

Vision Sensor

Flagship Model  
FZ3 Series

5M  
camera

HDR

PANORAMA

Trape-  
zoidal  
Correction

Real  
Color

2

OMRON



# TOP SPEED

Industry's First Multi-task Processing System Offering  
Greatest Sensing Performance

FZ3-900 Series



NEW

realizing



# Speed Beyond Expectation



## Significantly Shorter Inspection / Startup Time Thanks to Dual Mega ARCS Engines and Greatest Sensing Performance

The manufacturing environment is changing every second.

OMRON's FZ3-900 series is a vision sensor system perfect for manufacturers who wish to flexibly meet these changing needs to make better products.

Greatest Sensing Performance of FZ3 + Dual Mega ARCS Engines.

The industry's first multi-task processing, the FZ3-900 series not only realizes fast, accurate inspection / measurement flows, but it significantly reduces man-hours and allows more efficient introduction of your vision sensor system as well as its operation from setting adjustment to data collection and analysis.

All inspection steps become faster, while the startup time and initial cost are reduced, which means that the FZ3-900 series vision sensor adds value to your entire manufacturing process.



## Fastest Processing

### Quicker measurement time

Adopting the industry's first parallel processing algorithms, the FZ3-900 series significantly reduces the total processing time from image input to result output.

High speed mode(parallel operation) ▶ p5

### Trigger intervals

OMRON's unique multi-input function enables ultra-high speed processing. Triggers are input at one-half the intervals of a comparable system, resulting in double the tact performance one-half the tact time.

High speed mode(single line) ▶ p5

## First-ever Multi-task Processing

### One controller performs inspections that normally require two units

One controller can independently process triggers for multiple lines. This feature not only significantly reduces the initial equipment cost, but you also need the installation space for only one unit.

Multi-line random-trigger mode ▶ p6

### Faster acquisition of more image measurement data

100% image measurement logging is possible even in inspection processes requiring high accuracy, high speed and multiple cameras. Inspection images can be saved as quality data and utilized in developing suitable manufacturing methods.

High speed logging mode ▶ p6

### Zero downtime for setting adjustment

Even when a defect or abnormal trend occurs, you can check the condition and adjust the relevant settings without stopping the line.

Non-stop adjustment mode ▶ p7

## Greatest Sensing Performance

### Dynamic range Simple lighting environment for ideal imaging

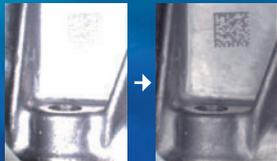


Image from a normal camera      Image from a HDR camera

The conventional difficulty in setting and adjusting lighting conditions is ascribed to the limited dynamic ranges of cameras. FZ3's HDR (High Dynamic Range) function has achieved a high dynamic range, 5000:1 maximum. This function solves existing problems in setting for lighting.

High Dynamic Range (HDR) function ▶ p8

### High resolution High accuracy & wide measurement field



2448 x 2044 pixels

The FZ3-900 series is equipped with a camera offering industry's highest resolution of 5 million pixels. More precise inspections and measurements are enabled by measuring high-resolution images with an advanced image-processing algorithm.

5 million-pixel camera ▶ p10

### Detecting edges and scratches by slightest color differences



Edges are detected reliably even when the contrast between the background and subject is low.

An entirely new imaging technology where a total of 16.77 million colors are captured in a RGB 256 full-color mode for high-speed processing. Color information is processed exactly the same way as when the subject is viewed by human eyes, which means that colors can be accurately differentiated even when the contrast between the background and work is low or the color difference is small.

Real color sensing ▶ p15

# Only Possible with Multi-task System

## Industry's Fastest Inspection & Measurement Processing

[ Patent Pending ]

### Industry's fastest **Dual Mega ARCS Engines**



The FZ3-900 series is equipped with Dual Mega ARCS Engines to process data twice as fast as when one Mega ARCS Engine is used. This engine achieves multi-task, high-speed processing not heretofore possible.

With conventional serial systems, each process can not be started until the previous process is completed. Under the Dual Mega ARCS architecture, two engines perform multiple tasks in parallel to dramatically reduce the inspection time. As a result, you can process more data over a shorter time compared to conventional systems.

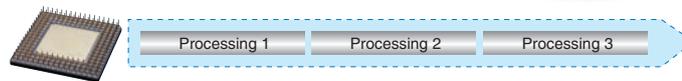


Industry's fastest CPU

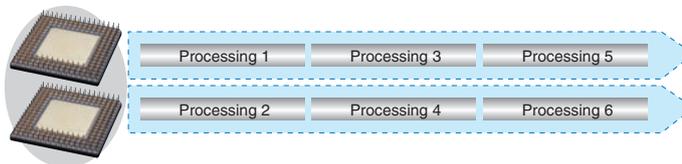
P.B.S. architecture

Dual Mega ARCS

#### [Conventional processing]



#### [Dual processing]



**Only the Dual Mega ARCS architecture can realize a completely parallel processing of measurement, adjustment and logging tasks!**

The key feature of Dual Mega ARCS Engines is that they enable completely parallel processing. Parallel processing not only speeds up inspection, but it also allows the system to behave like having two brains (heads) by letting you inspect two completely different lines with a single vision sensor or adjust parameters during inspection.



#### Dual processing of <measurement x measurement>



#### Perfect for applications requiring inspection speed

##### [1] High speed mode (parallel operation)

One measurement flow is divided into two to process the two sub-flows in parallel ▶ P. 5

##### [2] High speed mode (single line)

The conventional multi-input function has been improved to achieve even shorter trigger input intervals ▶ P. 5

#### Two different inspections with a single unit

##### [3] Multi-line random-trigger mode

Two measurement flows can be processed independently ▶ P. 6

#### Dual processing of <measurement x logging>



#### Saving all inspection images

##### [4] High speed logging mode

Measured images can be saved to an external memory device without affecting the measurement time ▶ P. 6

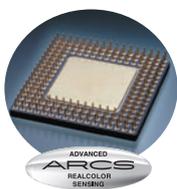
#### Dual processing of <measurement x adjustment>



#### Adjusting and checking settings without stopping production operation

##### [5] Non-stop adjustment mode

You can adjust flows and setting parameters during measurement ▶ P. 7



#### What is ARCS?

Short for "Advanced Real Color Sensing," ARCS is OMRON's patented imaging engine capable of processing images in real colors. The FZ3 series real color processing captures and quickly processes vast amounts of color information to achieve ideal sensing close to what human eyes can. It realizes accurate, stable inspection unthinkable with simple filtering. The ARCS processing capability continues to advance with the progress of the FZ series.

▶ P. 5 Real Color Sensing

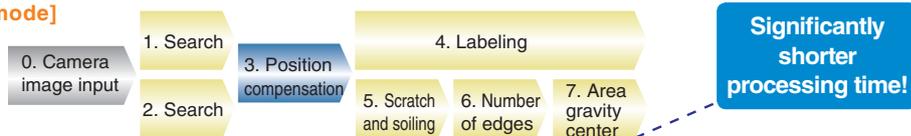
## Fastest measurement Highspeed mode (parallel operation)

Multiple measurements are processed in parallel with the system making decisions automatically to minimize the total measurement processing time from image input to result output. This significantly reduces the time to output result following a trigger input. This feature is ideal for inspections where more data must be processed or higher resolution is needed.

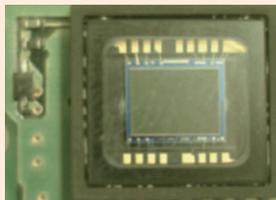
### [Conventional flow]



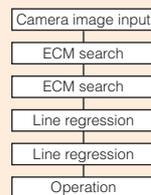
### [Flow in high speed mode]



### CCD alignment inspection



(Example) The flow shown below reduces the processing time by 47%



Parallel measurement flows significantly reduce the measurement time. This function is particularly useful in inspections using high-pixel camera that otherwise take a long measurement time.

#### Effect

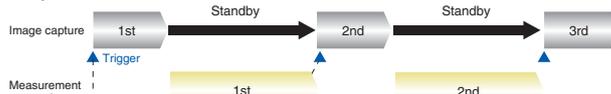
- A shorter tact time can be achieved after consolidating lines or when the utilization ratio is to be improved at subsequent production increases.
- Alignment data and other measurement results can be sent to subsequent processes more quickly.

## Short trigger intervals High speed mode (single line)

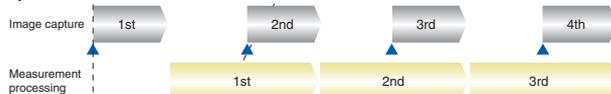
OMRON's unique multi-input function has become more advanced. Combined with the parallel processing capability of Dual Mega ARCS Engines, this function halved the trigger intervals of conventional systems. You can add inspection items without affecting the current processing time, which gives you scalability to meet future needs.

### [Conventional system]

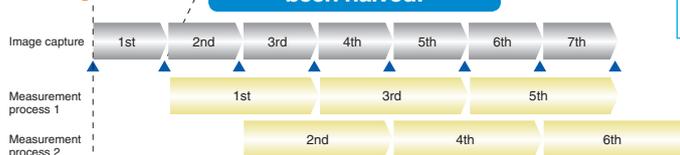
#### ■ Without multi-input



#### ■ With multi-input



### [High speed mode]



#### Issues

Camera images can also be captured during measurement. If image inputs exceed the buffer capacity, however, trigger intervals cannot be shortened because the minimum trigger interval depends on the measurement processing time.

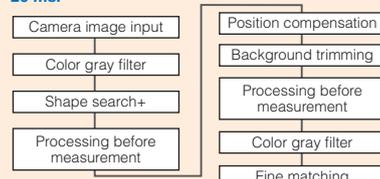
#### Resolution

Parallel measurement processing halves the trigger intervals of conventional systems. As a result, the inspection tact time is also reduced to a half.

### Appearance inspection of caps



(Example) The flow shown below halves the trigger intervals of conventional system to only 26 ms.



The processing flows for first and second triggers are processed in parallel to halve the trigger interval.

#### Effect

Shorter trigger intervals shorten the inspection cycle time.

# Benefit of a Multi-task System

## Reduce the time and cost for setup and operation

### One unit performs inspections that normally require two units **Multi-line random trigger mode**

Conventional imaging systems cannot perform two inspection processing simultaneously. With Dual Mega ARCS Engines, one controller accepts two trigger inputs simultaneously or randomly to process two different setups parallelly or independently.



#### Issues

Before, two controllers were needed to inspect two locations, processes or lines within the required tact time, which added to introduction cost.

#### Resolution

With the FZ3-900 series, on the other hand, two triggers can be input randomly to run two independent inspection processing in parallel.

#### Random inspection of lines positioned close to each other

Even when the timing of work arrival is not at constant intervals, they can be inspected with only one controller.



#### Simultaneous inspection of two locations

This mode is ideal for applications where triggers are not input simultaneously or constantly, such as when the top surface is inspected with a single trigger and side faces with four triggers.



#### Effect

You can reduce the number of controllers to be installed to save installation space, introduction cost and current consumption.

### All images can be saved even during measurement **High speed logging mode**

Complete parallel processing of measurement and logging means you can also connect high-speed, large-capacity (up to 2 terabytes) hard disk drives. Accordingly, you can save all images on high-speed tact lines, which was difficult to do with conventional systems (\*1).

#### [Conventional system]

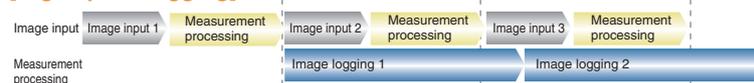
##### ■ Priority on measurement processing



##### ■ Priority on image logging



#### [High speed logging]



All images are saved.

\*1 All images can be saved under the following conditions:  
 •300,000-pixel camera x 1 unit . Measurement time: 33 ms  
 •Images can be saved continuously for approx. one week when a 2-terabyte HDD is used (based on 8 hours of operation a day).

#### Issues

Since logging was not possible during measurement, the user had to choose either measurement or logging. Accordingly, not all images could be saved or image input triggers had to be delayed depending on the measurement trigger intervals.

#### Resolution

Measurement and image logging are processed completely in parallel. As a result, you can save all images.

Defect inspection on a new product or a line adopting a new manufacturing method



Printing inspection in automobile assembly processes



All images you have saved can be utilized for trend analysis to help establish an appropriate manufacturing method quickly for a new product or a line adopting a new manufacturing method.

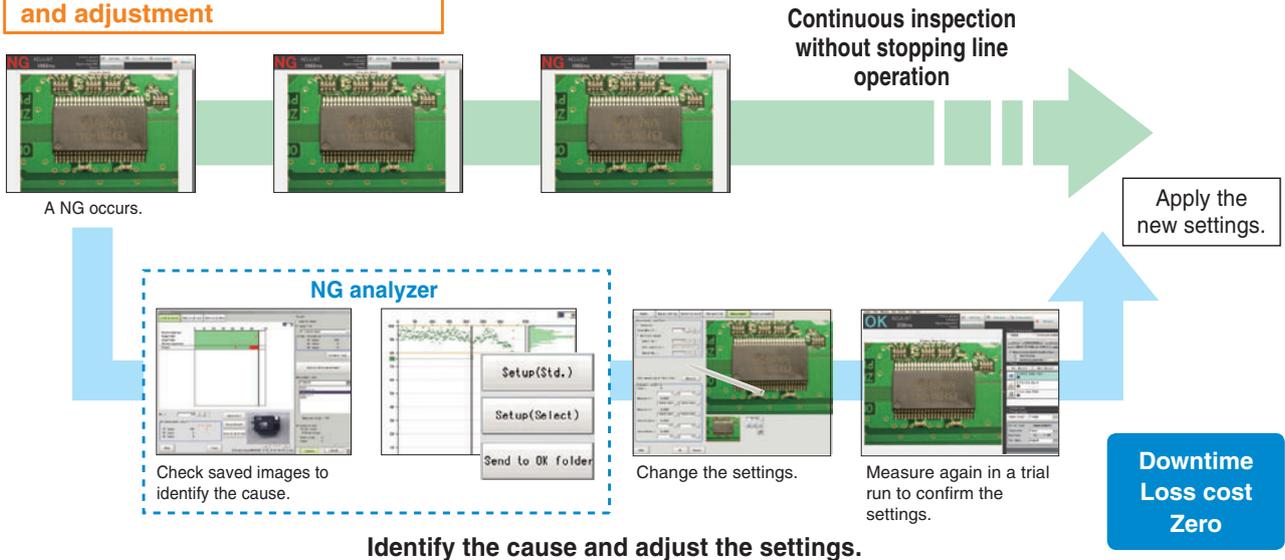
#### Effect

- When a NG occurs, the cause can be identified and remedial actions taken quickly.
- Saving all images leads to more efficient traceability control.

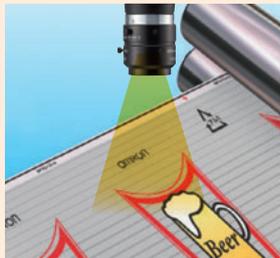
## Zero downtime for setting adjustment Non-stop adjustment mode

You can check conditions and reconfigure settings while measurement is still in progress if dimensional variations of works, changes in external environment, etc., require adjustments and checks. Since adjustment is possible without stopping the line/inspection, you can eliminate downtime, need to add visual inspections to identify uninspected products, and cost increase associated with them.

### Parallel processing of inspection and adjustment



### Printing / soiling inspection of sheets



Loss cost can be reduced. Ideal for mass-production processes with a higher unit production volume or 24-hour lines.

#### Effect

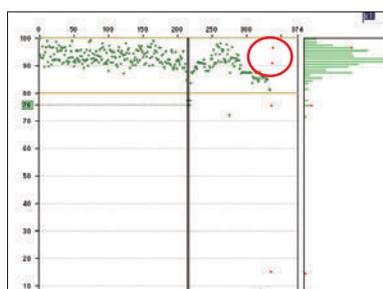
- Results can be checked and adjustment can be made with zero downtime.
- Because the line is not stopped, there is less idle time associated with restarting of the line.

## Doubly effective when combined with the Non-stop adjustment mode NG analyzer

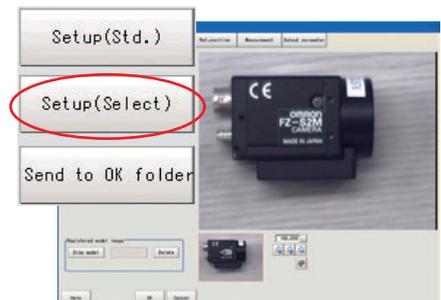
You can display in a structured manner a graph showing the results measured at once on logging images. This lets you identify the cause of a given NG much more quickly. You can also measure all images again after changing a given setting, to check the reliability of the new setting. Adjustment and troubleshooting has never been so quick, simple and reliable.



Processed items and parameters that generated an erroneous judgment can be identified at a glance.



You can check the detailed results of parameters to identify the cause of the NG.



Select a desired measurement result on the graph to switch to the adjustment mode.

# Original HDR Technology

Making it possible!

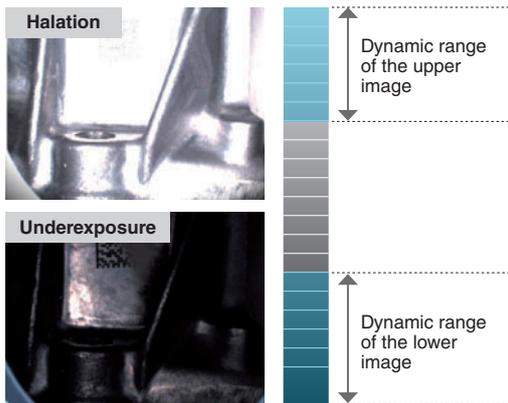


## Eliminate the side effects of lighting

### High Dynamic Range Function

FZ3's high dynamic range minimizes the effects of lighting such as halation and allows highly precise inspections.

#### Conventional images

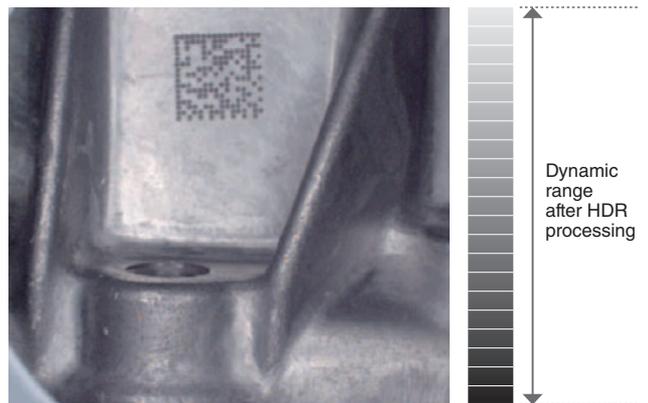


#### Defects Undetectable Due to Overexposure or Underexposure

Any spot outside the dynamic range is blurred by halation or shadow.

**Reflective and shadowy areas can be reproduced simultaneously under the same lighting conditions.**

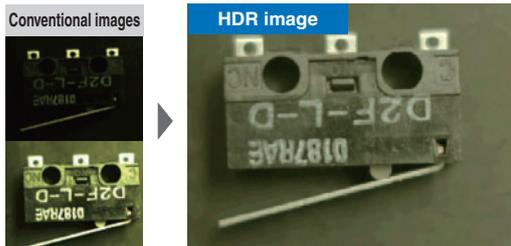
#### HDR image



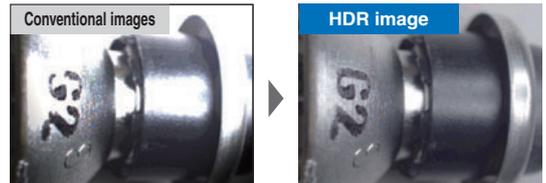
#### Defects Detectable Even on Reflective or Shadowy Surfaces

The surface of the workpiece is accurately reproduced and detected even with overexposure or underexposure.

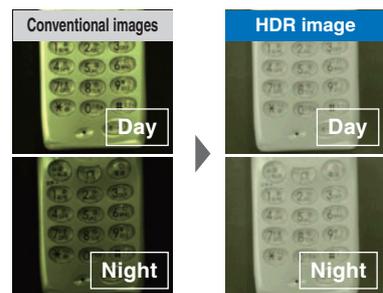
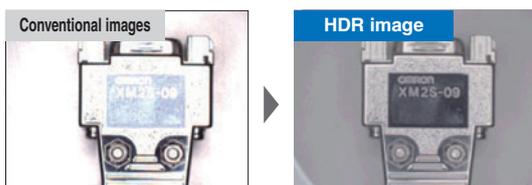
**The reflective surfaces of cylindrically-curved workpieces in which conventional vision sensors have had difficulty can be reproduced.**



**The surfaces of metal workpieces can be reproduced accurately.**



**The influence of changing lighting conditions from day to night are effectively minimized.**



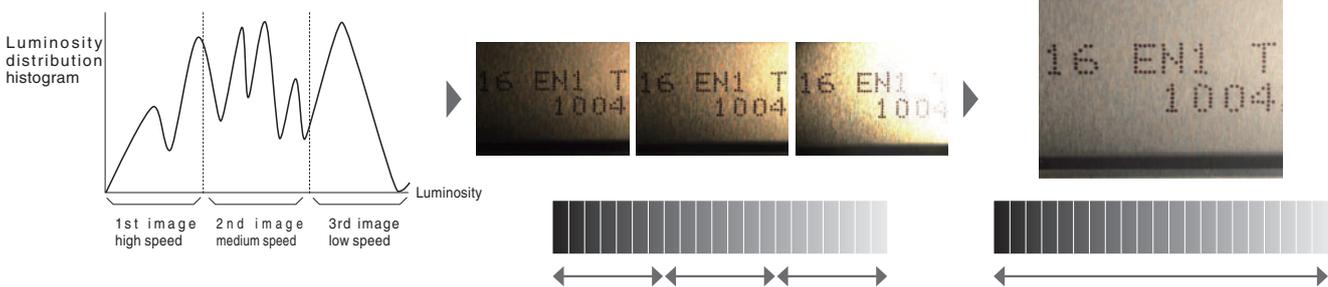
## HDR Image Generation Technology

Dynamic range means the imaging hardware's ability to manage differences in lighting. The higher dynamic range the hardware scores, the clearer images it can generate when imaging objects with a strong contrast in luminosity. Featuring the HDR Image Generation technology, FZ3 can take two or more images of a workpiece at different levels of luminosity by automatically changing its shutter speed and synthesizes them into a single image rapidly. As a result, the bright field where image capture is possible expands 5,000 times in LD ratio compared to a general CCD camera. Accordingly, you can obtain vivid images not possible in processing flows where images are color-depth filtered one by one in real time.

Instantaneously calculates the luminosity distribution in the field of view, and automatically setting a number of images to be taken and the shutter speed for each image.

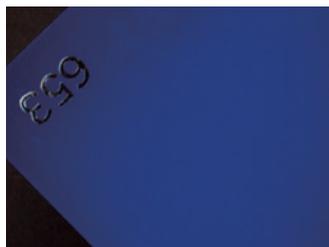
Continuous imaging at different shutter speeds.

Instantaneous synthesis of different images at different levels of luminosity. The wide dynamic range allows you to generate clear images even with overexposure or under changing lighting conditions.

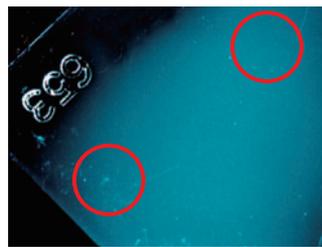


## HDR High-Contrast Mode

The HDR function that quickly produces multiple composite images offers the high-contrast mode. In this mode, images captured at a constant shutter speed are layered on top of one another and output. Before, each image had to be enlarged to increase contrast, and consequently the noise component of the image was also amplified. In the HDR high-contrast mode, on the other hand, multiple images are combined together and then averaged to reduce their noise component, after which the images are enlarged. This way, only the contrast of the area of interest and its background can be increased.

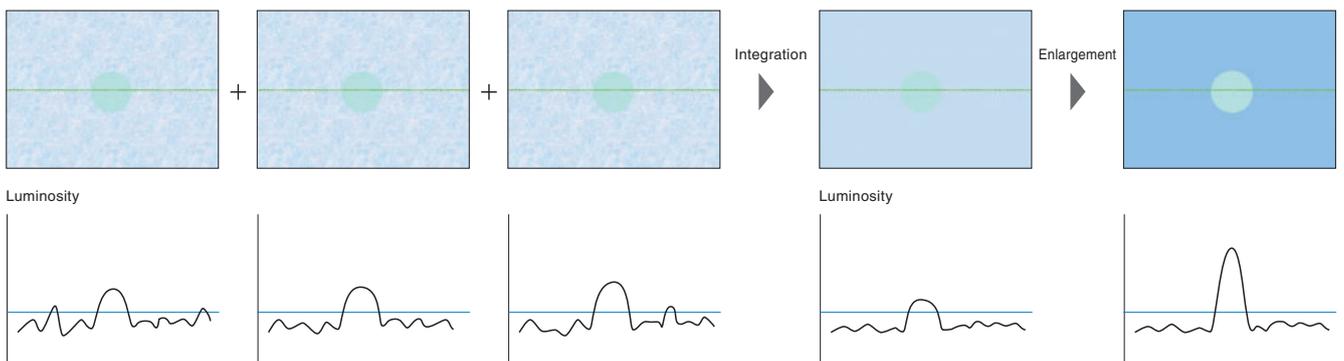


Conventional system  
Low contrast makes the surface appear uniform.



HDR high-contrast image  
Many scratches and soiled areas can be found.

## Technology of HDR High-Contrast Mode



There is a low contrast in brightness between the background noises and the thing to be inspected.

The contrast is enhanced by integrating and enlarging two or more images.

# High Resolution Image Generation



## Higher Resolutions and Wider Fields of Vision

### 5 Million-Pixel Cameras

The new 5 million-pixel cameras allow high precision appearance inspections and measurements that cannot be handled by conventional 2 million-pixel cameras.



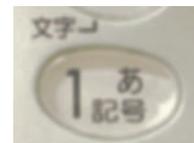
Color Type  
FZ-SC5M2



Black and  
White Type  
FZ-S5M2



5 million pixels  
(2448x2044 pixels)



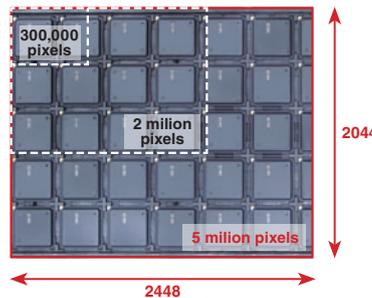
2 million pixels  
(1600x1200 pixels)

#### 1.5-times wider field of vision



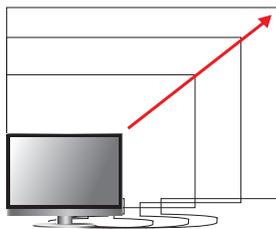
Even a large workpiece can be imaged at one time and the details are very clear

#### Reducing Tact Time



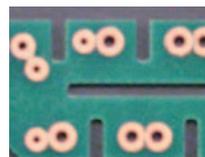
FZ3 takes a single wide-view image of a large workpiece used be imaged in multiple pieces and thus reduces inspection tact time.

#### Reducing Set-up Time

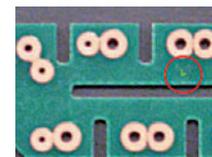


Thanks to the cameras' wider fields of vision, you don't have to move their positions during set up on a production line for different products in different sizes.

#### Making Invisible Defects Visible



2 million pixels



5 million pixels

The improved resolution of the system's cameras allows you to detect very slight defects that were impossible for its predecessor to catch.

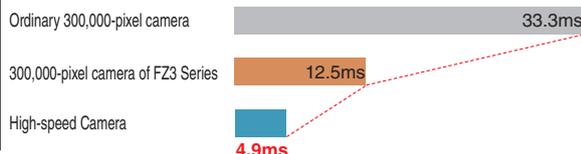
### High-speed Camera

The speed of capturing images by a 0.3-megapixel Camera has been greatly increased.

The difference is most obvious in applications requiring a wide field of vision, high precision, and high speed.



color FZ-SHC  
Black & White FZ-SH



### Intelligent Compact Camera **NEW**

This compact camera comes equipped with high-power illumination that evenly lights the field of vision. A leading-edge optical system provides four times the brightness of previous models. For glossy surfaces that easily reflect light, an accessory Polarizing Filter can be used to cut glare and easily produce a clear image.



Equipped with Polarizing Filter to Cut Regular Reflection

color FZ-SQ□

## Autofocus Camera / Intelligent Camera with illumination



### Autofocus Camera

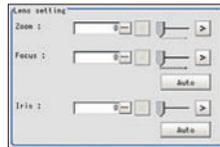
**Color** FZ-SZC100  
FZ-SZC15

These image processing cameras for FA needs are equipped with auto focus functions and lights. You can remotely control the focus, aperture, field of vision and lighting of the cameras installed at a distant from the controllers. You can apply a set of lighting conditions for any particular inspection to different lines by saving the setting data for the inspection into the controller. This function allows prompt setting for each inspection procedure. It also helps reduce setting variations among individual operators.



### Intelligent Camera

**Color** FZ-SLC100  
FZ-SLC15



Setting the focus, aperture and field of vision

### Intelligent Lighting

You can control the brightness levels of up to 8 lights in 256 gradations. Since you can register the most appropriate setting for each lighting task, stable lighting conditions are always ensured.

\* Function available only with FZ-SLC100 and FZ-SLC15

Lighting Patterns  
8 places can be controlled



Brightness Levels  
256 gradations



### Innovative zoom function

With this function, the camera can flexibly respond to inspections on mixed production lines or any changes in its field of vision for additional inspections.

■ Model with Narrow Field of Vision ■ Model with Wide Field of Vision



## Ultra-compact Pen-shaped Camera / Ultra-slim Flat Camera

Our high-performance, high-speed 300,000-pixel cameras have been remarkably downsized. They can be installed in spaces which are too small for conventional cameras.



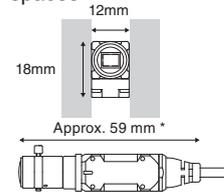
**Color** FZ-SPC  
**Black & White** FZ-SP



**Color** FZ-SFC  
**Black & White** FZ-SF

### Most compact and shortest pen-shaped camera in the industry

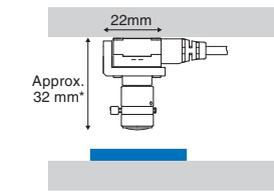
Suitable for use in narrow spaces



\*This is the size with nothing other than a lens (FZ-LES3).

### First slim flat camera in the industry

Suitable for use in spaces with little depth that usually require mirrors



\*This is the size with nothing other than a lens (FZ-LES3) and does not include a spacer for installation.

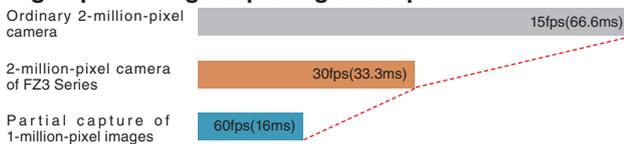
## 2-million-Pixel camera

This high-resolution 2-million-pixel camera (1600 x 1200 pixels) boasts the fastest image capture speed in its class. It is equivalent to the speed of 300,000-pixel cameras. Furthermore, the camera can capture 1-million-pixel images (1600 x 600 pixels) at a speed of 60 fps in the partial capture mode.



**Color** FZ-S2M  
**Black & White** FZ-S2M

### High speed image capturing of 30 fps



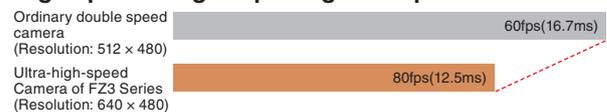
## 300,000-pixel Camera

This camera achieves an image capture speed of 80 fps with full VGA resolution of 640 x 480 pixels, saving input time about 4 ms. It features high speed with highest cost performance. Furthermore, it allows faster image capturing in the partial capture mode.



**Color** FZ-SC  
**Black & White** FZ-S

### High speed image capturing of 80 fps



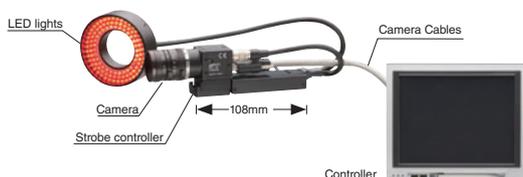
### Partial capture function

This function allows you to specify any part of the workpiece and capture images thereof at a faster speed. Image capturing at a speed of 3 ms maximum is possible.



## Strobe Controller to manage the Lighting Without Complex Wiring and Additional Power Supply

You can easily control lighting by connecting this strobe controller to the camera and the light using a single cable. Unlike ordinary lighting control units built on controllers, you do not need any complex wiring for this strobe controller. This makes the system very easy to handle. You can control all lighting sequences with this controller.

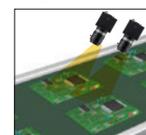


- Small Size for Easy Installation
- No Additional Power Supply Needed
- Simple System With Simple Wiring
- Controlling Lighting from the Controller

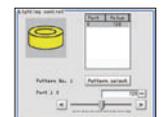
### Application Examples



The strobe controller installed on a robot is ideal for robotic inspections.



The controller can prevent mutual interference between different cameras by controlling lighting.



Data of specific lighting conditions can be saved in the controller. In this way, you can save time for setting lighting conditions before conducting each inspection.

# Real-time Image Generation Technology

## Ideal for Inspection



[ Patent Pending ]

### Minimizing the effects of the camera position or flutter during the carrying process

#### Trapezoidal Distortion Correction

Correcting distorted images shot from an angle. High-precision inspections are ensured even when images are taken from an angle or the carrying process is unstable.



Registered model image

Scroll



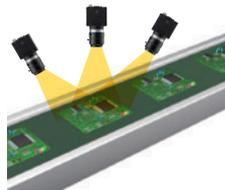
[Conventional system]  
Scroll of the subject reduces the correlation value. The model cannot be detected.



[After trapezoidal distortion correction]  
Even when scroll occurs, the distortion is compensated to make sure the model is detected stably.

#### Cross shots image capture is possible

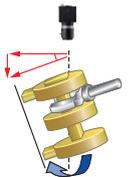
FZ3 allows space-saving line designs since cameras can be mounted in any small spaces at any angle. Furthermore, you would have no difficulty in finding appropriate spaces for an additional camera for an additional inspection item.



#### Coping with any flutter in the carrying process

High-precision inspections are ensured even when there is flutter in the carrying process. Unlike the conventional vision sensors, FZ3 can also correct perspective distortions.

Not only the horizontal and vertical positions, but also the inclination can be compensated.



Even when the subject inclines due to the movement of the arm, its position can be compensated.



[ Patent Pending ]

### Precise Inspections of Large Workpieces in Whole

#### Ultra-Wide Panorama Image Processing

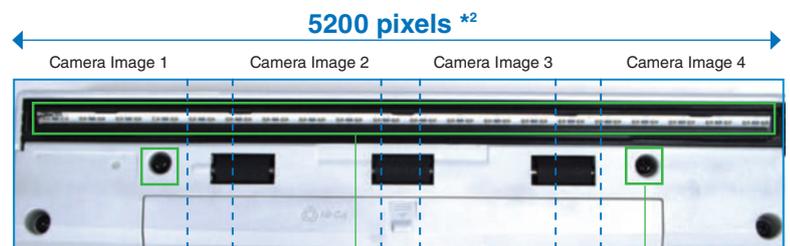
When taking images of a large workpiece in multiple pieces using two or more cameras, a conventional vision sensor processes the images taken by the cameras separately in order to secure a satisfactory level of resolution. FZ3's panoramic image processing\*1 capability allows the measurement of a large or long workpiece in whole by synthesizing the images taken by camera and generating a single image from them.

#### Wide Panorama

Images taken by two to four 2-million-pixel cameras are put together like a line camera to generate a single image as if it is taken by a single camera when inspecting a horizontally long workpiece.

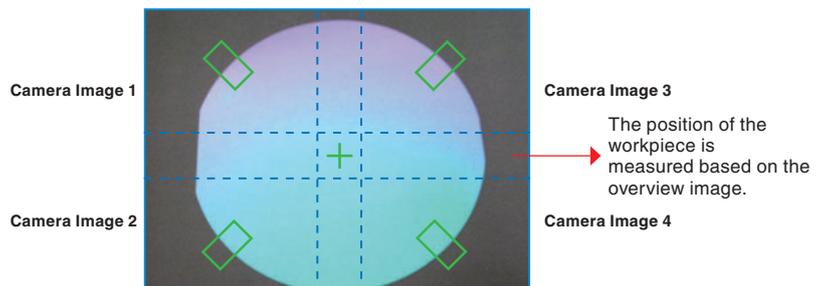
#### Synthesis of up to four images

Up to four images can be synthesized horizontally and vertically in accordance with the shape of the workpiece.



An inspection area can be specified across the images taken by two or more cameras.

The position of the inspection area can be adjusted based on the overview image.



Camera Image 1

Camera Image 2

Camera Image 3

Camera Image 4

The position of the workpiece is measured based on the overview image.

\*1 This feature can be performed with cameras of 2 million pixels or less.

\*2 The images of four 2 million-pixel cameras overlap each other at their edges, with each overlapping area covering 25% of the entire area of each image.

[ Patent Pending ]

## Eliminating reflection of light on the surfaces of moving workpieces

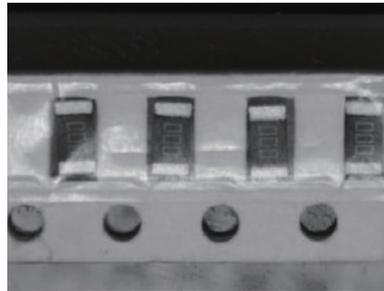
### High-speed Halation Prevention Filter

This feature detects blurs caused by halation or unstable lighting, and automatically make corrections.

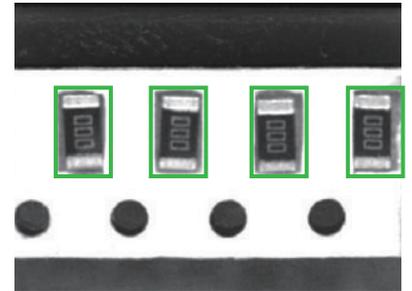
It is very useful when workpieces to be inspected are moving at a high speed or inspections are made through a transparent film.



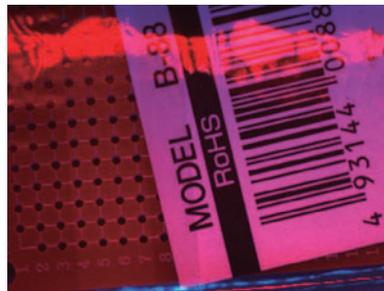
Halation is cut off by capturing images using a special halation-cutoff lamp (FZ-SXCRB7018BR-4S).



Before processing



After processing



Analyzing the color elements captured as specular light (halation)



Automatically choosing the most appropriate filter to prevent halation and generating images most appropriate for inspections

## Removing fringes to detect defects

### Fringe-killer Filter

Other than detecting defects by subtraction, FZ3 can also remove some peculiar patterns such as fringes in the background for more stable inspections.



Conventional images



Image processed by the Fringe-killer Filter

The filter removes fringes in the background and detects defects only even when fringes is as big as defects.



Before processing



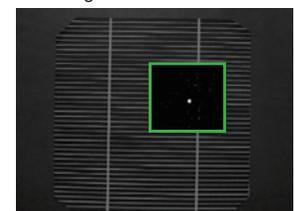
After processing

Analyzing images by subtraction and detecting only subtle changes as defects.

Removing horizontal, vertical and lattice fringes



Before processing



After processing

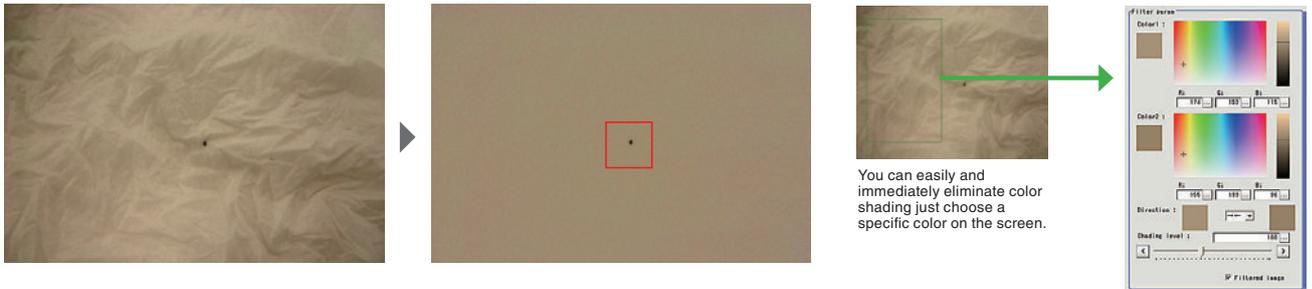
FZ3 can choose the type of fringes to be removed in accordance with the background of each workpiece to be inspected.

# New generation processing items (approx. 60)

## Filters to optimize input images / Position Correction

### Color shadings elimination filter First in the industry

The filter eliminates Specific background color data that may hamper the detection of defects. It also improves the accuracy of inspection to detect scratches or dirt. This cutting-edge function is made possible only with FZ3's Real Color Sensing technology.

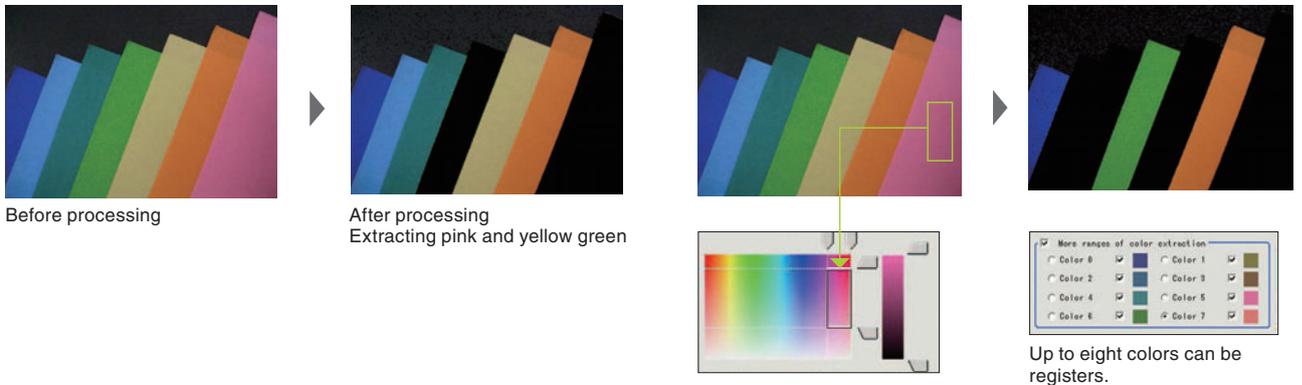


### Color extracting filter

The filter allows the extraction of any specific color from the image. Since you can register up to eight colors, as the colors to be eliminated, you do not need to adjust settings for different processing items. The filter works in two modes, one for extracting the color specified and the other for extracting all colors other than the specified one. You can flexibly switch between the two modes according to requirements for individual inspections.

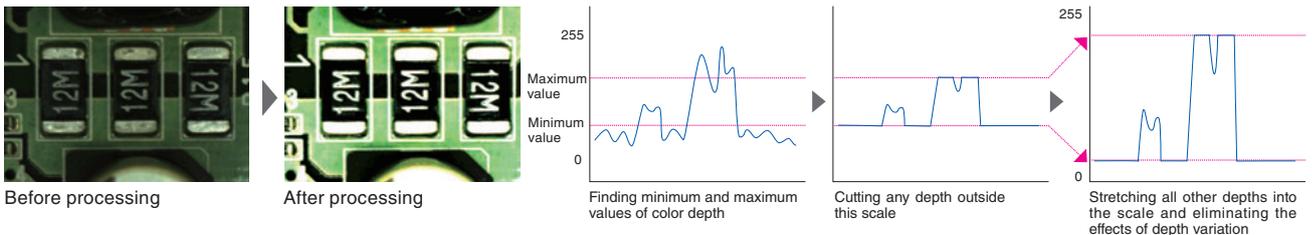
First in the industry All colors other than the ones specified can be extracted. When there are a number of colors you want to extract, this mode saves time in color setting.

You can easily specify any color by just clicking it on the screen. The color chart on the screen, that shows the color you have chosen, enables intuitive operation even for fine adjustments.



### Elimination of Background

A minimum value and a maximum value are set for each of the RGB colors. Any color depth under the minimum value is specified as "0," and any depth over the maximum value as "255." Then all other depths between them are stretched into a 0 to 255 scale. An area to be inspected is visualized with high contrast while the effects of depths outside this scale are eliminated.



### Rectangular Development of Circular Images First in the industry

This function allows recognition of characters printed along the circumferences of circular surfaces by converting circular images into rectangular forms. The characters can be inspected with the same resolution even after such rectangular development.

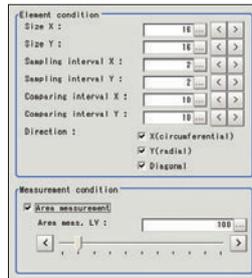


# High Precision Inspections of Defect

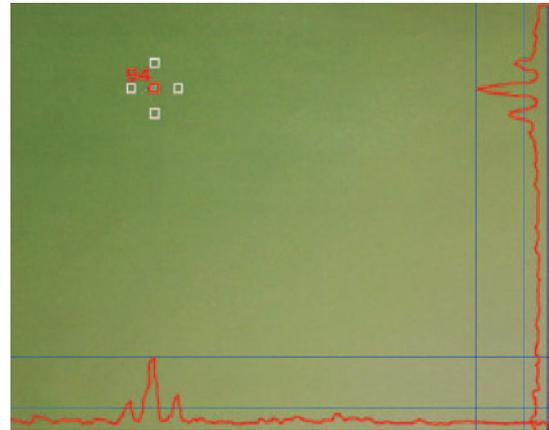
## Inspections of Scratches and Dirt

Subtle scratches and dirt can be detected with more fine-tuned conditions compared to conventional inspections. Since you can clearly distinguish defects to be detected from the background, the failure detection rate can be decreased. Combined with our 5 million-pixel camera, this function enables much more precise inspections of scratches.

Fine parameters for defect detection allow fine settings at the pixel level.



[ Patent Pending ] Scratch detection profile displayed on the screen



You can confirm wave profiles and comparison elements on the screen. This feature also enables easy thresholding setting and fine adjustments on the screen.

## Fine Matching / Defect

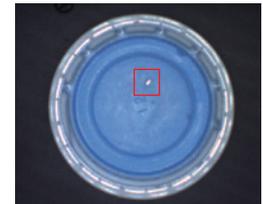
With our Real Color Sensing technology, FZ3 can accurately recognize and process subtle variations in color. This feature helps you detect unpredictable scratches and dirt. High precision defect inspections are possible by using both Fine Matching and Defect flexibly according to the background of each image.

### Fine Matching



It is useful for detecting scratches, chipped edges or subtle dirt in complex backgrounds.

### Defect



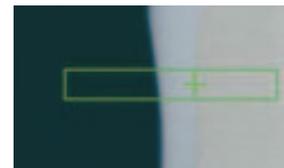
It is useful for detecting scratches and dirt in plain backgrounds.



[ Patent Pending ]

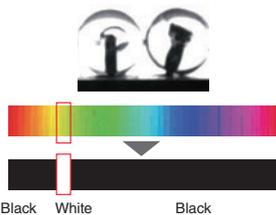
## What is Real Color Sensing?

In order to secure stable measurements in different inspection environments, FZ Series feature Omron's proprietary Real Color Sensing processing, in addition to the conventional color image processing.



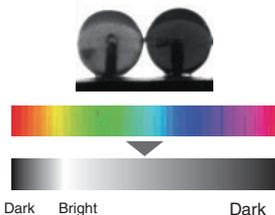
Edges are detected reliably even when the contrast between the background and subject is low.

### Color Segmentation Processing



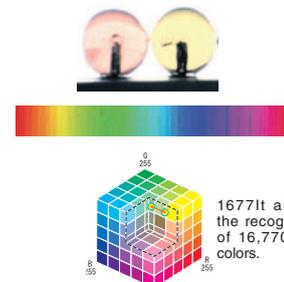
Color images taken by the camera are processed after being converted into black and white pixels. The color extracted is represented as white, and the other colors as black. Based on minimum information, high speed processing is possible. Since color data is limited only to brightness, however, it takes a long time to make optical adjustments for extracting color features.

### Color Image Processing



Color images are converted into 256 levels of black-and-white brightness and the contrasts of specific colors is enhanced. More precise, stable results can be produced compared to color segmentation. However, this method has difficulty in capturing subtle variations in color because all colors are converted into black-and-white brightness levels. Therefore, it is difficult to detect subtle changes in images with low contrast.

### Real Color Sensing



Different colors are represented as different positions in the 3D RGB space. Subtle variations in color can be recognized by representing them as distances between different color pixels comprising this space. Thus, scratches and dirt can be detected accurately even in images with low contrast.



# New generation processing items (approx. 60)

## High Speed / High Precision Pattern Recognition

### Shape Search

The geometry correlation search for conducting search based on the profile information of the workpiece ensures greater absorption of dimensional variations among individual works (changes in background, contrast, etc.) and consequently achieves stable detection.

The detection speed is approx. 20 times that of a conventional processing system, which allows for high-speed detection even when images are captured with high-resolution camera.

Compared with geometric correlation search processing by OMRON's conventional system

Conventional system 700ms

Shape search 35ms

Approx. 20 times faster detection (representative example)

Registered model image

Even low-contrast images are detected stably.

### Sensitive Search

This allows the recognition of very subtle differences that cannot be detected through ordinary search processes, by dividing the registered model image into several pieces and carefully matching them. Thus you don't have to spend a lot of time for delicate threshold setting.

Different conditions for dividing the model image can be set.

### Flexible Search

When inspecting workpieces with some variations in shape, such variations are sometimes recognized erroneously as defects. Flexible Search ensures accurate searches regardless of some variations in print quality or shape, by registering several images of non-defective products as models. It helps you decrease your inspection failure rate by rejecting defective products only.

■ Inspection of characters on IC chips

Before model addition	OK 1234	NG 1234	NG 1234	NG 3741
After model addition	OK 1234	OK 1234	OK 1234	NG 3741

Avoiding inspection failures

## Area / Labeling

### Dynamic segmentation and high-performance labeling

This item features a dynamic segmentation in addition to the conventional labeling. This function ensures the accurate detection of labels by automatically sensing any uneven color depth in the same image and changing thresholds locally.

Ordinary segmentation

Dynamic segmentation

#### Easy to sort, Wide variety of conditions to be extracted

- Area
- Gravity (x, y)
- Main axial angle
- Major axis, minor axis and ratio of an ellipse
- Width, height and coordinate (x, y) of a circumscribed rectangle
- Perimeter
- Circularity
- Major axis and minor axis of a rotating rectangle
- Radius of an inscribed circle
- Radius of a circumscribed circle
- Number of holes

## High Performance Edge Detection

### Scan Edge Position, Scan Edge Width

Edge positions and widths can be accurately detected by dividing the area to be inspected into several segments. Scan Edge Position measures the points closest and farthest to the edge as well as the inclination and surface conditions of the workpiece to be inspected. Scan Edge Width measures the local and average widths of the workpiece. This allows the accurate measurement of the positions of the workpiece's peripheral parts as well as its bore diameters. Edge detection method can be chosen from the intensity projection method and the differentiation method.

Measuring minimum width

Measuring maximum width

It is also useful for measuring the depths of grooves on metal shafts.

# Character / Code Recognition

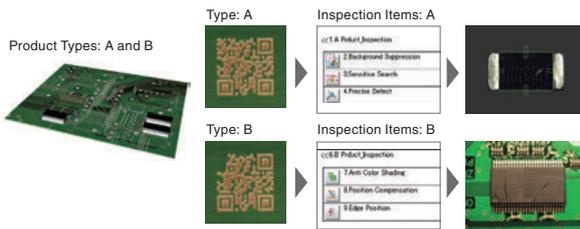
## Read Bar Codes / 2D Codes

It allows the detection of the types of products before inspections as well as the collection and accumulation of information on inspections.

### Switching among different inspection items according to the types of products

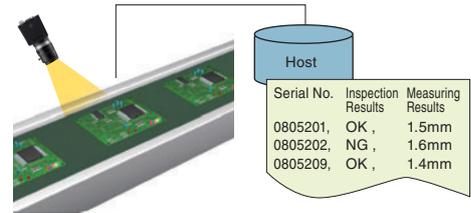
Different sets of inspection items can be automatically set for different types of products detected through code reading processes.

The item, that covers all processes from product type detection to inspections without involving the host, can save time for interconnection and programming.



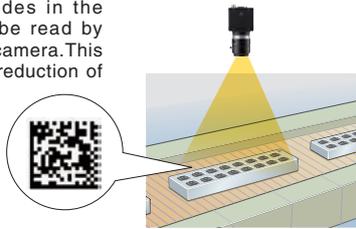
### Collecting and accumulating information on inspections in real time

You can collect the serial numbers of components and measuring results in real time while they are being inspected. The causes of defects can be tracked down immediately by consolidating such serial numbers and measuring results at the host.



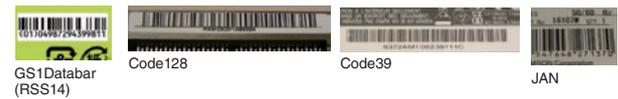
### Reading different codes at a time

Two or more different codes in the same field of vision can be read by utilizing a high resolution camera. This function contributes to the reduction of inspection tact time.



### Codes that can be read with FZ3

#### Bar codes



#### 2D codes



## Character Inspection / Date Verification

This item allows easy inspections of characters by registering specific characters in the model dictionary and specifying areas to be inspected.

OCR mode: Reading printed characters and outputting them to an external device.

OCV mode: Judging matching with registered models

OCR + Count: Characters counted simultaneously



### Calendar function

Character strings to be inspected are automatically updated by specifying duration of use. It can allow the inspections of encrypted dates (such as "X" representing 10).

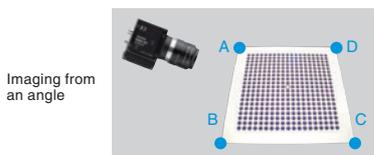


Compatible with various date formats

## Items supporting measurement

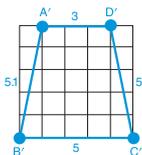
### High Precision Calibration

This is a function corresponding to trapezoidal distortion correction. High precision measurements are possible even when cameras are installed at an angle.



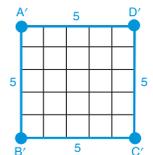
#### Conventional calibration

When trapezoidal distortions are caused by perspective differences, significant calibration errors are observed.



#### FZ3

High precision calibrations are possible for trapezoidal distortions by using parameters considering perspective transformation.



### Coping with geometric computation Circle/Line Regression

With this item, you can cope with geometric computation in addition to functional computation. It allows you to relate coordinates very easily while looking at images.



You can obtain the center or radius of a circle from an arbitrary number of points on its perimeter.



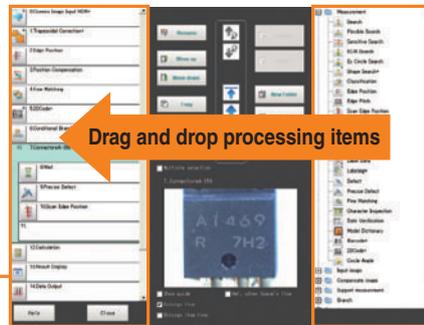
You can obtain a straight line, the intersection of two straight lines and its angle, or the distance between a straight line and a point from an arbitrarily selected number of points.

## Designing

### Easy set-up

#### Flow menu

Basic processing items required for various inspections such as image input, measurement, display and output are packaged. FZ3 can immediately support any process, from the initial setup to the launch of a new line, with the setting screen for each processing item from which the user can set the required threshold values and parameters.



Drag and drop processing items

Adopting the setting window for each processing items, required parameters and inspection area can be set easily.

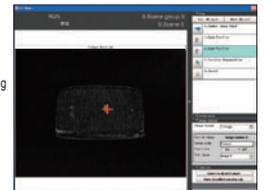
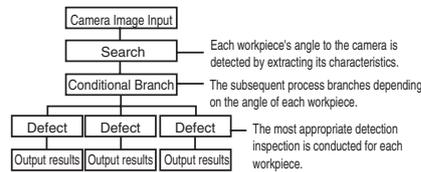


Processing equivalent to programming is achieved by calculating the inspection results and changing the subsequent processes depending on the results.

### Examples of Processing Flow Customization

#### Defect Inspection for Workpieces Carried at Different Angles to the Camera

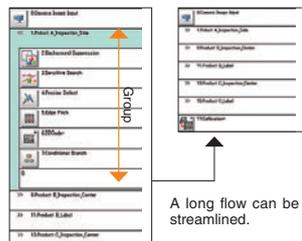
In order to inspect workpieces placed and carried at different angles to the camera, the most appropriate settings can be made automatically for each angle.



### Useful Functions in Flow Menu

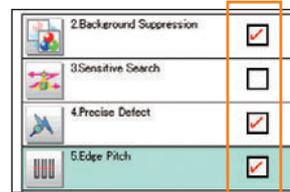
#### Flow Group function

Processing items can be named and grouped. You can efficiently manage a long work flow by assigning a folder to each processing item.



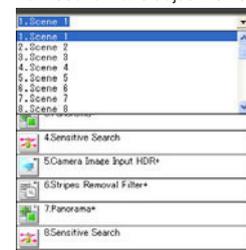
#### Performing different processing items at a time

You can copy or delete two or more processing items at a time by just checking them on the screen.



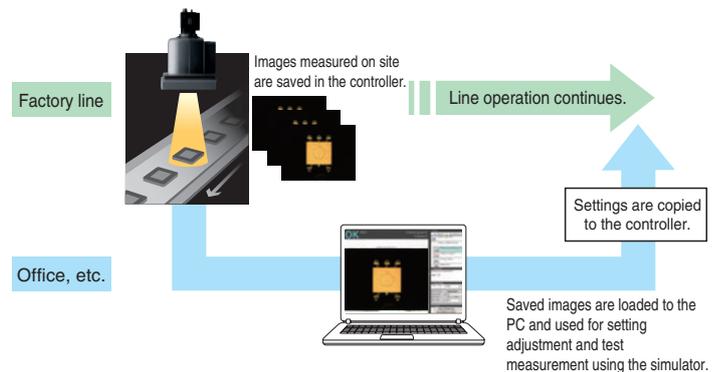
#### Copy & paste processing items from another scene.

You can set up a new flow menu by combining different processing items copied from other scenes. When you want to utilize the setting of other scene, you do not need to make adjustments.



### Test Measurement and Setting and Adjustment On Your PC Without Stopping the Operation

You can use simulation software that operates in the same environment as the controller, to perform all tasks from flow design and test measurement to setting adjustment. You can make adjustments without stopping the line. This saves a lot of time at the production site.

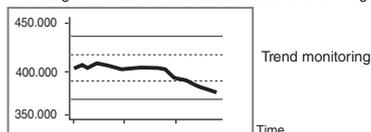


### Useful Functions for Test Measurement

#### Continuous test measurement function

Settings must be verified with as many images as possible. With OMRON's FZ3, continuous measurements of hundreds of images can be performed by a single click.

Checking the results of continuous measurement in a graph



#### Judgment monitoring function

Continuous measurement stops automatically when a defect occurs. Once the measurement stops, you can select the next course of action right away for efficient testing and verification.

If a defect occurs, measurement stops automatically --> Select the course of action.

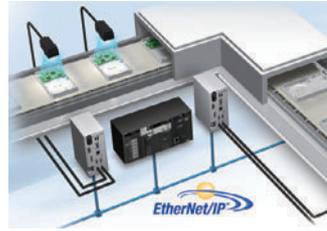


Introducing a new software program (VisionOptimizer) that works with the simulation software to calculate optimum settings. See the end of this brochure for details.



## EtherNet/IP **NEW**

EtherNet/IP is a widely used communication protocol in factories around the world. You can easily connect to OMRON PLCs or any other vendor device that supports EtherNet/IP to enable high-speed communication.



## Easy Creation of Ladder Programs Improved PLC Link Function

There are now more models supporting the PLC function that lets you perform serial data communication with the PLC link via simple input operation. This reduces the design man-hours because creating ladder programs for the PLC has become much easier.

**[Applicable models]** OMRON Corporation CS, CJ, CP and NSJ series  
 <NEW> Mitsubishi Electric Corporation Q series



Reading and writing of I/O memory areas can be set easily on the dedicated menu screen.

## Operation

### Customizable Screens for User-friendly Operation

Operating screens can be customized freely and easily according to the inspection details and actual environment of the site. A full set of customization functions are available to let you not only prevent malfunctions and unexpected downtimes on site, but also take immediate actions should you encounter sudden defects.



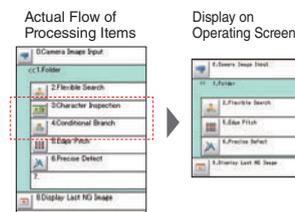
#### Measurement information

Measurement information to be shown on operating screens can be customized. You can change the items to be displayed as well as the position and font size of each item.



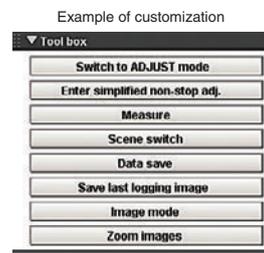
#### Display of Processing Items

You can set "No Display" of any processing items during operation



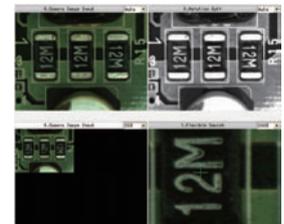
#### Shortcut buttons

You can arrange a set of shortcut buttons as you like. With these buttons, you can promptly cope with any defects or adjustments whenever necessary during operation.



#### Multi-screen Display, Display of the latest NG image

Displays on the Measurement screen can be changed as you like according to the number of cameras and their purposes. You can display a detail of a workpiece and its overall image at the same time on the screen. This function also enables a comparison between an NG image and the image actually being inspected.



# Basic Configuration

## Controllers

### Best performance for each application

#### Dual-task, High-grade, High-speed Controllers

Adopting the industry's first dual-engine architecture, these models can process high grade items via dual parallel flows.



Controllers integrated with LCD	Two-camera controllers	FZ3-H900 (NPN) / FZ3-H905 (PNP)
	Four-camera controllers	FZ3-H900-10 (NPN) / FZ3-H905-10 (PNP)
Box-type Controllers	Two-camera controllers	FZ3-H950 (NPN) / FZ3-H955 (PNP)
	Four-camera controllers	FZ3-H950-10 (NPN) / FZ3-H955-10 (PNP)

#### Dual-task, High-speed Controllers

Adopting the industry's first dual-engine architecture, these models can process standard items faster.



Controllers integrated with LCD	Two-camera controllers	FZ3-900 (NPN) / FZ3-905 (PNP)
	Four-camera controllers	FZ3-900-10 (NPN) / FZ3-905-10 (PNP)
Box-type Controllers	Two-camera controllers	FZ3-950 (NPN) / FZ3-955 (PNP)
	Four-camera controllers	FZ3-950-10 (NPN) / FZ3-955-10 (PNP)

#### High-grade, High-speed Controllers

With the industry's fastest CPU, the controllers promptly process cutting-edge, high grade processing items. Not only a 2 million-pixel camera but also a 5 million-pixel-camera can also be connected to the controllers.



Controllers integrated with LCD	Two-camera controllers	FZ3-H700 (NPN) / FZ3-H705 (PNP)
	Four-camera controllers	FZ3-H700-10 (NPN) / FZ3-H705-10 (PNP)
Box-type Controllers	Two-camera controllers	FZ3-H750 (NPN) / FZ3-H755 (PNP)
	Four-camera controllers	FZ3-H750-10 (NPN) / FZ3-H755-10 (PNP)

#### High-speed Controllers

High-resolution 5 million-pixel-cameras can be connected to the controllers with the industry's fastest CPU. They are ideal for high speed processing of standard inspection items.



Controllers integrated with LCD	Two-camera controllers	FZ3-700 (NPN) / FZ3-705(PNP)
	Four-camera controllers	FZ3-700-10(NPN) / FZ3-705-10(PNP)
Box-type Controllers	Two-camera controllers	FZ3-750(NPN) / FZ3-755(PNP)
	Four-camera controllers	FZ3-750-10(NPN) / FZ3-755-10(PNP)

## Cameras and Accessories

### Digital cameras

#### 5 million-pixel



#### 2 million-pixel



#### 300,000-pixel



### High-speed camera

#### 300,000-pixel



### Small digital cameras

#### 300,000-pixel flat type



### Lenses



### Camera Cables



### 300,000-pixel pen type



## High-grade Controllers

These standard controllers feature our cutting-edge High Grade algorithm. They allow flexible defect solving capability and high speed processing at the same time.



Controllers integrated with LCD	Two-camera controllers	FZ3-H300(NPN) / FZ3-H305(PNP)
	Four-camera controllers	FZ3-H300-10(NPN) / FZ3-H305-10(PNP)
Box-type Controllers	Two-camera controllers	FZ3-H350 (NPN) / FZ3-H355(PNP)
	Four-camera controllers	FZ3-H350-10(NPN) / FZ3-H355-10(PNP)

## Standard Controllers

They cover all standard functions and processing items. Their performance is more than adequate.



Controllers integrated with LCD	Two-camera controllers	FZ3-300(NPN) / FZ3-305(PNP)
	Four-camera controllers	FZ3-300-10(NPN) / FZ3-305-10(PNP)
Box-type Controllers	Two-camera controllers	FZ3-350(NPN) / FZ3-355(PNP)
	Four-camera controllers	FZ3-350-10(NPN) / FZ3-355-10(PNP)



Controllers integrated with LCD



Box-type Controllers

## NEW Lite Controllers

The reasonable price of this Controller makes it easy to apply to an application. Standard functions and processing items are joined by a high dynamic range function and 2-million-pixel camera.



Box-type	Two-camera controllers	FZ3-L350(NPN)/FZ3-L355(PNP)
	Four-camera controllers	FZ3-L350-10(NPN)/FZ3-L355-10(PNP)

## Intelligent cameras



Narrow field of vision  
FZ-SLC15



Wide field of vision  
FZ-SLC100



Narrow field of vision  
FZ-SZC15



Wide field of vision  
FZ-SZC100

## Autofocus cameras

## Intelligent Compact Camera



Narrow view  
FZ-SQ010F



Standard  
FZ-SQ050F



Wide View  
(long-distance)  
FZ-SQ100F



Wide View  
(short-distance)  
FZ-SQ100N

## Cable extension unit



Cable extension unit  
FZ-VSJ

## Strobe controller



FZ-LTA100  
FZ-LTA200

Strobe controller designed specifically for FZ Series  
3Z4S-LT MLEK-C100E1TS2  
Manufactured by MORITEX Corporation

## Peripheral devices



LCD monitor  
FZ-M08



Monitor cable  
FZ-VM



Parallel cable  
FZ-VP  
FZ-VPX

## Intelligent camera diffusion plate



Narrow field of vision  
FZ-SLC15-DL  
Wide field of vision  
FZ-SLC-100-DL

## Halation cut illumination



Integrated unit combining light, strobe controller and camera  
FZ-SXCRB7018BR-4S



USB memory  
FZ-MEM2G  
FZ-MEM8G



VESA attachment  
FZ-VESA



Desktop controller stand  
FZ-DS

# Ordering Information

## FZ3 Series

Item	Descriptions			Model	Remarks		
Controllers	Dual-task, High-grade, High-speed Controllers	Controllers integrated with LCD	Two-camera controllers	NPN/PNP	FZ3-H900/FZ3-H905	With touch pen	
			Four-camera controllers	NPN/PNP	FZ3-H900-10/FZ3-H905-10		
		Box-type controllers	Two-camera controllers	NPN/PNP	FZ3-H950/FZ3-H955	—	
			Four-camera controllers	NPN/PNP	FZ3-H950-10/FZ3-H955-10		
	Dual-task, High-speed Controllers	Controllers integrated with LCD	Two-camera controllers	NPN/PNP	FZ3-900/FZ3-905	With touch pen	
			Four-camera controllers	NPN/PNP	FZ3-900-10/FZ3-905-10		
		Box-type controllers	Two-camera controllers	NPN/PNP	FZ3-950/FZ3-955	—	
			Four-camera controllers	NPN/PNP	FZ3-950-10/FZ3-955-10		
	High-grade, High-speed Controllers	Controllers integrated with LCD	Two-camera controllers	NPN/PNP	FZ3-H700/FZ3-H705	With touch pen	
			Four-camera controllers	NPN/PNP	FZ3-H700-10/FZ3-H705-10		
		Box-type Controllers	Two-camera controllers	NPN/PNP	FZ3-H750/FZ3-H755	—	
			Four-camera controllers	NPN/PNP	FZ3-H750-10/FZ3-H755-10		
	High-grade Controllers	Controllers integrated with LCD	Two-camera controllers	NPN/PNP	FZ3-H300/FZ3-H305	With touch pen	
			Four-camera controllers	NPN/PNP	FZ3-H300-10/FZ3-H305-10		
		Box-type Controllers	Two-camera controllers	NPN/PNP	FZ3-H350/FZ3-H355	—	
			Four-camera controllers	NPN/PNP	FZ3-H350-10/FZ3-H355-10		
	High-speed Controllers	Controllers integrated with LCD	Two-camera controllers	NPN/PNP	FZ3-700/FZ3-705	With touch pen	
			Four-camera controllers	NPN/PNP	FZ3-700-10/FZ3-705-10		
		Box-type Controllers	Two-camera controllers	NPN/PNP	FZ3-750/FZ3-755	—	
			Four-camera controllers	NPN/PNP	FZ3-750-10/FZ3-755-10		
	Standard Controllers	Controllers integrated with LCD	Two-camera controllers	NPN/PNP	FZ3-300/FZ3-305	With touch pen	
			Four-camera controllers	NPN/PNP	FZ3-300-10/FZ3-305-10		
		Box-type Controllers	Two-camera controllers	NPN/PNP	FZ3-350/FZ3-355	—	
			Four-camera controllers	NPN/PNP	FZ3-350-10/FZ3-355-10		
Lite Controllers	Box-type Controllers	Two-camera controllers	NPN	FZ3-L350	—		
			PNP	FZ3-L355			
		Four-camera controllers	NPN	FZ3-L350-10			
			PNP	FZ3-L355-10			
Cameras	Intelligent cameras	Wide field of vision	Color	FZ-SLC100	Camera + Zoom, Autofocus Lens + Intelligent Lighting		
		Narrow field of vision	Color	FZ-SLC15			
	Autofocus cameras	Wide field of vision	Color	FZ-SZC100	Camera + Zoom, Autofocus Lens		
		Narrow field of vision	Color	FZ-SZC15			
	Digital cameras	300,000 pixels	Monochrome	FZ-S	Lens required		
			Color	FZ-SC			
		2 million pixels	Monochrome	FZ-S2M			
			Color	FZ-SC2M			
		5 million pixels	Monochrome	FZ-S5M2			
			Color	FZ-SC5M2			
	High-speed cameras (See note 1.)	300,000-pixels	Monochrome	FZ-SH	CCTV lens required		
			Color	FZ-SHC			
	Small digital cameras	300,000-pixel flat type	Monochrome	FZ-SF	CCTV lens required		
			Color	FZ-SFC			
		300,000-pixel pen type	Monochrome	FZ-SP			
			Color	FZ-SPC			
	Intelligent Compact Cameras	Wide View (long-distance)	Color	FZ-SQ100F	—		
		Wide View (short-distance)	Color	FZ-SQ100N			
		Standard	Color	FZ-SQ050F			
		Narrow view	Color	FZ-SQ010F			
	Cameras peripheral devices	Intelligent camera diffusion plate		Wide field of vision	FZ-SLC100-DL	—	
				Narrow field of vision	FZ-SLC15-DL	—	
		CCTV Lenses			3Z4S-LE Series		—
		Extension Tubes					—
Low-distortion Lenses			FZ-LEH5/LEH8/LEH12/LEH16/LEH25/LEH35/LEH50/LEH75/LEH100		Low distortion lens for 2-million pixel cameras and 5 million-pixel cameras		
Lenses for small camera			FZ-LES3/LES6/LES16/LES30		Lens for 300,000-pixel small cameras		
Extension Tubes for small camera			FZ-LESR		Extension Tubes for 300,000-pixel small cameras		
Halation cut illumination			FZ-SXCRB7018BR-4S		Integrated unit combining special Halation cut illumination, strobe controller and camera (without lens)		
			FZ-LTCRB7018BR-4S		Integrated unit combining special Halation cut illumination and strobe controller		
			FZ-LTRB7018BR-4S		Special Halation cut illumination only		
For Intelligent Compact Camera		Mounting brackets		FQ-XL	—		
		Polarizing Filter Attachment		FQ-XF1	—		

Item	Descriptions	Model	Remarks	
Cables	Camera Cable	FZ-VS	Cable length: 2 m, 5 m, or 10 m (See note 3.)	
	Bend resistant Camera Cables	FZ-VSB	Cable length: 2 m, 5 m, or 10 m (See note 4.)	
	Right-angle Camera Cable (See note 2.)	FZ-VSL	Cable length: 2 m, 5 m, or 10 m (See note 3.)	
	Long-distance camera cable	FZ-VS2	Cable length: 15 m (See note 5.)	
	Long-distance right-angle camera cable	FZ-VSL2	Cable length: 15 m (See note 5.)	
	Cable extension unit	FZ-VSJ	Up to two Extension Units and three Cables can be connected. (Maximum cable length: 45 m (See note 6.))	
	Monitor cable	FZ-VM	Cable length: 2 m or 5 m	
	Parallel cable	FZ-VP FZ-VPX (See note 7.)	Cable length: 2 m or 5 m Connector-type	
Peripheral devices	LCD monitor	FZ-M08	For Box-type Controllers	
	USB memory	2 GB	FZ-MEM2G	Capacity: 2 GB
		8 GB	FZ-MEM8G	Capacity: 8 GB
	VESA attachment	FZ-VESA	For installing the LCD integrated-type controller	
	Desktop controller stand	FZ-DS	For installing the LCD integrated-type controller	
Mouse	—	Recommended Products (Optical Mouse) • Microsoft Corporation: Compact Optical Mouse, U81 Series		
External Lighting	3Z4S-LT Series	—	—	
	FZ-LT Series	—		
	FL Series	—		
Strobe Controller	For 3Z4S-LT Series	Manufactured by MORITEX Corporation 3Z4S-LT MLEK-C100E1TS2	One channel	
	For FZ-LT Series	FZ-LTA100 FZ-LTA200	Two channels	
Lighting Controller	For FL Series	FL-TCC1	—	

Note 1: High-speed camera is supported by firmware Ver. 3.21 or later. Please consult your OMRON representative.

2: This Cable has an L-shaped connector on the Camera end.

3: The 10-m cable cannot be used for the intelligent camera, autofocus camera and 5 million-pixel camera.

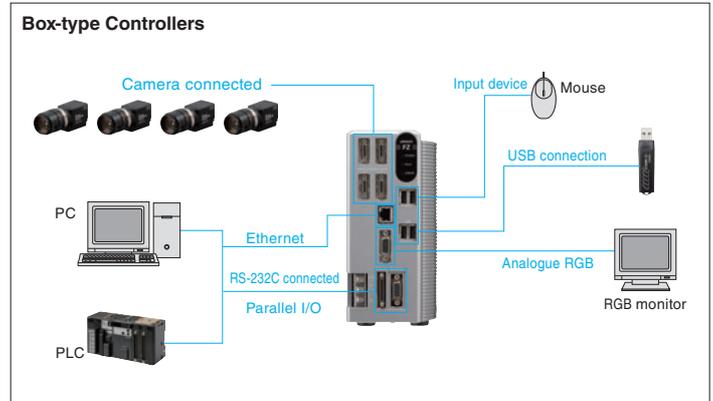
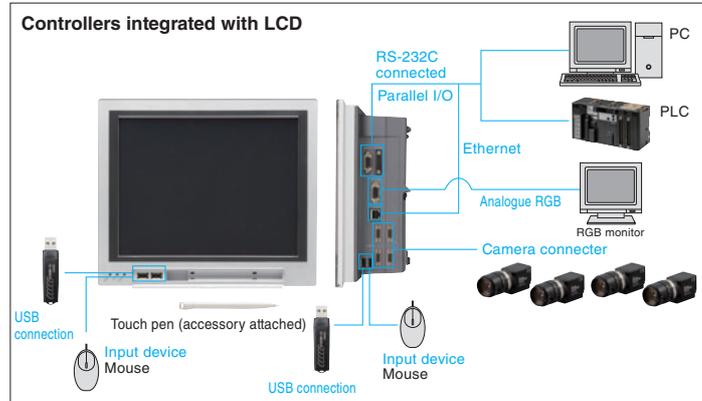
4: The 10-m cable cannot be used for the intelligent camera, autofocus camera 2 million-pixel camera and 5 million-pixel camera.

5: The 15-m cable cannot be used for the intelligent camera, autofocus camera and 5 million-pixel camera.

6: The maximum cable length depends on the Camera being connected, and the model and length of the Cable being used. For further information, please refer to the "Cameras / Cables" table in Page 27.

7: Connector-Terminal Block Conversion Units can be connected (Recommended Products: OMRON XW2B-50G4/50G5, XE2D-50G6).

## System configuration



## Lenses

### High-resolution, Low-distortion Lenses

Model	FZ-LEH5	FZ-LEH8	FZ-LEH12	FZ-LEH16	FZ-LEH25	FZ-LEH35	FZ-LEH50	FZ-LEH75	FZ-LEH100
Appearance									
Focal length	5mm	8mm	12.5mm	16mm	25mm	35mm	50mm	75mm	100mm
Brightness	F2.8	F1.4	F1.4	F1.4	F1.4	F2	F2.8	F2.5	F2.8
Filter size	M40.5 P0.5	M27.0 P0.5	M27.0 P0.5	M27.0 P0.5	M27.0 P0.5	M27.0 P0.5	M27.0 P0.5	M34.0 P0.5	M40.5 P0.5

The 5-mm Extension Tubes (3Z4S-LE ML-EXR) cannot be used with FZ-LEH25 Lenses.

### CCTV Lenses

Model	3Z4S-LE ML-0614	3Z4S-LE ML-0813	3Z4S-LE ML-1214	3Z4S-LE ML-1614	3Z4S-LE ML-2514	3Z4S-LE ML-3519	3Z4S-LE ML-5018	3Z4S-LE ML-7527	3Z4S-LE ML-10035
Appearance									
Focal length	6mm	8mm	12mm	16mm	25mm	35mm	50mm	75mm	100mm
Brightness	F1.4	F1.3	F1.4	F1.4	F1.4	F1.9	F1.8	F2.7	F3.5
Filter size	M27 P0.5	M25.5 P0.5	M27 P0.5	M27 P0.5	M27 P0.5	M27 P0.5	M30.5 P0.5	M30.5 P0.5	M30.5 P0.5

### Lenses for small camera

Model	FZ-LES3	FZ-LES6	FZ-LES16	FZ-LES30
Appearance				
Focal length	3mm	6mm	16mm	30mm
Brightness	F2.0	F2.0	F3.4	F3.4

### Extension Tubes

Model	3Z4S-LE ML-EXR
Contents	Set of 7 tubes(40 mm, 20 mm, 10 mm, 5 mm, 2.0 mm, 1.0 mm, and 0.5 mm) Maximum outer diameter: 30 mm dia.

• Do not use the 0.5-mm, 1.0-mm, and 2.0-mm Extension Tubes attached to each other. Since these Extension Tubes are placed over the threaded section of the Lens or other Extension Tube, the connection may loosen when more than one 0.5-mm, 1.0-mm or 2.0-mm Extension Tube are used together.

### Extension Tubes for small camera

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

• Reinforcement may be required for combinations of Extension Tubes exceeding 30 mm if the Camera is subject to vibration.

# Ratings and Specifications (Controllers)

## Dual-task, High-grade, High-speed Controllers and Dual-task, High-speed Controllers

Model		NPN Output	FZ3-900	FZ3-900-10	FZ3-H900	FZ3-H900-10	FZ3-950	FZ3-950-10	FZ3-H950	FZ3-H950-10	
		PNP Output	FZ3-905	FZ3-905-10	FZ3-H905	FZ3-H905-10	FZ3-955	FZ3-955-10	FZ3-H955	FZ3-H955-10	
Connected Camera		Please refer to the "Camera Connection" table in Page 28.									
No. of Cameras		2	4	2	4	2	4	2	4	4	
Processing resolution	When connected to a intelligent compact camera	752(H)×480(V)									
	When connected to a 300,000-pixel camera	640(H)×480(V)									
	When connected to a 2 million-pixel camera	1600(H)×1200(V)									
	When connected to a 5 million-pixel camera	2448(H)×2044(V)									
No. of scenes		32									
Number of logged images (See note 1.)	When connected to a intelligent compact camera	Connected to 1 camera	214								
		Connected to 2 cameras	107								
		Connected to 3 cameras	71								
		Connected to 4 cameras	53								
	When connected to a 300,000-pixel camera	Connected to 1 camera	Color camera: 250, Monochrome Camera: 252								
		Connected to 2 cameras	Color camera: 125, Monochrome Camera: 126								
		Connected to 3 cameras	Color camera: 83, Monochrome Camera: 84								
		Connected to 4 cameras	Color camera: 62, Monochrome Camera: 63								
	When connected to a 2 million-pixel camera	Connected to 1 camera	Color camera: 40, Monochrome Camera: 40								
		Connected to 2 cameras	Color camera: 20, Monochrome Camera: 20								
		Connected to 3 cameras	Color camera: 13, Monochrome Camera: 13								
		Connected to 4 cameras	Color camera: 10, Monochrome Camera: 10								
	When connected to a 5 million-pixel camera	Connected to 1 camera	Color camera: 15, Monochrome Camera: 15								
		Connected to 2 cameras	Color camera: 7, Monochrome Camera: 7								
		Connected to 3 cameras	Color camera: 5, Monochrome Camera: 5								
		Connected to 4 cameras	Color camera: 3, Monochrome Camera: 3								
Operation		Touch pen, mouse, etc.					Mouse or similar device				
Settings		Create series of processing steps by editing the flowchart (Help messages provided).									
Serial communications		RS-232C/422A:1CH									
Network communications		Ethernet 100BASE-TX/10BASE-T									
EtherNet/IP communications		Ethernet port baud rate: 100 Mbps (100Base-TX)									
Parallel I/O		(When used in Multi-line random-trigger mode) 17 inputs (RESET, STEP0/ENCTRIG_Z0, STEP1/ENCTRIG_Z1, DSA0 to 1, ENCTRIG_A0 to 1, ENCTRIG_B0 to 1, DI0 to 7), 29 outputs (RUN/BUSY1, BUSY0, GATE0 to 1, OR0 to 1, READY0 to 1, ERROR, STGOUT0 to 3, DO0 to 15) (When used in other mode) 13 inputs (RESET, STEP0/ENCTRIG_Z0, DSA0, ENCTRIG_A0, ENCTRIG_B0, DI0 to 7), 26 outputs (RUN, BUSY0, GATE0, OR0, READY0, ERROR, STGOUT0 to 3, DO0 to 15)									
Monitor interface		Integrated Controller and LCD 12.1 inch TFT color LCD (Resolution: XGA 1,024 × 768 dots)					Analog RGB video output, 1 channel (Resolution: XGA 1,024 × 768 dots)				
USB interface		4 channels (supports USB 1.1 and 2.0)									
Power supply voltage		20.4 to 26.4 VDC									
Current consumption (at 24.0 VDC) (See note 3.)	When connected to a intelligent compact camera	5 A max.	7.5 A max.	5 A max.	7.5 A max.	5 A max.	7.5 A max.	5 A max.	7.5 A max.	7.5 A max.	
	When connected to a intelligent or autofocus camera										
	When connected to a 300,000-pixel camera										
	When connected to a 2 million-pixel camera	3.7 A max.	4.9 A max.	3.7 A max.	4.9 A max.	3.7 A max.	4.9 A max.	3.7 A max.	4.9 A max.	4.9 A max.	
		When connected to a 5 million-pixel camera									
Ambient temperature range		Operating: 0 to 45°C, 0 to 50°C (See note 2.), Storage: -20 to 65°C (with no icing or condensation)									
Ambient humidity range		Operating and storage: 35% to 85% (with no condensation)									
Weight		Approx. 3.2 kg	Approx. 3.4 kg	Approx. 3.2 kg	Approx. 3.4 kg	Approx. 1.8 kg	Approx. 1.9 kg	Approx. 1.8 kg	Approx. 1.9 kg	Approx. 1.9 kg	
Accessories		Touch pen (one, inside the front panel), Please Read First, Instruction Manual (Setup), 6 mounting brackets					Please Read First, Instruction Manual (Setup)				

Note 1: The image logging capacity changes when multiple cameras of different types are connected at the same time.

2: The operation mode can be changed on the controller menu.

3: The current consumption when the maximum number of cameras supported by each controller are connected. If a strobe controller model is connected to a lamp, the current consumption is as high as when an intelligent camera is connected.

## High-grade, High-speed Controllers and High-speed Controllers

Model	NPN Output	FZ3-700	FZ3-700-10	FZ3-H700	FZ3-H700-10	FZ3-750	FZ3-750-10	FZ3-H750	FZ3-H750-10	
	PNP Output	FZ3-705	FZ3-705-10	FZ3-H705	FZ3-H705-10	FZ3-755	FZ3-755-10	FZ3-H755	FZ3-H755-10	
Connected Camera		Please refer to the "Camera Connection" table in Page 28.								
No. of Cameras (See note 1.)		2	4	2	4	2	4	2	4	
Processing resolution	When connected to a intelligent compact camera	752(H)×480(V)								
	When connected to a 300,000-pixel camera	640(H)×480(V)								
	When connected to a 2 million-pixel camera	1600(H)×1200(V)								
	When connected to a 5 million-pixel camera	2448(H)×2044(V)								
No. of scenes		32								
Number of logged images (See note 2.)	When connected to a intelligent compact camera	Connected to 1 camera	214							
		Connected to 2 cameras	107							
		Connected to 3 cameras	71							
		Connected to 4 cameras	53							
	When connected to a 300,000-pixel camera	Connected to 1 camera	Color camera: 250, Monochrome Camera: 252							
		Connected to 2 cameras	Color camera: 125, Monochrome Camera: 126							
		Connected to 3 cameras	Color camera: 83, Monochrome Camera: 84							
		Connected to 4 cameras	Color camera: 62, Monochrome Camera: 63							
	When connected to a 2 million-pixel camera	Connected to 1 camera	Color camera: 40, Monochrome Camera: 40							
		Connected to 2 cameras	Color camera: 20, Monochrome Camera: 20							
		Connected to 3 cameras	Color camera: 13, Monochrome Camera: 13							
		Connected to 4 cameras	Color camera: 10, Monochrome Camera: 10							
	When connected to a 5 million-pixel camera	Connected to 1 camera	Color camera: 11, Monochrome Camera: 11							
		Connected to 2 cameras	Color camera: 5, Monochrome Camera: 5							
	Operation		Touch pen, mouse, etc.				Mouse or similar device			
	Settings		Create series of processing steps by editing the flowchart (Help messages provided).							
Serial communications		RS-232C/422A:1CH								
Network communications		Ethernet 100BASE-TX/10BASE-T								
EtherNet/IP communications		Ethernet port baud rate: 100 Mbps (100Base-TX)								
Parallel I/O		11 inputs (RESET, STEP, DSA, and DI 0 to 7), 26 outputs (RUN, BUSY, GATE, OR, READY, ERROR, STGOUT 0 to 3, and DO 0 to 15)								
Monitor interface		Integrated Controller and LCD 12.1 inch TFT color LCD (Resolution: XGA 1,024 × 768 dots)				Analog RGB video output, 1 channel (Resolution: XGA 1,024 × 768 dots)				
USB interface		4 channels (supports USB 1.1 and 2.0)								
Power supply voltage		20.4 to 26.4 VDC								
Current consumption (at 24.0 VDC) (See note 4.)	When connected to a intelligent compact camera	5 A max.	7.5 A max.	5 A max.	7.5 A max.	5 A max.	7.5 A max.	5 A max.	7.5 A max.	
	When connected to a intelligent or autofocus camera									
	When connected to a 300,000-pixel camera									
	When connected to a 2 million-pixel camera	3.7 A max.	4.9 A max.	3.7 A max.	4.9 A max.	3.7 A max.	4.9 A max.	3.7 A max.	4.9 A max.	
	When connected to a 5 million-pixel camera									
Ambient temperature range		Operating: 0 to 45°C, 0 to 50°C (See note 3.), Storage: -20 to 65°C (with no icing or condensation)								
Ambient humidity range		Operating and storage: 35% to 85% (with no condensation)								
Weight		Approx. 3.2 kg	Approx. 3.4 kg	Approx. 3.2 kg	Approx. 3.4 kg	Approx. 1.8 kg	Approx. 1.9 kg	Approx. 1.8 kg	Approx. 1.9 kg	
Accessories		Touch pen (one, inside the front panel), Please Read First, Instruction Manual (Setup), 6 mounting brackets				Please Read First, Instruction Manual (Setup)				

Note 1: When connecting 5 million-pixel cameras, up to two cameras can be connected.

2: The number of logged images will vary when connecting multiple Cameras with different models.

3: The operating mode can be switched from the Controller Menu settings.

4: When the strobe controller is connected to the lights, the controller uses power as much as it does when connected to the intelligent camera.

5: Do not install the firmware for FZ2 in any High Grade High Speed or High Grade controller of the FZ3 series. It will lead to the failure of the controller. For software download, please contact your Omron representative.

## High-grade Controllers and Standard Controllers

Model	NPN Output	FZ3-300	FZ3-300-10	FZ3-H300	FZ3-H300-10	FZ3-350	FZ3-350-10	FZ3-H350	FZ3-H350-10
	PNP Output	FZ3-305	FZ3-305-10	FZ3-H305	FZ3-H305-10	FZ3-355	FZ3-355-10	FZ3-H355	FZ3-H355-10
Connected Camera		Please refer to the "Camera Connection" table in Page 28.							
No. of Cameras		2	4	2	4	2	4	2	4
Processing resolution	When connected to a intelligent compact camera	752(H)×480(V)							
	When connected to a 300,000-pixel camera	640(H)×480(V)							
	When connected to a 2 million-pixel camera	1600(H)×1200(V)							
No. of scenes		32							
Number of logged images (See note 1.)	When connected to a intelligent compact camera	Connected to 1 camera	214						
		Connected to 2 cameras	107						
		Connected to 3 cameras	71						
		Connected to 4 cameras	53						
	When connected to a 300,000-pixel camera	Connected to 1 camera	Color camera: 250, Monochrome Camera: 252						
		Connected to 2 cameras	Color camera: 125, Monochrome Camera: 126						
		Connected to 3 cameras	Color camera: 83, Monochrome Camera: 84						
		Connected to 4 cameras	Color camera: 62, Monochrome Camera: 63						
	When connected to a 2 million-pixel camera	Connected to 1 camera	Color camera: 40, Monochrome Camera: 40						
		Connected to 2 cameras	Color camera: 20, Monochrome Camera: 20						
		Connected to 3 cameras	Color camera: 13, Monochrome Camera: 13						
		Connected to 4 cameras	Color camera: 10, Monochrome Camera: 10						
Operation		Touch pen, mouse, etc.				Mouse or similar device			
Settings		Create series of processing steps by editing the flowchart (Help messages provided).							
Serial communications		RS-232C/422A:1CH							
Network communications		Ethernet 100BASE-TX/10BASE-T							
EtherNet/IP communications		Ethernet port baud rate: 100 Mbps (100Base-TX)							
Parallel I/O		11 inputs (RESET, STEP, DSA, and DI 0 to 7), 26 outputs (RUN, BUSY, GATE, OR, READY, ERROR, STGOUT 0 to 3, and DO 0 to 15)							
Monitor interface		Integrated Controller and LCD 12.1 inch TFT color LCD (Resolution: XGA 1,024 × 768 dots)				Analog RGB video output, 1 channel (Resolution: XGA 1,024 × 768 dots)			
USB interface		4 channels (supports USB 1.1 and 2.0)							
Power supply voltage		20.4 to 26.4 VDC							
Current consumption (at 24.0 VDC) (See note 3.)	When connected to a intelligent compact camera	5 A max.	7.5 A max.	5 A max.	7.5 A max.	5 A max.	7.5 A max.	5 A max.	7.5 A max.
	When connected to a intelligent or autofocus camera								
	When connected to a 300,000-pixel camera	3.7 A max.	4.9 A max.	3.7 A max.	4.9 A max.	3.7 A max.	4.9 A max.	3.7 A max.	4.9 A max.
	When connected to a 2 million-pixel camera								
Ambient temperature range		Operating: 0 to 45°C, 0 to 50°C (See note 2.), Storage: -20 to 65°C (with no icing or condensation)							
Ambient humidity range		Operating and storage: 35% to 85% (with no condensation)							
Weight		Approx. 3.2 kg	Approx. 3.4 kg	Approx. 3.2 kg	Approx. 3.4 kg	Approx. 1.8 kg	Approx. 1.9 kg	Approx. 1.8 kg	Approx. 1.9 kg
Accessories		Touch pen (one, inside the front panel), Please Read First, Instruction Manual (Setup), 6 mounting brackets				Please Read First, Instruction Manual (Setup)			

Note 1: The number of logged images will vary when connecting multiple Cameras with different models. 2: The operating mode can be switched from the Controller Menu settings.

3: When the strobe controller is connected to the lights, the controller uses power as much as it does when connected to the intelligent camera.

## Lite Controllers

Model	NPN Output	FZ3-L350	FZ3-L350-10	
	PNP Output	FZ3-L355	FZ3-L355-10	
Connected Camera		Please refer to the "Camera Connection" table in Page 28.		
No. of Cameras		2	4	
Processing resolution	When connected to a intelligent compact camera	752(H)×480(V)		
	When connected to a 300,000-pixel camera	640(H)×480(V)		
	When connected to a 2 million-pixel camera	1600(H)×1200(V)		
No. of scenes		32		
Number of logged images (See note 1.)	When connected to a intelligent compact camera	Connected to 1 camera	214	
		Connected to 2 cameras	107	
		Connected to 3 cameras	71	
		Connected to 4 cameras	53	
	When connected to a 300,000-pixel camera	Connected to 1 camera	Color camera: 250, Monochrome Camera: 252	
		Connected to 2 cameras	Color camera: 125, Monochrome Camera: 126	
		Connected to 3 cameras	Color camera: 83, Monochrome Camera: 84	
		Connected to 4 cameras	Color camera: 62, Monochrome Camera: 63	
	When connected to a 2 million-pixel camera	Connected to 1 camera	Color camera: 40, Monochrome Camera: 40	
		Connected to 2 cameras	Color camera: 20, Monochrome Camera: 20	
		Connected to 3 cameras	Color camera: 13, Monochrome Camera: 13	
		Connected to 4 cameras	Color camera: 10, Monochrome Camera: 10	
Operation		Mouse, etc.		
Settings		Create series of processing steps by editing the flowchart (Help messages provided).		
Serial communications		RS-232C: 1CH		
Network communications		Ethernet 100BASE-T/100BASE-TX/10BASE-T		
EtherNet/IP communications		Ethernet port baud rate: 100 Mbps (100Base-TX)		
Parallel I/O		11 inputs (RESET, STEP, DSA, and DI 0 to 7), 26 outputs (RUN, BUSY, GATE, OR, READY, ERROR, STGOUT 0 to 3, and DO 0 to 15)		
Monitor interface		Analog RGB video output, 1 channel (Resolution: XGA 1,024 × 768 dots)		
USB interface		2 channels (supports USB 1.1 and 2.0)		
Power supply voltage (See note 2.)		20.4 to 26.4 VDC		
Current consumption (at 24.0 VDC) (See note 3.)	When connected to a intelligent compact camera	4.0 A max.	5.5 A max.	
	When connected to a intelligent or autofocus camera			
	When connected to a 300,000-pixel camera	2.6 A max.	2.9 A max.	
	When connected to a 2 million-pixel camera			
Ambient temperature range		Operating: 0 to 50°C Storage: -20 to 65°C (with no icing or condensation)		
Ambient humidity range		Operating and storage: 35% to 85% (with no condensation)		
Weight		Approx. 1.8kg		
Accessories		Instruction manual		

Note 1: The number of images that can be logged will vary if different types of Camera are connected at the same time.

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

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

3: The current consumption is for when the maximum numbers of Cameras is connected to the Controller.

When lighting is connected through a Strobe Controller, the current consumption will be the same as when the Intelligent Camera is connected.

# Ratings and Specifications (Cameras)

## Intelligent cameras, autofocus cameras

	FZ-SLC100	FZ-SLC15	FZ-SZC100	FZ-SZC15
Image elements	Interline transfer reading all pixels, 1/3-inch CCD image elements			
Color/Monochrome	Color			
Effective pixels	640(H)×480(V)			
Pixel size	7.4(μm)×7.4(μm)			
Shutter function	Electronic shutter; select shutter speeds from 1/10 to 1/50,000 s			
Partial function	12 to 480 lines			
Frame rate (image read time)	80fps(12.5ms)			
Field of vision (See note 2.)	13 to 100mm (See note1.)	2.9 to 14.9mm (See note1.)	13 to 100mm (See note1.)	2.9 to 14.9mm (See note1.)
Installation distance	70 to 190mm (See note1.)	35 to 55mm (See note1.)	77.5 to 197.5mm (See note1.)	47.5 to 67.5mm
LED class (See note 3.) (lighting)	Class 2			—
Ambient temperature range	Operating: 0 to 50°C Storage: -25 to 65°C (with no icing or condensation)			
Ambient humidity range	Operating and storage: 35% to 85% (with no condensation)			
Weight	Approx. 670 g	Approx. 700 g	Approx. 500 g	
Accessories	Instruction Sheet and hexagonal wrench			

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

## Digital cameras

	FZ-S	FZ-SC	FZ-S2M	FZ-SC2M	FZ-S5M2	FZ-SC5M2
Image elements	Interline transfer reading all pixels, 1/3-inch CCD image elements		Interline transfer reading all pixels, 1/1.8-inch CCD image elements		Interline transfer reading all pixels, 2/3-inch CCD image elements	
Color/Monochrome	Monochrome	Color	Monochrome	Color	Monochrome	Color
Effective pixels	640(H)×480(V)		1600(H)×1200(V)		2448(H)×2044(V)	
Pixel size	7.4(μm)×7.4(μm)		4.4(μm)×4.4(μm)		3.45(μm)×3.45(μm)	
Shutter function	Electronic shutter; select shutter speeds from 1/10 to 1/50,000 s		Electronic shutter; select shutter speeds from 1/10 to 1/50,000 s		Electronic shutter; select shutter speeds from 1/10 to 1/50,000 s	
Partial function	12 to 480 lines		12 to 1200 lines		12 to 2044 lines	
Frame rate (image read time)	80fps(12.5ms)		30fps(33.3ms)		16fps(62.5ms)	
Field of vision, installation distance	Selecting a lens according to the field of vision and installation distance					
Ambient temperature range	Operating: 0 to 50°C Storage: -25 to 65°C (with no icing or condensation)		Operating: 0 to 40°C Storage: -25 to 65°C (with no icing or condensation)		Operating: 0 to 40°C Storage: -25 to 65°C (with no icing or condensation)	
Ambient humidity range	Operating and storage: 35% to 85% (with no condensation)					
Weight	Approx. 55g		Approx. 76g		Approx. 140g	
Accessories	Instruction manual					

## Small digital cameras

	FZ-SF	FZ-SFC	FZ-SP	FZ-SPC
Image elements	Interline transfer reading all pixels, 1/3-inch CCD image elements			
Color/Monochrome	Monochrome	Color	Monochrome	Color
Effective pixels	640(H)×480(V)			
Pixel size	7.4(μm)×7.4(μm)			
Shutter function	Electronic shutter; select shutter speeds from 1/10 to 1/50,000 s			
Partial function	12 to 480 lines			
Frame rate (image read time)	80fps(12.5ms)			
Field of vision, installation distance	Selecting a lens according to the field of vision and installation distance			
Ambient temperature range	Operating: 0 to 50°C (camera amp) 0 to 45°C (camera head) Storage: -25 to 65°C (with no icing or condensation)		Operating: 0 to 50°C (camera amp) 0 to 45°C (camera head) Storage: -25 to 65°C (with no icing or condensation)	
Ambient humidity range	Operating and storage: 35% to 85% (with no condensation)		Operating and storage: 35% to 85% (with no condensation)	
Weight	Approx. 150g		Approx. 150g	
Accessories	Instruction manual, installation bracket, Four mounting brackets(M2)		Instruction manual	

## High-speed cameras

	FZ-SH	FZ-SHC
Image elements	Interline transfer reading all pixels, 1/3-inch CCD image elements	
Color/Monochrome	Monochrome	Color
Effective pixels	640(H)×480(V)	
Pixel size	7.4(μm)×7.4(μm)	
Shutter function	Electronic shutter; select shutter speeds from 1/10 to 1/50,000 s	
Partial function	12 to 480 lines	
Frame rate (image read time)	204fps(4.9ms)	
Field of vision, installation distance	Selecting a lens according to the field of vision and installation distance	
Ambient temperature range	Operating: 0 to 40°C Storage: -25 to 65°C (with no icing or condensation)	
Ambient humidity range	Operating and storage: 35% to 85% (with no condensation)	
Weight	Approx. 105g	
Accessories	Instruction manual	

## Intelligent compact cameras

	FZ-SQ010F	FZ-SQ050F	FZ-SQ100F	FZ-SQ100N
Image elements	1/3-inch CMOS image elements			
Color/Monochrome	Color			
Effective pixels	752(H)×480(V)			
Pixel size	6.0(μm)×6.0(μm)			
Shutter function	1/250 to 1/32,258			
Partial function	8 to 752 lines			
Frame rate (image read time)	60fps			
Field of vision	7.5×4.7 to 13×8.2mm	13×8.2 to 53×33mm	53×33 to 240×153mm	29×18 to 300×191mm
Installation distance	38 to 60mm	56 to 215mm	220 to 970mm	32 to 380mm
LED class	Class 2			
Ambient temperature range	Operating: 0 to 50°C Storage: -25 to 65°C			
Ambient humidity range	Operating and storage: 35% to 85% (with no condensation)			
Weight	Approx. 150 g		Approx. 140 g	
Accessories	Mounting bracket(FQ-XL), polarizing filter attachment(FQ-XF1), instruction manual and warning label			

# Ratings and Specifications (LCD Monitor, Cable)

## LCD Monitor

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

## Camera Cables

	FZ-VS (2m)	FZ-VSB(2m)	FZ-VSL(2m)
Shock resistiveness (durability)	10 to 150Hz single amplitude 0.15mm 3 directions, 8 strokes, 4 times		
Ambient temperature range	Operation and storage: 0 to +65°C (with no icing or condensation)		
Ambient humidity range	Operation and storage: 40 to 70%RH (with no condensation)		
Ambient atmosphere	No corrosive gases		
Material	Cable sheath, connector: PVC		
Minimum bending radius	69mm	81mm	69mm
Weight	approx.170g	approx.220g	approx.170g

## Monitor Cable

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

## Halation cut illumination

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

## Cable Extension Unit

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

Note 1: A 12-VDC power supply must be provided to the Cable Extension Unit when connecting the Intelligent camera, the Autofocus camera, the Intelligent Compact Camera, the Strobe controller, or the Lighting Controller.  
2: The current consumption shows when connecting the Cable Extension Unit to an external power supply.

## Long-distance Camera Cables

	FZ-VS2 (15m)	FZ-VSL2(15m)
Shock resistiveness (durability)	10 to 150Hz single amplitude 0.15mm 3 directions, 8 strokes, 4 times	
Ambient temperature range	Operation and storage: 0 to +65°C (with no icing or condensation)	
Ambient humidity range	Operation and storage: 40 to 70%RH (with no condensation)	
Ambient atmosphere	No corrosive gases	
Material	Cable sheath, connector: PVC	
Minimum bending radius	93mm	
Weight	approx.1600g	

## Parallel Cable

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

## Illumination specifications

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

# Connection Table

## Camera Connection Table

Type of camera	Model	Resolution	Lite Controllers (FZ3-L35□, FZ3-L35□-10)	Standard Controllers (FZ3-3□□, FZ3-3□□-10)	High-grade Controllers (FZ3-H3□□, FZ3-H3□□-10)	High-speed Controllers (FZ3-7□□, FZ3-7□□-10)	High-grade, High-speed Controllers (FZ3-H7□□, FZ3-H7□□-10)	Dual-task, High-speed Controllers (FZ3-H9□□, FZ3-H9□□-10)	Dual-task, High-grade, High-speed Controllers (FZ3-H9□□, FZ3-H9□□-10)
Intelligent cameras	FZ-SLC100	300,000 Pixels	○	○	○	○	○	○	○
	FZ-SLC15	300,000 Pixels	○	○	○	○	○	○	○
Autofocus cameras	FZ-SZC100	300,000 Pixels	○	○	○	○	○	○	○
	FZ-SZC15	300,000 Pixels	○	○	○	○	○	○	○
Digital cameras	FZ-SC	300,000 Pixels	○	○	○	○	○	○	○
	FZ-S	300,000 Pixels	○	○	○	○	○	○	○
	FZ-SC2M	2 million pixels	○	○	○	○	○	○	○
	FZ-S2M	2 million pixels	○	○	○	○	○	○	○
	FZ-SC5M2	5 million pixels	×	×	×	○ (See note 1.)	○ (See note 1.)	○	○
High-speed cameras	FZ-S5M2	5 million pixels	×	×	×	○ (See note 1.)	○ (See note 1.)	○	○
	FZ-SHC	300,000 Pixels	○	○	○	○	○	○	○
Small digital cameras	FZ-SH	300,000 Pixels	○	○	○	○	○	○	○
	FZ-SFC	300,000 Pixels	○	○	○	○	○	○	○
	FZ-SF	300,000 Pixels	○	○	○	○	○	○	○
Intelligent compact cameras	FZ-SPC	300,000 Pixels	○	○	○	○	○	○	○
	FZ-SP	300,000 Pixels	○	○	○	○	○	○	○
	FZ-SQ10F	360,000 Pixels	○	○	○	○	○	○	○
	FZ-SQ050F	360,000 Pixels	○	○	○	○	○	○	
	FZ-SQ100F	360,000 Pixels	○	○	○	○	○	○	
	FZ-SQ100N	360,000 Pixels	○	○	○	○	○	○	

Note 1: When connecting 5 million-pixel cameras, up to two cameras can be connected.

## Cameras / Cables Connection Table

Type of camera	Model	Cable length	Intelligent cameras Autofocus cameras	High-speed cameras	Digital cameras			Small digital cameras Pen type / flat type	Intelligent compact cameras
					300,000-pixel	2 million-pixel	5 million-pixel		
Camera Cables Right-angle camera cables	FZ-VS FZ-VSL	2m	○	○	○	○	○	○	○
		5m	○	○	○	○	○	○	○
		10m	×	○	○	○	×	○	○
Bend resistant camera cables	FZ-VSB	2m	○	○	○	○	○	○	○
		5m	○	○	○	○	○	○	○
		10m	×	○	○	○	×	○	○
Long-distance camera cable Long-distance right-angle camera cable	FZ-VS2 FZ-VSL2	15m	×	○	○	○	×	○	○

# Processing Items

\*The items in red are High Grade processing items.

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

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

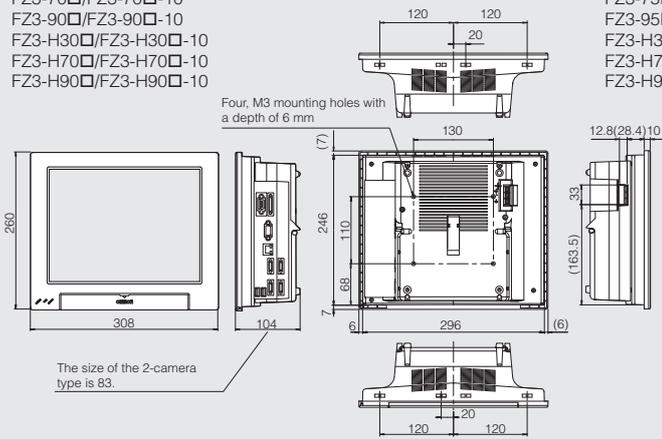
Note 1 : Bar Codes that can be read : JAN/EAN/UPC (including add-on codes), Code 39, Codabar (NW-7), ITF (Interleaved 2 of 5), Code 93, Code 128, GS1-128, GS1 DataBar (RSS-14 / RSS Limited / RSS Expanded), Pharmacode  
 2 : 2D Codes that can be read : Data Matrix (ECC200), QR Code

# External Dimensions (Unit:mm)

## FZ3-series Controllers

### ■ LCD-integrated type

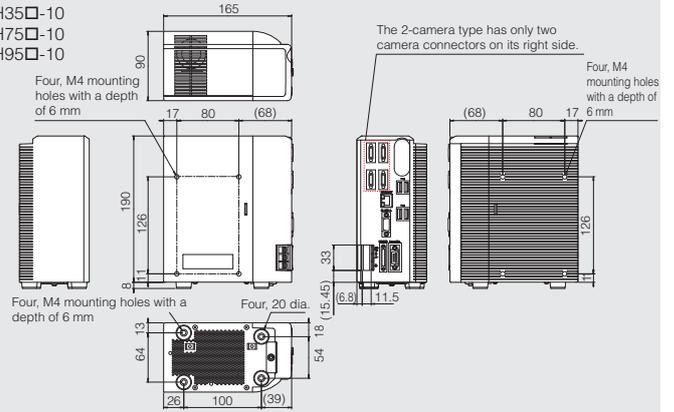
- FZ3-30□/FZ3-30□-10
- FZ3-70□/FZ3-70□-10
- FZ3-90□/FZ3-90□-10
- FZ3-H30□/FZ3-H30□-10
- FZ3-H70□/FZ3-H70□-10
- FZ3-H90□/FZ3-H90□-10



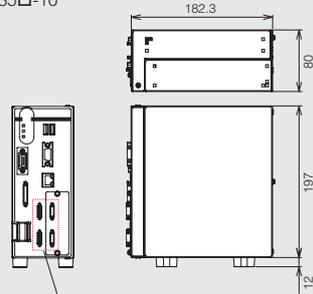
The size of the 2-camera type is 83.

### ■ Box-type

- FZ3-35□/FZ3-35□-10
- FZ3-75□/FZ3-75□-10
- FZ3-95□/FZ3-95□-10
- FZ3-H35□/FZ3-H35□-10
- FZ3-H75□/FZ3-H75□-10
- FZ3-H95□/FZ3-H95□-10



### FZ3-L35□/ FZ3-L35□-10

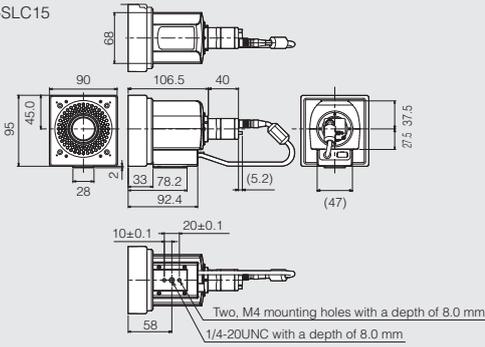


\*Only the two camera connectors on the left are used for Controllers that support only two cameras.

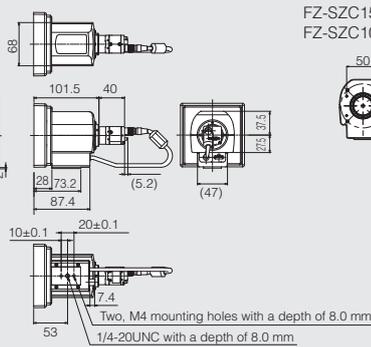
# Cameras

## Intelligent camera

FZ-SLC15



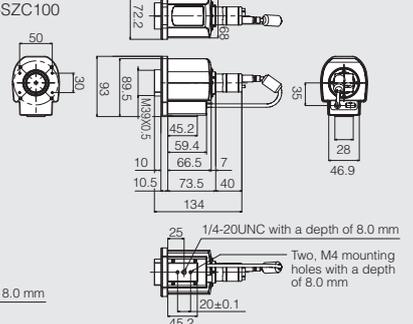
FZ-SLC100



## Auto focus camera

FZ-SZC15

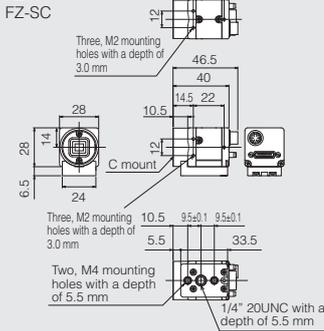
FZ-SZC100



## Digital cameras

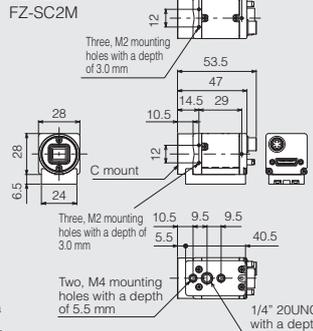
### 300,000-pixel camera

FZ-S



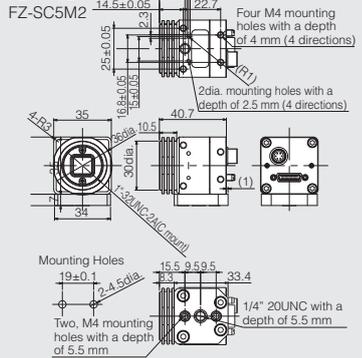
### 2 million-pixel camera

FZ-S2M



### 5 million-pixel camera

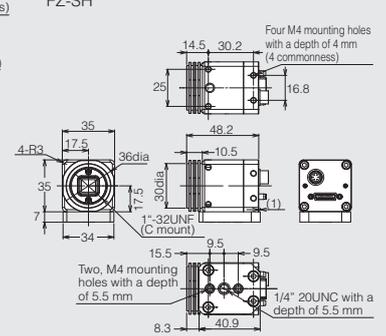
FZ-S5M2



### High speed camera

FZ-SHC

FZ-SH



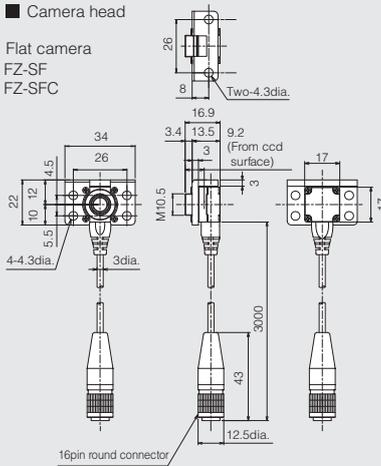
## Small digital cameras

### Camera head

Flat camera

FZ-SF

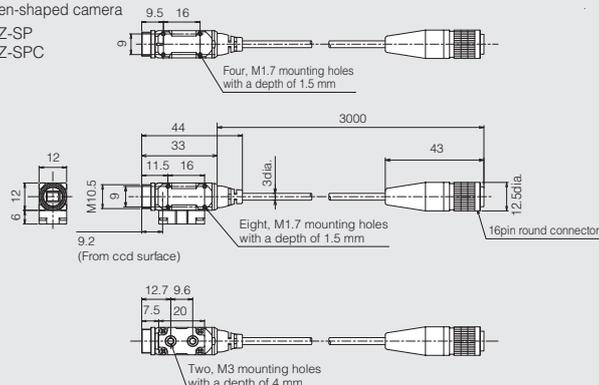
FZ-SFC



Pen-shaped camera

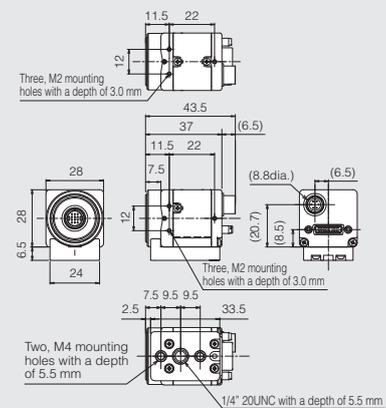
FZ-SP

FZ-SPC



### Camera amplifier

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



## Intelligent Compact Cameras

Narrow view / Standard

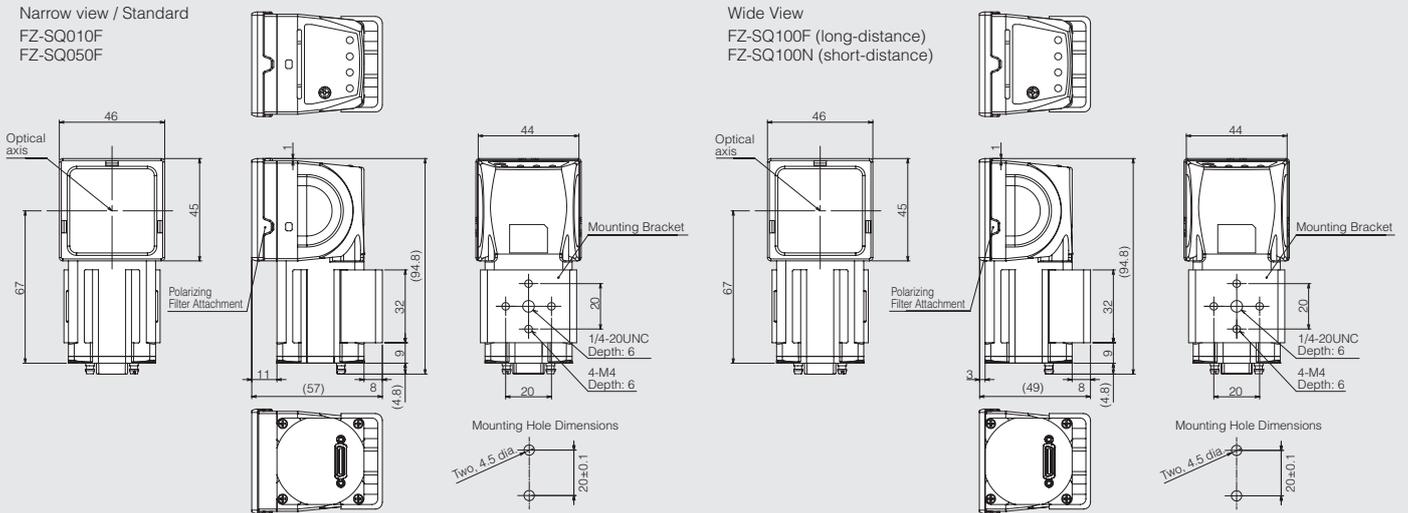
FZ-SQ10F

FZ-SQ050F

Wide View

FZ-SQ100F (long-distance)

FZ-SQ100N (short-distance)



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

Tightening torque: 1.2 N·m

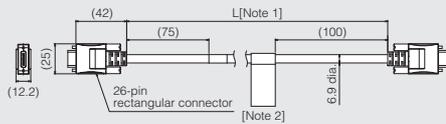
[Note1]: The mounting brackets can be connected to either side.

Tightening torque: 1.2 N·m

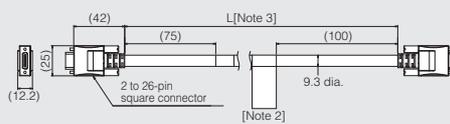
# Cable

## Camera Cable

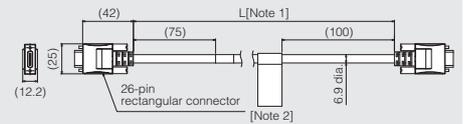
### ■ Camera Cable(Model FZ-VS)



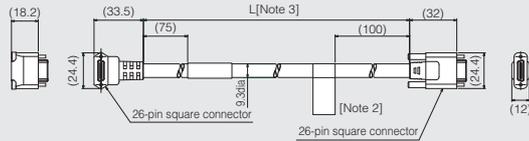
### ■ Long-distance Camera Cable(Model FZ-VS2)



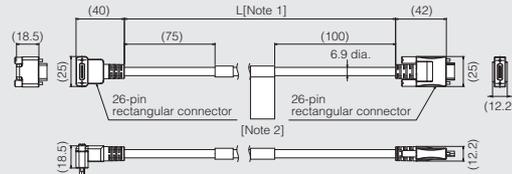
### ■ Bend resistant Cable(Model FZ-VSB)



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



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



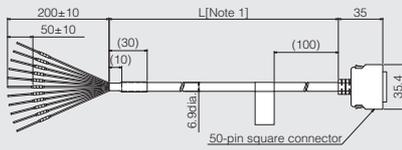
[Note1]: cable is available in 2m/5m/10m.  
The FZ-VS, FZ-VSB, and FZ-VSL are also available with a cable length of 3.5 m.

[Note2]: Each camera cables has polarity. Please ensure that the name plate side of the cable is connected to the controller.

[Note3]: cable is available in 15m.

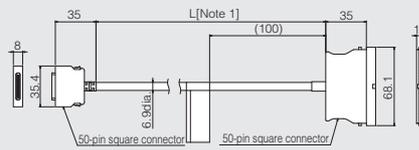
## Parallel Cable(Model FZ-VP)

### FZ-VP



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

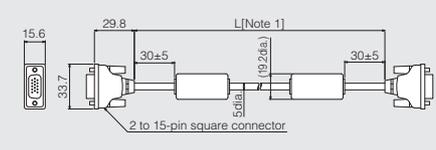
### FZ-VPX



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

## Monitor Cable(Model FZ-VM)

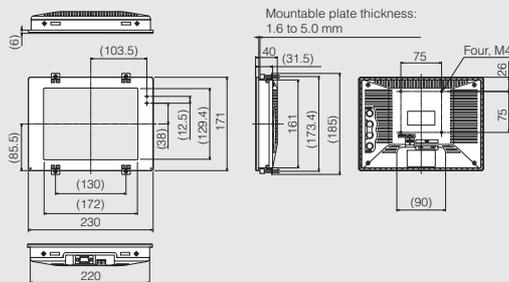
### FZ-VM



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

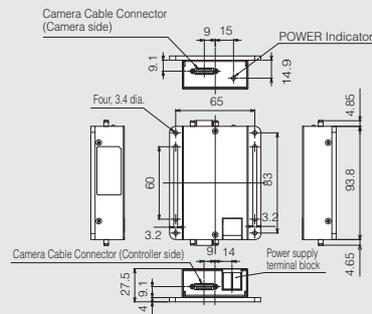
# LCD Monitor

## FZ-M08



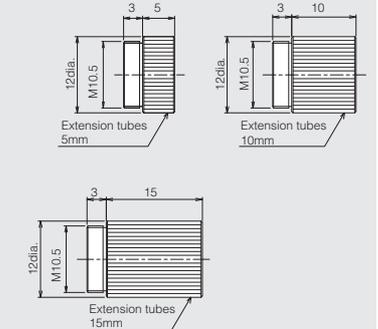
# Camera Cable Extension Unit

## FZ-VSJ



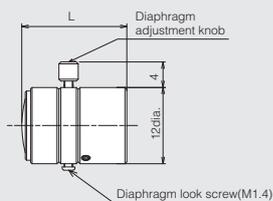
# Extension Tubes for small camera

## FZ-LESR



# Lens for small camera

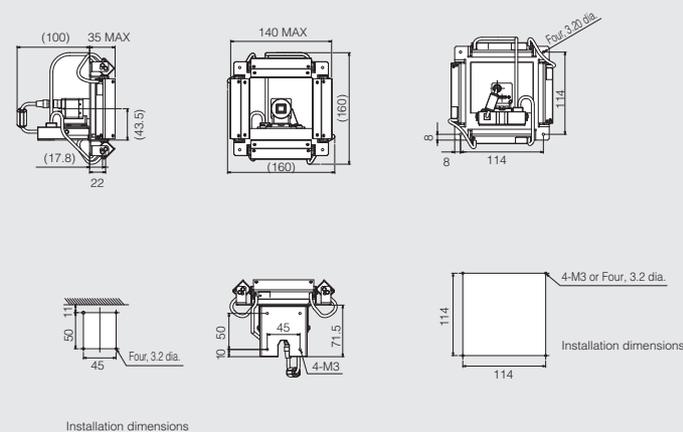
## FZ-LES Series



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

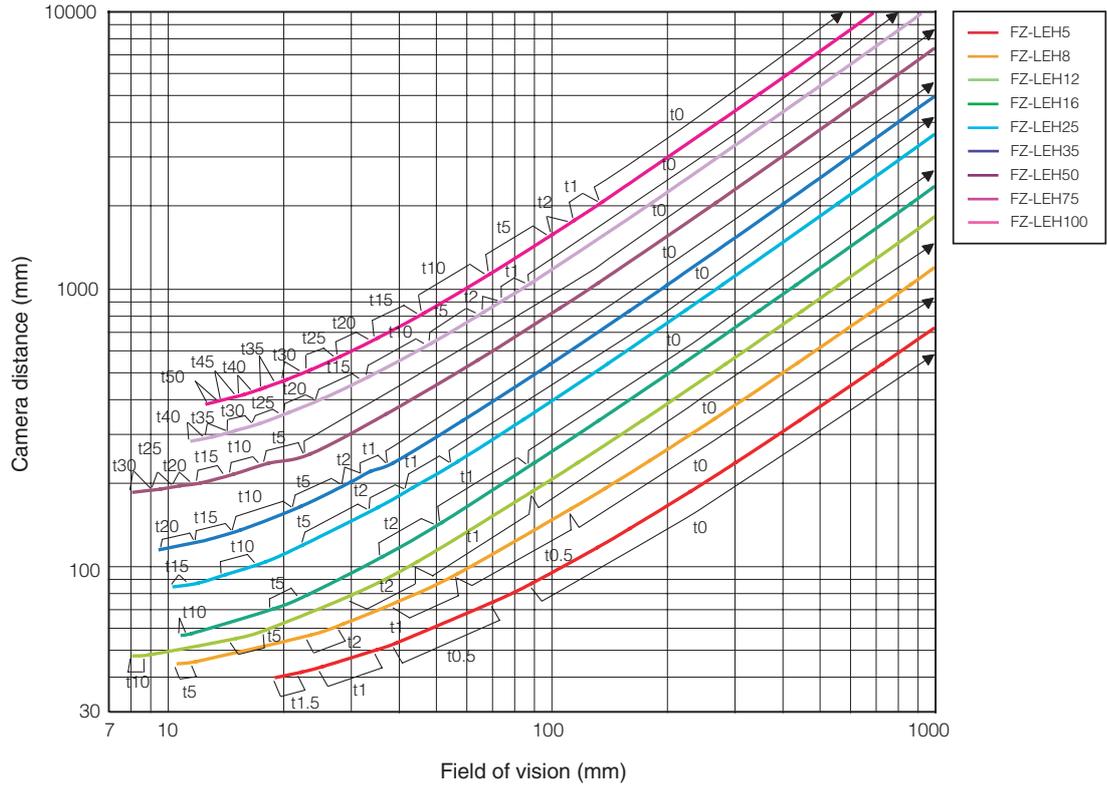
# Special Halation-cutoff Lamp

## FZ-SXCRB7018BR-4S (camera-integrated type)



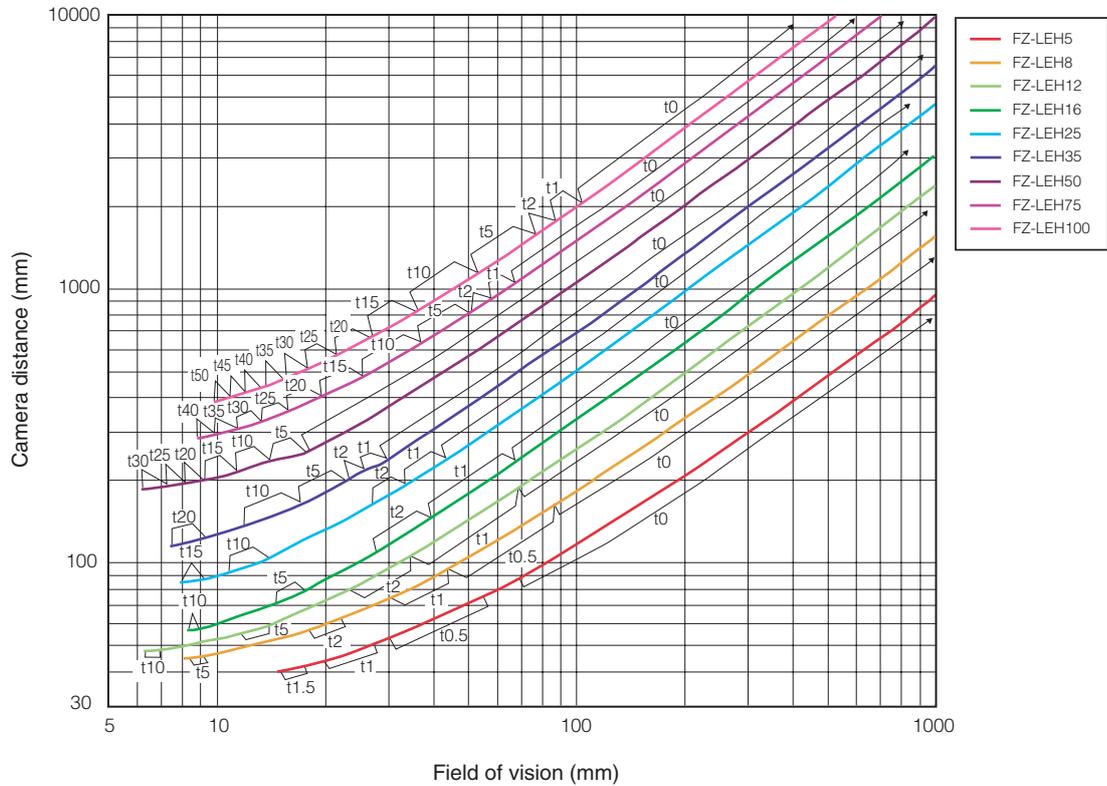
# Optical Chart

## 5 million-pixel digital camera FZ-S 5M2



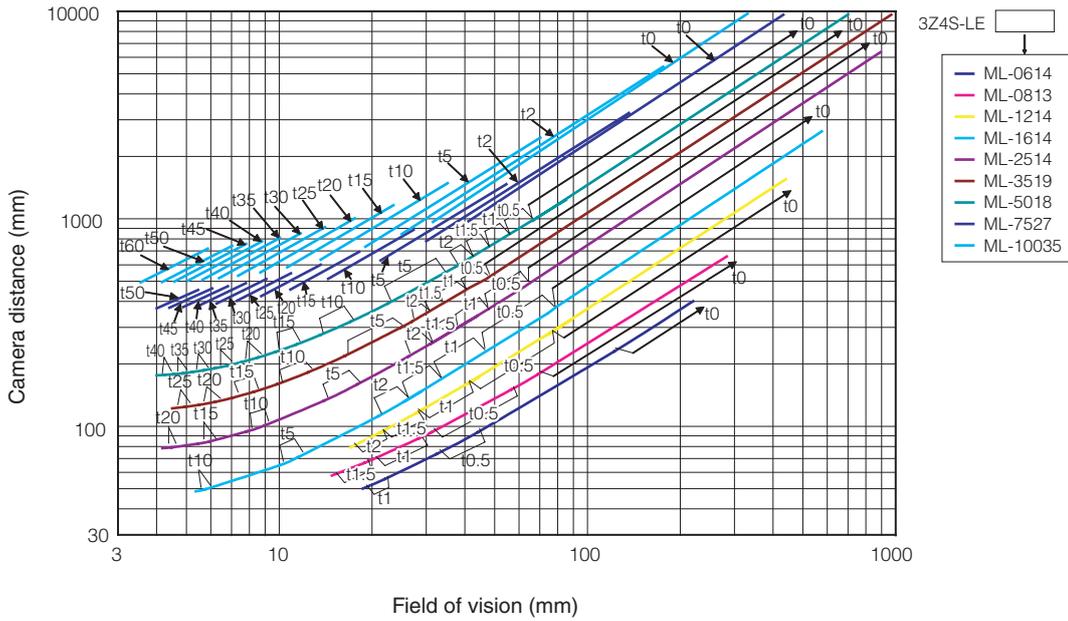
The 5-mm Extension Tubes (3Z4S-LE ML-EXR) cannot be used with FZ-LEH25 Lenses.

## 2 million-pixel digital camera FZ-S 2M

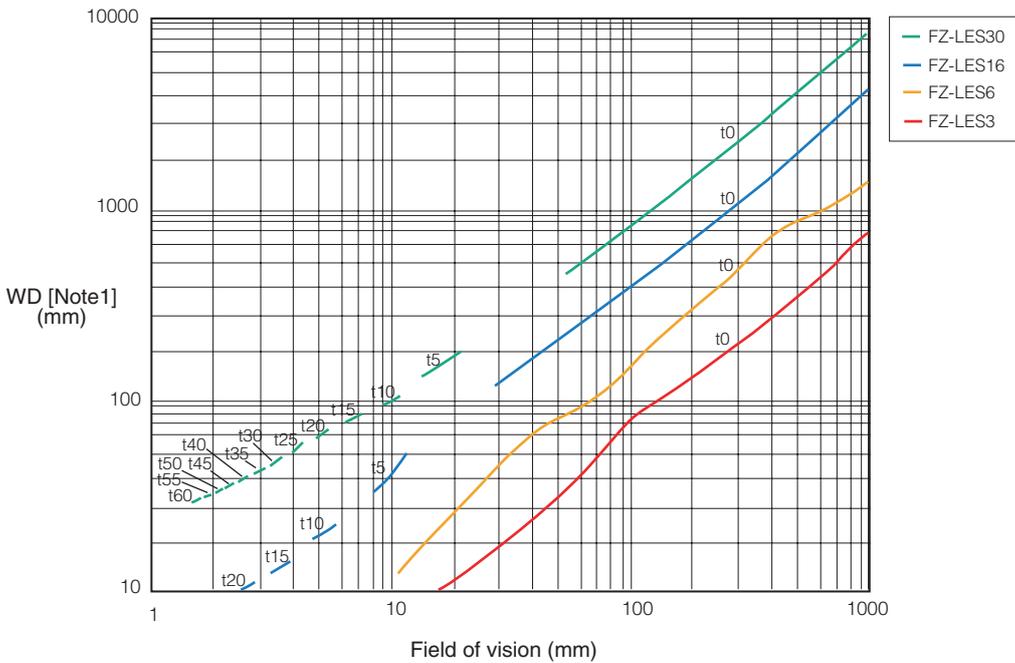


The 5-mm Extension Tubes (3Z4S-LE ML-EXR) cannot be used with FZ-LEH25 Lenses.

**300,000-pixel High-speed camera FZ-SH□, and Digital camera FZ-S□**



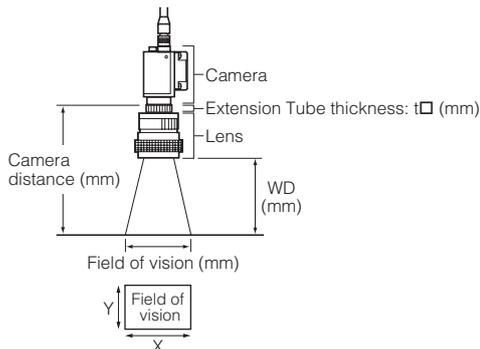
**300,000-pixel small digital cameras FZ-SF□, FZ-SP□**



Note1: The vertical axis represents WD, not installation distance.

■ Meaning of Optical Chart

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



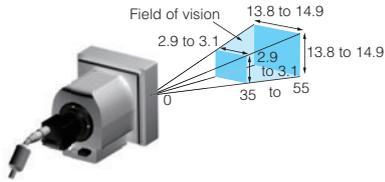
Note1: The lengths of the fields of vision given in the optical charts are the lengths of the Y axis.  
 Note2: The vertical axis represents WD for small cameras.

## Intelligent Cameras, Autofocus Cameras

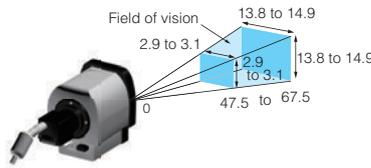
### ■ Narrow View

(Unit: mm)

FZ-SLC15

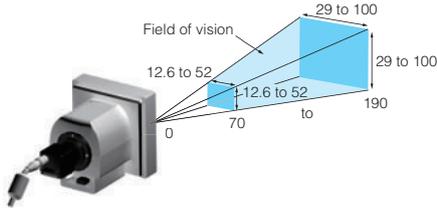


FZ-SZC15

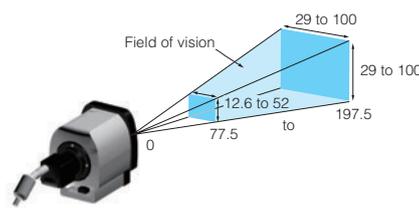


### ■ Wide View

FZ-SLC100



FZ-SZC100



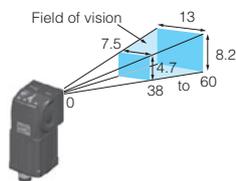
\*Field of Vision of Intelligent Cameras and Autofocus Cameras

The images displayed on the monitor will be rectangular images of 640×480 pixels.  
The valid processing area for measurements is the 480×480-pixel area in the middle.  
The above figures show the dimensions of the middle 480×480 pixels.

## Intelligent Compact Cameras

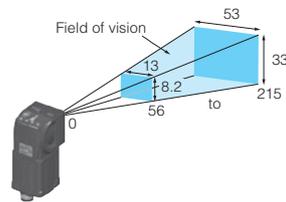
### ■ Narrow View

FZ-SQ010F



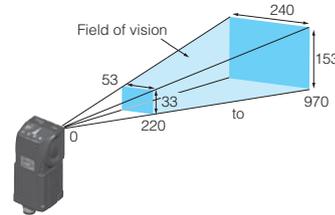
### ■ Standard

FZ-SQ050F



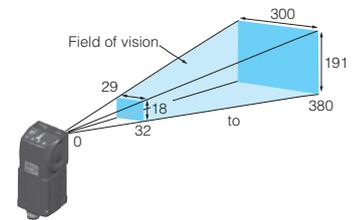
### ■ Wide View (Long-distance)

FZ-SQ100F



### ■ Wide View (Short-distance)

FZ-SQ100N



## Other Products in the Vision Sensor Series

The Perfect Setup Software

### Vision Optimizer

This computer software package automatically verifies the optimum settings for a FZ3-series Vision Sensor.

- Reduces false rejections and increases throughput.
- Greatly reduces setup verification work.
- Helps standardize setting references and know-how.



Low-cost Integrated Vision Sensor

### FQ Series

A Palm-size Vision Sensor That's Applicable Essentially Anywhere on the Line

- Camera, lighting, and processor all integrated into a compact design.
- Clear images even for glossy and metallic surfaces.
- Helps standardize setting references and know-how.
- Easy expansion for additional inspections with connections to up to 8 sensors.



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