 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

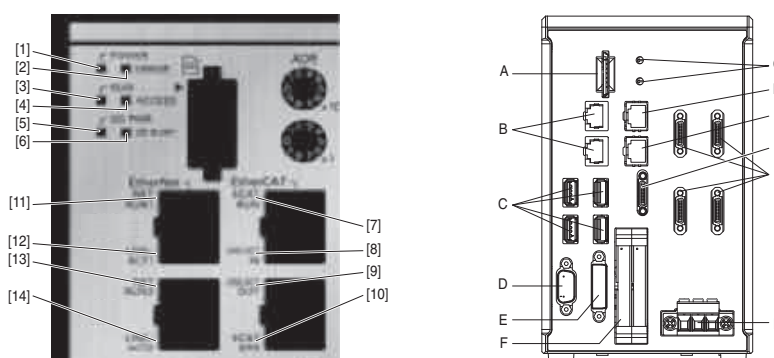
EtherCAT communication specifications

Item	Specifications
Communications standard	IEC61158 Type 12
Physical layer	100BASE-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 type and braiding)
Transmission distance	Distance between nodes: 100 m or less
Node address setting	00 to 9
External connection terminals	RJ45 x 2 (shielded), IN: EtherCAT input data, OUT: EtherCAT output data
Send/receive PDO data sizes	Input
	Output
Mailbox data size	Input
	Output
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.

Nomenclature

FH sensor controller (4 camera type)

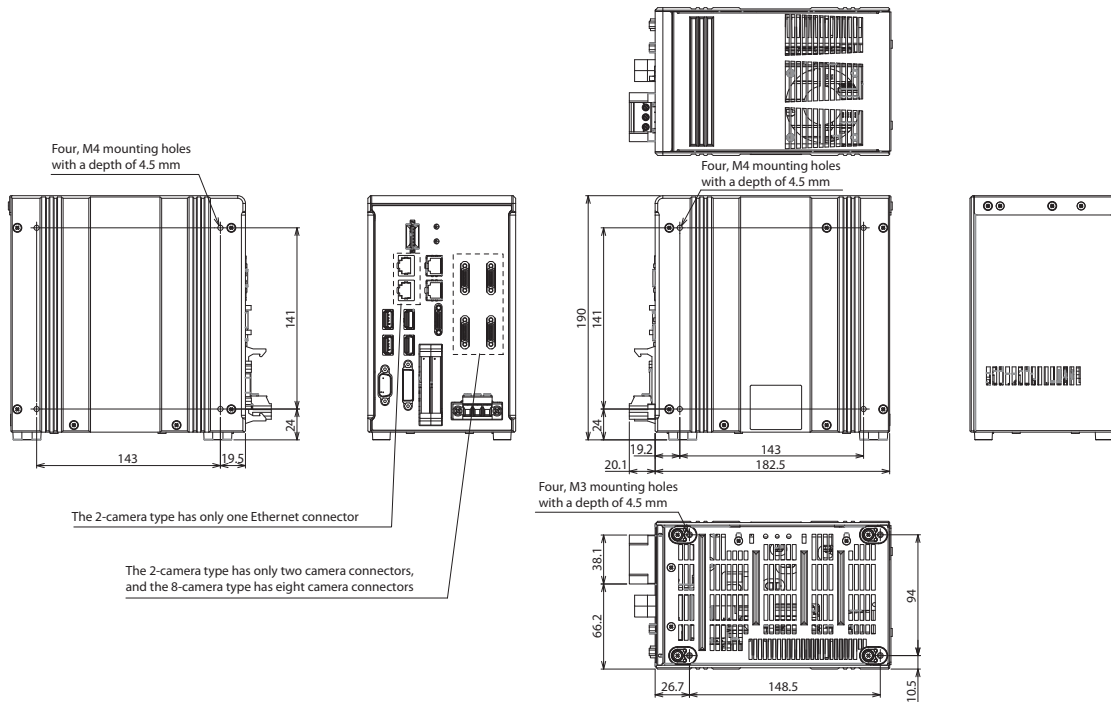


	Name	Description
[1]	POWER LED	Lit while power is ON
[2]	ERROR LED	Lit when an error has occurred
[3]	RUN LED	Lit while the controller is in measurement mode
[4]	ACCESS LED	Lit while the memory is accessed
[5]	SD POWER LED	Lit while the power is supplied to the SD card and the card is usable
[6]	SD BUSY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

Dimensions

FH sensor controller

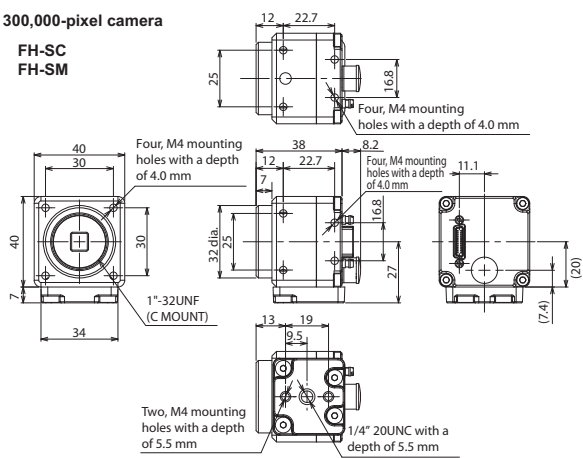


Camera

High-speed CMOS camera

300,000-pixel camera

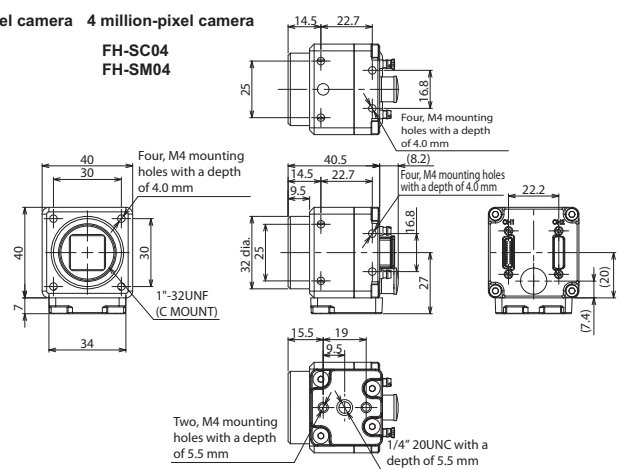
FH-SC
FH-SM



2 million-pixel camera 4 million-pixel camera

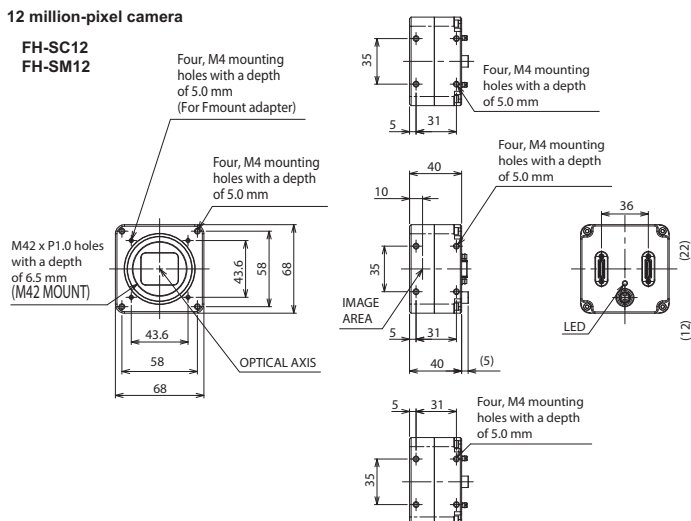
FH-SC02
FH-SM02

FH-SC04
FH-SM04



12 million-pixel camera

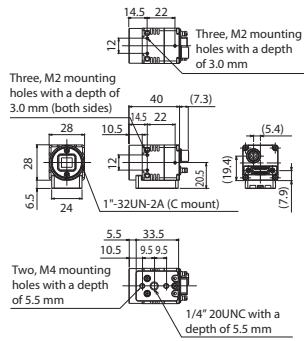
FH-SC12
FH-SM12



Digital CCD camera

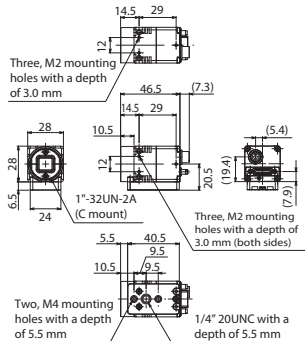
300,000-pixel camera

FZ-SC
FZ-S



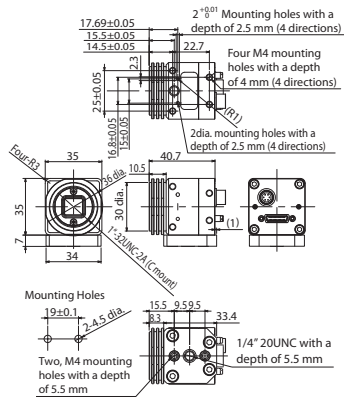
2 million-pixel camera

FZ-SC2M
FZ-S2M



5 million-pixel camera

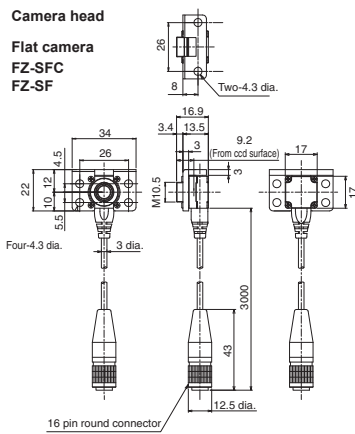
FZ-SC5M2
FZ-S5M2



Small digital CCD camera

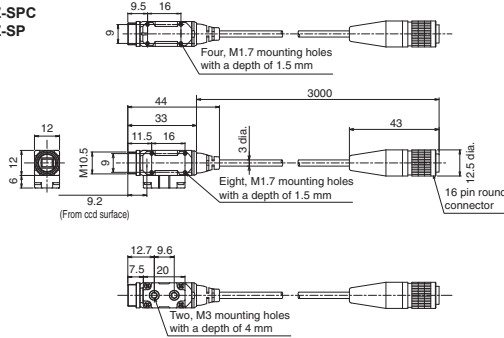
Camera head

Flat camera
FZ-SFC
FZ-SF



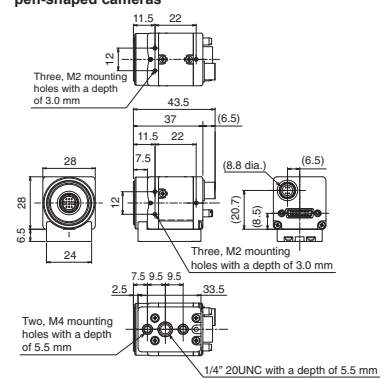
Pen-shaped camera

FZ-SPC
FZ-SP



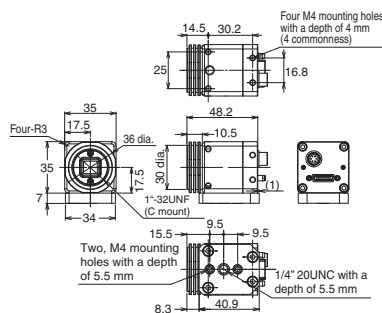
Camera amplifier

Can be used for both flat cameras and pen-shaped cameras



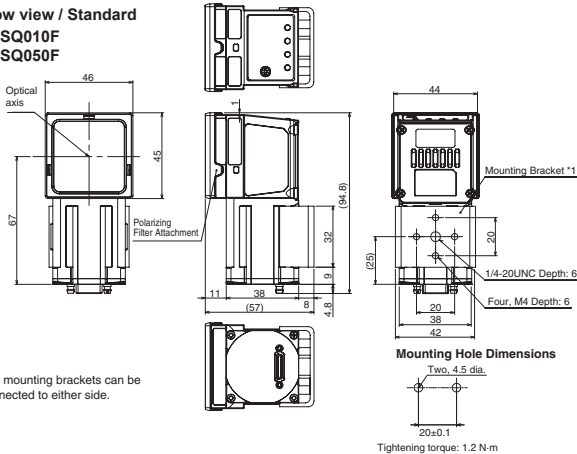
High-speed CCD camera

FZ-SHC
FZ-SH



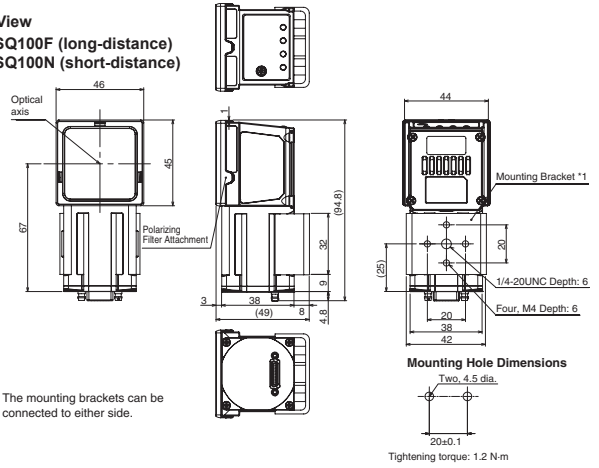
Intelligent compact CMOS camera

Narrow view / Standard
FZ-SQ010F
FZ-SQ050F



*1. The mounting brackets can be connected to either side.

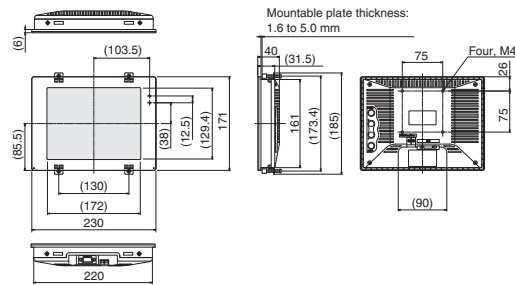
Wide View
FZ-SQ100F (long-distance)
FZ-SQ100N (short-distance)



*1. The mounting brackets can be connected to either side.

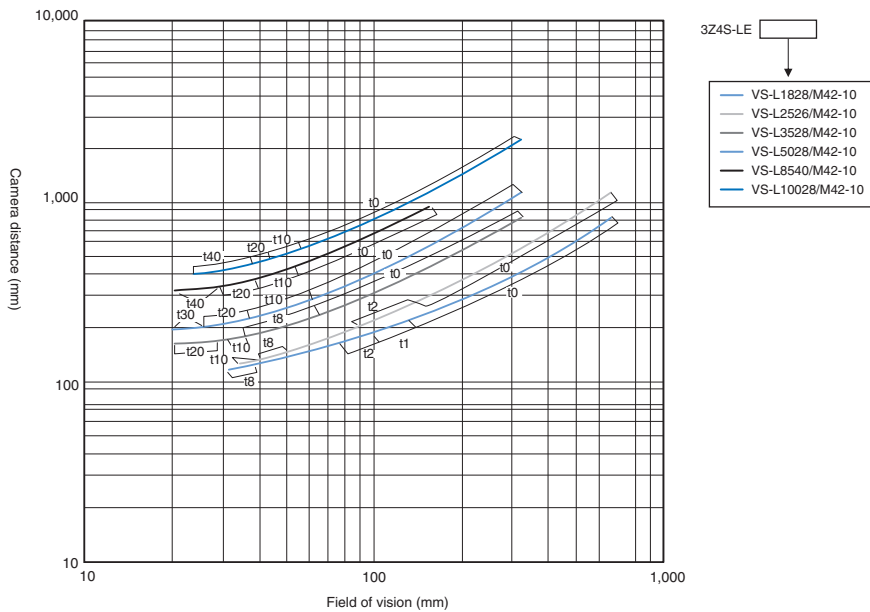
LCD monitor

FZ-M08

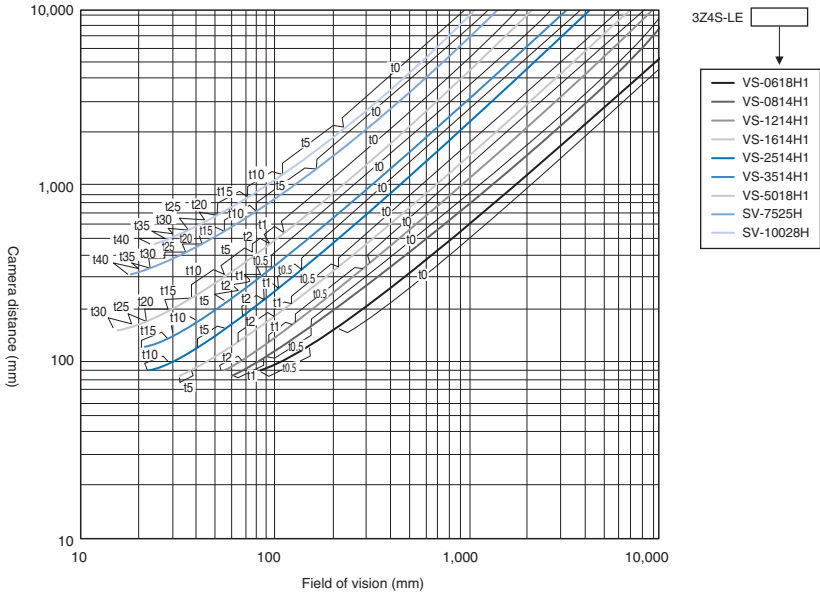


Optical chart

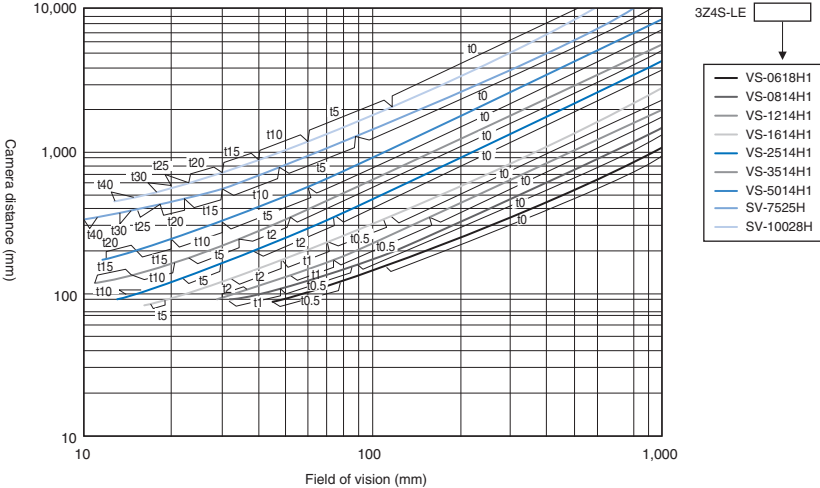
High-speed CMOS camera FH-S□12, 12-million pixel



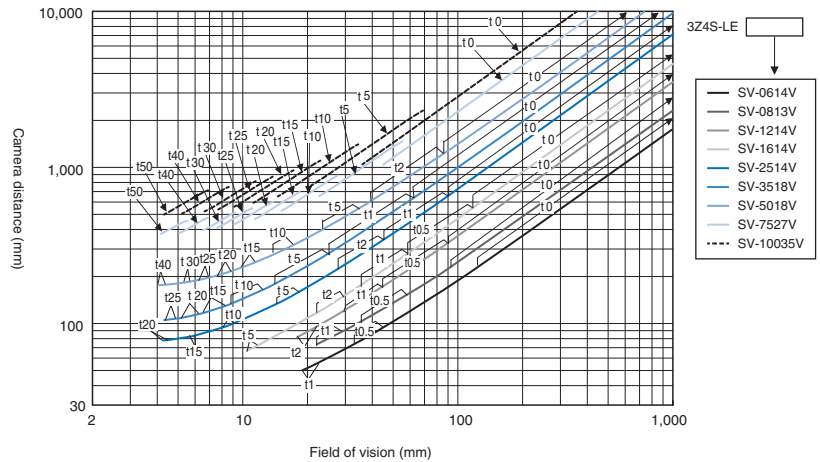
High-speed CMOS camera FH-S□04, 4 million-pixel



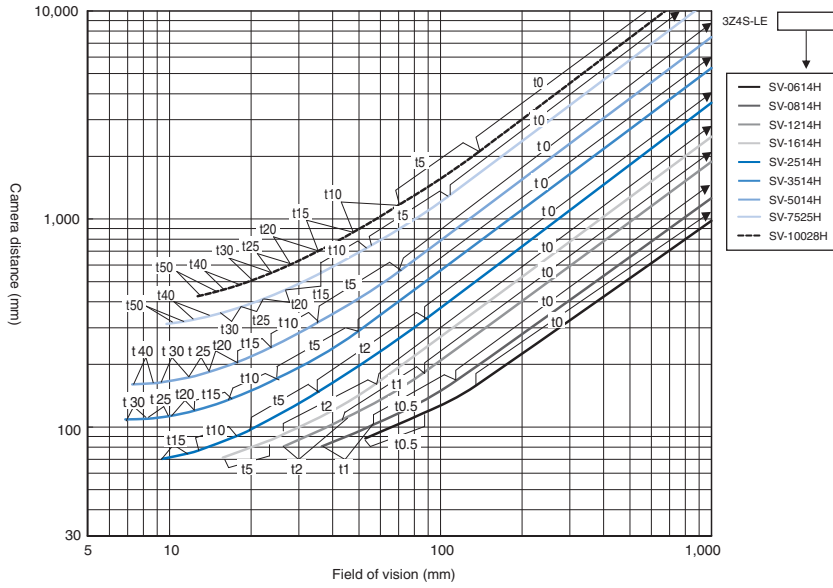
High-speed CMOS camera FH-S□02, 2 million-pixel



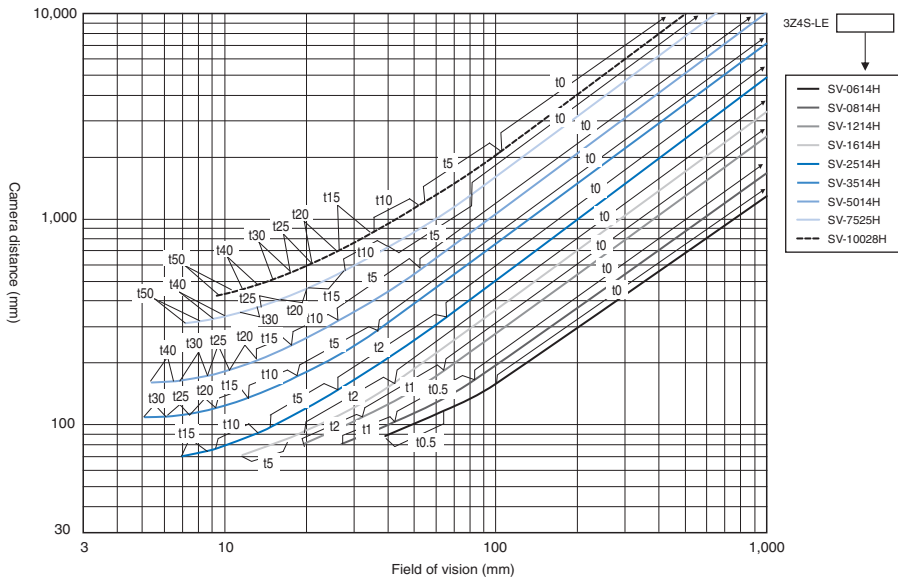
High-speed CMOS camera FH-S□ / High-speed CCD camera FZ-SH□ / Digital CCD camera FZ-S□, 300,000-pixel



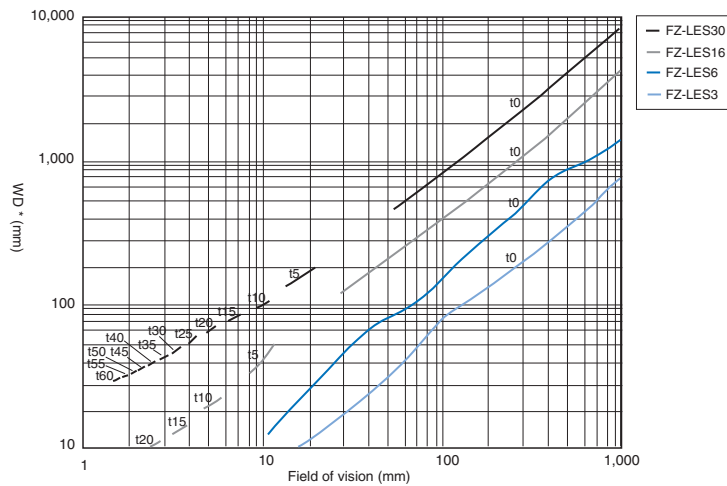
Digital CCD camera FZ-S□5M2, 5 million-pixel



Digital CCD camera FZ-S□2M, 2 million-pixel

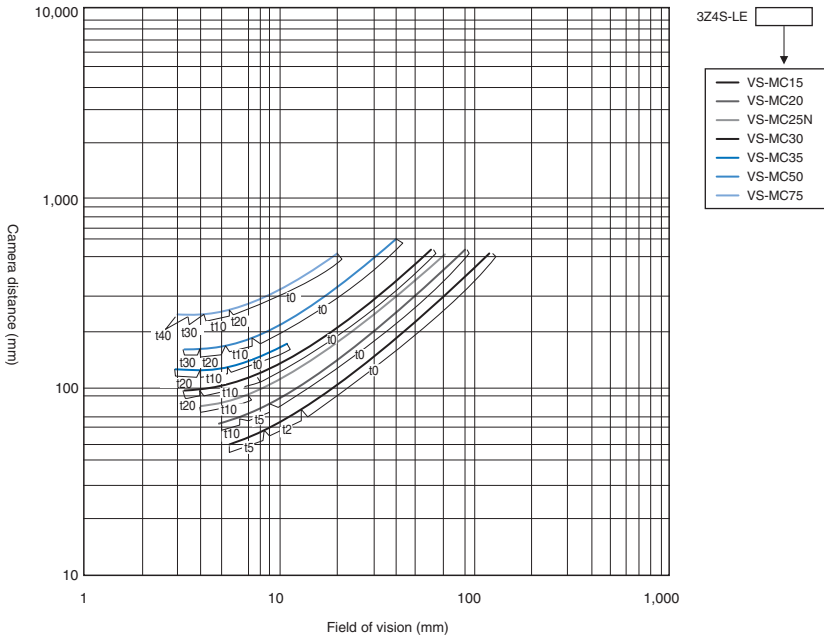


Small digital CCD camera FZ-SF□, FZ-SP□, 300,000-pixel

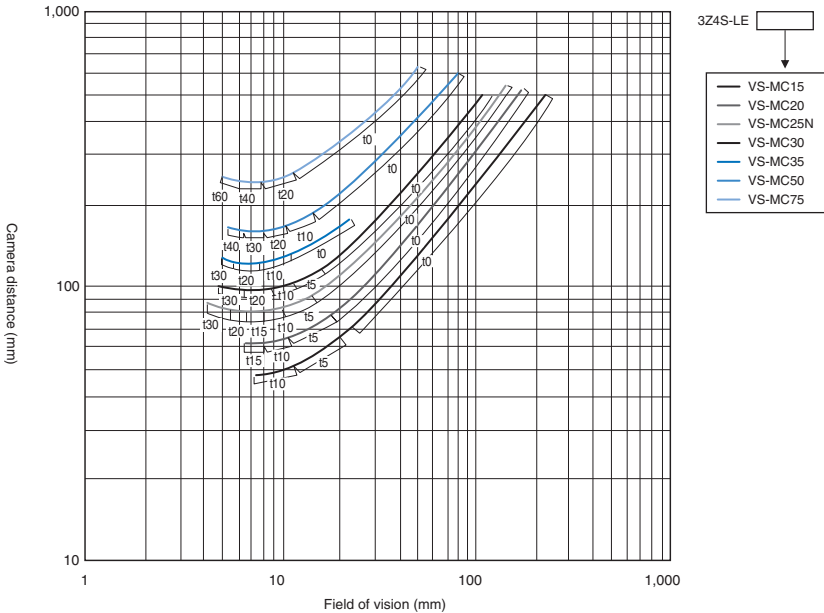


* The vertical axis represents WD, not installation distance.

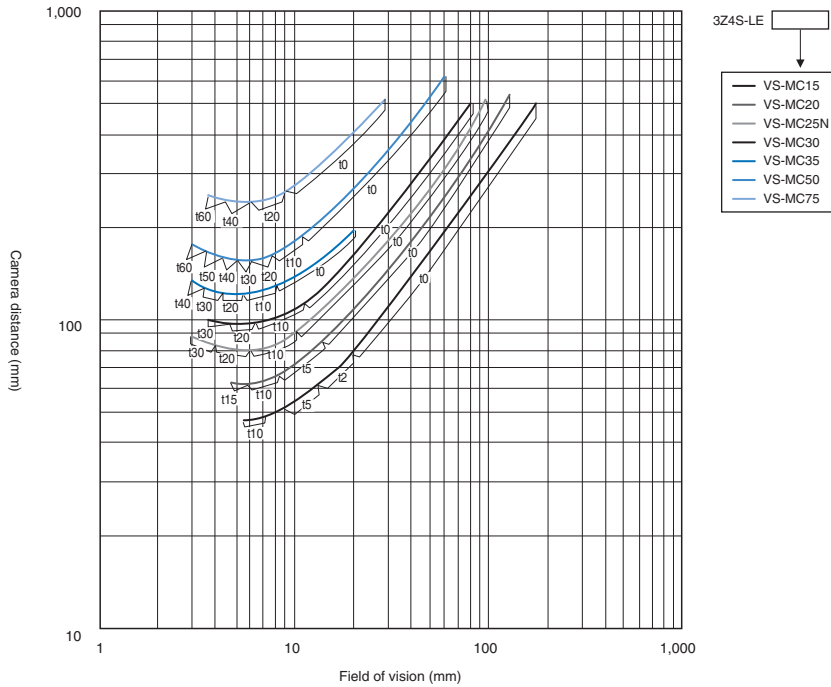
High-speed CMOS camera FH-S□ / High-speed CCD camera FZ-SH□ / Digital CCD camera FZ-S□, 300,000-pixel (vibrations and shocks resistant)



Digital CCD camera FZ-S□5M2, 5 million-pixel (vibrations and shocks resistant)

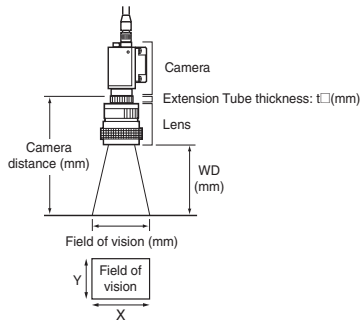


Digital CCD camera FZ-S□2M, 2 million-pixel (vibrations and shocks resistance)



Meaning of optical chart

The X axis of the optical chart shows the field of vision (mm)^{*1}, and the Y axis of the optical chart shows the camera installation distance (mm).^{*2}

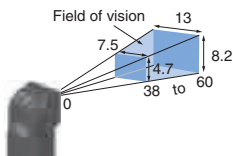


*1. The lengths of the fields of vision given in the optical charts are the lengths of the Y axis.

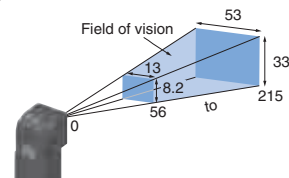
*2. The vertical axis represents WD for small cameras.

Intelligent compact CMOS camera

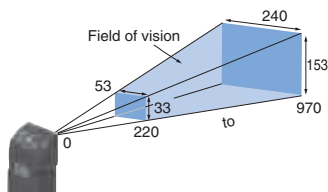
• Narrow View FZ-SQ010F



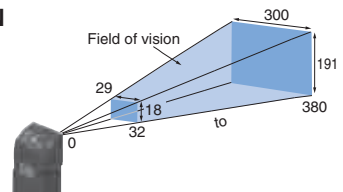
• Standard FZ-SQ050F



• Wide View (Long-distance) FZ-SQ100F




• Wide View (Short-distance) FZ-SQ100N














Ordering information

Sensor controller

Type	CPU	No. of cameras	Output	Model	Appearance
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	

Camera

Type	Specifications		Image read time	Model	Appearance						
High-speed CMOS camera (Lens required)	12 million-pixel ¹	Color	25.7 ms ²	FH-SC12							
		Monochrome		FH-SM12							
	4 million-pixel	Color	8.5 ms ²	FH-SC04							
		Monochrome		FH-SM04							
	2 million-pixel	Color	4.6 ms ²	FH-SC02							
		Monochrome		FH-SM02							
	300,000-pixel	Color	3.3 ms ²	FH-SC							
		Monochrome		FH-SM							
	Digital CCD camera (Lens required)	5 million-pixel	Color	62.5 ms					FZ-SC5M2		
			Monochrome						FZ-S5M2		
		2 million-pixel	Color	33.3 ms					FZ-SC2M		
			Monochrome						FZ-S2M		
300,000-pixel		Color	12.5 ms	FZ-SC							
		Monochrome		FZ-S							
Small digital CCD camera (Lenses for small camera required)	300,000-pixel flat type	Color	12.5 ms	FZ-SFC							
		Monochrome		FZ-SF							
	300,000-pixel pen type	Color		FZ-SPC							
		Monochrome		FZ-SP							
High-speed CCD camera (Lens required)	300,000-pixel	Color	4.9 ms	FZ-SHC							
		Monochrome		FZ-SH							
Intelligent compact CMOS camera (Camera + manual focus lens + high power lighting)	Narrow view	Color	16.7 ms	FZ-SQ010F							
	Standard view			FZ-SQ050F							
	Wide view (long-distance)			FZ-SQ100F							
	Wide view (short-distance)			FZ-SQ100N							

*1. Up to four cameras can be connected to one controller. Up to eight cameras other than 12 million-pixel cameras can be connected to a FH-3050-20 or FH-1050-20.

*2. When connected using two camera cables.

Lenses

C-mount lens for 1/3-inch image sensor

Type	Specifications					Model	Appearance/Dimensions (mm)
	Focal length	Brightness	Filter size	Max. sensor size	Mount		
C-mount lens for 1/3-inch image sensor (Recommend: FZ-S□/ FZ-SH□/ FH-S□)	6 mm	F1.4	M27.0 P0.5	1/3 inch	C-mount	3Z4S-LE SV-0614V	
	8 mm	F1.3	M25.5 P0.5			3Z4S-LE SV-0813V	
	12 mm	F1.4	M27.0 P0.5			3Z4S-LE SV-1214V	
	16 mm	F1.4	M27.0 P0.5			3Z4S-LE SV-1614V	
	25 mm	F1.4	M27.0 P0.5			3Z4S-LE SV-2514V	
	35 mm	F1.8	M27.0 P0.5			3Z4S-LE SV-3518V	
	50 mm	F1.8	M30.5 P0.5			3Z4S-LE SV-5018V	
	75 mm	F2.7	M30.5 P0.5			3Z4S-LE SV-7527V	
	100 mm	F3.5	M30.5 P0.5			3Z4S-LE SV-10035V	

C-mount lens for 2/3-inch image sensor

Type	Specifications					Model	Appearance/Dimensions (mm)
	Focal length	Brightness	Filter size	Max. sensor size	Mount		
C-mount lens for 2/3-inch image sensor (Recommend: FZ-S□2M/ FZ-S□5M2)	6 mm	F1.4	M40.5 P0.5	2/3 inch	C-mount	3Z4S-LE SV-0614H	
	8 mm	F1.4	M35.5 P0.5			3Z4S-LE SV-0814H	
	12 mm	F1.4	M27.0 P0.5			3Z4S-LE SV-1214H	
	16 mm	F1.4	M27.0 P0.5			3Z4S-LE SV-1614H	
	25 mm	F1.4	M27.0 P0.5			3Z4S-LE SV-2514H	
	35 mm	F1.4	M35.5 P0.5			3Z4S-LE SV-3514H	
	50 mm	F1.4	M40.5 P0.5			3Z4S-LE SV-5014H	
	75 mm	F2.5	M34.0 P0.5			1 inch	3Z4S-LE SV-7525H ¹
	100 mm	F2.8	M37.5 P0.5	3Z4S-LE SV-10028H ¹			

¹ 3Z4S-LE SV-7525H and 3Z4S-LE SV-10028H can also be used for FH-S□02/FH-S□04.

C-mount lens for 1-inch image sensor

Type	Specifications					Model	Appearance/Dimensions (mm)
	Focal length	Brightness	Filter size	Max. sensor size	Mount		
C-mount lens for 1-inch image sensor (Recommend: FH-S□02/ FH-S□04 ¹⁾)	6 mm	F1.8	Can not be used with a filter	1 inch	C-mount	3Z4S-LE VS-0618H1	
	8 mm	F1.4	M55.0 P0.75			3Z4S-LE VS-0814H1	
	12 mm	F1.4	M35.5 P0.5			3Z4S-LE VS-1214H1	
	16 mm	F1.4	M30.5 P0.5			3Z4S-LE VS-1614H1	
	25 mm	F1.4	M30.5 P0.5			3Z4S-LE VS-2514H1	
	35 mm	F1.4	M30.5 P0.5			3Z4S-LE VS-3514H1	
	50 mm	F1.8	M40.5 P0.5			3Z4S-LE VS-5018H1	

*1. 3Z4S-LE SV-7525H with focal length of 75 mm and 3Z4S-LE SV-10028H with local length of 100 mm are also available.

M42-mount lens for large image sensor

Type	Specifications					Model	Appearance/Dimensions (mm)
	Focal length	Brightness	Filter size	Max. sensor size	Mount		
M42-mount lens for large image sensor (Recommend: FH-S□12)	18 mm	F2.8	M55.0 P0.75	1.8 inch	M42-mount	3Z4S-LE VS-L1828/M42-10	
	25 mm	F2.6	M55.0 P0.75			3Z4S-LE VS-L2526/M42-10	
	35 mm	F2.8	M62.0 P0.75			3Z4S-LE VS-L3528/M42-10	
	50 mm	F2.8	M62.0 P0.75			3Z4S-LE VS-L5028/M42-10	
	85 mm	F4.0	M52.0 P0.75			3Z4S-LE VS-L8540/M42-10	
	100 mm	F2.8	M52.0 P0.75			3Z4S-LE VS-L10028/M42-10	

Lens for small camera

Type	Specifications		Model	Appearance/Dimensions (mm)
	Focal length	Brightness		
Lens for small camera	3 mm	F2.0	FZ-LES3	
	6 mm	F2.0	FZ-LES6	
	16 mm	F3.4	FZ-LES16	
	30 mm	F3.4	FZ-LES30	

Vibrations and shocks resistant, C-mount lens for 2/3-inch image sensor

Type	Specifications					Mount	Model	Appearance/ Dimensions (mm)
	Focal length	Filter size	Optical magnification	Iris range ^{*2} / Depth of field (mm) ^{*3}	Max. sensor size			
Vibrations and shocks resistant C-mount lens for 2/3-inch image sensor (Recommend: FZ-S□/ FZ-S□2M/FZ-S□5M2/ FZ-SH□/FH-S□)	15 mm	M27.0 P0.5	0.03 x	Max. aperture: 183.1 F5.6: 512.7 F8: 732.4	2/3 inch	C-mount	3Z4S-LE VS-MC15-□ ^{*1}	
			0.2 x	Max. aperture: 4.8 F5.6: 13.4 F8: 19.2				
			0.3 x	Max. aperture: 2.3 F5.6: 6.5 F8: 9.2				
	20 mm	M27.0 P0.5	0.04 x	Max. aperture: 110.8 F5.6: 291.2 F8: 416.0	2/3 inch	C-mount	3Z4S-LE VS-MC20-□ ^{*1}	
			0.25 x	Max. aperture: 3.4 F5.6: 9.0 F8: 12.8				
			0.4 x	Max. aperture: 1.5 F5.6: 3.9 F8: 5.6				
	25 mm	M27.0 P0.5	0.05 x	Max. aperture: 67.2 F5.6: 188.2 F8: 268.8	2/3 inch	C-mount	3Z4S-LE VS-MC25N-□ ^{*1}	
			0.25 x	Max. aperture: 3.2 F5.6: 9.0 F8: 12.8				
			0.5 x	Max. aperture: 1.0 F5.6: 2.7 F8: 3.8				
	30 mm	M27.0 P0.5	0.06 x	Max. aperture: 47.1 F5.6: 131.9 F8: 188.4	2/3 inch	C-mount	3Z4S-LE VS-MC30-□ ^{*1}	
			0.15 x	Max. aperture: 8.2 F5.6: 22.9 F8: 32.7				
			0.45 x	Max. aperture: 1.1 F5.6: 3.2 F8: 4.6				
	35 mm	M27.0 P0.5	0.26 x	Max. aperture: 2.8 F5.6: 8.4 F8: 11.9	2/3 inch	C-mount	3Z4S-LE VS-MC35-□ ^{*1}	
			0.3 x	Max. aperture: 2.2 F5.6: 6.5 F8: 9.2				
			0.65 x	Max. aperture: 0.6 F5.6: 1.7 F8: 2.5				
	50 mm	M27.0 P0.5	0.08 x	Max. aperture: 33.8 F5.6: 75.6 F8: 108.0	2/3 inch	C-mount	3Z4S-LE VS-MC50-□ ^{*1}	
			0.2 x	Max. aperture: 6.0 F5.6: 13.4 F8: 19.2				
			0.48 x	Max. aperture: 1.3 F5.6: 2.9 F8: 4.1				
	75 mm	M27.0 P0.5	0.14 x	Max. aperture: 17.7 F5.6: 26.1 F8: 37.2	2/3 inch	C-mount	3Z4S-LE VS-MC75-□ ^{*1}	
			0.2 x	Max. aperture: 9.1 F5.6: 13.4 F8: 19.2				
			0.62 x	Max. aperture: 1.3 F5.6: 1.9 F8: 2.7				

*1. Insert the iris range into □ in the model number as follows:

- F = Aperture: Blank
- F = 5.6 = FN056
- F = 8 = FN080

*2. F-number can be selected from maximum aperture, 5.6 and 8.0.







*3. When circle of least confusion is 40 μm.

Extension tubes











Type	Specifications	Model
For M42-mount lens ^{*1}	Set of 5 tubes: 20 mm, 10 mm, 8 mm, 2 mm and 1 mm Maximum outer diameter: 47.5 mm dia.	3Z4S-LE VS-EXR/M42
For C-mount lens ^{*1}	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.	3Z4S-LE SV-EXR
For small digital CCD camera	Set of 3 tubes: 15 mm, 10 mm and 5 mm Maximum outer diameter: 12 mm dia.	FZ-LESR



*1. 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. Reinforcement is required to protect against vibration when extension tubes exceeding 30 mm are used. When using the extension tube, check it the actual device before using it.

Camera accessories

Type	Specifications	Model	Appearance	
External lighting		FLV Series FL Series	-	
Lighting controller (Required to control external lighting from a controller)	For FLV-Series	Camera mount lighting controller One channel	FLV-TCC1	
		Four channels	FLV-TCC4	
	Analog lighting controller	FLV-ATC Series		
	For FL-Series	Camera mount lighting controller	FL-TCC1	
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	-
	For FZ-S□2M		FZ-S2M-XLC	
	For FZ-S□5M2		FZ-S5M-XLC	
	For FZ-SH□		FZ-SH-XLC	
	For FH-S□12		FH-SM12-XLC	

Cables

Type	Specifications	Model	Appearance
Camera cable	Standard 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 ^{*2})	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		FH-VMRGB	
Parallel I/O cable ^{*3}	Cable length: 2 m	XW2Z-S013-2	
	Cable length: 5 m	XW2Z-S013-5	
Parallel I/O cable for connector-terminal conversion unit ^{*3}	Cable length: 0.5 m	XW2Z-050EE	
	Cable length: 1 m	XW2Z-100EE	
	Cable length: 1.5 m	XW2Z-150EE	
	Cable length: 2 m	XW2Z-200EE	
	Cable length: 3 m	XW2Z-300EE	
	Cable length: 5 m	XW2Z-500EE	







Type	Specifications	Model	Appearance
Connector-terminal block conversion units, general-purpose devices	Wiring method: Phillips screw	XW2R-J34G-T	
	Wiring method: Slotted screw (rise up)	XW2R-E34G-T	
	Wiring method: Push-in spring	XW2R-P34G-T	
Encoder cable for line-driver	Cable length: 1.5 m	FH-VR	

*1. The maximum cable length depends on the camera being connected, and the model and length of the cable being used. 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.

Accessories

Type	Specifications	Model	Appearance
LCD monitor	For box-type controllers	FZ-M08	
USB memory	2 GB	FZ-MEM2G	
	8 GB	FZ-MEM8G	
SD card	2 GB	HMC-SD291	
	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	

Development environment

Please purchase a CD-ROM and licenses the first time you purchase the Application Producer. CD-ROM's and licenses are available individually. The license does not include the CD-ROM.

Product	Specifications	Number of licenses	Media	Model
	Description			
Application Producer	Software components that provide a development environment to further customize the standard controller features of the FH series. System requirements:	- (Media only)	CD-ROM	FH-AP1
	<ul style="list-style-type: none"> • CPU: Intel Pentium Processor (SSE2 or higher) • OS: Windows 7/8 (32-bit/64-bit version) • .NET Framework: .NET Framework 3.5 or higher • Memory: At least 2 GB RAM, at least 2 GB available disk space • Browser: Microsoft® Internet Explorer 6.0 or higher • Display: XGA (1024 x 768), true color (32-bit) or higher • Optical drive: CD/DVD drive The following software is required to customize the software: Microsoft® Visual Studio® 2012/2010/2008 Professional	1 license	-	FH-AP1L

Computer software

Item	Model
Sysmac Studio version 1.07 or higher	SYSMAC-SE2□□□

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat.No.SysCat_Q031-E2-02 In the interest of product improvement, specifications are subject to change without notice.

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- Purchasing management, order record and tracking of shipments.

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Product	Code	Reference	Product link
Vision system, connector converter DVI-I to RGB for FH	377548	FH-VMRGB	Buy on EAN
Vision System, polarizer filter CF.	337800	FQ-XF1	Buy on EAN
Vision system, high-resolution 12mm lens for sensor 1 inch	378615	3Z4S-LE VS-1214H1	Buy on EAN
	378616	3Z4S-LE VS-1614H1	Buy on EAN
Vision system, high-resolution lens 35mm sensor 1 inch	378618	3Z4S-LE VS-3514H1	Buy on EAN
Vision system, high-resolution lens 50mm sensor 1 inch	378619	3Z4S-LE VS-5018H1	Buy on EAN
Vision System, Standard Color Camera FOV: 29x18-300x191 Dist: 32-380	351980	FZ-SQ100N	Buy on EAN
Vision System, Camera FH High resolution monochrome 12Mp	384725	FH-SM12	Buy on EAN
Vision system, high resolution color camera (5MP)	330096	FZ-SC5M2	Buy on EAN
	386984	3Z4S-LE VS-L10028/M42-10	Buy on EAN
Vision lens, standard, low distortion 100mm	373681	3Z4S-LE SV-10035V	Buy on EAN
Vision lens, standard, low distortion 8mm	373700	3Z4S-LE SV-0813V	Buy on EAN
Vision system, Unit Xpectia extension cable.	241486	FZ-VSJ	Buy on EAN
Vision System, miniature camera lens 6mm	254746	FZ-LES6	Buy on EAN

Vision System, miniature pen Color Camera Standard	254743	FZ-SPC	Buy on EAN
	386979	3Z4S-LE VS-L1828/M42-10	Buy on EAN
Vision system, high-resolution lens 8mm for sensor 1 inch	386974	3Z4S-LE VS-0814H1	Buy on EAN
Vision system, high resolution 6mm Lens for sensor 1 inch	386975	3Z4S-LE VS-0618H1	Buy on EAN
Vision system, extension tubes Kit for camera lenses FH 12Mpx	386976	3Z4S-LE VS-EXR/M42	Buy on EAN
Vision System, Controller Xpectia 8 cam era. PNP & NPN EtherCAT	377761	FH-1050-20	Buy on EAN
Vision System, Xpectia controller 8 High-grafor advanced camera better. PNP & NPN EtherCAT	377760	FH-3050-20	Buy on EAN
Vision system, high-resolution 25mm Lens	373710	3Z4S-LE SV-2514H	Buy on EAN
Vision system, high-resolution 35mm Lens	373711	3Z4S-LE SV-3514H	Buy on EAN
Vision system, high-resolution 50mm Lens	373712	3Z4S-LE SV-5014H	Buy on EAN
Vision System, Kit extension tubes Lens	373713	3Z4S-LE SV-EXR	Buy on EAN
Vision system, camera mounting bracket FS-S_12	393766	FH-SM12-XLC	Buy on EAN
Vision system, camera mounting bracket FZ-S5M_2	393768	FZ-S2M-XLC	Buy on EAN
Vision System, Miniature Color Camera Standard	254741	FZ-SFC	Buy on EAN
	118309	K2L	Buy on EAN
Vision system, mounting bracket width CF.	372115	FQ-XL2	Buy on EAN
Vision System, Controller High-grafor Xpectia Advanced 4 camera better. PNP & NPN EtherCAT	377470	FH-3050-10	Buy on EAN
Vision System, Controller Xpectia 4 Cam era. PNP & NPN EtherCAT	377472	FH-1050-10	Buy on EAN
Vision System, Controller Xpectia 2 cam. PNP & NPN EtherCAT	377471	FH-1050	Buy on EAN
Control System, Terminal Block 1: 1 Connection Push-In 34 pts	372995	XW2R-P34G-T	Buy on EAN
Vision System, Color LCD Monitor	235825	FZ-M08	Buy on EAN
Vision system, high-resolution monochrome camera (2Mp)	375355	FZ-S2M	Buy on EAN
Vision lens, standard, low distortion 75mm	373680	3Z4S-LE SV-7527V	Buy on EAN
Vision System, FH Color Camera Standard 640x480	377457	FH-SC	Buy on EAN

Vision lens, standard, low distortion 6mm	373699	3Z4S-LE SV-0614V	Buy on EAN
Vision system, high-resolution 75mm Lens	373697	3Z4S-LE SV-7525H	Buy on EAN
Machine Controllers, SD Memory Card 2GB	355818	HMC-SD291	Buy on EAN
Vision System, High Resolution Color Camera FH 4Mp	377453	FH-SC04	Buy on EAN
Vision System, Controller Xpectia High-grafor advanced 2 cam. PNP & NPN EtherCAT	377451	FH-3050	Buy on EAN
Vision System, Camera FH High resolution monochrome 2Mp	377456	FH-SM02	Buy on EAN
Vision System, High Resolution Color Camera FH 2Mp	377455	FH-SC02	Buy on EAN
Vision System, Standard Color Camera FOV: 53x33-240x153 Dist: 220-970	351979	FZ-SQ100F	Buy on EAN
Vision System, Standard Color Camera FOV: 7,5x4,7-13x8,2 Dist: 38-60	351977	FZ-SQ010F	Buy on EAN
Vision System, Camera FH High resolution monochrome 4Mp	377454	FH-SM04	Buy on EAN
Vision system, high-resolution lens 25mm sensor 1 inch	378617	3Z4S-LE VS-2514H1	Buy on EAN
	386982	3Z4S-LE VS-L5028/M42-10	Buy on EAN
Vision lens, high resolution, low distortion 100mm	373698	3Z4S-LE SV-10028H	Buy on EAN
Vision System, High Resolution Color Camera FH 12Mp	384724	FH-SC12	Buy on EAN
	386981	3Z4S-LE VS-L3528/M42-10	Buy on EAN
	386980	3Z4S-LE VS-L2526/M42-10	Buy on EAN
	386983	3Z4S-LE VS-L8540/M42-10	Buy on EAN
Vision System, Accessory mount LCD controller FZ panel	241473	FZ-DS	Buy on EAN
Vision System, Support Xpectia controller	241472	FZ-VESA	Buy on EAN
Vision system, high-resolution monochrome camera	330097	FZ-S5M2	Buy on EAN
Vision system, high-resolution 16mm Lens	373709	3Z4S-LE SV-1614H	Buy on EAN
Vision system, high-resolution 12mm Lens	373708	3Z4S-LE SV-1214H	Buy on EAN
Vision system, high-resolution lens 8mm	373707	3Z4S-LE SV-0814H	Buy on EAN
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