

# OMRON

NEW

## Vision sensor with built-in LCD monitor

"Smart Sensor" ZFX-C



*"Essential Innovation  
for Future Generations"*

realizing

# *Easy Vision Being Our Vision*

*The Omron's new ZFX-C Smart Vision Sensor is a total Image Processing system that includes everything from a camera with an integrated light source to an image-processing unit.*

*With Omron's newly developed proprietary measurement algorithm, the parameter can be set through only a few steps involving the operation of a touch-panel color monitor.*

*This "Smart" user interface provides simplicity of usage giving anyone all they can need to perform a complete image enhancement.*

*The new technology and style of the ZFX-C paves the way to a new era of vision sensors.*



# “Smart Recipe” with condensed know-how

World's first

*Capturing the image processing know-how Omron has accumulated over many years, the world's first “Smart Recipe” has radically reduced setting up time allowing for greater productivity.*

## One-touch automatic setting

The essential skills for image processing are now packaged into Omron's unique algorithm. The setting that traditionally required much fumbling is now made easy with the “select from auto listed options” using recipes. Lighting setup, the longtime problem for image processing, and the tricky parameter details involved in measurement setup, can now be done automatically with just the flip of a switch.



# Smart Recipe

Smart Recipe is an Omron invention of a 3-step setting procedure. By adopting a new algorithm to encapsulate "human know-how", the auto setup for lighting and measurement is now possible. Anyone can rapidly perform a high level of image processing.

## Step 1

### Choose best lighting

Patent pending

The know-how and trial and error that have been indispensable and required much time and effort up to now in lighting setup is now an automated process. By just selecting the best one from the candidate images automatically captured by changing the lighting pattern with the auto-lighting, anyone can easily find the optimal lighting. User can now easily determine settings for shiny work with high degrees of reflection and black monochrome work with low degrees of reflection, something very tricky before. In addition, when a more detailed setup is needed, the customized setup can be used to incorporate know-how.

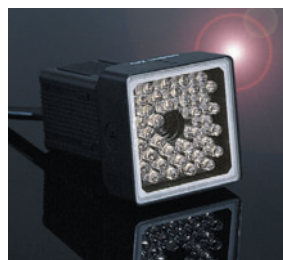


With automatic lighting setup, user can simply select the best image from thumbnail of candidate images.



A more detailed set up is possible with the customized lighting setup while looking at the image.

### Built-in lighting camera that enables an advanced automatic lighting

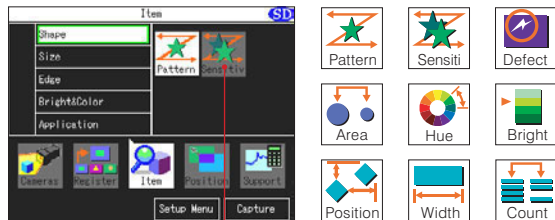


The Built-in lighting camera and improved controller brings about an even higher degree of automatic lighting. With this camera you can produce up to a maximum of 1296 patterns of reflective lighting making the chore of choosing lighting equipment unnecessary. The lighting setup can be managed as digital data so it is possible to store the optimal setup for each job, and it smoothly handles the changing of settings. It is also possible to fine-tune the customized setup can be added.



## Step2 Choose measurement icon

The measurement method can be specified by just choosing the icon from out of a total of 9 measurement items for different types of inspection.



Basic operations merely through selection of on-screen icons  
Intuitive operations

## Step3 Draw region, press and go

Just specify the region of interest and press Auto key and the system will determine the most suitable parameters for the target image.

Now anyone can easily perform a complex and advanced parameter setting which used to require special knowledge and cumbersome steps.

Customized setting is also possible by fine tuning the parameters automatically set up. The time required to set up parameters can be significantly reduced.

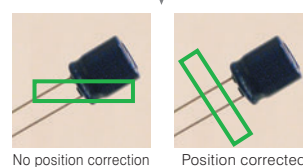
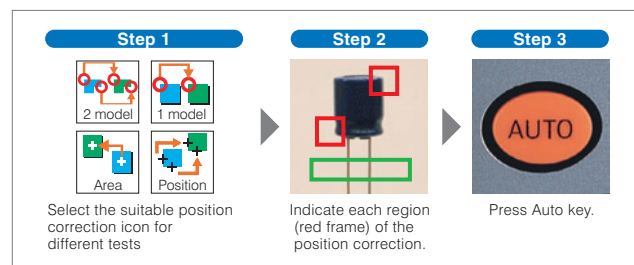


Appropriate filters and edge scan directions for width measurement can be automatically set by analyzing the target image.

## Easily adjusts position

### 3-step position correction

Even when the position of work changes due to the conveyer condition, the excellent position correction function can come into play allowing adjustment using the work contours, two stage position correction and so on. With the auto setup, position difference can be easily adjusted to enable stable measurement.



In response to the position difference, the measurement region is automatically adjusted.

# Tailored Measurement item

Including two shape measurement items, the system contains 5 categories and 9 types of Shape, Size, Edge, Bright and Hue, Application measurement items. It responds to the variety of inspection requirements in the manufacturing sites.

## Shape measurement item

### Pattern search

Fastest in the industry

The shape measurement is a fundamental algorithm for image processing. By adopting a new image processor, the pattern search achieves a balance in the three factors of speed, precision and stabilization, something that was an arduous task until now. It now supports a 360-degree revolving search and a sub-pixel processing of 1000 to 1 pixel units as well as a multi area searcher. The robust pattern search can respond to the multitude of inspects and measurements of any application.



A further improvement is the balance achieved in revolving searches that occur in pattern matching for a revolving work. The most time-consuming 360-degree revolving search can be performed with an excellent accuracy.

### Sensitive search

NEW

When it comes to the difficult processing of detecting small differences, the Omron's unique sensitive search matches work at a smallest detail and in doing so makes such detection all the more possible. It resists variations in position and density to capture even the smallest detail in the complex patterns.



It is possible to detect even the smallest differences in the work.

## Application specific measurement item

### Defect

It is used to detect smears, scratches, chipping and burrs on the work. Defects are displayed on the screen, which makes it ideal tool for visual inspection.



Almost indistinguishable scratches can be detected after enhancing contrast using the color filter.



Counts the number of scratches

## Size measurement item

### Region

Detects the existence of work within a region and measures its size based on the area to perform various classification.



LED illumination is determined based on the area of extracted color.



Smart sensor  
**ZFX-C**

**Bright and Hue measurement item**

**Hue**

NEW

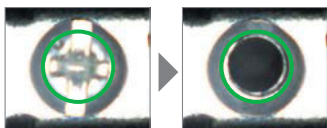
The three factors in color, i.e. hue, saturation and brightness value, are measured and digitalized. And whilst an accurate differentiation of the color is performed, it is also possible to measure the color variety with the deviation measurement function (with color camera connected).



The individual threshold for the hue, saturation and brightness value parameters can be set up so that even if one of them is different, it can be detected accurately and intensely. On the other hand, by expanding the range for the brightness value and saturation, and so on, it is possible to stabilize the color detection in the hue without any interference from illumination alterations.

**Bright**

Measures the brightness within a region. It can be used for checking the presence of a component, etc., by generating average density and density deviation values.

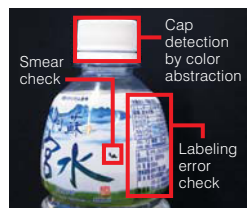


Based on the change in brightness, the presence of a screw (OK or NG) is determined.

**Functions to support optimal measurements**

**Up to 32 regions**

In one captured image, it is possible to measure a multiple up to 32 regions. When carrying out difficult inspection, it is possible to set-up a color filter and color extraction for each measurement item.



Measures three regions.

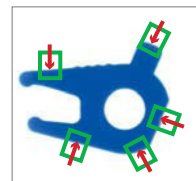
**Screen registration function**

It is possible to register the image used in the setup. When you use the live image during setup sometimes the set up is not correct due to position differences in the work. However, with the registered image saved in the SD memory card as a "master image for setup", it can be easily verified when abnormal measurements occur.

**Edge measurement item**

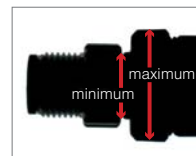
**Position**

The existence or not and the position of the edge is measured. Oblique edges can now be measured even in complex conditions and even more accurate position measurements can be taken. The peak bottom measurement function that can accurately capture the edges is now supported.



**Width**

The width of the edge is measured. By using the edge partitioning method, it is possible to measure the maximum and minimum width.



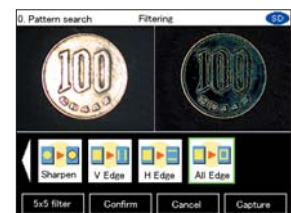
**Count**

The number of edges inside the area is counted. Based on the number of edges on the pre-registered good model, it counts the edges in the area and determines the correctness.



**Gray filtering setup using double screen**

For each measurement item, it is possible to run 8 types of gray filtering such as expansion and contraction to enable stable measurements. Through the "setup while looking" option that makes it possible to check the preview, the optimal gray filtering can be selected.



**Calculations function**

It is possible to make arithmetical calculations for measurement values, and calculations involving general functions, trigonometry, geometrical functions and logical functions. It is possible to setup internal variables, and complex calculations can be carried out.

# Visualized Controller

Smallest in class controller build in embedded LCD saves space and time.



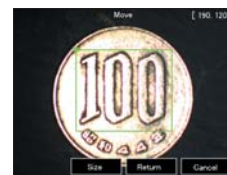
## Visualized setting and monitoring

Smallest in class

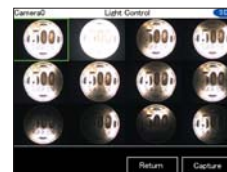
Despite its small form factor, the enlarged screen significantly improves the visibility and the ease of operation. The method of operation can be selected from 3way - the touch pen, key pad or console.



Enlarged screen enables wide range of views



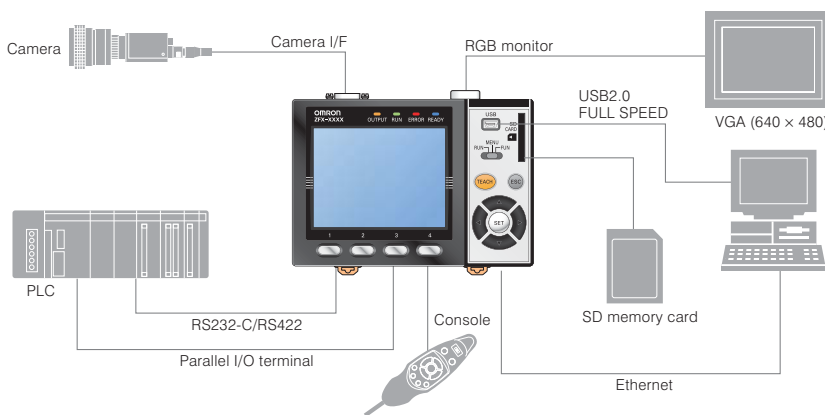
Simple setting with large screen



Overview with thumbnail screen

## Rich interface support

Automatically detects the connected camera and displays the appropriate menu. With rich selection of interface including parallel RS-232C/RS-422, USB 2.0, the extensibility is superior.







# Intensive camera solutions

8 types of cameras that can be selected for different types of work to achieve optimal measurement.

## Built-in lighting camera

Triple-speed camera (IP65)

Line up of 6 types of built-in lighting cameras that do not need lighting selection or setup. The color camera can respond to a wide range of work with a 5-150mm field of view. Through image compression and partial capturing, it can support a high-speed line.



ZFX-SR10 (monochrome)  
Field of view 5 ▶ 9 mm



ZFX-SC50 (color)  
Field of view 10 ▶ 50 mm  
(IP67 model available)



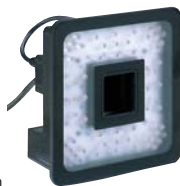
ZFX-SR50 (monochrome)  
Field of view 10 ▶ 50 mm



ZFX-SC90 (color)  
Field of view 60 ▶ 90 mm  
(IP67 model available)



ZFX-SC10 (color)  
Field of view 5 ▶ 9 mm



ZFX-SC150 (color)  
Field of view 80 ▶ 150 mm  
(IP67 model available)

## C-mount camera unit

NEW

Triple-speed camera

This product line includes C-mount camera that can select the lens to match the field. It can be used in combination with optional lighting such as transmitted lighting, low angle lighting and bar lighting, etc. to support different inspection types.



ZFX-SC  
(color)

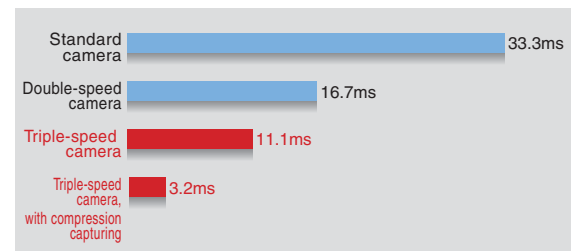


ZFX-S  
(monochrome)

## Innovative triple-speed camera

Fastest in the industry

Performs fast transfer of 11.1ms that are 3 times faster than standard cameras and 1.5 times faster than high-speed cameras while maintaining a resolution of the whole screen. In addition, a super speed, minimum 3.2ms transfer is possible with image compressions and partial capturing.



## Excellent ease of use

### Flexible installation

Flexible installation supported for different mounting site conditions. It can be mounted on DIN rail as well as on the control panel surface. (Optional panel mount adapter available.)

### Hybrid interface

A new interface that supports both parallel I/O and terminal platform to dramatically improve the ease of wiring.



# advanced Color Engine

The ZFX-C's advanced auto-color processing ability makes stable and accurate measurements a reality, even for usually difficult to detect contrast and low lighting work.



## Automatic color filter

Industry's first



Even for images clearly distinguishable in color, when converted to monochrome the contrast tends to become low. Color filter analyzer automatically selects the optimal color filter (auto color filter) based on the image analysis result to adjust the contrast, to allow for stable image measurement. Any intermediate color can be arranged for the color filter using custom settings.



## Choose desired color

NEW

### Simply select from the list of colors

It is now possible to run an automatic pickup of color, something that used to be a complex procedure, using simply the Auto key. The advanced color engine automatically detects the color distribution in the selected range and automatically lists up to 4 optional color pickup in the order of color area. After that, user can simply select the desired color to be pickup.



Specify the pickup area and press the Auto key to display 4 optional colors for pickup.

### Fine-tuning by using dual-screen

The auto color pickup can fine-tune each of the hue, saturation and brightness value. Using double screens, the source image and the color pickup image can be compared and adjusted. This enables easy and stable pickup of colors with low illumination (traditionally difficult to pickup) and colors with large variation. The efficiency of operation is greatly increased.



# Versatile support tool

The concept behind Smart Recipe that eradicates the pain of image processing has been leveraged in the system ramp-up and deployment.

## Image storing and re-measurement

Stores up to 100 files of image data in the main memory without slowing measurement speed. Images data can be re-measured so even with a high-speed line, for example, the results of the measurements can be checked at leisure afterwards.



## On-site fine adjustment

**NEW**

On site variety adjustment of work is essential. Without returning to the menu mode, the measurement region, color contrast setup and so on can be tuned in adjust mode, using double screen to compare with the original image. The measurement results of the stored images can also be displayed so the unnecessary rejects can be efficiently reduced.



Variety adjustment can be controlled simply using the adjust mode.

## Visualized monitoring and analysis

**NEW**

Through a list/individual view of measurement results, and a logging monitor display, user can easily understand the measurement situation. The results display can be chosen from 9 patterns including individual results view (upper left, upper middle), lists of results/region view (lower left, lower middle), list of results/All results view (upper right), and data list view (bottom right). The results can be reviewed in detail which is useful for statistical analysis.



### Password function

It is possible to set up a password that alters between operating mode and other. This protects against operational errors at the manufacturing site.

### Display capture function

Display images can be captured and stored in the SD memory card. Useful for report documentation.

## Ordering Information

### Controllers

| Appearance  | Power supply    | Circuit type | Model   |
|---|-----------------|--------------|---------|
| 1-camera model<br> | DC21.6 to 26.4V | NPN          | ZFX-C10 |
|   |                 | PNP          | ZFX-C15 |
| 2-camera model<br> |                 | NPN          | ZFX-C20 |
|   |                 | PNP          | ZFX-C25 |

### Cameras

| Appearance  | Type                 | Setting distance | Sensing area   | Model                                    | Remarks   |                 |
|---|----------------------|------------------|--|--|---|-----------------|
| <br>(ZFX-SC50) | Camera with lighting | Monochrome type  | 34mm to 49mm   | 4.9mm x 4.9mm to 8.9mm x 8.9mm(variable) | ZFX-SR10<br>ZFX-SR10R (See note.)                       | Cable length:2m |
|   |                      |                  | 38mm to 194mm  | 9.8mm x 9.8mm to 49mm x 49mm(variable)   | ZFX-SR50<br>ZFX-SR50R (See note.)                       |                 |
|   |                      | Color type       | 34mm to 49mm   | 4.9mm x 4.9mm to 8.9mm x 8.9mm(variable) | ZFX-SC10<br>ZFX-SC10R (See note.)                       |                 |
|   |                      |                  | 31mm to 187mm  | 9.8mm x 9.8mm to 49mm x 49mm(variable)   | ZFX-SC50<br>ZFX-SC50W(IP67)<br>ZFX-SC50R (See note.)    |                 |
|   |                      |                  | 67mm to 142mm  | 49mm x 49mm to 89mm x 89mm(variable)     | ZFX-SC90<br>ZFX-SC90W(IP67)<br>ZFX-SC90R (See note.)    |                 |
|   |                      |                  | 115mm to 227mm   | 89mm x 89mm to 148mm x 148mm(variable)   | ZFX-SC150<br>ZFX-SC150W(IP67)<br>ZFX-SC150R (See note.) |                 |
|   | Camera only          | Monochrome type  | The CCTV lens is selected according to the range of detection and the installation distance. | ZFX-S                                    | A Camera Cable is required.                             |                 |
|   |                      | Color type       |  | ZFX-SC                                   |   |                 |

Note. Equipped with a robot cable.

### Camera Cables

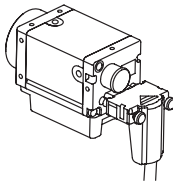
| Type   |  | Cable length | Model          |
|--|--|--------------|----------------|
| Camera Cable<br>(See note 1.)                | Normal type                                | 3m,8m        | ZFX-VS         |
|  | Robot cable type                           | 3m           | ZFX-VSR        |
| Right-angle<br>Camera Cable<br>(See note 2.) | Normal type<br>(bending direction: A)      | 3m,8m        | ZFX-VSLA 3M/8M |
|  | Robot cable type<br>(bending direction: A) | 3m           | ZFX-VSRLA 3M   |
|  | Normal type<br>(bending direction: B)      | 3m,8m        | ZFX-VSLB 3M/8M |
|  | Robot cable type<br>(bending direction: B) | 3m           | ZFX-VSRLB 3M   |

Note 1: It is necessary for ZFX-S and ZFX-SC. ZFX-SR\_/SC\_ is a cable drawing out type, it doesn't use it.

Note 2: Cable Bending Directions

Bending Direction A  
(Model numbers ending in "A")

The Cable bends  
downward at the  
Camera.

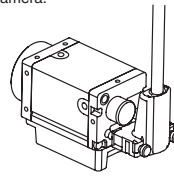


The Cable bends  
toward the front panel  
at the Controller.

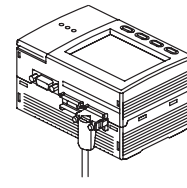


Bending Direction B  
(Model numbers ending in "B")

The Cable bends  
upward at the  
Camera.



The Cable bends  
toward the back panel  
at the Controller.



### Camera extension cable

| Type   |                                     | Cable length | Model                  |
|--|-------------------------------------|--------------|------------------------|
| Camera<br>Extension<br>Cable                         | Normal type                         | 3m           | ZFX-XC3A (See note.1)  |
|  |                                     | 8m           | ZFX-XC8A (See note.1)  |
|  | Robot cable type                    | 3m           | ZFX-XC3AR (See note.1) |
| Camera<br>Extension Cable<br>(long-distance<br>type) | Extension cable (See note 2.)       | 15m,25m      | ZFX-XC_BR              |
|  | Digital equalizer (camera side)     | 0.2m         | ZFX-XEQ01              |
|  | Digital equalizer (Controller side) | 0.2m         | ZFX-XEQ02              |

Note: The total combined length of the cables connected to the Controller and camera must not exceed 28.4 m (including the camera cable).

Note 1: Up to two camera extension cables can be connected to the camera cable as long as the total cable length between the controller and the camera does not exceed 19 m.

Note 2: Connect the ZFX-VS□□/VSR□□ Camera Cable to the Camera and connect the ZFX-XC□A/XC□AR Extension Cable to the Controller.

### Other cable

| Type               | Cable length | Model      |
|--------------------|--------------|------------|
| Parallel I/O Cable | 2m,5m        | ZFX-VP     |
| RS-232C Cable      | 2m           | ZFX-XPT2A  |
|                    | 5m           | ZFX-XPT5A  |
|                    | 15m          | ZFX-XPT15A |
| RS-422 Cable       | 2m           | ZFX-XPT2B  |
|                    | 5m           | ZFX-XPT5B  |
|                    | 15 m         | ZFX-XPT15B |
| Monitor Cable      | 2m,5m        | FZ-VM      |
| Special USB cable  | 1.8 m        | ZFX-XUSB   |

### Accessories

| Type                               | Model   |           |
|------------------------------------|---|-----------|
| Console                            | ZFX-KP (2m / 5m)  |           |
| LCD Monitor                        | FZ-M08  |           |
| Panel Mount Adapters               | ZFX-XPM   |           |
| Optional Lighting<br>(See note 1.) | bar lighting  | ZFV-LTL01 |
|                                    | bar double-lighting   | ZFV-LTL02 |
|                                    | bar low-angle lighting  | ZFV-LTL04 |
|                                    | light source for<br>through beam                              | ZFV-LTF01 |
| CCTV Lenses /Extension Tubes       | 3Z4S-LE series  |           |
| External Lighting                  | 3Z4S-LT series  |           |
| Strobe Controller (See note 2.)    | Manufactured by MORITEX Corporation<br>3Z4S-LT MLEK-C100E1TSX |           |

Note 1: It is possible to ZFX-SC50 and ZFX-SC90 use it.

Note 2: It is possible to ZFX-S and ZFX-SC use it. It uses it so that the controller may control an external lighting. The Strobe Controller cannot be connected when using a Right-angle Camera Cable.

## Specifications

### Controllers

| Item                             |                                   | ZFX-C20  | ZFX-C25   | ZFX-C10H | ZFX-C15H  | ZFX-C10                          | ZFX-C15    |
|----------------------------------|-----------------------------------|--|---|----------|---|----------------------------------|------------|
| Number of connected cameras      |                                   | 2  |   | 1        |   |                                  |            |
| Connectable camera               |                                   | ZFX-SR_/SC_/S/SC   |   |          |   |                                  |            |
| Processing resolution            |                                   | When ZFX-SR_/SC_ is connected:464 (H) x464 (V)<br>When ZFX-S/SC is connected:608 (H) x464 (V)  |   |          |   |                                  |            |
| Display                          | LCD monitor                       | 3.5" TFT color LCD (320 x 240 pixels)  |   |          |   |                                  |            |
|                                  | Indicator                         | "Measuring" indicator (color: green): RUN<br>Trigger indicator (color: blue): ENABLE<br>Judgment indicator (color: orange): OUTPUT<br>Error indicator (color: red): ERROR                        |   |          |   |                                  |            |
| External I/F                     | Parallel interface                | Input  | 12 points (RESET, DSA, DI0 to 8, TRIG)  |          |   |                                  |            |
|                                  |                                   | Output   | 23 points (OR, ERROR, RUN, ENABLE, GATE, STGOUT0 to 1 (*1), DO0 to 15)  |          |   |                                  |            |
|                                  |                                   | Circuit type   | NPN   | PNP      | NPN   | PNP                              | NPN        |
|                                  | Serial interface                  | USB2.0   | 1 port, FULL SPEED, MINI-B connector  |          |   |                                  |            |
|                                  |                                   | RS-232C  | 1 port, max. 115200 bps (cannot be used simultaneously with RS-422 interface)   |          |   |                                  |            |
|                                  |                                   | RS-422   | 1 port, max. 115200 bps (cannot be used simultaneously with RS-232C interface)  |          |   |                                  |            |
|                                  | Network communications            | Ethernet   | 1 port, 100BASE-TX/10BASE-T   |          |   |                                  |            |
|                                  | Monitor output                    | Analog RGB output, 1 ch (resolution VGA: 640 x 480)  |   |          |   |                                  |            |
| Memory card I/F                  | SD card slot 1 ch                 |  |   |          |   |                                  |            |
| Operation I/F                    |                                   | Touch panel, key operation, console connection   |   |          |   |                                  |            |
| Main functions                   | Number of registered banks        |  | 32 banks  |          |   |                                  |            |
|                                  | Number of setup items             |  | 128 items/1 bank  |          |   | 32 items/1 bank                  |            |
|                                  | Measurement items                 | Shape inspection   | Pattern search, sensitive search, flexible search, grappic search   |          |   | Pattern search, sensitive search |            |
|                                  |                                   | Size inspection  | Area, labeling  |          |   | Area                             |            |
|                                  |                                   | Edge inspection  | Position, width, count, angle   |          |   | Position, width, count, angle    |            |
|                                  |                                   | Brightness/color inspection  | Brightness, HUE   |          |   | Brightness, HUE                  |            |
|                                  |                                   | Application-based inspection   | Defects, grouping   |          |   | Defects                          |            |
| Position correction              |                                   | 1 model search, 2 model search, position, area, labeling, angle  |   |          | 1 model search, 2 model search, position, area, angle |                                  |            |
| Additional functions             | Image memory function             |  | Max. 100 images (when 2 cameras are connected, 50 images/camera)  |          |   |                                  |            |
|                                  | Analysis function                 |  | Logging monitor   |          |   | ---                              |            |
| Menu language                    |                                   | Japanese/English (can be switched)   |   |          |   |                                  |            |
| Ratings                          | Power supply voltage              |  | 21.6 to 26.4 VDC (including ripple)   |          |   |                                  |            |
|                                  | Current consumption               |  | 1.5 A max.  |          | 1.2 A max.  |                                  | 1.0 A max. |
|                                  | Insulation resistance             |  | Across all lead wires and controller case: 20 MΩ (by 250 V megger)  |          |   |                                  |            |
|                                  | Dielectric strength               |  | Across all lead wires and controller case, 1000 VAC, 50/60 Hz, 1 min  |          |   |                                  |            |
| Operation environment robustness | Ambient temperature range         |  | Operating: 0 to + 50°C, Storage: -15 to +60°C (with no icing or condensation)   |          |   |                                  |            |
|                                  | Ambient humidity range            |  | Operating and storage: 35% to 85% (with no condensation)  |          |   |                                  |            |
|                                  | Ambient atmosphere                |  | No corrosive gases allowed  |          |   |                                  |            |
|                                  | Degree of protection              |  | IP20 (IEC60529)   |          |   |                                  |            |
|                                  | Vibration resistance (durability) |  | Vibration frequency: 10 to 150 Hz Single-amplitude: in0.35 mm<br>Acceleration: 50 m/s <sup>2</sup> 10 times for 8 minutes in X, Y, and Z directions |          |   |                                  |            |
|                                  | Shock resistance (destructive)    |  | 150 m/s <sup>2</sup> 3 times each in 6 directions (up/down, left/right, forward/backward)   |          |   |                                  |            |
| Material                         |                                   | Case: Polycarbonate (PC), Plate face: PMMA   |   |          |   |                                  |            |
| Weight                           |                                   | Approx. 650 g  |   |          |   | Approx. 620 g                    |            |
| Accessories                      |                                   | Touch pen (ZFX-TP), Exhaust unit (ZFX-EU), Terminal block adapter (ZFX-XTB)<br>Terminal block adapter mounting screws (4 p'ces) , Ferrite core (2 p'ces), Instruction Sheet, and Power connector |   |          |   |                                  |            |

\*1 Only STGOUT0 is functional on the ZFX-C10H/C15H/C10/C15.

## Specifications

### Cameras

| Item  | ZFX-SR10 /SR10R  | ZFX-SR50 /SR50R   | ZFX-SC10 /SC10R   | ZFX-SC50 /SC50W /SC50R  | ZFX-SC90 /SC90W /SC90R  | ZFX-SC150 /SC150W /SC150R   |
|---|--|---|---|---|---|---|
| Detection range (H x V)  | 4.9 mm x 4.9 mm to 8.9 mm x 8.9 mm (variable)  | 9.8 mm x 9.8 mm to 49 mm x 49 mm (variable)   | 4.9 mm x 4.9 mm to 8.9 mm x 8.9 mm (variable)                                     | 9.8 mm x 9.8 mm to 49 mm x 49 mm (variable)   | 49 mm x 49 mm to 89 mm x 89 mm (variable)   | 89 mm x 89 mm to 148 mm x 148 mm (variable)   |
| Setting distance (L)  | 34 mm to 49 mm   | 38 mm to 194 mm   | 34 mm to 49 mm  | 31 mm to 187 mm   | 67 mm to 142 mm   | 115 mm to 227 mm  |
| Relationship between setting distance and detection range   |   |          |  |   |    |  |
| Image capture element   | All-pixel capture inter-line transfer type 1/3" CCD (monochrome)   |   | All-pixel capture inter-line transfer type 1/3" CCD (color)                       |   |   |   |
| Effective number of pixels  | 659(H) x 494 (V)   |   |   |   |   |   |
| Pixel size  | 7.4 μm (H) x 7.4 μm (V)  |   |   |   |   |   |
| Shutter speed   | 1/170s to 1/20000s   |   |   |   |   |   |
| Partial function (partial capture)  | OFF  |   | 1/2 partial, 1/4 partial  |   |   |   |
| Image rate function   | Fine, Normal, High speed   |   | Not available   |   |   |   |
| Frame rate (at capture of entire screen)  | 90 fps   |   |   |   |   |   |
| Lens mount  | — (with Lens)  |   |   |   |   |   |
| Lighting  | Lighting method  | Pulse lighting  |   |   |   |   |
|   | LED  | Red LED   |   | White LED   |   |   |
|   | Type   | Direct lighting   |   |   |   |   |
|   | Guide light  | Available (center, measurement region)  |   | Not available   |   |   |
|   | Optional lighting I/F  | Not available   |   | Available (ZFV-LT Series)   |   | Not available   |
| Ratings   | Indicator Class*1  | —   | Class 1   | Class 2   | Class 2   | Class 1   |
|   | Power supply voltage (supplied from Controller)  | 15 VDC  |   | 15 VDC, 48 VDC  |   |   |
|   | Current consumption  | Approx. 200 mA  |   | Approx. 350 mA (15 VDC: approx. 150 mA, 48 VDC: approx. 200 mA) (including current consumption when optional lighting is connected)   |   |   |
| Operation environment robustness  | Ambient temperature range  | Operating: 0 to + 40°C, Storage: -20 to +65°C (with no icing or condensation)             |   |   |   |   |
|   | Ambient humidity range   | Operating and storage: 35% to 85% (with no condensation)                                  |   |   |   |   |
|   | Ambient atmosphere   | No corrosive gases allowed  |   |   |   |   |
|   | Degree of protection   | IP65 (IEC60529)   |   | ZFX-SC___: IP65 (IEC60529), ZFX-SC___W: IP67 (IEC60529)   |   |   |
|   | Dielectric strength  | 1000 VAC 50 Hz/60 Hz 1 min  |   |   |   |   |
|   | Vibration resistance (durability)  | 10 to 150 Hz Single-amplitude 0.35 mm 10 times for 8 min each in X, Y, and Z directions   |   |   |   |   |
|   | Shock resistance (destructive)   | 150 m/s <sup>2</sup> 3 times each in 6 directions (up/down, left/right, forward/backward) |   |   |   |   |
| Connection method   | Cable built-in type (cable length: 2 m)  |   |   |   |   |   |
| Cable type  | ZFX-SC□□□□/SC□□□□W/SR□□□□: Normal cable<br>ZFX-SC□□□□R/SR□□□□R: Robot cable  |   |   |   |   |   |
| Material  | ZFX-SR10/SR50/SC10/SC50/SC50W/SC90/SC90W/SC150/SC150W/SC150R:<br>Case: ABS, mounting fixture: PBT<br>ZFX-SR10R/SR50R/SC10R/SC50R/SC90R:<br>Case: ABS, Mounting fixture (base): Aluminum, Mounting fixture (bracket): Stainless steel   |   |   |   |   |   |
| Weight  | ZFX-SR10/SR50/SC10: Approx. 200 g (including mounting fixture and cable)<br>ZFX-SR10R/SR50R/SC10R: Approx. 270 g (including mounting fixture and cable)<br>ZFX-SC50/SC50W: Approx. 270 g (including mounting fixture and cable)<br>ZFX-SR50R: Approx. 400 g (including mounting fixture and cable) |   |   |   | ZFX-SC90/SC90W:<br>Approx. 300 g (including mounting fixture and cable)<br>ZFX-SC90R:<br>Approx. 400 g (including mounting fixture and cable) |   |
| Accessories   | ZFX-SR10/SR50/SC10:<br>Mounting fixture (ZFV-XMF) 1 p'ce, Ferrite core 2 p'ces, Instruction Sheet<br>ZFX-SR10R/SR50R/SC10R:<br>Mounting fixture (ZFV-XMF3) 1 set, Ferrite core 2 p'ces, Instruction Sheet  |   |   | ZFX-SC50/SC50W/SC90/SC90W:<br>Mounting fixture (ZFV-XMF2) 1 p'ce, Ferrite core 2 p'ces, Warning label 1, Instruction Sheet<br>ZFX-SC50R/90R:<br>Mounting fixture (ZFV-XMF4) 1 set, Ferrite core 2 p'ces, Warning label 1, Instruction Sheet |   | Ferrite core 2 p'ces, Instruction Sheet   |

\*1: Applicable standards IEC60825-1:1993 +A1:1997 +A2:2001, EN60825-1:1994 +A2:2001 +A1:2002

## Specifications

### Cameras

| Item   | ZFX-S<br>(monochrome type)  | ZFX-SC<br>(color type)  |
|--|---|---|
| Detection range (H x V)<br> | The CCTV lens is selected according to the detection range and the setting distance.                  |   |
| Setting distance (L)   |   |   |
| Relationship between setting distance and detection range  |   |   |
| Image capture element  | All-pixel capture inter-line transfer type 1/3" CCD (monochrome)                                      | All-pixel capture inter-line transfer type 1/3" CCD (color)                             |
| Effective number of pixels   | 659(H) x 494 (V)  |   |
| Pixel size   | 7.4 μm (H) x 7.4 μm (V)   |   |
| Shutter speed  | 1/170s to 1/20000s  |   |
| Partial function (partial capture)   | Not available   | 1/2 partial, 1/4 partial  |
| Image rate function  | Fine, Normal, High speed  | Not available   |
| Frame rate (at capture of entire screen)   | 90 fps  |   |
| Lens mount   | C mount   |   |
| Lighting   | Lighting method   | —   |
|  | LED   |   |
|  | Type  |   |
|  | Guide light   |   |
|  | Optional lighting I/F   |   |
| Indicator Class*1  | —   |   |
| Ratings  | Power supply voltage (supplied from Controller)   | 15 VDC, 48 VDC  |
|  | Current consumption   | Approx. 160 mA  |
| Operation environment robustness   | Ambient temperature range   | Operating: 0 to + 50°C,<br>Storage: -25 to +65°C<br>(with no icing or condensation)     |
|  | Ambient humidity range  | Operating and storage: 35% to 85% (with no condensation)                                |
|  | Ambient atmosphere  | No corrosive gases allowed  |
|  | Degree of protection  | IP20 (IEC60529)   |
|  | Dielectric strength   | 500VAC 50 Hz/60Hz 1 min   |
|  | Vibration resistance (durability)   | 10 to 150 Hz Single-amplitude 0.35 mm 10 times for 8 min each in X, Y, and Z directions |
| Shock resistance (destructive)   | 150 m/s <sup>2</sup> 3 times each in 6 directions (up/down, left/right, forward/backward)             |   |
| Connection method  | Connector connection type (camera cable ZFX-VS/VSR required)  |   |
| Cable type   | ZFX-SC□□□/SC□□□W/SR□□: Normal cable<br>ZFX-SC□□□R/SR□□R: Robot cable                                  |   |
| Material   | Case: Aluminum die-cast,<br>Cover: Zinc-plated copper plate 0.5 mm thick,<br>Camera mounting base:ABS |   |
| Weight   | Approx. 80 g  |   |
| Accessories  | Instruction Sheet   |   |

\*1: Applicable standards IEC60825-1:1993 +A1:1997 +A2:2001, EN60825-1:1994 +A2:2001 +A1:2002



## CCTV Lenses

### Optical Graph

If using the ZFX-S/SC Camera (Camera only), refer to the optical graph below and select the lens and Extension Tubes. The lens to be selected will depend on the size of the measurement object and the camera distance.



### Meaning of Optical Graph

The X axis of the graph shows the field of vision L (mm), and the Y axis shows the camera distance A (mm).



### CCTV Lenses

| Lens model   | 3Z4S-LE SV-0614V   | 3Z4S-LE SV-0813V   | 3Z4S-LE SV-1214V   | 3Z4S-LE SV-1614V   | 3Z4S-LE SV-2514V   | 3Z4S-LE SV-3518V   | 3Z4S-LE SV-5018V   | 3Z4S-LE SV-7527V   | 3Z4S-LE SV-10035V  |
|--------------|--|--|--|--|--|--|--|--|--|
| Appearance   |  29 dia. 30.0 |  28 dia. 34.0 |  29 dia. 29.5 |  29 dia. 24.0 |  29 dia. 24.5 |  29 dia. 33.5 |  32 dia. 37.0 |  32 dia. 42.0 |  32 dia. 43.9 |
| Focal length | 6 mm   | 8 mm   | 12 mm  | 16 mm  | 25 mm  | 35 mm  | 50 mm  | 75 mm  | 100 mm   |
| Brightness   | F1.4   | F1.3   | F1.4   | F1.4   | F1.4   | F1.8   | F1.8   | F2.7   | F3.5   |
| Filter size  | M27 P0.5   | M25.5 P0.5   | M27 P0.5   | M27 P0.5   | M27 P0.5   | M27 P0.5   | M30.5 P0.5   | M30.5 P0.5   | M30.5 P0.5   |

### Extension Tubes

|          |   |
|----------|---|
| Model    | 3Z4S-LE SV-EXR  |
| Contents | Set of seven tubes (0.5 mm, 1.0 mm, 2.0 mm, 5 mm, 10 mm, 20 mm, and 40 mm)<br>Maximum outer diameter: 30 mm |

\*Do not use the 0.5-mm, 1.0-mm, and 2.0-mm Extension Tubes next to each other.

These Extension Tubes are placed over the threaded section of the Lens or other Extension Tube. If more than one them are used together, the connection of the threaded section may not be secure.

\*Reinforcement is required to protect against vibration when Extension Tubes exceeding 30 mm are used.



Cameras

ZFX-SR10/SR50



ZFX-SR10R/SR50R



ZFX-SC10



ZFX-SC10R



ZFX-SC50/SC50W

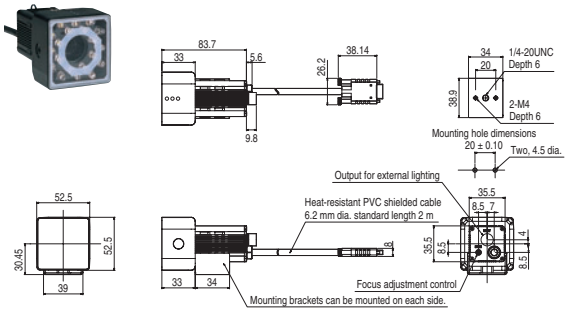


ZFX-SC50R



**Cameras**

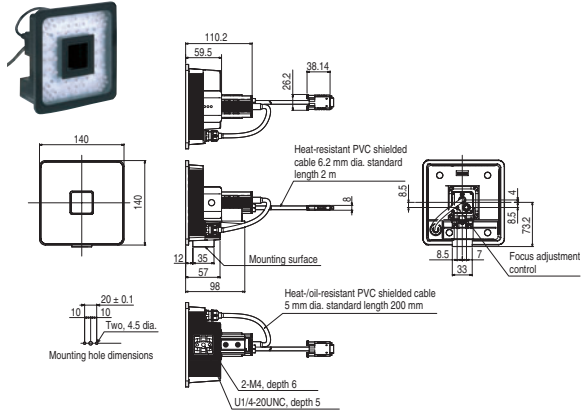
**ZFX-SC90/SC90W**



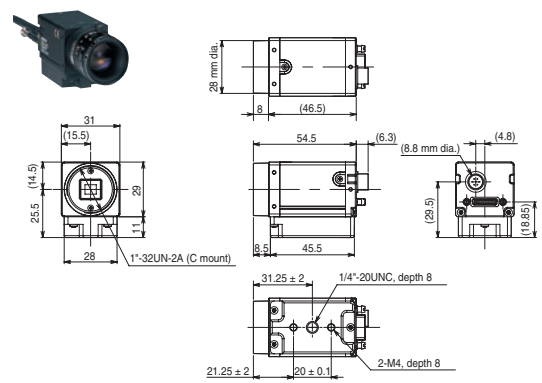
**ZFX-SC90R**



**ZFX-SC150/SC150W**

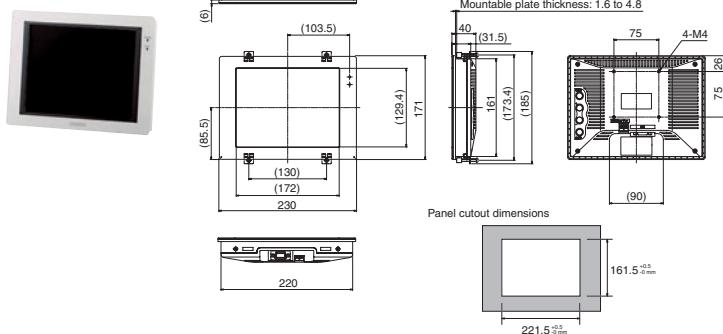


**ZFX-S/SC**



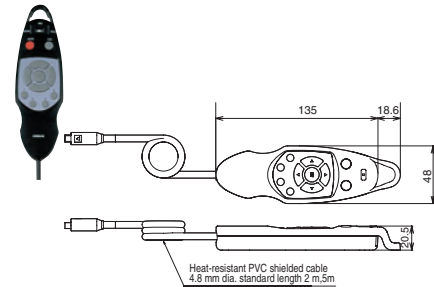
**LCD Monitor**

**FZ-M08**



**Console**

**ZFX-KP**







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