

Vision System FZ5-Series

A range of processing items for positioning and inspection

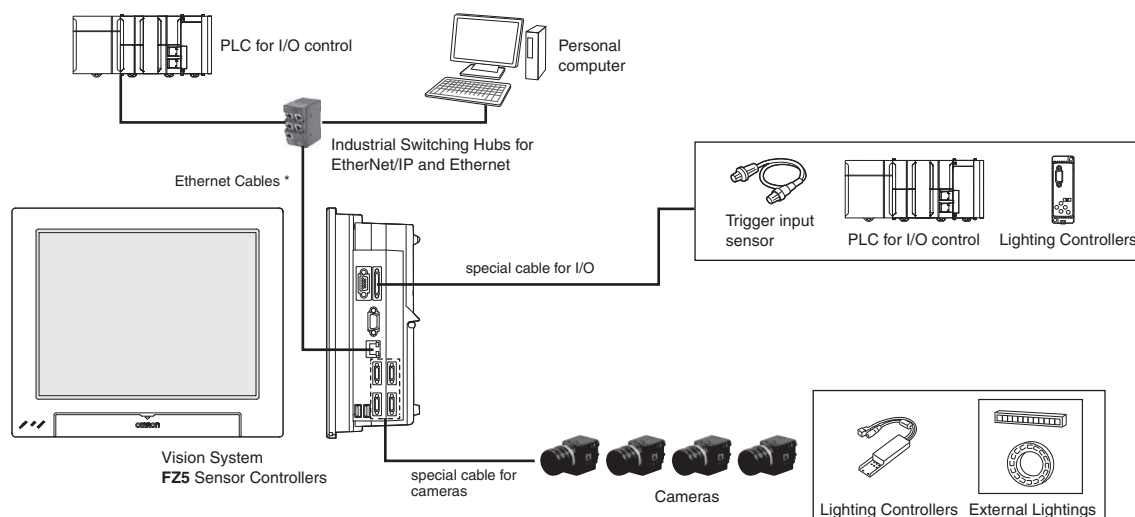
- The High-precision Object Detection Required for Positioning
- Converting Measurement Results to Output User Units
- Easily Integrate Interfaces into the Machine
- Easy Setup with Program Scalability



System configuration

EtherNet/IP, No-protocol Ethernet and PLC Link Connections


Example of the FZ5 Sensor Controllers (4-camera type)



* To use Straight or cross STP (shielded twisted-pair) cable of category 5 or higher for Ethernet and RJ45 connector.








Ordering Information

FZ5 Series Sensor Controllers








| Item | CPU | No. of cameras | Output | Model |
|--|------------------------|----------------|--------|-------------|
|  Controllers integrated with LCD | High-speed Controllers | 2 | NPN | FZ5-1200 |
| | | | PNP | FZ5-1205 |
| | | 4 | NPN | FZ5-1200-10 |
| | | | PNP | FZ5-1205-10 |
| | Standard Controllers | 2 | NPN | FZ5-800 |
| | | | PNP | FZ5-805 |
| | | 4 | NPN | FZ5-800-10 |
| | | | PNP | FZ5-805-10 |

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Cameras

| Item | | Descriptions | Color / Monochrome | Image Acquisition Time | Model |
|---|---|----------------------------|--------------------|------------------------|-----------|
|  | Digital CCD/CMOS Cameras (Lens required) | 5 million pixels | Color | 38.2 ms | FZ-SC5M3 |
| | | | Monochrome | | FZ-S5M3 |
|  | | 2 million pixels | Color | 33.3 ms | FZ-SC2M |
| | | | Monochrome | | FZ-S2M |
|  | | 300,000 pixels | Color | 12.5 ms | FZ-SC |
| | | | Monochrome | | FZ-S |
|  | Small Digital CCD Cameras (Lenses for small camera required) | 300,000-pixel flat type | Color | 12.5 ms | FZ-SFC |
| | | | Monochrome | | FZ-SF |
|  | | 300,000-pixel pen type | Color | 12.5 ms | FZ-SPC |
| | | | Monochrome | | FZ-SP |
|  | Intelligent Compact CMOS Cameras (Camera + Manual Focus Lens + High power Lighting) | Narrow view | Color | 16.7 ms | FZ-SQ010F |
| | | Standard view | Color | | FZ-SQ050F |
|  | | Wide View (long-distance) | Color | | FZ-SQ100F |
| | | Wide View (short-distance) | Color | | FZ-SQ100N |

Camera Cables

| Item | Descriptions | Cable length *2 | Model |
|---|---|-----------------|--------------|
|  | Camera Cable | 2m | FZ-VS3 2M |
| | | 3m | FZ-VS3 3M |
| | | 5m | FZ-VS3 5M |
| | | 10m | FZ-VS3 10M |
|  | Bend resistant Camera Cable | 2m | FZ-VSB3 2M |
| | | 3m | FZ-VSB3 3M |
| | | 5m | FZ-VSB3 5M |
| | | 10m | FZ-VSB3 10M |
|  | Right-angle Camera Cable *1 | 2m | FZ-VSL3 2M |
| | | 3m | FZ-VSL3 3M |
| | | 5m | FZ-VSL3 5M |
| | | 10m | FZ-VSL3 10M |
|  | Bend resistant Right-angle Camera Cable *1 | 2m | FZ-VSLB3 2M |
| | | 3m | FZ-VSLB3 3M |
| | | 5m | FZ-VSLB3 5M |
| | | 10m | FZ-VSLB3 10M |
|  | Long-distance Camera Cable | 15m | FZ-VS4 15M |
|  | Long-distance Right-angle Camera Cable *1 | 15m | FZ-VSL4 15M |
|  | Cable Extension Unit Up to two Extension Units and three Cables can be connected. (Maximum cable length: 45 m *2) | - | FZ-VSJ |

*1 This Cable has an L-shaped connector on the Camera end.

*2 The maximum cable length depends on the Camera being connected, and the model and length of the Cable being used. For further information, please refer to the "Cameras / Cables Connection Table" and "Maximum Extension Length Using Cable Extension Units FZ-VSJ".


Cameras / Cables Connection Table

| Type of camera | Model | Cable length | Digital CCD/CMOS cameras | | | Small digital CCD cameras Pen type / flat type | Intelligent compact CMOS cameras |
|---|---------------------|--------------|--------------------------|-----------------|--------------------|--|----------------------------------|
| | | | 300,000-pixel | 2 million-pixel | 5 million-pixel | | |
| | | | FZ-S/SC | FZ-S2M/SC2M | FZ-S5M3/SC5M3/S5M2 | | |
| Camera Cables Right-angle camera cables | FZ-VS3 FZ-VSL3 | 2 m | Yes | Yes | Yes | Yes | Yes |
| | | 3 m | Yes | Yes | Yes | Yes | Yes |
| | | 5 m | Yes | Yes | Yes | Yes | Yes |
| | | 10 m | Yes | Yes | No | Yes | Yes |
| Bend resistant camera cables Bend resistant Right-angle Camera Cable | FZ-VSB3 FZ-VSLB3 | 2 m | Yes | Yes | Yes | Yes | Yes |
| | | 3 m | Yes | Yes | Yes | Yes | Yes |
| | | 5 m | Yes | Yes | Yes | Yes | Yes |
| | | 10 m | Yes | Yes | No | Yes | Yes |
| Long-distance camera cable Long-distance right-angle camera cable | FZ-VS4 FZ-VSL4 | 15 m | Yes | Yes | No | Yes | Yes |




Maximum Extension Length Using Cable Extension Units FZ-VSJ

| Item | Model | Maximum cable length using 1 Camera Cable | Max. number of connectable Extension Units | Using Cable Extension Units FZ-VSJ | |
|---|------------------------|---|--|------------------------------------|---|
| | | | | Max. cable length | Connection configuration |
| Digital CCD/CMOS Cameras | FZ-S/SC FZ-S2M/SC2M | 15 m (Using FZ-VS4/VSL4) | 2 | 45 m | Camera cable: 15 m × 3 Extension Unit: 2 |
| | FZ-S5M3/SC5M3 | 5 m (Using FZ-VS□/VSL□) | 2 | 15 m | Camera cable: 5 m × 3 Extension Unit: 2 |
| Small Digital CCD Cameras Flat type/ Pen type | FZ-SF/SFC FZ-SP/SPC | 15 m (Using FZ-VS4/VSL4) | 2 | 45 m | Camera cable: 15 m × 3 Extension Unit: 2 |
| Intelligent Compact CMOS Cameras | FZ-SQ□ | 15 m (Using FZ-VS4/VSL4) | 2 | 45 m | Camera cable: 15 m × 3 Extension Unit: 2 |

LED Monitor Cable

| Item | Descriptions | Cable length | Model |
|---|-------------------|--------------|----------|
|  | LED Monitor Cable | 2 m | FZ-VM 2M |
| | | 5 m | FZ-VM 5M |


Parallel I/O Cable

| Item | Descriptions | Cable length | Model |
|---|--|--------------|---------------|
|  | Parallel I/O Cable | 2 m | FZ-VP 2M |
| | | 5 m | FZ-VP 5M |
|  | Parallel I/O Cable for Connector-terminal Conversion Unit Connector-Terminal Block Conversion Units can be connected (Terminal Blocks Recommended Products: OMRON XW2R-□50GD-T*) | 2 m | FZ-VPX 2M |
| | | 5 m | FZ-VPX 5M |
|  | Connector-Terminal Block Conversion Units, General-purpose devices | | XW2R-□50GD-T* |

* Insert the wiring method into □ in the model number as follows. Phillips screw = J, Slotted screw (rise up) = E, Push-in spring = P
Refer to the XW2R Series catalog (Cat. No. G077) for details.

Recommended EtherNet/IP Communications Cables

Use Straight or cross STP (shielded twisted-pair) cable of category 5 or higher for EtherNet/IP.

| Item | Descriptions | | | Model |
|---|---|-------------------------|----------------------|---------------------------------|
| — | Wire Gauge and Number of Pairs: AWG24, 4-pair Cable | Cables | Hitachi Metals, Ltd. | NETSTAR-C5E SAB 0.5 4P CP *1 |
| — | | RJ45 Connectors | Kuramo Electric Co. | KETH-SB *1 |
| — | Wire Gauge and Number of Pairs: AWG22, 2-pair Cable | | Panduit Corporation | MPS588-C *1 |
| — | | Cables | Kuramo Electric Co. | KETH-PSB-OMR *2 |
| — | | | JMACS Japan Co.,Ltd. | PNET/B *2 |
|  | | RJ45 Assembly Connector | OMRON | XS6G-T421-1 *2 |













Note: Please be careful while cable processing for EtherNet/IP, connectors on only one end should be shield connected.

*1 We recommend you to use above cable For EtherNet/IP and RJ45 Connector together.

*2 We recommend you to use above cable For EtherNet/IP and RJ45 Assembly Connector together.

FZ5-Series

Accessories

| Item | Descriptions | | | Model |
|---|--|------------------------------|----------------------------------|------------------|
|  | LCD Monitor 8.4 inches For Box-type Controllers | | | FZ-M08 |
|  | USB Memory | 2 GB | | FZ-MEM2G |
| | | 8 GB | | FZ-MEM8G |
|  | VESA Attachment For installing the LCD integrated-type controller | | | FZ-VESA |
|  | Desktop Controller Stand For installing the LCD integrated-type controller | | | FZ-DS |
|  | Display/USB Switcher | | | FZ-DU |
| — | Mouse Recommended Products Driverless wired mouse (A mouse that requires the mouse driver to be installed is not supported.) | | | — |
|  | Industrial Switching Hubs for EtherNet/IP and Ethernet | 5 port | Current consumption: 0.07 A | W4S1-05D |
| — | External Lighting | — | — | FLV Series * |
| | | | | FL Series * |
|  | Lighting Controller (Required to control external lighting from a Controller) | For FLV-Series | Camera Mount Lighting Controller | FLV-TCC Series * |
|  | | | Analog Lighting Controller | FLV-ATC Series * |
|  | | For FL-Series | Camera Mount Lighting Controller | FL-TCC Series * |
|  | For Intelligent Compact Camera | Mounting Bracket | | FQ-XL |
|  | | Mounting Brackets | | FQ-XL2 |
|  | | Polarizing Filter Attachment | | FQ-XF1 |
| — | Mounting Bracket for FZ-S□ | | | FZ-S-XLC |
| | Mounting Bracket for FZ-S□2M | | | FZ-S2M-XLC |
| | Mounting Bracket for FH-S□, FZ-S□5M□ | | | FH-SM-XLC |

* Refer to the Vision Accessory Catalog (Cat. No. Q198) for details.

Lenses

Refer to the *Vision Accessory Catalog* (Cat. No. Q198) for details.

| Resolution | Camera Model | Size of image element | Recommended lens | | |
|-----------------|---------------|-----------------------|------------------|------------------|--|
| | | | Standard Lens | Telecentric Lens | Vibrations and Shocks Resistant Lens |
| 300,000-pixel | FZ-SF/SFC | 1/3" equivalent | FZ-LES Series | --- | --- |
| | FZ-SP/SPC | | | | |
| | FZ-S/SC | | SV-V Series | | |
| 2 million-pixel | FZ-S2M/SC2M | 1/1.8" equivalent | SV-H Series | VS-TCH Series | VS-MCA Series Non-telecentric Macro VS-MC Series |
| | | | VS-H1 Series | | |
| 5 million-pixel | FZ-S5M3/SC5M3 | 2/3" equivalent | SV-H Series | VS-TCH Series | VS-MCA Series Non-telecentric Macro VS-MC Series |

Ratings and Specifications (FZ5 Sensor Controllers)

| Type | | | High-speed Controllers | | Standard Controllers | |
|--------------------------------------|--|------------------------|---|----------------|----------------------|----------------|
| Model | | NPN | FZ5-1200 | FZ5-1200-10 | FZ5-800 | FZ5-800-10 |
| | | PNP | FZ5-1205 | FZ5-1205-10 | FZ5-805 | FZ5-805-10 |
| Controller type | | | Controllers integrated with LCD | | | |
| No. of Cameras | | | 2 | 4 | 2 | 4 |
| Connected Camera | | | Can be connected to FZ-S series. | | | |
| Processing resolution | When connected to a intelligent compact camera | | 752 (H) 480 (V) | | | |
| | When connected to a 300,000-pixel camera | | 640 (H) 480 (V) | | | |
| | When connected to a 2 million-pixel camera | | 1600 (H) 1200 (V) | | | |
| | When connected to a 5 million-pixel camera | | 2448 (H) 2044 (V) | | | |
| No. of scenes | | | 128 *1 | | | |
| Number of logged images *2 | When connected to a intelligent compact camera | Connected to 1 camera | 232 | | | |
| | | Connected to 2 cameras | 116 | | | |
| | | Connected to 3 cameras | 77 | | | |
| | | Connected to 4 cameras | 58 | | | |
| | When connected to a 300,000-pixel camera | Connected to 1 camera | Color camera: 270, Monochrome Camera: 272 | | | |
| | | Connected to 2 cameras | Color camera: 135, Monochrome Camera: 136 | | | |
| | | Connected to 3 cameras | Color camera: 90, Monochrome Camera: 90 | | | |
| | | Connected to 4 cameras | Color camera: 67, Monochrome Camera: 68 | | | |
| | When connected to a 2 million-pixel camera | Connected to 1 camera | Color camera: 43, Monochrome Camera: 43 | | | |
| | | Connected to 2 cameras | Color camera: 21, Monochrome Camera: 21 | | | |
| | | Connected to 3 cameras | Color camera: 14, Monochrome Camera: 14 | | | |
| | | Connected to 4 cameras | Color camera: 10, Monochrome Camera: 10 | | | |
| | When connected to a 5 million-pixel camera | Connected to 1 camera | Color camera: 16, Monochrome Camera: 16 | | | |
| | | Connected to 2 cameras | Color camera: 8, Monochrome Camera: 8 | | | |
| | | Connected to 3 cameras | Color camera: 5, Monochrome Camera: 5 | | | |
| | | Connected to 4 cameras | Color camera: 4, Monochrome Camera: 4 | | | |
| Operation | | | Touch pen, mouse, etc. | | | |
| Settings | | | Create series of processing steps by editing the flowchart (Help messages provided). | | | |
| Language | | | Japanese, English, Chinese (simplified), Chinese (Traditional), Korean, German, French, Italian, Spanish | | | |
| Serial communications | | | RS-232C/422: 1 CH | | | |
| EtherNet communications | | | Ethernet 1000BASE-T | | | |
| EtherNet/IP communications | | | Ethernet port baud rate: 100 Mbps (100Base-TX) | | | |
| Parallel I/O | | | (When used in Multi-line random-trigger mode) • 17 inputs (RESET, STEP0/ENCTRIG_Z0, STEP1/ENCTRIG_Z1, DSA0 to 1, ENCTRIG_A0 to 1, ENCTRIG_B0 to 1, DI0 to 7), • 29 outputs (RUN/BUSY1, BUSY0, GATE0 to 1, OR0 to 1, READY0 to 1, ERROR, STGOUT0 to 3, DO0 to 15) (When used in other mode) • 13 inputs (RESET, STEP0/ENCTRIG_Z0, DSA0, ENCTRIG_A0, ENCTRIG_B0, DI0 to 7), • 26 outputs (RUN, BUSY0, GATE0, OR0, READY0, ERROR, STGOUT0 to 3, DO0 to 15) * STGOUT 2 to 3 only for camera 4 ch type | | | |
| Monitor interface | | | Integrated Controller and LCD 12.1 inch TFT color LCD (Resolution: XGA 1,024 768 dots) | | | |
| USB interface | | | 4 channels (supports USB 1.1 and 2.0) | | | |
| Power supply voltage *3 | | | 20.4 to 26.4 VDC | | | |
| Current consumption (at 24.0 VDC) *4 | When connected to a intelligent compact camera | | 5.0 A max. | 7.5 A max. | 5.0 A max. | 7.5 A max. |
| | When connected to a 300,000-pixel camera | | | | | |
| | When connected to a 2 million-pixel camera | | 3.7 A max. | 4.9 A max. | 3.7 A max. | 4.9 A max. |
| | When connected to a 5 million-pixel camera | | | | | |
| 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) | | | |
| Ambient humidity range | | | Operating and storage: 35% to 85% (with no condensation) | | | |
| Weight | | | Approx. 3.2 kg | Approx. 3.4 kg | Approx. 3.2 kg | Approx. 3.4 kg |
| Accessories | | | Touch pen (one, inside the front panel), Instruction Manual, 6 mounting brackets | | | |

*1 This can be increased up to 1024 using the Scene group conversion tool.

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

*3 Do not ground the positive terminal of the 24-VDC power supply to a Lite Controller.

If the positive terminal is grounded, electrical shock may occur when an SG (0-V) part, such as the case of the Controller or Camera, is touched.

*4 The current consumption when the maximum number of cameras supported by each controller are connected.

If a lighting controller model is connected to a lamp, the current consumption is as high as when an intelligent compact camera is connected.

FZ5-Series

Ratings and Specifications (Cameras)

Digital CCD/CMOS Cameras

| Model | FZ-S | FZ-SC | FZ-S2M | FZ-SC2M | FZ-S5M3 | FZ-SC5M3 |
|---|---|-------|---|---------|---|----------|
| Image elements | Interline transfer reading all pixels, CCD image elements (1/3-inch equivalent) | | Interline transfer reading all pixels, CCD image elements (1/1.8-inch equivalent) | | CMOS image elements (2/3-inch equivalent) | |
| Color/Monochrome | Monochrome | Color | Monochrome | Color | Monochrome | Color |
| Effective pixels | 640 (H) × 480 (V) | | 1600 (H) × 1200 (V) | | 2448 (H) × 2048 (V) | |
| Imaging area H x V (opposing corner) | 4.8 × 3.6 (6.0mm) | | 7.1 × 5.4 (8.9mm) | | 8.4 × 7.1 (11mm) | |
| Pixel size | 7.4 (μm) × 7.4 (μm) | | 4.4 (μm) × 4.4 (μm) | | 3.45 (μm) × 3.45 (μm) | |
| Shutter function | Electronic shutter; select shutter speeds from 20 μs to 100 ms | | | | | |
| Partial function | 12 to 480 lines | | 12 to 1200 lines | | 4 to 2048 lines | |
| Frame rate (Image Acquisition Time) | 80 fps (12.5 ms) | | 30 fps (33.3 ms) | | 25.6 fps (38.2 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. 85 g | |
| Accessories | Instruction manual | | | | | |

Small CCD Digital Cameras

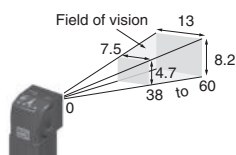
| Model | FZ-SF | FZ-SFC | FZ-SP | FZ-SPC |
|--|---|--------|--------------------|--------|
| Image elements | Interline transfer reading all pixels, CCD image elements (1/3-inch equivalent) | | | |
| Color/Monochrome | Monochrome | Color | Monochrome | Color |
| Effective pixels | 640 (H) × 480 (V) | | | |
| Imaging area H x V (opposing corner) | 4.8 × 3.6 (6.0mm) | | | |
| Pixel size | 7.4 (μm) × 7.4 (μm) | | | |
| Shutter function | Electronic shutter; select shutter speeds from 20 μs to 100 ms | | | |
| Partial function | 12 to 480 lines | | | |
| Frame rate (Image Acquisition Time) | 80 fps (12.5ms) | | | |
| 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 | |

Intelligent Compact CMOS Cameras

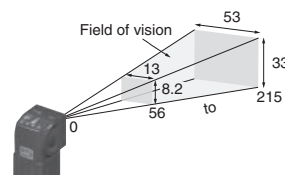
| Model | FZ-SQ010F | FZ-SQ050F | FZ-SQ100F | FZ-SQ100N |
|--------------------------------------|---|------------------------|-------------------------|-------------------------|
| Image elements | CMOS color image elements (1/3-inch equivalent) | | | |
| Color/Monochrome | Color | | | |
| Effective pixels | 752 (H) × 480 (V) | | | |
| Imaging area H x V (opposing corner) | 4.51 × 2.88 (5.35mm) | | | |
| Pixel size | 6.0 (μm) × 6.0 (μm) | | | |
| Shutter function | 1/250 to 1/32,258 | | | |
| Partial function | 8 to 480 lines | | | |
| Frame rate (Image Acquisition Time) | 60 fps (16.7 ms) | | | |
| 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 * | Risk Group2 | | | |
| 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 | | | |

* Applicable standards: IEC62471-2

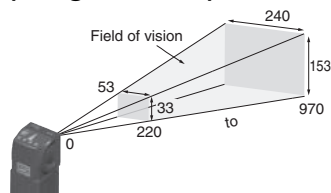
• Narrow View FZ-SQ010F



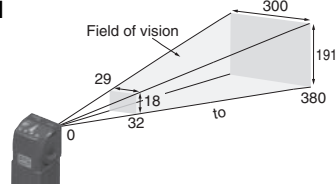
• Standard FZ-SQ050F



• Wide View (Long-distance) FZ-SQ100F



• Wide View (Short-distance) FZ-SQ100N



FZ5-Series

Ratings and Specifications (Cable, LCD Monitor)

Camera Cables

| Model | FZ-VS3 (2 m) | FZ-VSB3 (2 m) | FZ-VSL3 (2 m) | FZ-VSLB3 (2 m) |
|-------------------------------------|---|------------------|------------------|-------------------------------|
| Type | Standard | Bend resistant | Right-angle | Bend resistant Right-angle |
| 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 | 69mm | 69mm | 69mm | 69mm |
| Weight | Approx. 170 g | Approx. 180 g | Approx. 170 g | Approx. 180 g |

Cable Extension Unit

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

*1 A 12-VDC power supply must be provided to the Cable Extension Unit when connecting the Intelligent Compact Camera, or the Lighting Controller.

*2 The current consumption shows when connecting the Cable Extension Unit to an external power supply.

LCD Monitor

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

Long-distance Camera Cables

| Model | FZ-VS4 (15 m) | FZ-VSL4 (15 m) |
|-------------------------------------|---|----------------|
| Type | Standard | Right-angle |
| Shock resistiveness (durability) | 10 to 150 Hz single amplitude 0.15 mm 3 directions, 8 strokes, 4 times | |
| Ambient temperature range | Operation and storage: 0 to 65 °C (with no icing or condensation) | |
| Ambient humidity range | Operation and storage: 40 to 70%RH (with no condensation) | |
| Ambient atmosphere | No corrosive gases | |
| Material | Cable sheath, connector: PVC | |
| Minimum bending radius | 78 mm | |
| Weight | Approx. 1400 g | |

Parallel Cable

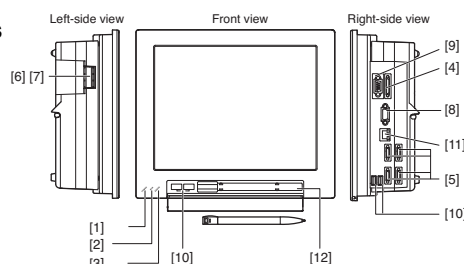
| Model | FZ-VP | FZ-VPX |
|---------------------------|---|---------------|
| Vibration resistiveness | 10 to 150 Hz single amplitude 0.15 mm 3 directions, 8 strokes, 4 times | |
| Ambient temperature range | Operation: 0 to 50 °C; Storage: -20 to 65 °C (with no icing or condensation) | |
| Ambient humidity range | Operation and storage: 35 to 85%RH (with no condensation) | |
| Ambient atmosphere | No corrosive gases | |
| Material | Cable sheath: heat-resistant PVC Connector: resin | |
| Minimum bending radius | 75 mm | |
| Weight | Approx. 160 g | Approx. 180 g |

LED Monitor Cable

| Model | FZ-VM |
|---------------------------|---|
| Vibration resistiveness | 10 to 150 Hz single amplitude 0.15 mm 3 directions, 8 strokes, 4 times |
| Ambient temperature range | Operation: 0 to 50 °C; Storage: -20 to 65 °C (with no icing or condensation) |
| Ambient humidity range | Operation and storage: 35 to 85%RH (with no condensation) |
| Ambient atmosphere | No corrosive gases |
| Material | Cable sheath: heat-resistant PVC Connector: PVC |
| Minimum bending radius | 75 mm |
| Weight | Approx. 170 g |




































Components and Functions






































Example of the FZ5 Sensor Controllers LCD-integrated type (4-camera type)



| | Name | Description |
|------|---|---|
| [1] | POWER LED | Lit while power is ON. |
| [2] | RUN LED | Lit while the controller is in Run Mode. |
| [3] | ERROR LED | Lit when an error has occurred. |
| [4] | I/O connector (control lines, data lines) | Connect the controller to external devices such as a sync sensor and PLC. |
| [5] | Camera connector | Connect cameras. |
| [6] | Power | Connect a DC power supply. Wire the power supply unit independently of other devices. After wiring, replace the terminal cover. |
| [7] | Ground terminal | Connect the ground wire. Make sure that the controller is grounded with a separate ground wire. |
| [8] | Monitor connector (analog RGB) | Connect monitor. |
| [9] | RS-232C/RS-422 connector | Connect an external device such as a personal computer or PLC. |
| [10] | USB connector | Connect a track ball, mouse and USB memory. A total of four USB ports are provided and any of them can be used. However, when connecting two or more USB memories, do not connect them to adjacent ports. Doing so may cause the USB memories to come into contact, resulting in malfunction or damage. |
| [11] | EtherNet connector | Connect the controller to a personal computer. |
| [12] | Touch pen (holder) | A touch pen is stored. (Provided with the LCD integrated type only) |

Processing Items

| Group | Icon | Processing Item | |
|-------------|---|-----------------------------|---|
| 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 II | Used to search the similar part of model from input image regardless of environmental changes. Detect the evaluation value and position. |
| |  | Shape Search III | Robust detection of positions is possible at high-speed and with high precision incorporating environmental fluctuations, such as differences in individual shapes of the workpieces, pose fluctuations, noise superimposition and shielding. |
| |  | EC Corner | This processing item measures a corner position (corner) of a workpiece. |
| |  | Ec Cross | The center position of a crosshair shape is measured using the lines created by the edge information on each side of the crosshair. |
| |  | 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. |
| |  | Circular Scan Edge Position | Measure center axis, diameter and radius of circular workpieces. |
| |  | Circular Scan Edge Width | Measure center axis, width and thickness of ring workpieces. |
| |  | Intersection | Calculate approximate lines from the edge information on two sides of a square workpiece to measure the angle formed at the intersection of the two lines. |
| |  | 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. |
| |  | Defect | Used for appearance measurement of plain-color measurement objects such as defects, stains and burrs. |
| |  | Precise Defect | 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 Inspect | 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]. |
| |  | 2DCode *2 | Recognize 2D code and display where the code quality is poor. |
| |  | Barcode *1 | Recognize barcode, verify and output decoded characters. |
| |  | OCR | Recognize and read characters in images as character information. |
| |  | OCR User Dictionary | Register dictionary data to use for OCR. |
| |  | Circle Angle | Used for calculating angle of inclination of circular measurement objects. |
| |  | Glue Bead Inspection | You can inspect coating of a specified color for gaps or runoffs along the coating path. |
| Input Image |  | Camera Image Input | To input images from cameras. And set up the conditions to input images from cameras. (To FZ5 Sensor Controllers only) |
| |  | Camera Image Input FH | To input images from cameras. And set up the conditions to input images from cameras. (For FH Sensor Controllers only) |

| Group | Icon | Processing Item | |
|---------------------|--|-----------------------------|--|
| Input Image |  | 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 Switch | 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. |
| |  | Multi-trigger Imaging | The Multi-trigger Imaging processing item captures multiple images at user-defined timings and executes parallel measurement for each image. Insert the Multi-trigger Imaging to the top of the flow. |
| |  | Multi-trigger Imaging Task | The Multi-trigger Imaging processing item captures multiple images at user-defined timings and executes parallel measurement for each image. Insert this processing item to the top of the processing which requires imaging for multiple times. |
| Compensate image |  | Position Compensation | Used when positions are differed. Correct measurement is performed by correcting position of input images. |
| |  | Filtering | Used for processing images input from cameras in order to make them easier to be measured. |
| |  | Background Suppression | To enhance contrast of images by extracting color in specified brightness. |
| |  | Brightness Correct Filter | Track brightness change of entire screen and remove gradual brightness change such as uneven 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 II | Remove the background pattern of vertical, horizontal and diagonal stripes. |
| |  | Polar Transformation | Rectify the image by polar transformation. Useful for OCR or pattern inspection printed on circle. |
| |  | Trapezoidal Correction | Rectify the trapezoidal deformed image. |
| |  | Machine Simulator | How the alignment marks would move on the image when each stage or robot axis is controlled can be checked. |
| |  | Image Subtraction | The registered model image and measurement image are compared and only the different pixels are extracted and converted to an image. |
| |  | Advanced filter | Process the images acquired from cameras in order to make them easier to measure. This processing item consolidates existing image conversion filtering into one processing item and adds extra functions. |
| |  | Panorama | Combine multiple image to create one big image. |
| Support measurement |  | Unit Macro | Advanced arithmetic processing can be easily incorporated into workflow as Unit Macro processing items. |
| |  | Unit Calculation Macro | This function is convenient when the user wants to calculate a value using an original calculation formula or change the set value or system data of a processing item. |
| |  | Calculation | Used when using the judge results and measured values of Procltem 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. |
| |  | Precise Calibration | Used for calibration corresponding to trapezoidal distortion and lens distortion. |
| |  | User Data | Used for setting of the data that can be used as common constants and variables in scene group data. |
| |  | Set Unit Data | Used to change the Procltem 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 Procltem 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. |
| |  | Image Conversion Logging | Used for saving the measurement images in JPEG and BMP format. |
| |  | 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 fmsl. |

FZ5-Series

| Group | Icon | Processing Item | |
|---------------------|------|---------------------------|---|
| Support measurement | | Focus | Focus setting is supported. |
| | | Iris | Focus and aperture setting is supported. |
| | | Parallelize | A part of the measurement flow is divided into two or more tasks and processed in parallel to shorten the measurement time. This processing item is placed at the top of processing to be performed in parallel. |
| | | Parallelize Task | A part of the measurement flow is divided into two or more tasks and processed in parallel to shorten the measurement time. This processing item is placed immediately before processing to be performed in parallel between Parallelize and Parallelize End. |
| | | Statistics | Used when you need to calculate an average of multiple measurement results. |
| | | Reference Calib Data | Calibration data and distortion compensation data held under other processing items can be referenced. |
| | | Position Data Calculation | The specified position angle is calculated from the measured positions. |
| | | Stage Data | Sets and stores data related to stages. |
| | | Robot Data | Sets and stores data related to robots. |
| | | Vision Master Calibration | This processing item automatically calculates the entire axis movement amount of the control equipment necessary for calibration. |
| | | PLC Mastro Calibration | Calibration data is created using a communication command from PLC. |
| | | Convert Position Data | The position angle after the specified axis movement is calculated. |
| | | Movement Single Position | The axis movement that is required to match the measured position angle to the reference position angle is calculated. |
| | | Movement Multi Points | The axis movements that are required to match the measured position angles to the corresponding reference position angles are calculated. |
| | | Detection Point | Obtains position/angle information by referring to the coordinate values measured with the Measurement Processing Unit. |
| | | Camera Calibration | By setting the camera calibration, the measurement result can be converted and output as actual dimensions. |
| | | Data Save | The set data can be saved in the controller main unit or as scene data. The data is held even after the FH/FZ power is turned off. |

| Group | Icon | Processing Item | |
|----------------|------|---------------------------|--|
| Branch | | Conditional Branch | Used where more than two kinds of products on the production line need to be detected separately. |
| | | End | This Procltem must be set up as the last processing unit of a branch. |
| | | DI Branch | Same as Procltem "Branch". But you can change the targets of conditional branching via external inputs. |
| | | Control Flow Normal | Set the measurement flow processing into the wait state in which the specific no-protocol command can be executed. |
| | | Control Flow PLC Link | Set the measurement flow processing into the wait state in which the specific PLC Link command can be executed. |
| | | Control Flow Parallel | Set the measurement flow processing into the wait state in which the specific parallel command can be executed. |
| | | Control Flow Fieldbus | Set the measurement flow processing into the wait state in which the specific Fieldbus command can be executed. |
| Output result | | Selective Branch | Easily branch to multiple destinations. |
| | | 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. |
| Display result | | Fieldbus Data Output | Outputs data to an external device, such as a Programmable Controller, through a fieldbus interface. |
| | | 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. |

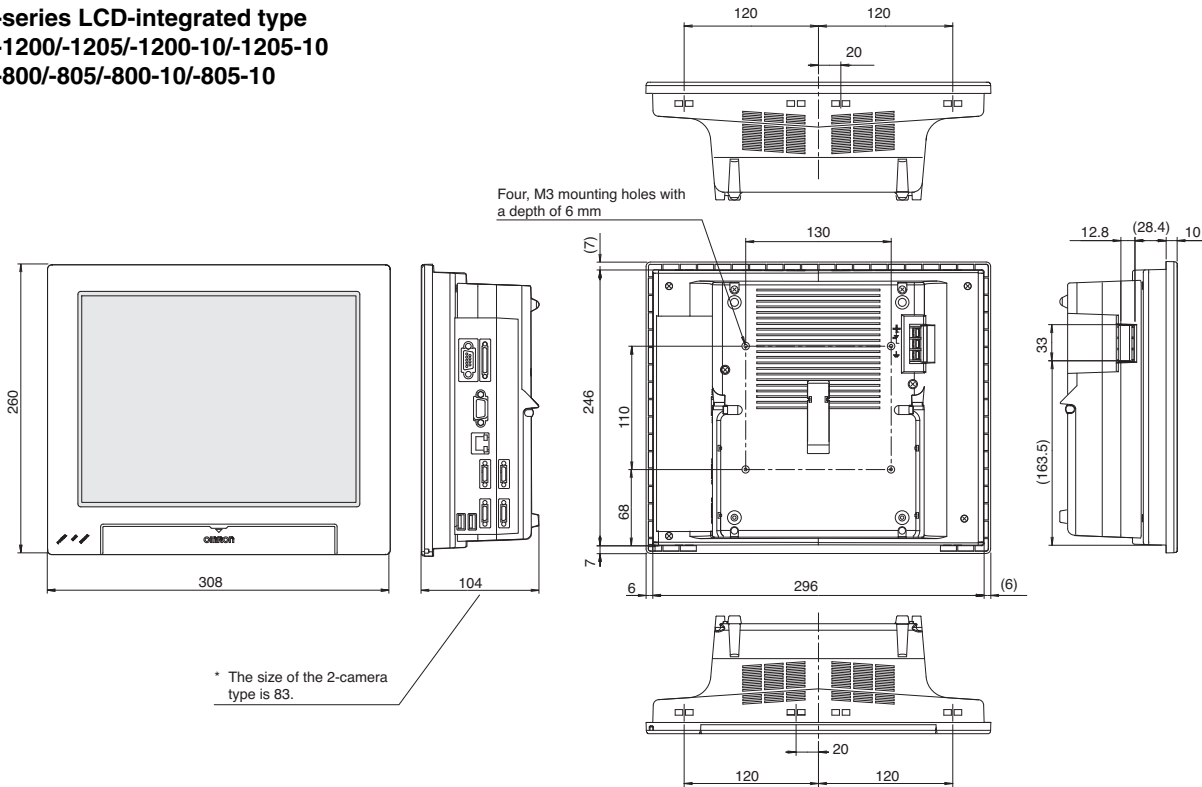
*1 Bar Codes that can be read : JAN/EAN/UPC (including add-on codes), Code 39, Codabar (NW-7), ITF (Interleaved 2 of 5), Code 93, Code 128, GS1-128, GS1 DataBar (RSS-14 / RSS Limited / RSS Expanded), Pharmacode
*2 2D Codes that can be read : Data Matrix (ECC200), QR Code

Dimensions

(Unit: mm)

Sensor Controllers

FZ5-series LCD-integrated type
FZ5-1200/-1205/-1200-10/-1205-10
FZ5-800/-805/-800-10/-805-10

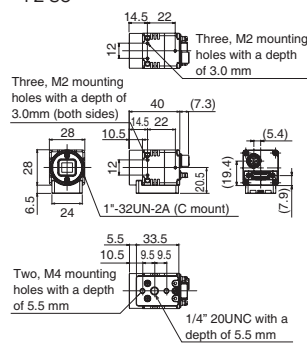


Cameras

Digital CCD/CMOS Cameras

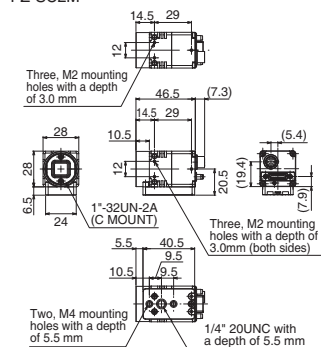
300,000-pixel camera

FZ-S
FZ-SC



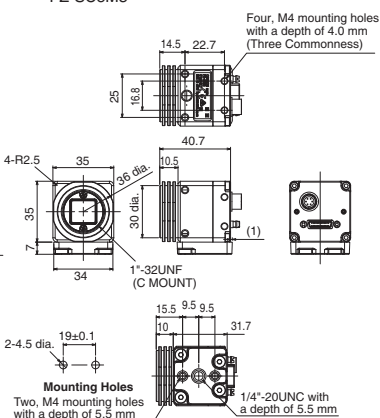
2 million-pixel camera

FZ-S2M
FZ-SC2M



5 million-pixel camera

FZ-S5M3
FZ-SC5M3

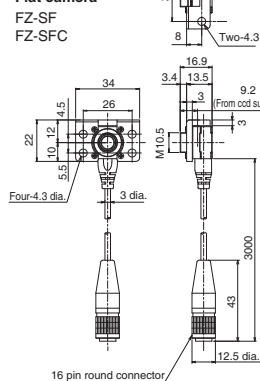


Small digital CCD cameras

Camera head

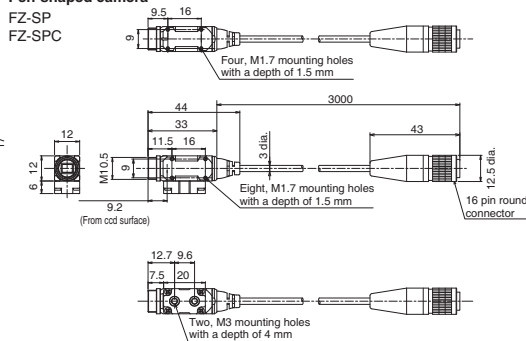
Flat camera

FZ-SF
FZ-SFC



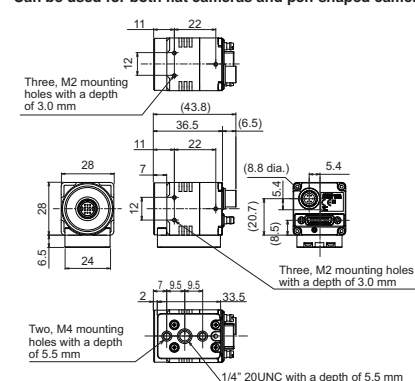
Pen-shaped camera

FZ-SP
FZ-SPC



Camera amplifier

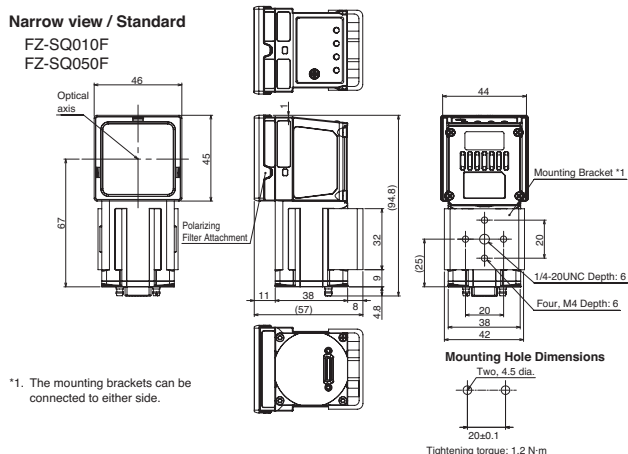
Can be used for both flat cameras and pen-shaped cameras



Intelligent Compact CMOS Cameras

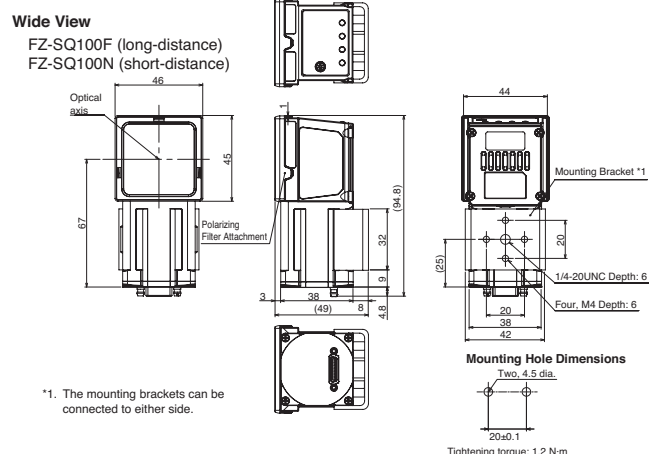
Narrow view / Standard

FZ-SQ010F
FZ-SQ050F



Wide View

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



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

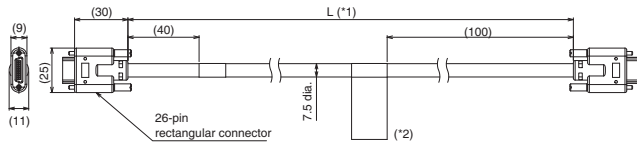
*1. The mounting brackets can be connected to either side.

Cables

Camera Cable

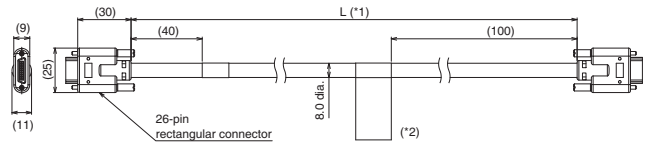
Camera Cable

FZ-VS3



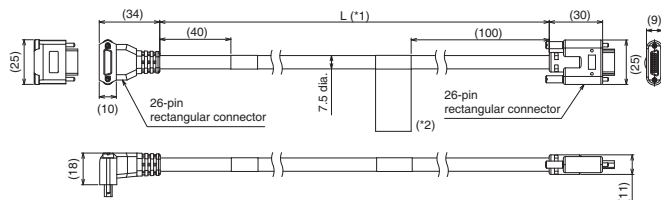
Bend resistant Camera Cable

FZ-VSB3



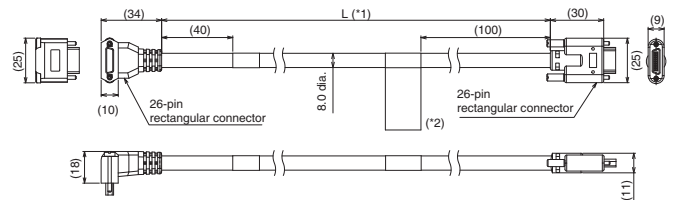
Right-angle Camera Cable

FZ-VSL3



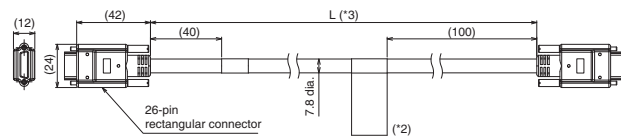
Bend resistant Right-angle Camera Cable

FZ-VSLB3



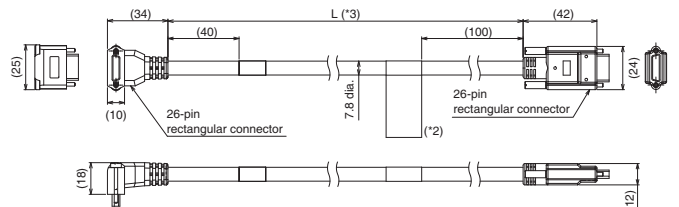
Long-distance Camera Cable

FZ-VS4



Long-distance Right-angle Camera Cable

FZ-VSL4



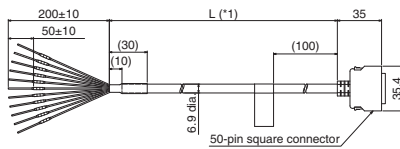
*1. Cable is available in 2m/3m/5m/10m.

*2. Each camera cables has polarity.
Please ensure that the name plate side of the cable is connected to the controller.

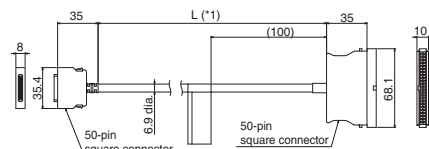
*3. Cable is available in 15m.

Parallel Cable

FZ-VP



FZ-VPX

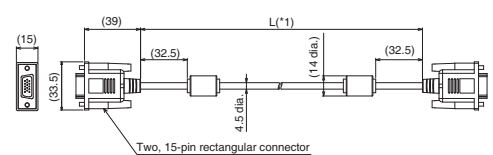


*1. cable is available in 2m/5m.

*1. cable is available in 2m/5m.

LED Monitor Cable

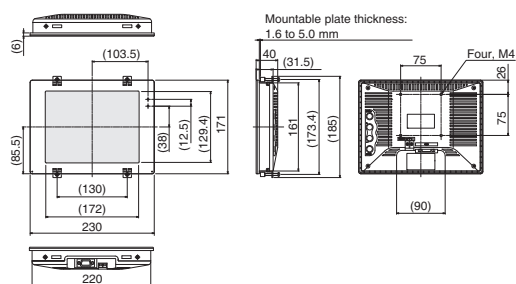
FZ-VM



*1. cable is available in 2m/5m.

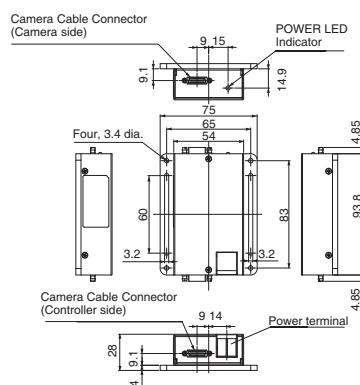
LCD Monitor

FZ-M08



Camera Cable Extension Unit

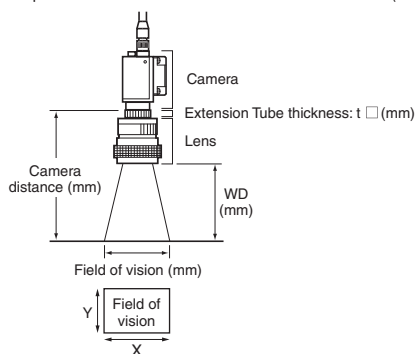
FZ-VSJ



Optical Chart

Meaning of Optical Chart

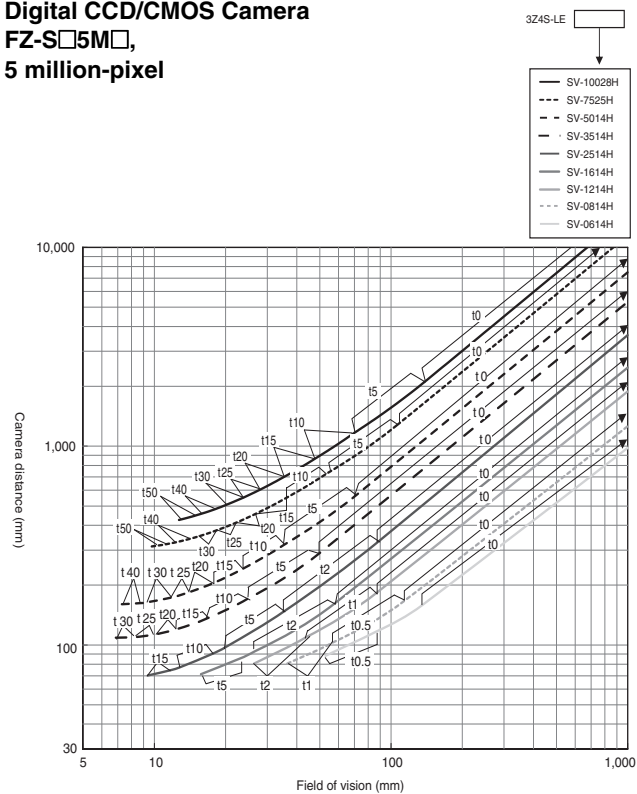
The X axis of the optical chart shows the field of vision (mm) (*1), and the Y axis of the optical chart shows the camera installation distance (mm) (*2).



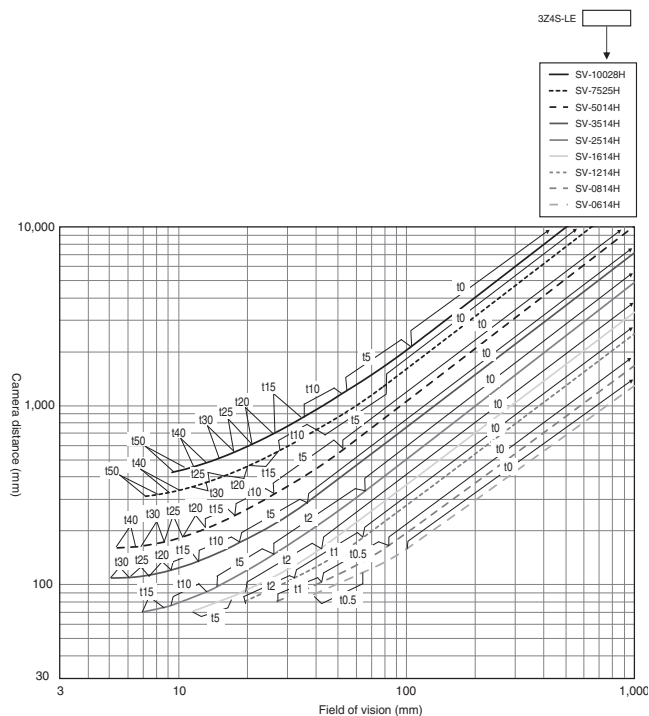
- *1. The lengths of the fields of vision given in the optical charts are the lengths of the Y axis.
- *2. The vertical axis represents WD for small cameras.

Digital CCD/CMOS Camera

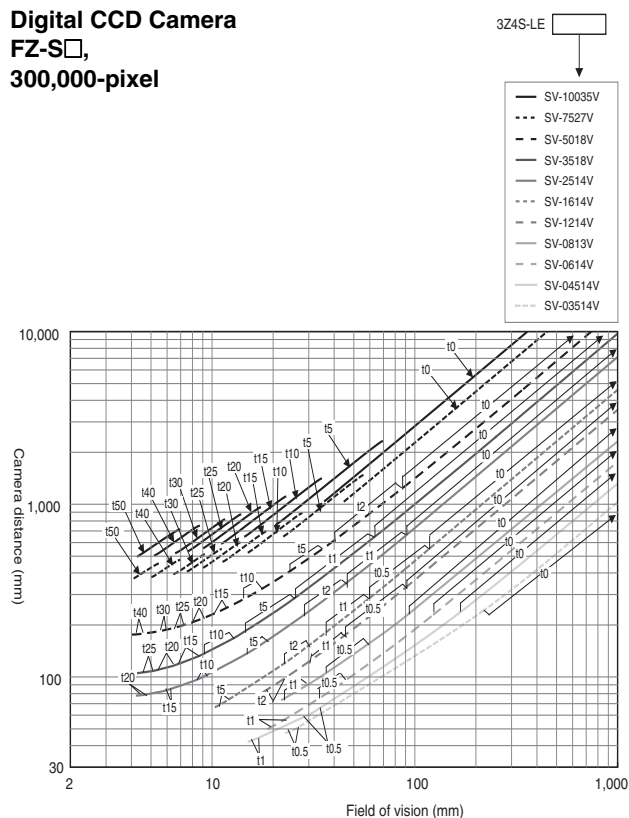
FZ-S□5M□,
5 million-pixel



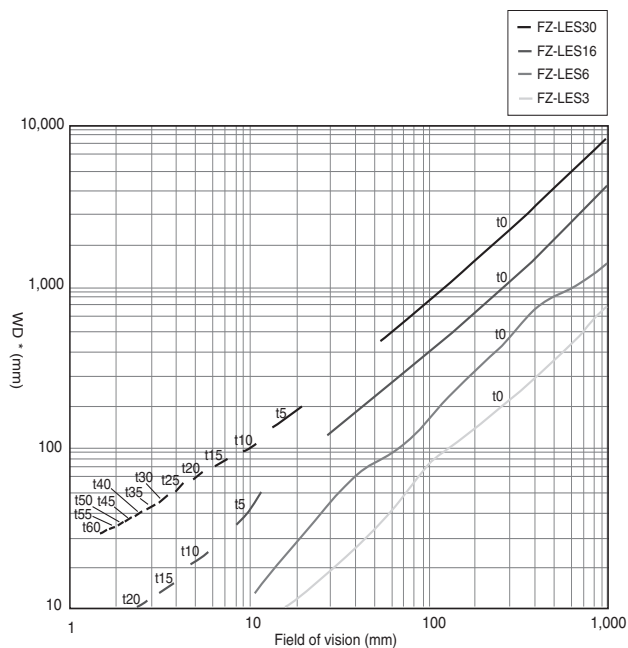
Digital CCD Camera FZ-S□2M, 2 million-pixel



Digital CCD Camera FZ-S□, 300,000-pixel

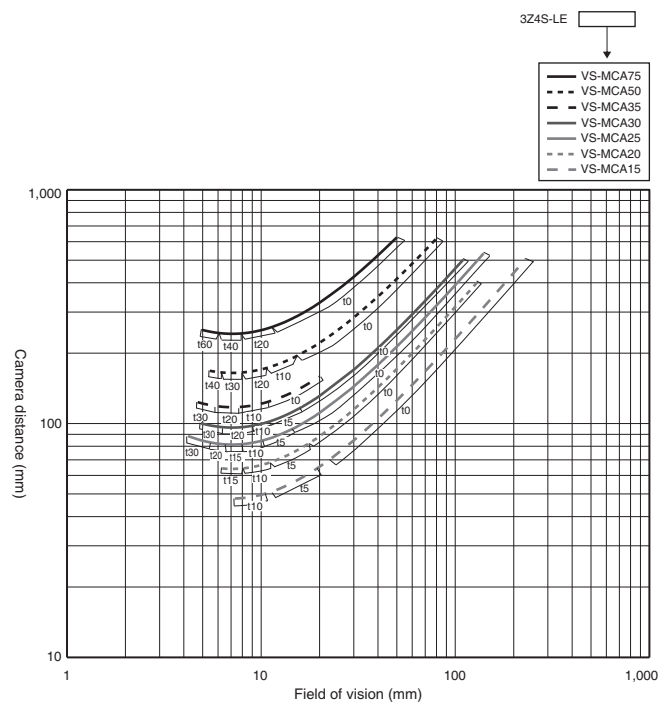


Small Digital CCD Cameras FZ-SF□, FZ-SP□, 300,000-pixel

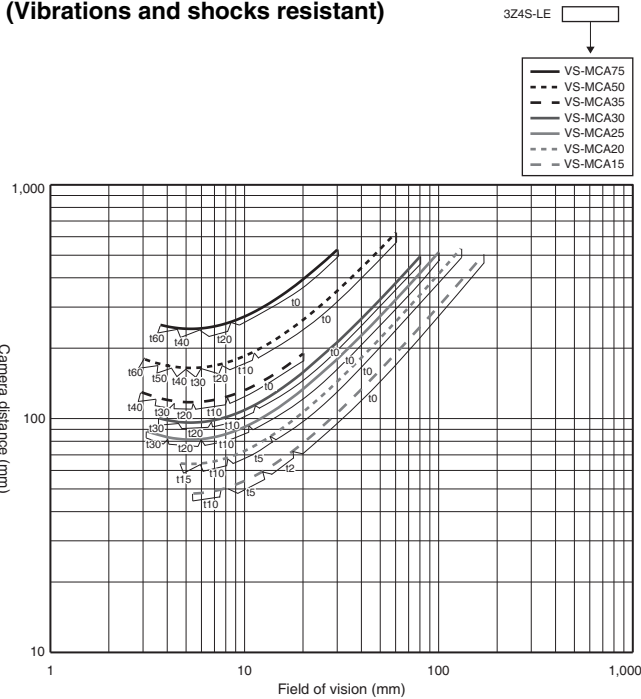


* The vertical axis represents WD, not installation distance.

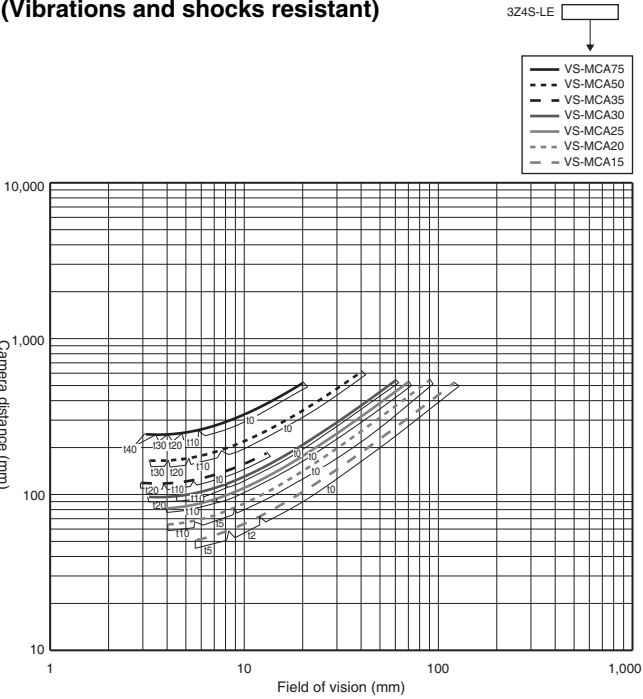
Digital CCD/CMOS Camera FZ-S□5M□, 5 million-pixel (Vibrations and shocks resistant)



Digital CCD Camera
FZ-S□2M,
2 million-pixel
(Vibrations and shocks resistant)



Digital CCD Camera
FZ-S□,
300,000-pixel
(Vibrations and shocks resistant)



Related Manuals

| Man.No. | Model number | Manual |
|---------|--------------|---|
| Z421 | FZ5 | Vision System FZ5 Series User's Manual |
| Z424 | FZ5 | Vision System FZ5 Series Processing Item Function Reference Manual |
| Z422 | FZ5 | Vision System FZ5 Series User's Manual for Communications Settings |
| Z423 | FZ5 | Vision System FZ5 series Hardware Setup Manual |
| Z425 | FZ5 | Vision System FZ5 series Macro Customize Functions Programming Manual |

[illegible]

Terms and Conditions Agreement

Read and understand this catalog.

Please read and understand this catalog before purchasing the products. Please consult your OMRON representative if you have any questions or comments.

Warranties.

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