

# Smart Sensors (with Ultra-High-Speed CCD Camera)

## ZFV Series



**NEW**

## Ordering Information

### ■ Sets of Sensor Head and Amplifier Unit

| Type                        | NPN       | PNP       |
|-----------------------------|-----------|-----------|
| Narrow View/Single Function | ZFV-R1010 | ZFV-R1015 |
| Narrow View/Standard        | ZFV-R1020 | ZFV-R1025 |
| Wide View/Single Function   | ZFV-R5010 | ZFV-R5015 |
| Wide View/Standard          | ZFV-R5020 | ZFV-R5025 |

### ■ Sensor Heads

| Appearance                                                                          | Type        | Working length          | Sensing area                                 | Model    |
|-------------------------------------------------------------------------------------|-------------|-------------------------|----------------------------------------------|----------|
|  | Narrow View | 34 to 49 mm (variable)  | 5 × 4.6 mm (H × V) to<br>9 × 8.3 mm (H × V)  | ZFV-SR10 |
|                                                                                     | Wide View   | 38 to 194 mm (variable) | 10 × 9.2 mm (H × V) to<br>50 × 46 mm (H × V) | ZFV-SR50 |

### ■ Amplifier Units

| Appearance                                                                          | Type            | Power supply | Output type | Model   |
|-------------------------------------------------------------------------------------|-----------------|--------------|-------------|---------|
|  | Single Function | 24 VDC ± 10% | NPN         | ZFV-A10 |
|                                                                                     | Standard        |              | PNP         | ZFV-A15 |
|                                                                                     |                 |              | NPN         | ZFV-A20 |
|                                                                                     |                 |              | PNP         | ZFV-A25 |

### ■ Accessories (Order Separately)

#### Data Storage Units

| Appearance                                                                          | Power supply | Output type | Model    |
|-------------------------------------------------------------------------------------|--------------|-------------|----------|
|  | 24 VDC       | NPN         | ZS-DSU11 |
|                                                                                     |              | PNP         | ZS-DSU41 |

## Controller Link Unit

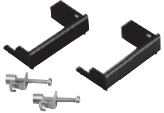
| Appearance                                                                        | Model  |
|-----------------------------------------------------------------------------------|--------|
|  | ZS-XCN |

## Sensor Head Extension Cable

| Cable length | Model                  | Quantity |
|--------------|------------------------|----------|
| 3 m          | ZFV-XC3BV2 (See note.) | 1        |
| 8 m          | ZFV-XC8BV2             | 1        |

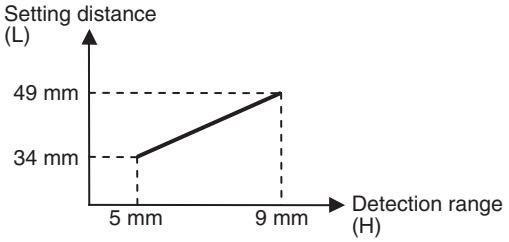
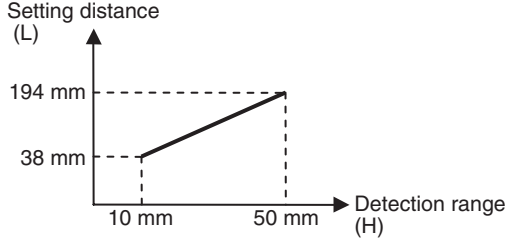
**Note:** ZFV-XC3BRV2 Robot Cable is also available.

## Panel-mounting Adapter

| Appearance                                                                        | Model   |                                  |
|-----------------------------------------------------------------------------------|---------|----------------------------------|
|  | ZS-XPM1 | First Unit                       |
|  | ZS-XPM2 | Additional Units (for expansion) |

# Specifications

## ■ Sensor Heads

| Item                                                  | ZFV-SR10 (Narrow View)                                                                            | ZFV-SR50 (Wide View)                                                                 |
|-------------------------------------------------------|---------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| Setting distance (L)                                  | 34 to 49 mm                                                                                       | 38 to 194 mm                                                                         |
| Detection range (H × V)                               | 5 × 4.6 mm to 9 × 8.3 mm                                                                          | 10 × 9.2 mm to 50 × 46 mm                                                            |
| Relation between setting distance and detection range |                |  |
| Guide light                                           | Provided (center, sensing area)                                                                   |                                                                                      |
| Built-in lens                                         | Focus: f15.65                                                                                     | Focus: f13.47                                                                        |
| Object lighting method                                | Pulse lighting                                                                                    |                                                                                      |
| Object light source                                   | Eight red LEDs                                                                                    |                                                                                      |
| Sensing element                                       | 1/3-inch CCD, partial scan                                                                        |                                                                                      |
| Shutter                                               | Electronic shutter, shutter time: 1/1,000 to 1/4,000                                              |                                                                                      |
| Power supply voltage                                  | 15 VDC (Supplied from Amplifier Unit.)                                                            |                                                                                      |
| Current consumption                                   | Approx. 200 mA                                                                                    |                                                                                      |
| Dielectric strength                                   | 1,000 VAC, 50/60 Hz for 1 min                                                                     |                                                                                      |
| Vibration resistance (destruction)                    | 10 to 150 Hz, 0.35-mm single amplitude, 10 times each in X, Y, and Z directions for 8 min         |                                                                                      |
| Shock resistance (destruction)                        | 150 m/s <sup>2</sup> , three times each in six directions (up/down, left/right, forward/backward) |                                                                                      |
| Ambient temperature                                   | Operating: 0 to 40°C, Storage: -25 to 65°C (with no icing or condensation)                        |                                                                                      |
| Ambient humidity                                      | Operating and storage: 35% to 85% (with no condensation)                                          |                                                                                      |
| Ambient atmosphere                                    | Must be free of corrosive gas.                                                                    |                                                                                      |
| Connection method                                     | Prewired, Standard cable length: 2 m                                                              |                                                                                      |
| Degree of protection                                  | IEC60529, IP65                                                                                    |                                                                                      |
| Materials                                             | Case: ABS, Mounting bracket: PBT                                                                  |                                                                                      |
| Weight                                                | Approx. 200 g (including mounting bracket and cord)                                               |                                                                                      |
| Accessories                                           | Mounting bracket (1), Ferrite core (1), Instruction sheet                                         |                                                                                      |

## ■ Amplifier Units

| Item                          |                                | Single-function models                                                                                                                                                                                                                                        |         | Standard models                                                                                               |         |
|-------------------------------|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|---------------------------------------------------------------------------------------------------------------|---------|
|                               |                                | ZFV-A10                                                                                                                                                                                                                                                       | ZFV-A15 | ZFV-A20                                                                                                       | ZFV-A25 |
| Output method                 |                                | NPN                                                                                                                                                                                                                                                           | PNP     | NPN                                                                                                           | PNP     |
| Output                        |                                | NPN: NPN open-collector output, 50 mA max. at 30 VDC, Residual voltage: 1.2 V max.<br>PNP: PNP open-collector output, 50 mA max., Residual voltage: 1.2 V max.                                                                                                |         |                                                                                                               |         |
| Inspection items              |                                | Pattern (PTRN), Brightness (BRGT)                                                                                                                                                                                                                             |         | Patterns (PTRN), Brightness (BRGT), Area (AREA), Width (WID), Position (POSI), Count (CNT), Characters (CHAR) |         |
| Teaching area                 |                                | Rectangular, one area                                                                                                                                                                                                                                         |         |                                                                                                               |         |
| Teaching area size            |                                | • Pattern (PTRN), Brightness (BRGT): Any rectangular area (256 × 256 max.)<br>• Area (AREA), Width (WID), Position (POSI), Count (CNT), Characters (CHAR): Any rectangular area (full screen max.)                                                            |         |                                                                                                               |         |
| Sensing area                  |                                | Full screen                                                                                                                                                                                                                                                   |         |                                                                                                               |         |
| Resolution                    |                                | 468 × 432 (H × V) max.                                                                                                                                                                                                                                        |         |                                                                                                               |         |
| Bank selection                |                                | Supported for 8 banks.                                                                                                                                                                                                                                        |         |                                                                                                               |         |
| Response time                 |                                | Pattern (PTRN), Brightness (BRGT): High-speed: 4 ms, Standard: 8 ms, High-precision: 12 ms<br>Area (AREA), Width (WID), Position (POSI), Count (CNT), Characters (CHAR): 128 × 128: 15 ms max.                                                                |         |                                                                                                               |         |
| Other functions               |                                | Control output switching: ON for OK or ON for NG<br>ON delay/OFF delay, One-shot output, “ECO” mode                                                                                                                                                           |         |                                                                                                               |         |
| Output signals                |                                | (1) Control output (OUTPUT), (2) Enable output (ENABLE), (3) Error output (ERROR)                                                                                                                                                                             |         |                                                                                                               |         |
| Input signals                 |                                | (1) Simultaneous measurement input (TRIG) or Continuous measurement input (TRIG), Switched by using menu.<br>(2) Bank selection inputs (BANK1 to BANK3)<br>(3) Workpiece still teaching (TEACH) or Workpiece moving teaching (TEACH), Switched by using menu. |         |                                                                                                               |         |
| Connect-<br>ing to ZS-<br>DSU | Image log-<br>ging trigger     | Stores NG images or all images.                                                                                                                                                                                                                               |         |                                                                                                               |         |
|                               | Sampling<br>rate               | ZFV measurement cycle (See note 1.)                                                                                                                                                                                                                           |         |                                                                                                               |         |
|                               | Number of<br>logged im-<br>age | Logs up to 128 images in series                                                                                                                                                                                                                               |         |                                                                                                               |         |
|                               | Number of<br>connected         | 15 max. (ZFV: 5 Units max., ZS-LDC: 9 Units max., ZS-MDC (See note 2.): 1 Unit max.)                                                                                                                                                                          |         |                                                                                                               |         |
|                               | External<br>bank func-<br>tion | Amplifier Unit setting data can be saved to the memory card as bank data. Reading bank data enables bank switching.                                                                                                                                           |         |                                                                                                               |         |
| Sensor Head interface         |                                | Digital interface                                                                                                                                                                                                                                             |         |                                                                                                               |         |
| Image display                 |                                | Compact TFT 1.8-inch LCD (Display dots: 557 × 234)                                                                                                                                                                                                            |         |                                                                                                               |         |
| Indicators                    |                                | • Judgement result indicator (OUTPUT)   • Inspection mode indicator (RUN)                                                                                                                                                                                     |         |                                                                                                               |         |
| Operation interface           |                                | • Cursor keys (up, down, left, right)   • Setting key (SET)   • Escape key (ESC)<br>• Operating mode switching (slide switch)   • Menu switching (slide switch)<br>• Teaching/Display switching key (TEACH/VIEW)                                              |         |                                                                                                               |         |
| Power supply voltage          |                                | 20.4 to 26.4 VDC (including ripple)                                                                                                                                                                                                                           |         |                                                                                                               |         |
| Current consumption           |                                | 600 mA max. (with Sensor Head connected)                                                                                                                                                                                                                      |         |                                                                                                               |         |
| Dielectric strength           |                                | 1,000 VAC, 50/60 Hz for 1 min between leads and Amplifier Unit case                                                                                                                                                                                           |         |                                                                                                               |         |
| Noise immunity                |                                | 1 kV, Pulse rise: 5 ns, Pulse width: 50 ns, Burst duration: 15 ms, Cycle: 300 ms                                                                                                                                                                              |         |                                                                                                               |         |
| Vibration resistance          |                                | Destruction: 10 to 150 Hz, 0.1-mm single amplitude, 10 times each in X, Y, and Z directions for 8 min                                                                                                                                                         |         |                                                                                                               |         |
| Shock resistance              |                                | Destruction: 150 m/s <sup>2</sup> , three times each in six directions (up/down, left/right, forward/backward)                                                                                                                                                |         |                                                                                                               |         |
| Ambient temperature           |                                | Operating: 0 to 50°C<br>Storage: -25 to 65°C (with no icing or condensation)                                                                                                                                                                                  |         |                                                                                                               |         |
| Ambient humidity              |                                | Operating and storage: 35% to 85%                                                                                                                                                                                                                             |         |                                                                                                               |         |
| Ambient atmosphere            |                                | Must be free of corrosive gas.                                                                                                                                                                                                                                |         |                                                                                                               |         |
| Degree of protection          |                                | IEC60529, IP20                                                                                                                                                                                                                                                |         |                                                                                                               |         |
| Materials                     |                                | Polycarbonate                                                                                                                                                                                                                                                 |         |                                                                                                               |         |
| Weight                        |                                | Approx. 300 g (including cord)                                                                                                                                                                                                                                |         |                                                                                                               |         |
| Accessories                   |                                | Ferrite core (1), Instruction sheet                                                                                                                                                                                                                           |         |                                                                                                               |         |

**Note 1.** This is the sampling rate when logging images. To log measurement data only, use the ZS-DSU settings.

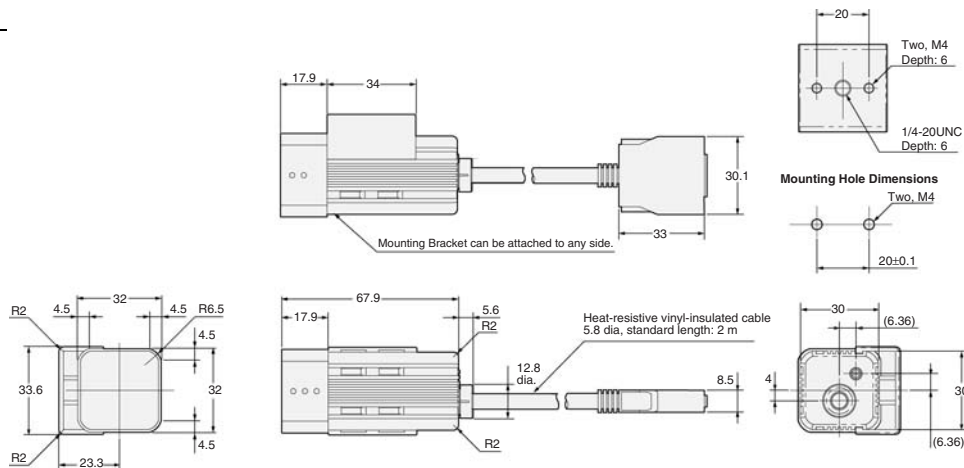
**2.** Image logging is not possible when the ZS-MDC is connected.

# Dimensions

**Note:** All units are in millimeters unless otherwise indicated.

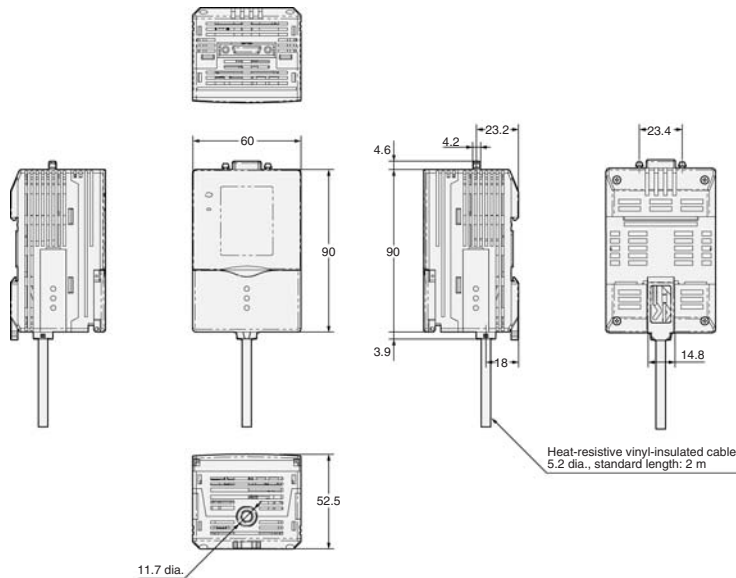
## Sensor Heads

ZFV-SR□



## Amplifier Units

ZFV-A□



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