

» Intuitive in use

Advanced Industrial Automation



A true "Easy vision Teach & Go" vision sensor

Omron's ZFV is an innovative image-processing system in a sensor format. What makes this sensor so special is how easy it is to use; with its 'Teach & Go' concept you can configure an inspection routine in just a few steps using the sensor's integrated, high-resolution colour LCD screen and simple menu system. The screen provides live image display during set-up and operation, and gives you instant feedback during the inspection process. And a choice of controllers gives you the tools to perform everything from simple presence detection to advanced pattern recognition.

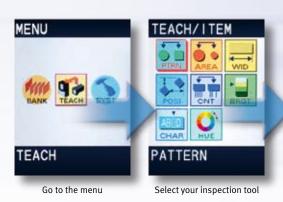
Colour and grey scale versions available

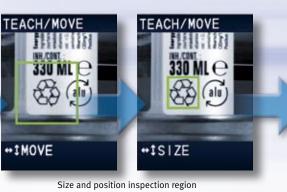
The latest addition to the ZFV family is the ZFV Colour sensor. Using this instead of the conventional monochrome sensor widens the choice of applications and increases the stability of measurement of the inspection. Through its automatic colour filter function, image contrast is optimised, making inspections more reliable. There are seven colour filters in total; the one that obtains the most suitable contrast can be automatically selected, so there's no need to worry about colour setting parameters.



Target - Teach - Go!

Set-up in minutes





Teach & Go

TEACH / VIEW

Intuitive user interface

The ZFV's user interface is smart! You can set parameters using a few buttons and the integrated LCD colour monitor. Operation menus and icons guide you through a simple set-up process. During operation, the LCD screen enables you to see results and images in real-time. There's no need to connect an external PC for set-up, maintenance or operation viewing; the ZFV supplies real-time images all the time. The ZFV provides instant feedback - on board - exactly when you need it.

Your benefit: No expert knowledge required, minimised downtime for setup and maintenance.







Pattern recognition

This tool verifies if a symbol printed on a package is present and complete using a taught feature as a reference.



Hue verification

The Hue tool inspects colour differences in a plain colour work-piece. A false colour cap will be rejected.



Width inspection

The Width tool measures an object, in this case a label, to verify that it is not folded or cut.

Multiple functions: "One Sensor Fits All" concept

Depending on the controller version, the ZFV contains up to 8 different tools; one can be selected at a time. These sophisticated tools offer an affordable sensor with a very intuitive user interface. Both the monochrome and colour version offer basically the same inspection functionality while the ZFV Colour uses the additional colour information included in the image. The tools include:



Counting (number): uses Edge Count to count the number of object edges.



Brightness: verifies objects using density average and deflection.



Pattern (shape): recognises objects by the difference of pattern and presence of pattern.



Width: measures the width of an object using Edge Tool.



Area (size): verifies an object using size (pixel count).



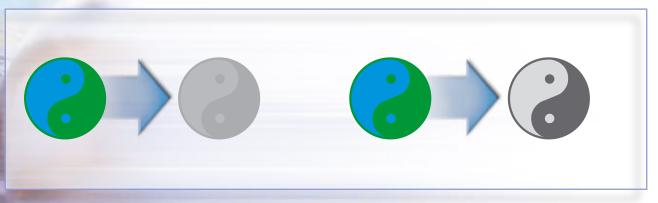
Character (text): inspects one character and the presence of a character string.



Position: verifies the position of an object using Edge Tool.



Hue: checks the difference between the measured colour and a reference colour (Colour version only).



This is what a grey scale sensor sees

That is what a monochrome sensor sees using red light. Depending on the object colour or object colour mix, the image contrast can be very weak.

This is what the ZFV Colour sees

The ZFV acquires a colour image, applies a colour filter and processes the resulting image. Image contrast is significantly increased.

Colour can be the difference

The monochrome version of the ZFV will be a perfect solution for all your easy vision tasks - as long as the object colours still provide enough image contrast. If that is not the case, use the ZFV Colour. As it acquires a colour image, it uses the colour information as a "virtual 3rd dimension" - adding security and reliability to your application.

Get the colours right

Through its automatic colour filter function, the ZFV Colour is able to see and inspect multi-coloured objects invisible for a grey scale sensor. Use the seven integrated colour filters and the colour pickup function to get the right contrast or extract only the relevant colour from the image— by using colour information, you simply "get the image good".

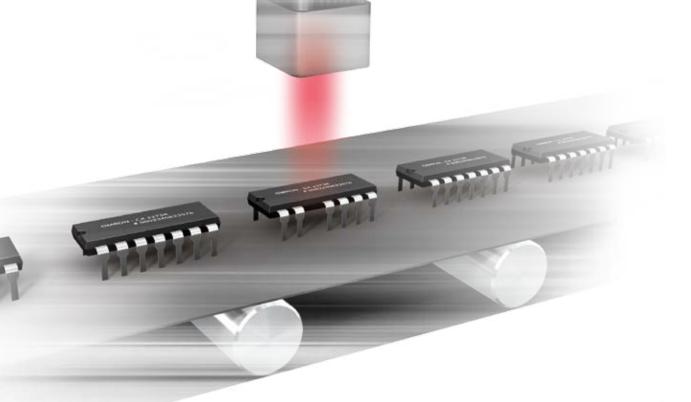






Scale it to your needs

You can set-up one inspection per controller – but the ZFV is scalable, so you can simply add controllers as required by connecting them to a common communication bus to expand the functionality of your sensor. Up to five controllers can be connected together through a simple snap-on system to perform multiple inspections on your work-piece. Other option modules, like the data storage unit (DSU) for data logging, can also be added to enhance communication and data storage functionality. Your benefit: You protect your investment; the sensor will grow with your requirements.





Light intensity and direction can be adjusted manually or switched off if an external light source is more appropriate. The range of detection heads is now larger than ever before, extending the field of view to 150 mm. This enables you to inspect even large work-pieces that previously could not be handled. Your benefit: Minimised investment cost due to the "one sensor fits all concept".



Easy meets advanced

The sensor keeps all settings for up to 8 configurations in an internal memory. If that is not enough or if you want to log or communicate results and settings, simply connect the optional data storage unit to either the grey scale or colour version.

The ZFV Colour also features USB and RS-232C interfaces for connection to a personal computer, enabling the easy transfer of data and results. Remote configuration software will be available later this year enabling you to remotely set-up and maintain your sensor.

Smart Vision Sensors

ZFV Gray Scale/Colour Series



Ordering Information

Models ZFV Gray Scale Series

Sets of Sensor Head and Amplifier Unit

| Туре | 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 | Туре | Setting distance | Sensing area | Model |
|------------|-------------|-------------------------|--------------------------------------|----------|
| | Narrow View | 34 to 49 mm (variable) | 5 x 4.6 mm to 9 x 8.3 mm (variable) | ZFV-SR10 |
| | Wide View | 38 to 194 mm (variable) | 10 x 9.2 mm to 50 x 46 mm (variable) | ZFV-SR50 |

Models ZFV Colour Series

Sensor Heads

| Appearance | Туре | Setting distance | Sensing area | Model |
|--|-----------------|--------------------------|---------------------------------------|-----------|
| | Narrow View | 34 to 49 mm (variable) | 5 x 4.6 mm to 9 x 8.3 mm (variable) | ZFV-SC10 |
| A STATE OF THE PARTY OF THE PAR | Standard View | 31 to 187 mm (variable) | 10 x 9.2 mm to 50 x 46 mm (variable) | ZFV-SC50 |
| | Wide View | 66 to 141 mm (variable) | 50 x 46 mm to 90 x 83 mm (variable) | ZFV-SC90 |
| | Ultra-wide View | 114 to 226 mm (variable) | 90 x 83 mm to 150 x 138 mm (variable) | ZFV-SC150 |

Amplifier Units ZFV Gray Scale Series

| Appearance | Туре | Power supply | Output type | Model |
|------------|----------|--------------|----------------|---------|
| 7 | Single | 24 VDC | NPN | ZFV-A10 |
| *** | Function | Function | PNP | ZFV-A15 |
| | Standard | | NPN | ZFV-A20 |
| | | | PNP | ZFV-A25 |

Amplifier Units ZFV Colour Series

| Appearance | Power supply | Output type | Model |
|------------|--------------|-------------|----------|
| | 24 VDC | NPN | ZFV-CA40 |
| | 24 VDO | PNP | ZFV-CA45 |

Common Accessories ZFV Gray Scale/Colour Series (order separately)

Data Storage Units

| Appearance | Power supply | Output type | Model |
|------------|--------------|-------------|----------|
| 555:3 | 24 VDC | NPN | ZS-DSU11 |
| mm 1.9s. | 24 100 | PNP | ZS-DSU41 |

Controller Link Unit

| CONTROLLE LINK OTHE | | |
|---------------------|--------|--|
| Appearance | Model | |
| il distant | ZS-XCN | |

Sensor Head Extension Cable

| Cable length | Model |
|--------------|-------------|
| 3 m | ZFV-XC3B *1 |
| 8 m | ZFV-XC8B |

^{*1.} ZFV-XC3BR Robot Cable is also available.

Panel-mounting Adapter

| Appearance | 22 | > > |
|------------|------------|----------------------------------|
| Model | ZS-XOM1 | ZS-XPM2 |
| | First Unit | Additional Units (for expansion) |

Specifications ZFV Gray Scale Series

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) | $5 \times 4.6 \text{ mm to } 9 \times 8.3 \text{ mm}$ | 10 × 9.2 mm to 50 × 46 mm | |
| Relation between setting distance and detection range | Setting distance (L) | Setting distance (L) | |
| | 34 mm 3 mm 5 mm 9 mm Sensing range(H) | 31 mm Sensing range (H) | |
| 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 | | |
| 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/s², three times each in six directions (up/down, left/right, forward/backward) | | |
| Connection method | Prewired, Standard cable length: 2 m | | |
| Degree of protection | IEC60529, IP65 | | |

Amplifier Units

| Item | Single- | function Models | Stan | ndard Models |
|-----------------------|---|--|--|---|
| | ZFV-A10 | ZFV-A15 | ZFV-A20 | ZFV-A25 |
| Output method | NPN | PNP | NPN | PNP |
| Inspection items | Pattern (PTRN), Bright | tness (BRGT) | Patterns (PTRN), Brigl Width (WID), Position Characters (CHAR) | htness (BRGT), Area (AREA), (POSI), Count (CNT), |
| Teaching area | Rectangular, one area | | | |
| Teaching area size | Pattern (PTRN), Brig Area (AREA), Width screen max.) | htness (BRGT): Any rectand (WID), Position (POSI), Cou | gular area (256 $	imes$ 256 max.) int (CNT), Characters (CHA | R): Any rectangular area (full |
| Sensing area | Full screen | | | |
| Resolution | 468 432 (H V) max | ۲. | | |
| Bank selection | Supported for 8 banks | • | | |
| Response time | partial scan) | Pattern (PTRN), Brightness (BRGT): High-speed: 4 ms, Standard: 8 ms, High-precision: 12 ms (not using partial scan) Area (AREA), Width (WID), Position (POSI), Count (CNT), Characters (CHAR): 128 128: 15 ms max. | | |
| Other functions | Control output switchir ON delay/OFF delay, (| Control output switching: ON for OK or ON for NG 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. (2) Bank selection inputs (BANK1 to BANK3) (3) Workpiece still teaching (TEACH) or Workpiece moving teaching (TEACH), Switched by using menu. | | | |
| Sensor Head interface | Digital interface | Digital interface | | |
| Image display | Compact TFT 1.8-inch | Compact TFT 1.8-inch LCD (Display dots: 557 234) | | |
| Indicators | Judgement result ind | Judgement result indicator (OUTPUT) Inspection mode indicator (RUN) | | |
| Operation interface | Cursor keys (up, down, left, right) Setting key (SET) Escape key (ESC) Operating mode switching (slide switch) Menu switching (slide switch) Teaching/Display switching key (TEACH/VIEW) | | | |
| Power supply voltage | 20.4 to 26.4 VDC (incl | 20.4 to 26.4 VDC (including ripple) | | |
| Current consumption | 600 mA max. (with Ser | 600 mA max. (with Sensor Head connected) | | |
| Degree of protection | IEC60529, IP20 | | | |

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Specifications ZFV Colour Series

Sensor Heads

| Item | ZFV-SC10 (Narrow View) | ZFV-SC50 (Wide View) | |
|--|---|---|--|
| Setting distance (L) | 34 to 49 mm (variable) | 31 to 187 mm (variable) | |
| Sensing range (H × V) | 5×4.6 mm to 9×8.3 mm (variable) | 10 \times 9.2 mm to 50 \times 46 mm (variable) | |
| Relation between setting distance and detection range Sensing range | Setting distance (L) 49 mm 34 mm 5 mm 9 mm Sensing range(H) | Setting distance (L) 187 mm 31 mm 50 mm Sensing range (H) | |
| Built-in lens | Focus: f15.65 | Focus: f13.47 | |
| Object lighting method | Pulse lighting | | |
| Object light source | Eight white LEDs | Thirty-six white LEDs | |
| Laser class *1 | Class 1 | Class 2 | |
| External lighting interface | No | Yes | |
| Sensing element | 1/3-inch CCD | | |
| Shutter | Electronic shutter, shutter time: 1/500 to 1/8,000 | | |
| Power supply voltage | 15 VDC (Supplied from Amplifier Unit.) | | |
| Current consumption | Approx. 200 mA | Approx. 350 mA (15 V: approx. 150 mA, 48 V: approx. 200 mA, including current when external light is connected) | |
| 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/s², three times each in six directions (up/down, left/right, forward/backward) | | |
| Connection method | Prewired, Standard cable length: 2 m | | |
| Degree of protection | IEC 60529, IP65 | IEC 60529, IP65 *2 | |

Applicable standards: IEC 60825-1: 1993, +A1: 1997, +A2: 2001, EN 60825-1: 1994, +A1: 2002, +A2: 2001 Consult your OMRON representative if IP67 protection is required.

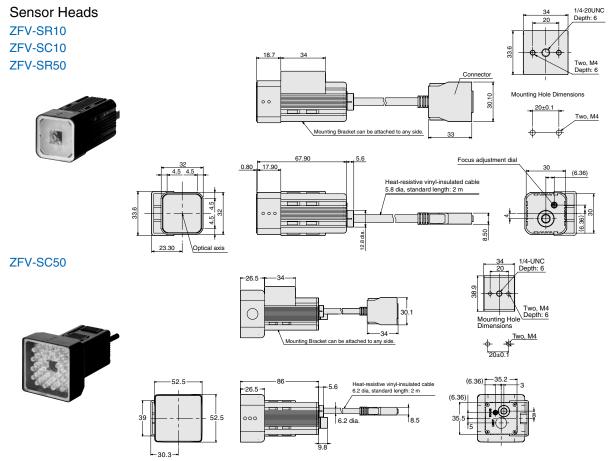
Note: More colour heads are available. Please contact your OMRON dealer for the full range of ZFV-SC heads.

Amplifier Units

| Output method NPN open collector, 30 VDC 50 mA max., residual voltage 1.2 V max. Serial I/O USB2.0 1 port, full-speed (12 Mbps) MINI-B RS-232C 1 port, 115200 bps max. Inspection items Patterns (PATTERN), Brightness (BRIGHT), Area (AREA), Width (WIDTH), Position (POSITION), Colour inspection (HUE) Teaching area size Patterns (PATTERN), Brightness (BRIGHT): Any rectangular area (256 × 256 max.) Area (AREA), Width (WIDTH), Position (POSITION), Count (COUNT), Colour inspection (HUE): Any rectangular area (full screen max.) Sensing area Full screen Resolution Bank selection Image input cycle Other functions Control output switching: ON for OK or ON for NG, ON delay/OFF delay, One-shot output, "EC Connecting to 25-DSU Image logging trigger Sampling rate ZFV measurement cycle '1 Number of logged images Logs up to 128 images in series | |
|--|---------|
| RS-232C 1 port, 115200 bps max. Inspection items Patterns (PATTERN), Brightness (BRIGHT), Area (AREA), Width (WIDTH), Position (POSITION), Count (COUNT), Colour inspection (HUE) Teaching area size • Patterns (PATTERN), Brightness (BRIGHT): Any rectangular area (256 × 256 max.) • Area (AREA), Width (WIDTH), Position (POSITION), Count (COUNT), Colour inspection (HUE): Any rectangular area (full screen max.) Sensing area Full screen Resolution 468 x 432 (H x V) max. Bank selection Supported for 8 banks. Image input cycle 13 ms (Standard), 8 ms (FAST mode), 5 ms (MAX mode) Other functions Control output switching: ON for OK or ON for NG, ON delay/OFF delay, One-shot output, "EC Connecting to ZS-DSU Image logging trigger Stores NG images or all images. Sampling rate ZFV measurement cycle *1 Number of logged images Logs up to 128 images in series | |
| Inspection items Patterns (PATTERN), Brightness (BRIGHT), Area (AREA), Width (WIDTH), Position (POSITION), Count (COUNT), Colour inspection (HUE) Patterns (PATTERN), Brightness (BRIGHT): Any rectangular area (256 × 256 max.) Area (AREA), Width (WIDTH), Position (POSITION), Count (COUNT), Colour inspection (HUE): Any rectangular area (full screen max.) Sensing area Full screen Resolution 468 x 432 (H x V) max. Bank selection Supported for 8 banks. Image input cycle Other functions Connect Connect Image logging trigger Stores NG images or all images. Sampling rate Number of logged images Logs up to 128 images in series | |
| Position (POSITION), Count (COUNT), Colour inspection (HUE) Teaching area size • Patterns (PATTERN), Brightness (BRIGHT): Any rectangular area (256 × 256 max.) • Area (AREA), Width (WIDTH), Position (POSITION), Count (COUNT), Colour inspection (HUE): Any rectangular area (full screen max.) Sensing area Resolution Full screen Resolution 468 x 432 (H x V) max. Bank selection Supported for 8 banks. Image input cycle 13 ms (Standard), 8 ms (FAST mode), 5 ms (MAX mode) Other functions Connecting to ZS-DSU Image logging trigger Stores NG images or all images. Sampling rate ZFV measurement cycle *1 Number of logged images Logs up to 128 images in series | |
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| ing to ZS-DSU Sampling rate ZFV measurement cycle *1 Number of logged images Logs up to 128 images in series | O" mode |
| ZŠ-DSU Sampling rate ZFV measurement cycle Number of logged images Logs up to 128 images in series | |
| Number of logged images Logs up to 128 images in series | |
| | |
| Number of connected Units 15 max. (ZFV: 5 Units max.) | |
| External bank function Amplifier Unit setting data can be saved to the memory card as bank data. Reading bank data enables bank switching. | |
| Output signals (1) Control output (OUTPUT) (2) Enable output (ENABLE) (3) Error output (ERROR) | |
| Input signals (1) Sync measurement input (TRIG)/Continuous measurement input (TRIG); switched from m (2) Bank selection input (BANK1-3) (3) Object stationary teaching (TEACH)/Object motion teaching (TEACH); switched from men | |
| Sensor Head interface Digital interface | |
| Image display TFT 1.8-inch LCD (Display dots: 557 x 234) | |
| Indicators • Judgment result indicator (OUTPUT, Colour: orange) • Inspection mode indicator (RUN, Cogreen) • Error indicator (ERR, Colour: red) • Ready status indicator (READY, Colour: blue) | our: |
| Operation interface • Cursor keys (up, down, left, right) • Setting key (SET) • Escape key (ESC) • Operating mode switching (slide switch) • Menu switching (slide switch) • Teaching/Display switching key (TEACH/VIEW) • Function keys (A to D, 4 inputs) | |
| Power supply voltage 20.4 to 26.4 VDC (including ripple) | |
| Current consumption 800 mA max. (with Sensor Head connected) | |
| Degree of protection IEC 60529, IP20 | |

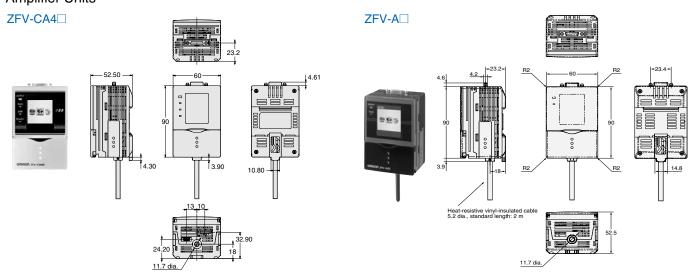
This is the sampling rate when logging images. To log measurement data only, use the ZS-DSU settings.

Dimensions



More colour heads are available. Please contact your OMRON dealer for the full range of ZFV-SC heads.

Amplifier Units



For full specifications and additional models please refer to www.omron-industrial.com Vision sensors - Cat.-No. Z205-E2-02A-X (ZFC Gray Scale Series) and E373-E2-01-X (ZFV Colour Series)

Smart Vision Sensors



www.never-fail.info

- Vision demonstrated live
- Inspiring applications



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