# All-in-One Vision System

- PC-based, flexible image processing system
- A variety of ready-to-use image processing parts
- Customized samples to quickly build ideal machine vision
- Highly robust, advanced measurement algorithm
- Lineup of connection-guaranteed peripheral devices, including Windows Embedded Standard-based FJ Controller

System configuration

Standard Configuration

Controllers integrated with LCD

Box-type Controllers
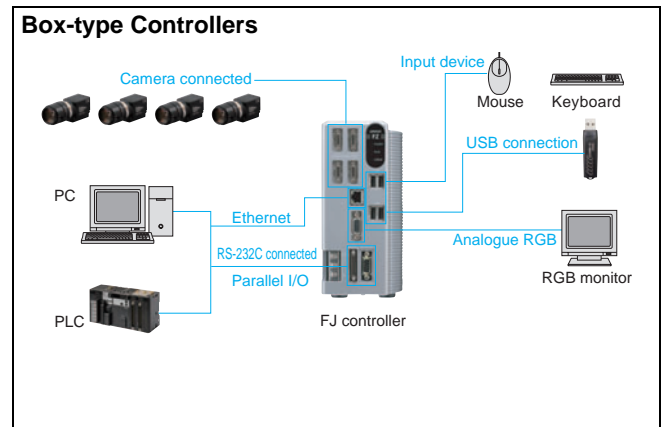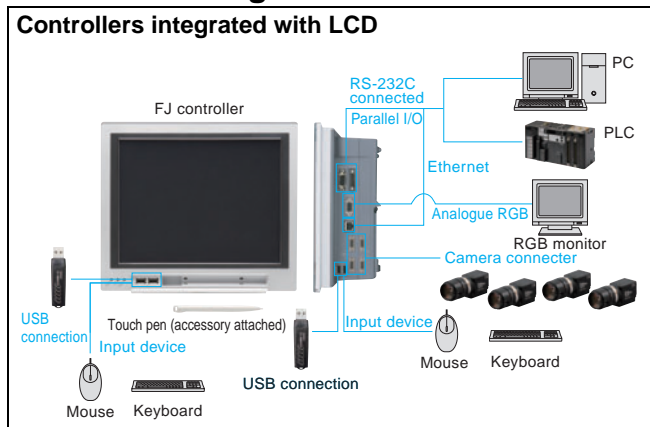
For Customization

Development environment Application producer

Sample codes and Development Wizard for easy customization are available.

Ordering Information

Controller

CPU	Type	Dual-task	HALCON installed (See note)	No. of Cameras	Output	Model
Core i5 2.4 GHz	Controller integrated with LCD	Yes	No	2	NPN	FJ-3000
		Yes	No	4	NPN	FJ-3000-10
		Yes	No	2	PNP	FJ-3005
		Yes	No	4	PNP	FJ-3005-10
		Yes	Yes	2	NPN	FJ-H3000
		Yes	Yes	4	NPN	FJ-H3000-10
		Yes	Yes	2	PNP	FJ-H3005
		Yes	Yes	4	PNP	FJ-H3005-10
	Box-type Controller	Yes	No	2	NPN	FJ-3050
		Yes	No	4	NPN	FJ-3050-10
		Yes	No	2	PNP	FJ-3055
		Yes	No	4	PNP	FJ-3055-10
		Yes	Yes	2	NPN	FJ-H3050
		Yes	Yes	4	NPN	FJ-H3050-10
		Yes	Yes	2	PNP	FJ-H3055
		Yes	Yes	4	PNP	FJ-H3055-10
Atom 1.6 GHz	Box-type Controller	No	No	2	NPN	FJ-350
		No	No	4	NPN	FJ-350-10
		No	No	2	PNP	FJ-355
		No	No	4	PNP	FJ-355-10

Note: HALCON runtime license has been installed. The development of HALCON requires HDevelop.

Development Environment

Type	Model	Operating environment

Application Producer	**FJ-AP1**	· CPU: Intel Pentium Processor (SSE2 or higher)
		· OS: Windows XP Professional (32bit) Service pack 3 or later, or 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 Color (32-bit) or higher
		· Optical drive: CD/DVD drive
		· The following software is required to customize the software:
		  Microsoft® Visual Studio® 2010 Professional

Cameras

Appearance	Type		Model		Remarks
	Digital Cameras	300,000-pixels	Color	**FZ-SC**	Lens required
			Monochrome	**FZ-S**	
	Digital Cameras	2 million pixels	Color	**FZ-SC2M**	
			Monochrome	**FZ-S2M**	
	Digital Cameras	5 million pixels	Color	**FZ-SC5M2**	
			Monochrome	**FZ-S5M2**	
	Small Digital Cameras	300,000-pixel flat type	Color	**FZ-SFC**	Lens for small cameras required
			Monochrome	**FZ-SF**	
	Small Digital Cameras	300,000-pixel pen type	Color	**FZ-SPC**	
			Monochrome	**FZ-SP**	
	High-speed Cameras	300,000-pixels	Color	**FZ-SHC**	Lens required
			Monochrome	**FZ-SH**	
	Intelligent Compact Cameras	Wide View (Long-distance)	Color	**FZ-SQ100F**	Camera + Lens + High-power Lighting
		Wide View (Short-distance)	Color	**FZ-SQ100N**	
		Standard	Color	**FZ-SQ050F**	
		Narrow View	Color	**FZ-SQ010F**	
	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**	

Cameras Peripheral Devices

Appearance	Type		Model	Remarks
	CCTV Lenses		**3Z4S-LE Series**	–
	Extension Tubes			
	Low-distortion Lenses		**3Z4S-LE SV-0614H/ SV-0814H/SV-1214H/ SV-1614H/SV-2514H/ SV-3514H/SV-5014H/ SV-7525H/SV-10028H**	Low distortion lens for 2-million and 5-million Pixel Cameras
	Lenses for Small Camera		**FZ-LES3/LES6/LES16/LES30**	Lens for 300,000-pixel Small Cameras
	Extension Tubes for Small Camera		**FZ-LESR**	Extension Tubes for 300,000-pixel Small Cameras
	Intelligent Camera Diffusion Plate	Wide field of vision	**FZ-SLC100-DL**	–
		Narrow field of vision	**FZ-SLC15-DL**	
	Halation cut illumination		**FZ-SXCRB7018BR-4S**	Integrated unit combining special Halation cut illumination, strobe controller and camera (without lens)
			FZ-LTCRB7018BR-4S	Integrated unit combining special Halation cut illumination and strobe controller
			FZ-LTRB7018BR-4S	Special Halation cut illumination only
	For Intelligent Compact Camera	Mounting brackets	**FQ-XL/XL2**	–
		Polarizing Filter Attachment	**FQ-XF1**	

Cables

Appearance	Type	Cable length:	Model	Remarks
	Camera Cable	2 m, 5 m, 10 m (See note 2)	**FZ-VS**	–
	Bend resistant Camera Cables	2 m, 5 m, 10 m (See note 3)	**FZ-VSB**	
	Right-angle Camera Cable (See note 1)	2 m, 5 m, 10 m (See note 2)	**FZ-VSL**	
	Long-distance Camera Cable	15 m (See note 4)	**FZ-VS2**	
	Long-distance Right-angle Camera Cable	15 m (See note 4)	**FZ-VSL2**	
	Cable Extension Unit	Maximum cable length: 45 m (Up to two Extension Units and three Cables can be connected.) (See note 5)	**FZ-VSJ**	
	Monitor Cable	2 m, 5 m	**FZ-VM**	
	Parallel Cable	2 m, 5 m	**FZ-VP**	
		2 m, 5 m, Connector-type	**FZ-VPX** (See note 6)	

Note: 1. This Cable has an L-shaped connector on the Camera end.
2. The 10-m Cable cannot be used for the Intelligent Camera, Autofocus Camera and 5-million pixel camera.
3. The 10-m Cable cannot be used for the Intelligent Camera, Autofocus Camera, 2-million pixel camera and 5-million pixel camera.
4. The 15-m Cable cannot be used for the Intelligent Camera, Autofocus Camera and 5-million pixel camera.
5. Maximum cable length depends on type of camera and cable length to connect. For details, refer to "Cameras / Cables Connection Table" on page 7.
6. Connector-Terminal Block Conversion Units can be connected (Recommended Products: OMRON XW2B-50G4/50G5, XE2D-50G6).

Peripheral Devices

Appearance	Type			Model	Remarks
	LCD Monitor			**FZ-M08**	For box-type controller
	USB Memory			**FZ-MEM2G**	Capacity: 2 GB
				FZ-MEM8G	Capacity: 8 GB
	VESA attachment			**FZ-VESA**	For installing the controller integrated with LCD
	Desktop controller stand			**FZ-DS**	For installing the controller integrated with LCD
	Lighting Controller	For FL-Series		**FL-TCC1**	Required to control external lighting from a Controller
	Strobe Controller	For 3Z4S-LT Series	One channel	Manufactured by MORITEX Corporation **3Z4S-LT MLEK-C100E1TS2**	
	Strobe Controller	For FZ-LT Series	One channel	**FZ-LTA100**	
			Two channels	**FZ-LTA200**	
—	External Lighting			**3Z4S-LT Series** **FZ-LT Series** **FL-Series**	—

Lenses
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-0725H	3Z4S-LE SV-10028H
Appearance	42 dia. 57.5	39 dia. 52.5	30 dia. 51.0	30 dia. 47.5	30 dia. 36.0	44 dia. 45.5	44 dia. 57.5	36 dia. 49.5	39 dia. 66.5
Focal length	6mm	8mm	12mm	16mm	25mm	35mm	50mm	75mm	100mm
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

CCTV Lenses

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-0727V	3Z4S-LE SV-10035V
Appearance	29 dia. 30.0	28 dia. 34.0	29 dia. 29.5	29 dia. 24.0	29 dia. 24.5	29 dia. 33.5	32 dia. 37.0	32 dia. 42.0	32 dia. 43.9
Focal length	6mm	8mm	12mm	16mm	25mm	35mm	50mm	75mm	100mm
Brightness	F1.4	F1.3	F1.4	F1.4	F1.4	F1.8	F1.8	F2.7	F3.5
Filter size	M27 P0.5	M25.5 P0.5	M27 P0.5	M27 P0.5	M27 P0.5	M27 P0.5	M30.5 P0.5	M30.5 P0.5	M30.5 P0.5

Lenses for small camera

Model	FZ-LES3	FZ-LES6	FZ-LES16	FZ-LES30
Appearance	12 dia. 16.4	12 dia. 19.7	12 dia. 23.1	12 dia. 25.5
Focal length	3mm	6mm	16mm	30mm
Brightness	F2.0	F2.0	F3.4	F3.4

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.

Extension Tubes for small camera

Model	FZ-LESR
Contents	Set of 3 tubes(15 mm, 10 mm, 5 mm) Maximum outer diameter: 12 mm dia.

- 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.

Ratings and Performance

Controller

Model	NPN Output	FJ-3000	FJ-3000-10	FJ-3050	FJ-3050-10	FJ-H3000	FJ-H3000-10	FJ-H3050	FJ-H3050-10	FJ-350	FJ-350-10
	PNP Output	FJ-3005	FJ-3005-10	FJ-3055	FJ-3055-10	FJ-H3005	FJ-H3005-10	FJ-H3055	FJ-H3055-10	FJ-355	FJ-355-10
Controller type		Controller integrated with LCD		Box-type controller		Controller integrated with LCD		Box-type controller		Box-type controller	
No. of cameras		2	4	2	4	2	4	2	4	2	4
CPU		Intel Core i5-520E Processor 2.40 GHz								Intel Atom N270 Processor 1.6 GHz	
Main memory		3 GB								2 GB	
Storage		Compact Flash 2 GB									
OS		Windows Embedded Standard 2009									
Dual-task		Yes								No	
HALCON installed		No				Yes				No	
Connected camera		Can be connected to all cameras.									
Operation		Controller integrated with LCD: touch pen, mouse, etc. Box-type controller: mouse, etc.									
Processing resolution		Intelligent Compact Camera: 752 (H) × 480 (V) 300,000-pixel camera: 640 (H) × 480 (V) 2-million pixel camera: 1600 (H) × 1200 (V), 5-million pixel camera: 2488 (H) × 2044 (V)									
No. of scenes		32									

Number of logged images

		Value
When connected to an Intelligent Compact Camera	Connected to 1 camera	214
	Connected to 2 cameras	107
	Connected to 3 cameras	71
	Connected to 4 cameras	53
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: 15, Monochrome Camera: 15
	Connected to 2 cameras	Color camera: 7, Monochrome Camera: 7
	Connected to 3 cameras	Color camera: 5, Monochrome Camera: 5
	Connected to 4 cameras	Color camera: 3, Monochrome Camera: 3

Item	FJ-3000 – FJ-H3055-10	FJ-350 / FJ-355 series
Serial communications	RS-232C/422A: 1CH	RS-232C: 1CH
Network communications	Ethernet 100BASE-TX/10BASE-T	Ethernet 1000BASE-T/100BASE-TX/10BASE-T
EtherNet/IP	Ethernet port baud rate: 100 Mbps (100BASE-TX)	
Parallel I/O	17 inputs (RESET, STEP0/ENCTRIG_Z0, STEP1/ENCTRIG_Z1, DSA0 to 1, ENCTRIG_A0 to 1, ENCTRIG_B0 to 1, DI0 to 7) 29 outputs (RUN/BUSY1, BUSY0, GATE0 to 1, OR0 to 1, READY0 to 1, ERROR, STGOUT0 to 3∗, DO0 to 15)	11 inputs (RESET, STEP, DSA, DI0 to 7) 26 outputs (RUN, BUSY, GATE, OR, READY, ERROR, STGOUT0 to 3∗, DO0 to 15)
Monitor interface	Controller integrated with LCD: integrated controller and LCD 12.1 inch TFT color LCD (Resolution: XGA 1,024 × 768 dots) Box-type controller: Analog RGB video output, 1 channel (Resolution: XGA 1,024 × 768 dots)	
USB interface	4 channels (supports USB 1.1 and 2.0)	2 channels (supports USB 1.1 and 2.0)
Power supply voltage	20.4 to 26.4 VDC	

Current consumption (at 24.0 VDC)	FJ-3000	FJ-3000-10	FJ-3050	FJ-3050-10	FJ-H3000	FJ-H3000-10	FJ-H3050	FJ-H3050-10	FJ-350	FJ-350-10
When connected to an Intelligent Compact Camera, intelligent or autofocus camera	5.0 A max.	7.5 A max.	5.0 A max.	7.5 A max.	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 300,000-pixel, 2 million-pixel, or 5 million-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.	2.6 A max.	2.9 A max.

Item	FJ-3000 – FJ-H3055-10	FJ-350 / FJ-355 series
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 50°C Storage: -20 to 65°C (with no icing or condensation)
Ambient humidity range	Operating and storage: 35 to 85°C (with no condensation)	

Weight	Approx. 3.4 kg	Approx. 1.9 kg	Approx. 3.4 kg	Approx. 1.9 kg	Approx. 1.8 kg

Accessories	Controller integrated with LCD: touch pen (one, inside the front panel), Instruction Manual, 6 mounting brackets, Member registration sheet Box-type controller: Instruction Manual, Member registration sheet

∗ STGOUT 2 to 3 only for camera 4ch type

Digital Cameras

	FZ-S	FZ-SC	FZ-S2M	FZ-SC2M	FZ-S5M2	FZ-SC5M2
Image elements	Interline transfer reading all pixels, 1/3-inch CCD image elements		Interline transfer reading all pixels, 1/1.8-inch CCD image elements		Interline transfer reading all pixels, 2/3-inch CCD image elements	
Color/Monochrome	Monochrome	Color	Monochrome	Color	Monochrome	Color
Effective pixels	640 (H) × 480 (V)		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 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 (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, 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	

High-speed Cameras

	FZ-SH	FZ-SHC
Image elements	Interline transfer reading all pixels, 1/3-inch CCD image elements	
Color/Monochrome	Monochrome	Color
Effective pixels	640 (H) × 480 (V)	
Pixel size	7.4 (μm) × 7.4 (μm)	
Shutter function	Electronic shutter; select shutter speeds from 1/10 to 1/50,000 s	
Partial function	12 to 480 lines	
Frame rate (image read time)	204 fps (4.9 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 Cameras

	FZ-SQ010F	FZ-SQ050F	FZ-SQ100F	FZ-SQ100N
Image elements	1/3-inch CMOS image elements			
Color/Monochrome	Color			
Effective pixels	752 (H) × 480 (V)			
Pixel size	6.0 (μm) × 6.0 (μm)			
Shutter function	1/250 to 1/32,258			
Partial function	8 to 752 lines			
Frame rate (image read time)	60 fps			
Field of vision	7.5 × 4.7 to 13 × 8.2 mm	13 × 8.2 to 53 × 33 mm	53 × 33 to 240 × 153 mm	29 × 18 to 300 × 191 mm
Installation distance	38 to 60 mm	56 to 215 mm	220 to 970 mm	32 to 380 mm
LED class	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			

Intelligent Cameras, Autofocus Cameras

	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 (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 (12.5ms)			
Field of vision (See note 2.)	13 to 100 mm (See note1.)	2.9 to 14.9 mm (See note1.)	13 to 100 mm (See note1.)	2.9 to 14.9 mm (See note1.)
Installation distance	70 to 190 mm (See note1.)	35 to 55 mm (See note1.)	77.5 to 197.5 mm (See note1.)	47.5 to 67.5 mm
LED class (See note 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			

Note: **1.** Tolerance: ±5% max.
2. The length of the visual field is the lengths along the Y axis.
3. Applicable standards: IEC 60825-1: 1993 + A1: 1997 + A2-2001, EN 60825-1: 1994 + A1: 2002 + A2: 2001

LCD Monitor

	FZ-M08
Size	8.4 inches
Type	Liquid crystal color TFT
Resolution	1,024 × 768 dots
Input signal	Analog RGB video input, 1 channel
Power supply voltage	21.6 to 26.4 VDC
Current consumption	Approx. 0.7 A max.
Ambient temperature range	Operating: 0 to 50°C Storage: -25 to 65°C (with no icing or condensation)
Ambient humidity range	Operating and storage: 35 to 85% (with no condensation)
Weight	Approx. 1.2 kg
Accessories	Instruction Sheet and 4 mounting brackets

Camera Cables

	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

	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

Halation Cut Illumination
General specifications

	FZ-SXC RB7018BR-4S	FZ-LTC RB7018BR-4S	FZ-LT RB7018BR-4S
Current consumption	18 W or less (12 VDC, 1.5 A max.) (including camera and strobe controller)		
Vibration resistance	10 to 150 Hz single amplitude 0.35 mm (maximum acceleration 50m/s^2) 3 directions, 8 strokes, 10 times		
Impact resistance	150m/s^2 6 directions, 3 times		
Ambient temperature	Operating: 0 to 50°C Storage: -25 to 60°C (with no icing or condensation)		
Ambient humidity	Operation and storage: 35 to 85%RH (with no condensation)		
Ambient atmosphere	No corrosive gases		
Protective structure	IEC60259 IP20		
Material	Case: zinc-coated steel plate Cover: acrylic board Clasp: stainless steel plate		
Weight including cables	Approx. 600 g	Approx. 500 g	Approx. 400 g

Cable Extension Unit

	FZ-VSJ
Power supply voltage (See note 1.)	11.5 to 13.5 VDC
Current consumption (See note 2.)	1.5 A max.
Ambient temperature range	Operating: 0 to 50°C Storage: -25 to 65°C (with no icing or condensation)
Ambient humidity range	Operating and storage: 35 to 85% (with no condensation)
Maximum Units connectable	2 Units per Camera
Weight	Approx. 240 g
Accessories	Instruction Sheet and 4 mounting screws

Note: 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

	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

	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

Illumination specifications

|	**Specifications**
Source	Blue LED (wavelength: Approx. 470 nm) Red LED (wavelength: 630 nma)
Illumination system	8 blocks luminous intensity variable illumination
Average lifetime	5,000 hours (Time it takes from manufacture for a 50% reduction in luminous intensity at an ambient temperature of 25°C, maximum brightness, and continuous illumination.)

Cameras / Cables Connection Table

Type of camera	Model	Cable length	Intelligent cameras Autofocus cameras	High-speed cameras	Digital cameras			Small digital cameras	Intelligent compact cameras
					300,000-pixel	2 million-pixel	5 million-pixel	Pen type / flat type	
Camera Cables Right-angle camera cables	FZ-VS FZ-VSL	2m	Yes	Yes	Yes	Yes	Yes	Yes	Yes
		5m	Yes	Yes	Yes	Yes	Yes	Yes	Yes
		10m	No	Yes	Yes	Yes	No	Yes	Yes
Bend resistant camera cables	FZ-VSB	2m	Yes	Yes	Yes	Yes	Yes	Yes	Yes
		5m	Yes	Yes	Yes	Yes	Yes	Yes	Yes
		10m	No	Yes	Yes	Yes	No	Yes	Yes
Long-distance camera cable Long-distance right-angle camera cable	FZ-VS2 FZ-VSL2	15m	No	Yes	Yes	Yes	No	Yes	Yes

Processing Items

*The red items are available only with controllers with HALCON.

Group	Icon	Processing Item
Inspections / Measurement		**Search** — Used to identify the shapes and calculate the position of measurement objects.
		Flexible Search — Recognizing the shapes of workpieces with variation and detecting their positions.
		Sensitive Search — Search a small difference by dividing the search model in detail, and calculating the correlation.
		ECM Search — Used to search the similar part of model form input image. Detect the evaluation value and position.
		Ec Circle Search — Extract circles using "round " shape information and get position, radius and quantity in high preciseness.
		Shape Search+ — Used to Search the similar part of models from input image. Detect the evaluation value and position.
		Classification — Used when various kinds of products on the assembly line need to be sorted and identified.
		Edge Position — Measure position of measurement objects according to the color change in measurement area.
		Edge Pitch — Detect edges by color change in measurement area. Used for calculating number of pins of IC and connectors.
		Scan Edge Position — Measure peak/bottom edge position of workpieces according to the color change in separated measurement area.
		Scan Edge Width — Measure max/min/average width of workpieces according to the color change in separated measurement area.
		Color Data — Used for detecting presence and mixed varieties of products by using color average and deviation.
		Gravity and Area — Used to measure area, center of gravity of workpieces by extracting the color to be measured.
		Labeling — Used to measure number, area and gravity of workpieces by extracting registered color.
		Label Data — Selecting one region of extracted Labeling, and get that measurement. Area and Gravity position can be got and judged.
		Labeling+ — Extract objects of registered color, and measure many features such as number and circularity.
		Defect — Used for appearance measurement of plain-color measurement objects such as defects, stains and burrs.
		PreciseDefect — Check the defect on the object. Parameters for extraction defect can be set precisely.
		Fine Matching — Difference can be detected by overlapping and comparing(matching) registered fine images with input images.
		Character Inspection — Recognize character according correlation search with model image registered in [Model Dictionary].
		Date Verification — Reading character string is verified with internal date.
		Model Dictionary — Register character pattern as dictionary. The pattern is used in [Character Inspection].
		Barcode+ (See note 1) — Recognize barcode, verify and output decoded characters.
		2DCode+ (See note 2) — Recognize 2D code, verify and output decoded characters.
		Circle Angle — Used for calculating angle of inclination of circular measurement objects.
Image Capturing		**Camera Image Input** — To input images from cameras. And set up the conditions to input images from cameras.
		Camera Image Input HDR — Create high-dynamic range images by acquiring several images with different conditions.
		Camera Image Input HDR Lite — HDR function for FZ-SQ☐ Intelligent Compact Cameras.
		Camera Switching — To switch the cameras used for measurement. Not input images from cameras again.
		Measurement Image Switching — To switch the images used for measurement. Not input images from camera again.
Correcting images		**Position Compensation** — Used when positions are differed. Correct measurement is performed by correcting position of input images.
		Trapezoidal Correction+ — Rectify the trapezoidal deformed image.
		Filtering — Used for processing images input from cameras in order to make them easier to be measured.

Note: 1. Bar Codes that can be read : 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), Pharmacode
2. 2D Codes that can be read : Data Matrix (ECC200), QR Code

*The red items are available only with controllers with HALCON.

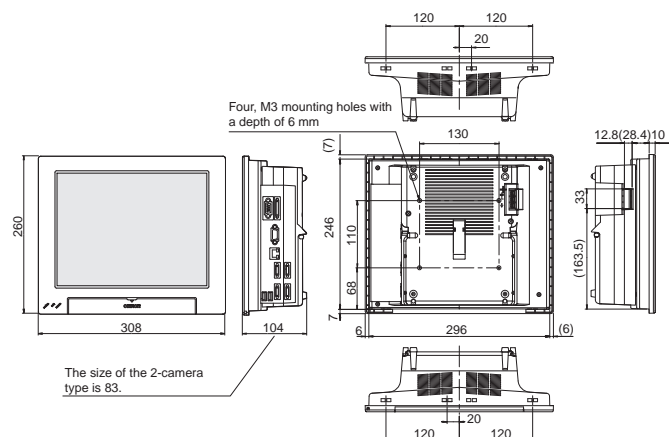| Group	Icon	Processing Item	
Correcting images		Background Suppression	To enhance contrast of images by extracting color in specified brightness.
		Color Gray Filter	Color image is converted into monochrome images to emphasize specific color.
		Extract Color Filter	Convert color image to color extracted image or binary image.
		Anti Color Shading	To remove the irregular color/pattern by uniformizing max.2 specified colors.
		Stripes Removal Filter+	Remove the background pattern of stripes.
		Halation Cut+	Remove halation from input image.
		Panorama+	Combine multiple image to create one big image.
		Polar Transformation	Rectify the image by polar transformation. Useful for OCR or pattern inspection printed on circle.
Assisting inspections / measurement		Macro	Advanced arithmetic processing can be easily incorporated into workflow as macro processing items.
		Calculation	Used when using the judge results and measured values of ProcItem which are registered in processing units.
		Line Regression	Used for calculating regression line from plural measurement coordinate.
		Circle Regression	Used for calculating regression circle from plural measurement coordinate.
		Calibration+	Transform (X,Y) position to the real coordinate system.
		Set Unit Data	Used to change the ProcItem data (setting parameters,etc.) that has been set up in a scene.
		Get Unit Data	Used to get one data (measured results, setting parameters,etc.) of ProcItem that has been set up in a scene.
		Set Unit Figure	Used for re-setting the figure data (model, measurement area) registered in an unit.
		Get Unit Figure	Used for get the figure data (model, measurement area) registered in an unit.
		Trend Monitor	Used for displaying the information about results on the monitor, facilitating to avoid NG and analyze causes.
		Image Logging	Used for saving the measurement images to the memory and USB memory.
		Data Logging	Used for saving the measurement data to the memory and USB memory.
		Elapsed Time	Used for calculating the elapsed time since the measurement trigger input.
		Wait	Processing is stopped only at the set time. The standby time is set by the unit of [ms].
		Focus	Focus setting is supported.
		Iris	Focus and aperture setting is supported.
Branching processing		Conditional Branch	Used where more than two kinds of products on the production line need to detected separately.
		End	This ProcItem must be set up as the last processing unit of a branch.
		DI Branch	Same as ProcItem "Branch". But you can change the targets of conditional branching via external inputs.
Outputting results		Data Output	Used when you need to output data to the external devices such as PLC or PC via serial ports.
		Parallel Data Output	Used when you need to output data to the external devices such as PLC or PC via parallel ports.
		Parallel Judgement Output	Used when you need to output judgement results to the external devices such as PLC or PC via parallel ports.
		Fieldbus Data Output	Outputs data to an external device, such as a Programmable Controller, through a fieldbus interface.
Displaying results on the monitor		Result Display	Used for displaying the texts or the figures in the camera image .
		Display Image File	Display selected image file.
		Display Last NG Image	Display the last NG images.

External Dimensions

(Unit: mm)

Controllers

■ LCD-integrated type
FJ-300□/FJ-300□-10
FJ-H300□/FJ-H300□-10

Four, M3 mounting holes with a depth of 6 mm

The size of the 2-camera type is 83.

■ Box-type
FJ-305□/FJ-305□-10
FJ-H305□/FJ-H305□-10

The 2-camera type has only two camera connectors on its right side.

Four, M4 mounting holes with a depth of 6 mm

Four, M4 mounting holes with a depth of 6 mm

Four, M4 mounting holes with a depth of 6 mm

Four, 20 dia.

FJ-35□/FJ-35□-10

∗ Only the two camera connectors on the left are used for Controllers that support only two cameras.
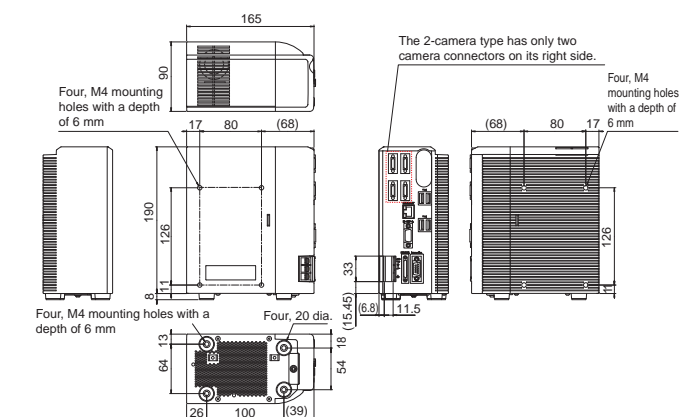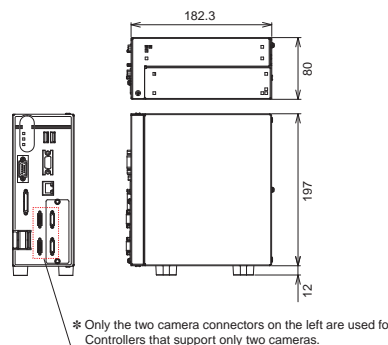
Cable
Camera Cable

■ Camera Cable (Model FZ-VS)

L [Note 1]

26-pin rectangular connector
[Note 2]

■ Long-distance Camera Cable (Model FZ-VS2)
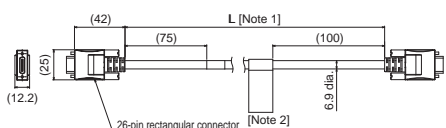
L [Note 3]

26-pin rectangular connector
[Note 2]
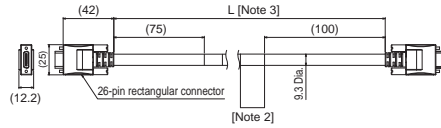
■ Bend resistant Cable (Model FZ-VSB)
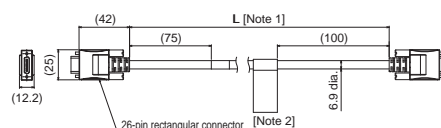
L [Note 1]

26-pin rectangular connector
[Note 2]

■ Long-distance Right-angle Camera Cable (Model FZ-VSL2)

L[Note 3]

26-pin square connector

26-pin square connector
[Note 2]

■ Right-angle Camera Cable (Model FZ-VSL)

L [Note 1]

26-pin rectangular connector

26-pin rectangular connector
[Note 2]
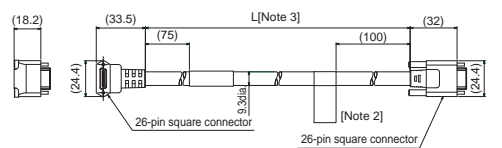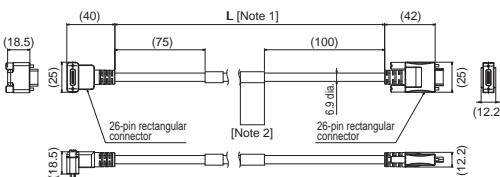
[Note1]: cable is available in 2m/5m/10m. The FZ-VS, FZ-VSB, and FZ-VSL are also available with a cable length of 3.5 m.
[Note2]: Each camera cables has polarity. Please ensure that the name plate side of the cable is connected to the controller.
[Note3]: cable is available in 15m.

Parallel Cable (Model FZ-VP)

FZ-VP

L[Note 1]

50-pin square connector

FZ-VPX

L[Note 1]

50-pin square connector
50-pin square connector
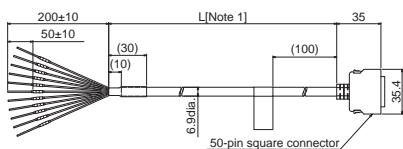
[Note1]:cable is available in 2m/5m.
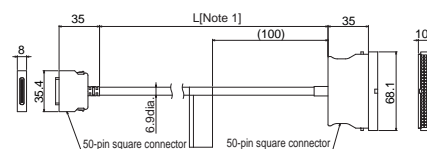
[Note1]:cable is available in 2m/5m.

Monitor Cable (Model FZ-VM)

L[Note 1]

2 to 15-pin square connector

[Note1]: cable is available in 2m/5m.

Cameras

■ Digital cameras

300,000-pixel camera	2 million-pixel camera	5 million-pixel camera
FZ-S	**FZ-S2M**	**FZ-S5M2**
FZ-SC	**FZ-SC2M**	**FZ-SC5M2**

■ Small digital cameras

Camera head
Flat camera
FZ-SF
FZ-SFC

Pen-shaped camera
FZ-SP
FZ-SPC

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

■ High speed camera

FZ-SHC
FZ-SH

■ Intelligent Compact Cameras

(Dimensional drawings are provided here only for the products that have undergone design changes as of Dec. 2012.)

Narrow view / Standard
FZ-SQ010F
FZ-SQ050F

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

Optical axis

Mounting Bracket

Polarizing Filter Attachment

1/4-20UNC Depth: 6

4-M4 Depth: 6

Mounting Hole Dimensions
Two, 4.5 dia.

20±0.1
Tightening torque: 1.2 N·m

[Note1]: The mounting brackets can be connected to either side.

Optical axis

Mounting Bracket

Polarizing Filter Attachment

1/4-20UNC Depth: 6

4-M4 Depth: 6

Mounting Hole Dimensions
Two, 4.5 dia.

20±0.1
Tightening torque: 1.2 N·m

[Note1]: The mounting brackets can be connected to either side.

See the diagram below when mounting bracket FQ-XL2 is attached.

Optical axis

4-M4 Depth: 6   1/4-20UNC Depth: 6

Cushion

Plate   Screw,set double head

Base

Mounting Hole Dimensions
Two, 4.5 dia.

20±0.1
Tightening torque: 1.2 N·m

■ Intelligent camera

FZ-SLC15

Two, M4 mounting holes with a depth of 8.0 mm
1/4-20UNC with a depth of 8.0 mm

FZ-SLC100

Two, M4 mounting holes with a depth of 8.0 mm
1/4-20UNC with a depth of 8.0 mm

■ Auto focus camera

FZ-SZC15
FZ-SZC100

1/4-20UNC with a depth of 8.0 mm

Two, M4 mounting holes with a depth of 8.0 mm
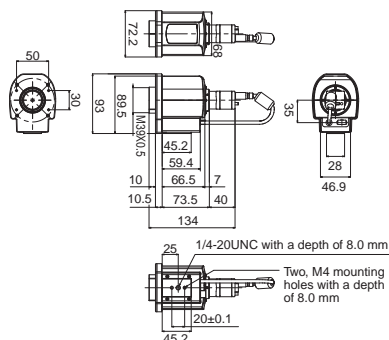
Lens for small camera
FZ-LES Series

L

Diaphragm adjustment knob

Diaphragm look screw(M1.4)
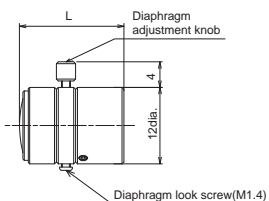
LensesModel	Focal length	Brightness	Maximum outside diameter	Overall length
FZ-LES3	3mm	F2.0	12 dia.	16.4mm
FZ-LES6	6mm	F2.0	12 dia.	19.7mm
FZ-LES16	16mm	F3.4	12 dia.	23.1mm
FZ-LES30	30mm	F3.4	12 dia.	25.5mm

Extension Tubes for small camera
FZ-LESR

Extension tubes 5mm

Extension tubes 10mm

Extension tubes 15mm
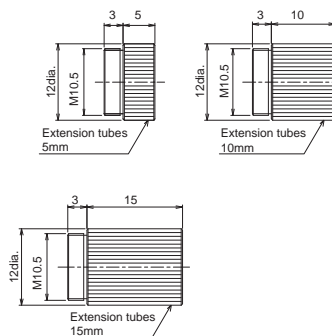
Special Halation-cutoff Lamp
FZ-SXCRB7018BR-4S (camera-integrated type)

Four, 3.20 dia.

Installation dimensions

4-M3 or Four, 3.2 dia.

Installation dimensions

Installation dimensions
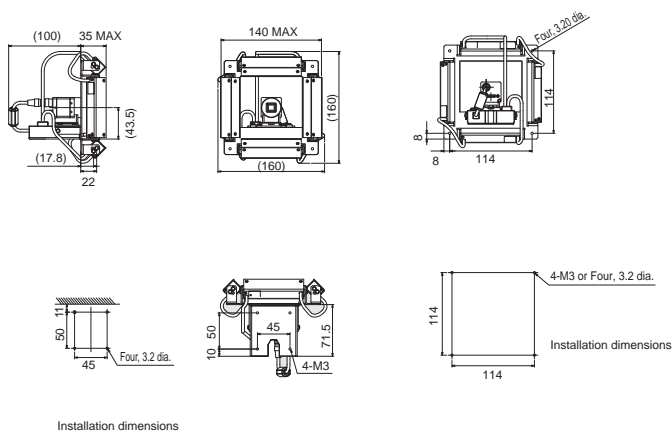
Camera Cable Extension Unit
FZ-VSJ

Camera Cable Connector (Camera side)

POWER Indicator

Four, 3.4 dia.

Camera Cable Connector (Controller side)

Power supply terminal block

LCD Monitor
FZ-M08

Mountable plate thickness: 1.6 to 5.0 mm

Four, M4
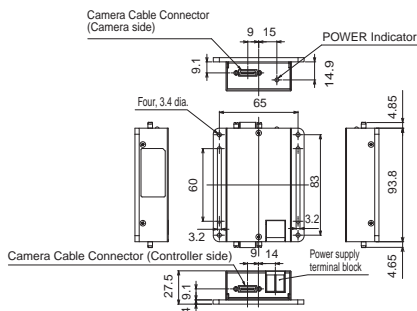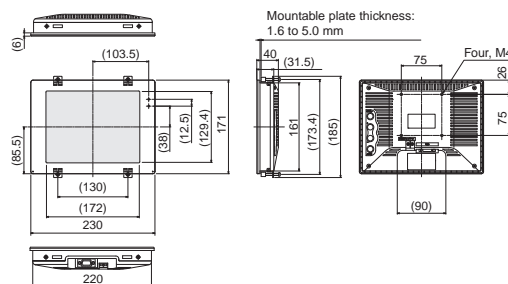
Optical Chart

5 million-pixel digital camera FZ-S□5M2
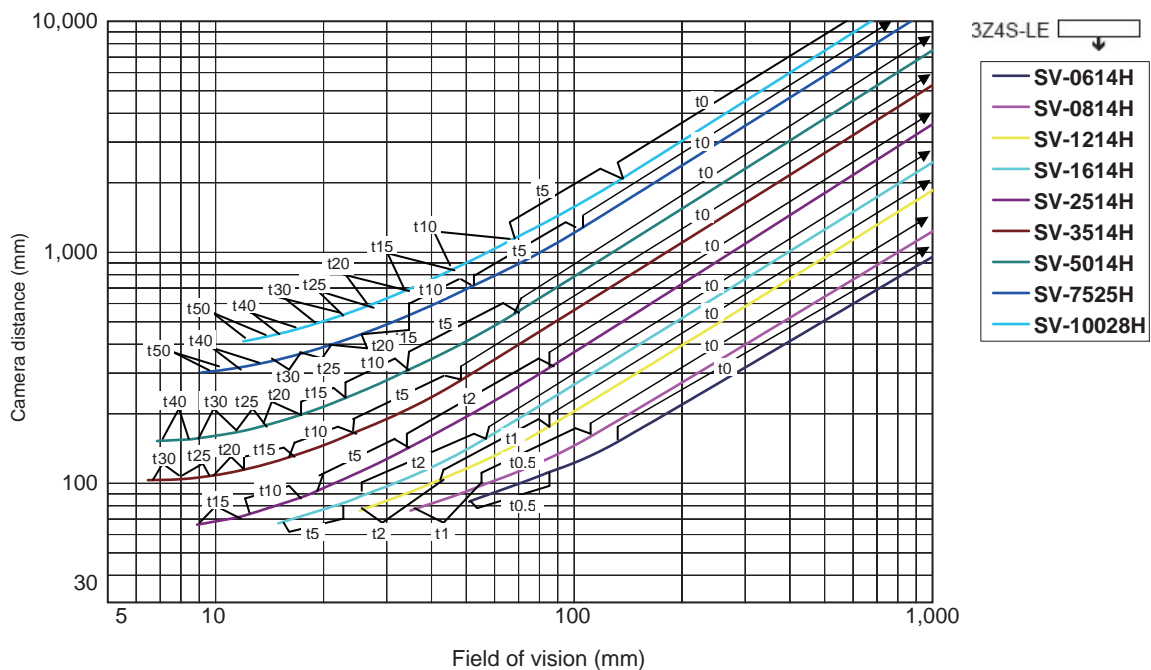
2 million-pixel digital camera FZ-S□2M
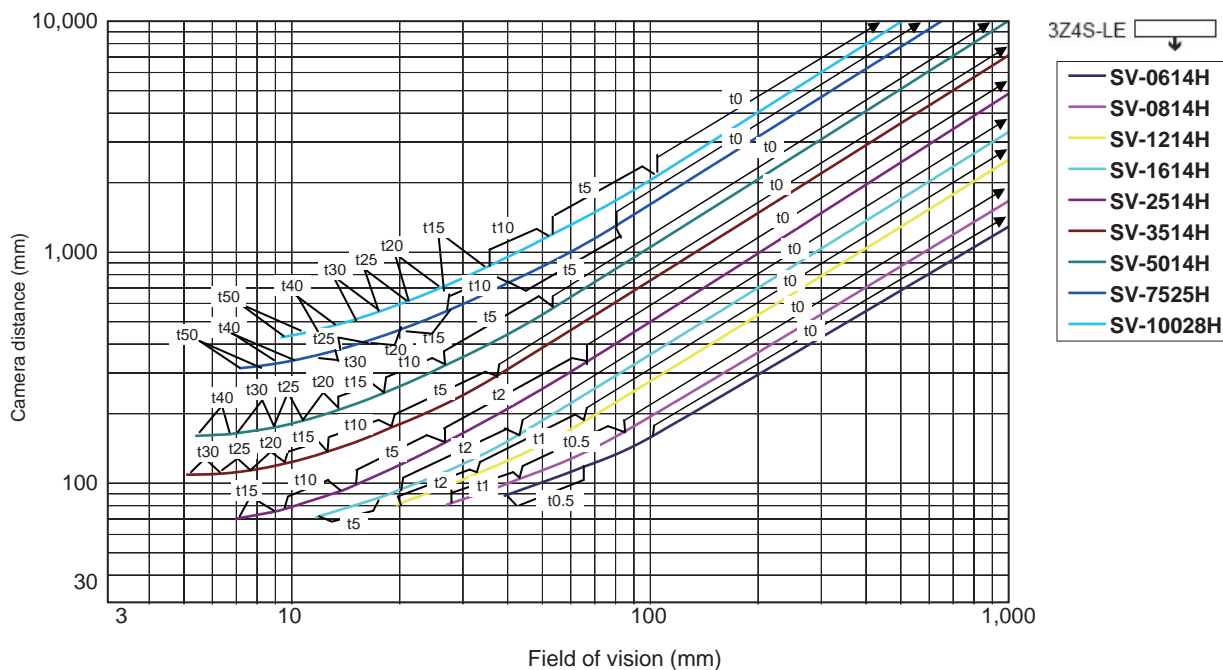
300,000-pixel High-speed camera FZ-SH□, and Digital camera FZ-S□

Chart legend (3Z4S-LE):
- SV-0614V
- SV-0813V
- SV-1214V
- SV-1614V
- SV-2514V
- SV-3518V
- SV-5018V
- SV-7527V
- SV-10035V

X axis: Field of vision (mm)
Y axis: Camera distance (mm)
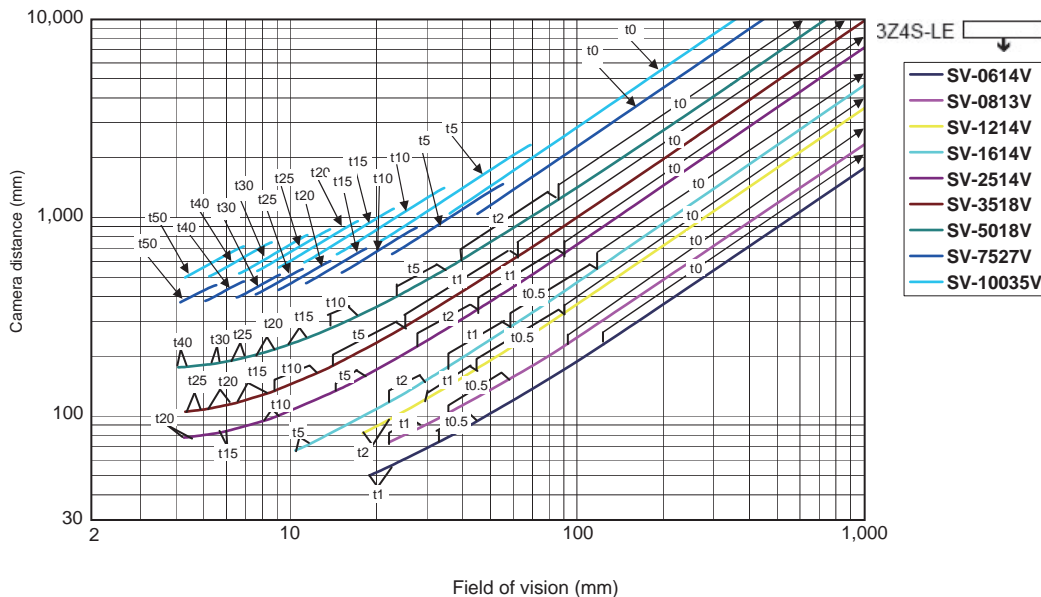
300,000-pixel small digital cameras FZ-SF□, FZ-SP□

Chart legend:
- FZ-LES30
- FZ-LES16
- FZ-LES6
- FZ-LES3

X axis: Field of vision (mm)
Y axis: WD [Note1] (mm)
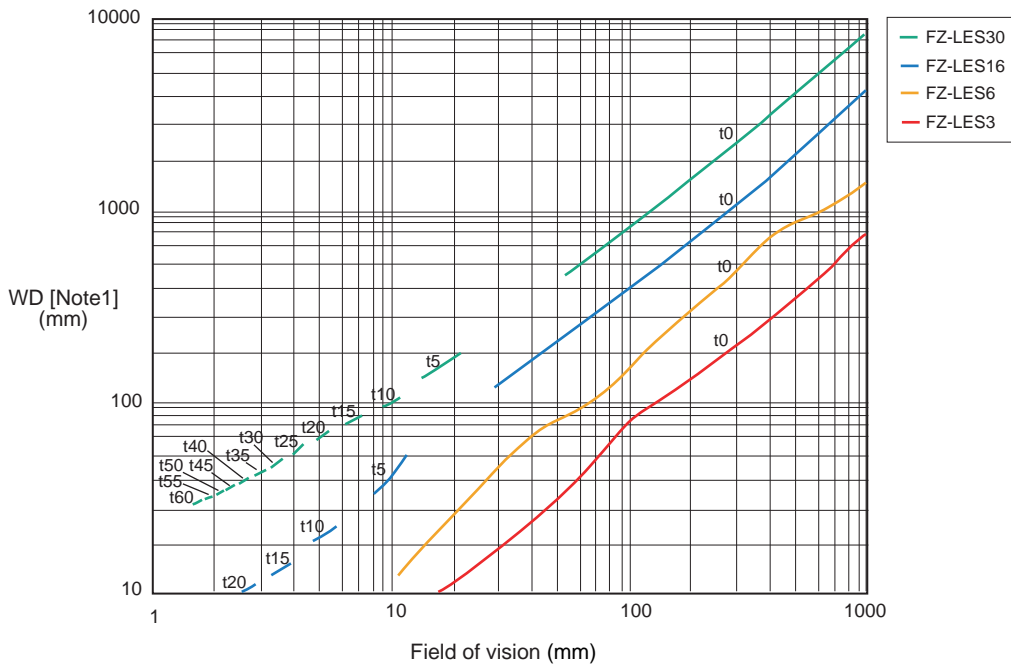
Note: 1. The vertical axis represents WD, not installation distance.

■ Meaning of Optical Chart

The X axis of the optical chart shows the field of vision (mm)(Note1),
and the Y axis of the optical chart shows the camera installation distance (mm)(Note2).

- Camera
- Extension Tube thickness: t□ (mm)
- Lens
- Camera distance (mm)
- WD (mm)
- Field of vision (mm)
- Field of vision
- Y
- X
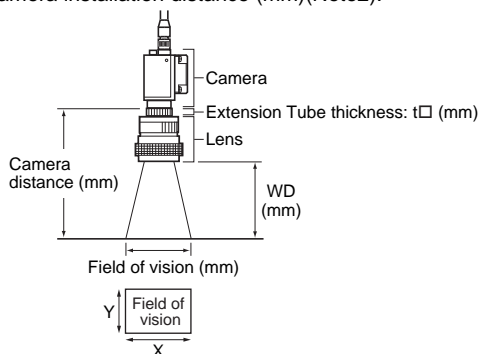
Note: 1. The lengths of the fields of vision given in the optical charts are the lengths of the Y axis.
   2. The vertical axis represents WD for small cameras.

Intelligent Cameras, Autofocus Cameras
■ Narrow View

(Unit: mm)

FZ-SLC15

Field of vision
13.8 to 14.9
2.9 to 3.1
2.9 to 3.1
13.8 to 14.9
0
35 to 55

FZ-SZC15

Field of vision
13.8 to 14.9
2.9 to 3.1
2.9 to 3.1
13.8 to 14.9
0
47.5 to 67.5

■ Wide View

FZ-SLC100

Field of vision
29 to 100
12.6 to 52
12.6 to 52
29 to 100
0
70 to 190

FZ-SZC100

Field of vision
29 to 100
12.6 to 52
12.6 to 52
29 to 100
0
77.5 to 197.5
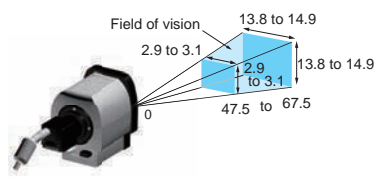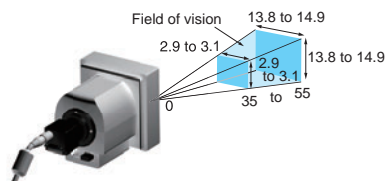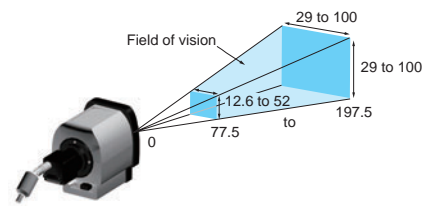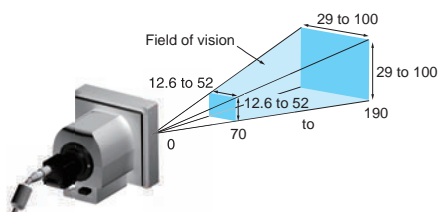
✱ Field of Vision of Intelligent Cameras and Autofocus Cameras
The images displayed on the monitor will be rectangular images of 640×480 pixels.
The valid processing area for measurements is the 480×480-pixel area in the middle.
The above figures show the dimensions of the middle 480×480 pixels.

Intelligent Compact Cameras
■ Narrow View   ■ Standard   ■ Wide View (Long-distance) ■ Wide View (Short-distance)

FZ-SQ010F   **FZ-SQ050F**   **FZ-SQ100F**   **FZ-SQ100N**

Field of vision
13
7.5
4.7
8.2
0
38 to 60

Field of vision
53
13
8.2
33
0
56 to 215

Field of vision
240
53
33
153
0
220 to 970

Field of vision
300
29
18
191
0
32 to 380

MEMO

MEMO

MEMO

LED Safety

⚠ WARNING
The lighting of Intelligent Compact Cameras emits visible light, which may adversely affect the eyes in rare instances. Do not look directly into the light emitted from the lighting. When the subject is a specular reflective object, protect your eyes from reflected light.

Displaying LED Labels

Attached the enclosed warning label in a readily visible location near the product, such as on the cable.

⚠ WARNIG
LED RADIATION
DO NOT STARE
INTO BEAM
Max.60mW 400msec
400-700nm
CLASS 2 LED PRODUCT
JIS C 6802:2005

Note: Do not use this document to operate the Unit.