

The New Standard for Image Inspection

FQ2 Smart Camera



Advanced inspection

In a compact housing.

Expanded

Performance and functionality.

Much more

Camera, communications, software tools.



Introducing the Smart Solution Camera

Flexible inspection capabilities, multiple camera and communication options -- this powerful Smart Camera has it all. Camera provides all of the best-selling features found in Vision Systems without the need for a separate controller.



- | | | | | | | | | | | | |
|-------------|----------------------------|----------------------|---------------------|------------|---------|--------------------|------------------|---------------------|----------------------------|--------------------------|-------------------|
| Code Reader | High-speed image processor | Megapixel capacity | Real color | Monochrome | C-mount | 9 inspection items | 11 image filters | 32-camera expansion | 360° position compensation | Ultra-wide field of view | DAP partial input |
| OCR | HDR | Sub-pixel processing | High-power lighting | IP67 | E-IP | PLC Link | FINS | 34 I/O points | RS-232C | Password | Image inversion |

Three Advantages for effective Machine Design

Compact Body

All in one Vision Sensor

All-in-one compact size that is perfect for use in tight spaces or designs requiring small size. Compared to more-advanced Vision Sensors with multiple components, this Sensor boasts a much more efficient hardware design.

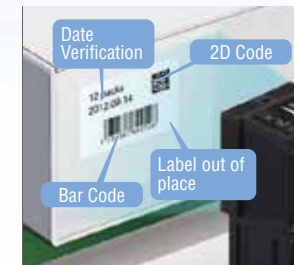


» p.04

Extended Functionality

Image Sensor, OCR, and Code Reader in One

The OCR function with the "build-in" dictionary and the Code Reading ability to recognize 15 code types, add to the solution and provide a powerful upgrade!



» Image Inspections p.06
 » OCR p.08
 » Code Reader p.10

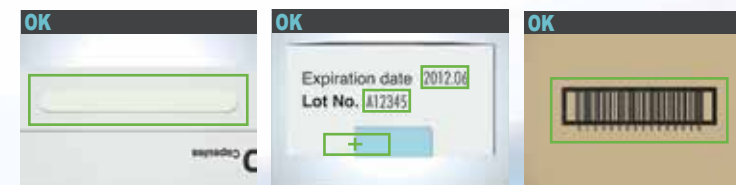
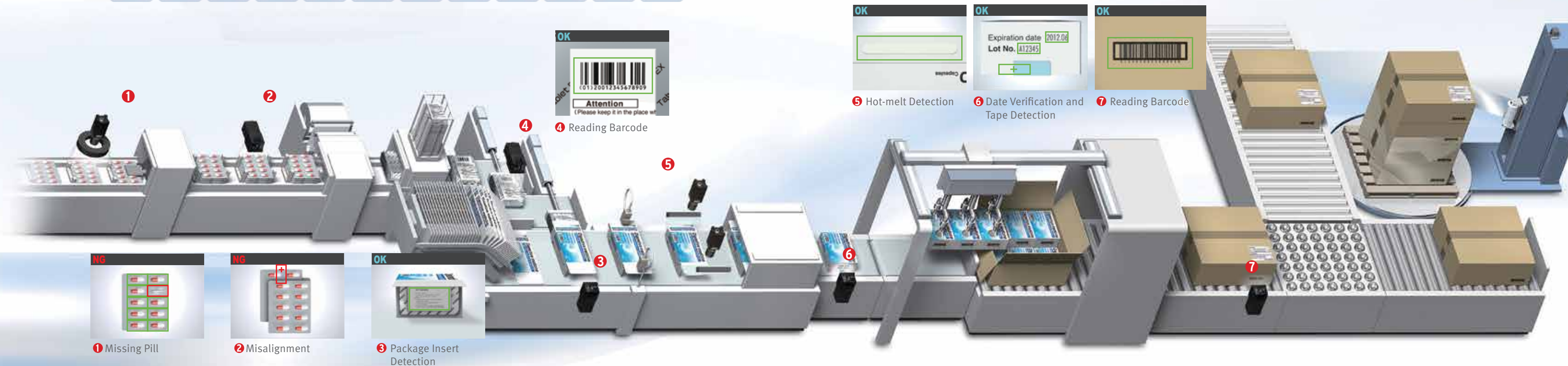
Versatile Lineup

A Lineup That Fits a Wide Range of Equipment

Expanded inspection menu, camera variations, and communication interfaces are offered at the same price level as our previous FQ Series. With a wide range of sensors, be certain that we have a solution for your various applications needs.



» p.12



5 Hot-melt Detection 6 Date Verification and Tape Detection 7 Reading Barcode



1 Missing Pill 2 Misalignment 3 Package Insert Detection

Compact

All You Need is One

All You Need in One Package

Image Processor

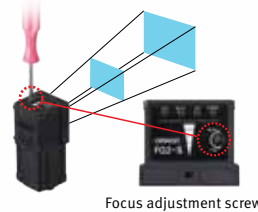
Previous Vision Sensors placed the image processor in a separate Controller, now the processor is built into the camera itself.

High-power Lighting

This Smart Camera includes high-power lighting capable of lighting evenly across a wide field of view. This provides sufficient light even when the polarizing filter is used.

Adjustable lens

The focus of the lens can be adjusted to take clear images for the required field of view and installation distance.



I/O and Power Supply Connector

The output line for inspection results, the input line for changing the setup along with other I/O lines and the power supply line are all combined into one connector.

Ethernet Connectivity

Commands can be input from a PLC to control the FQ2 via Ethernet. In the same way, inspection and measurement results can be output from the FQ2 to a PLC. What is more, and for traceability purposes, you can also transfer images to a computer.



IP67 Water Resistant



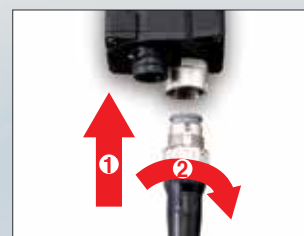
The sensor can be used in wet environments.

Flexible Cables



All cables from the camera are flexible. This allows the Sensor to be used safely on moving parts.

Smart Click Connectors

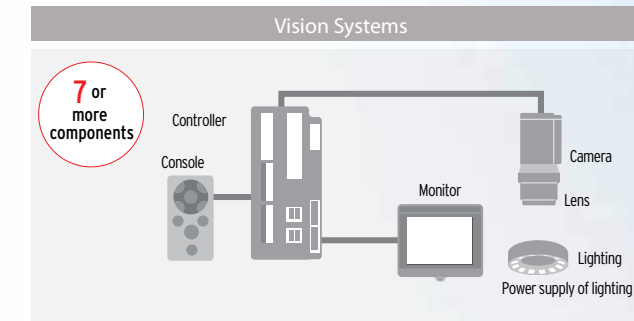


Connection is made quick and easy with a clear, definitive click-into-place mechanism.

Quick and Easy Design and Installation

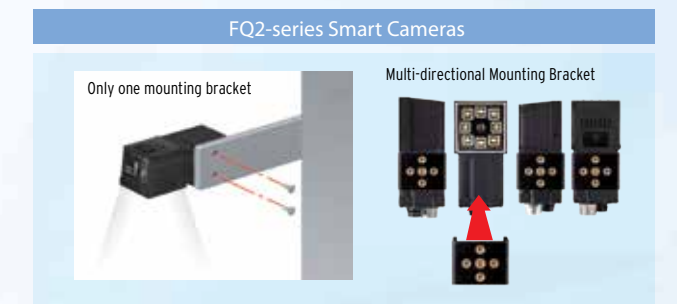
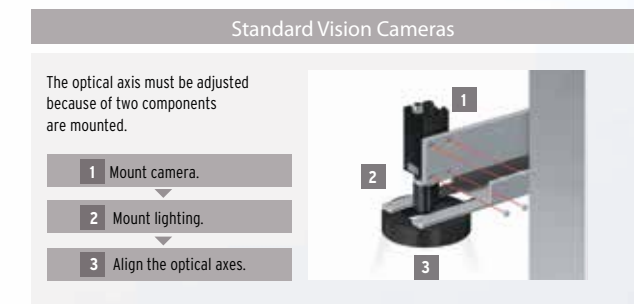
Easy Product Selection

All you need to do is select the camera based on the field of view and installation distance that you require. There is no need to select and purchase lights or lenses, they are integral to the Smart Camera. Furthermore, the time required to wire everything is drastically reduced, because you only need two components instead of 7 or more as is the case for a vision system.



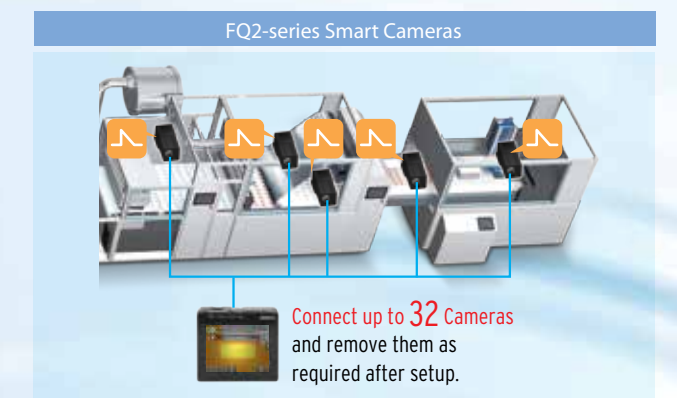
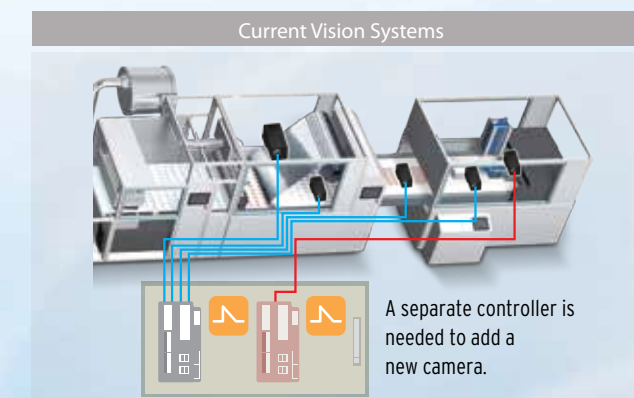
Easy Installation

The camera and lighting are integrated into a single unit, so only the camera mounting bracket is required. The Sensor comes with a multi-directional mounting bracket that can be attached on any of the four sides of the Camera. Additionally, since the light and camera are integrated, axis alignment is not required either.



Easy Camera Expansion Up to 32 Cameras

Just install the Cameras where you need them. No control panels are required to house the controllers. Triggers can be input for each Camera, so new Cameras can be added whenever required without having to worry about timing input design. 32 Cameras can be accessed and set up from a single Touch Finder, so you do not need to worry about adding more monitors when you need more Cameras. So, if an operator has problems or a specific request for any of the sensors on the network, you can quickly and remotely access the required sensor.

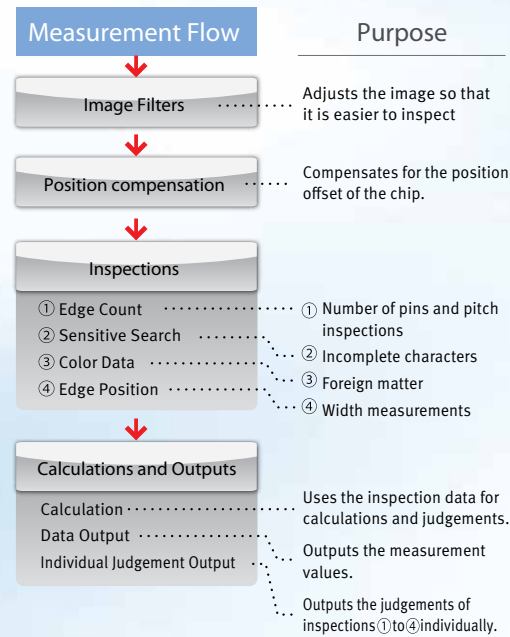


Easily Perform Both Inspection and Positioning

You can combine multiple inspection tools to perform inspections, positioning and other tasks, all from a single Sensor.

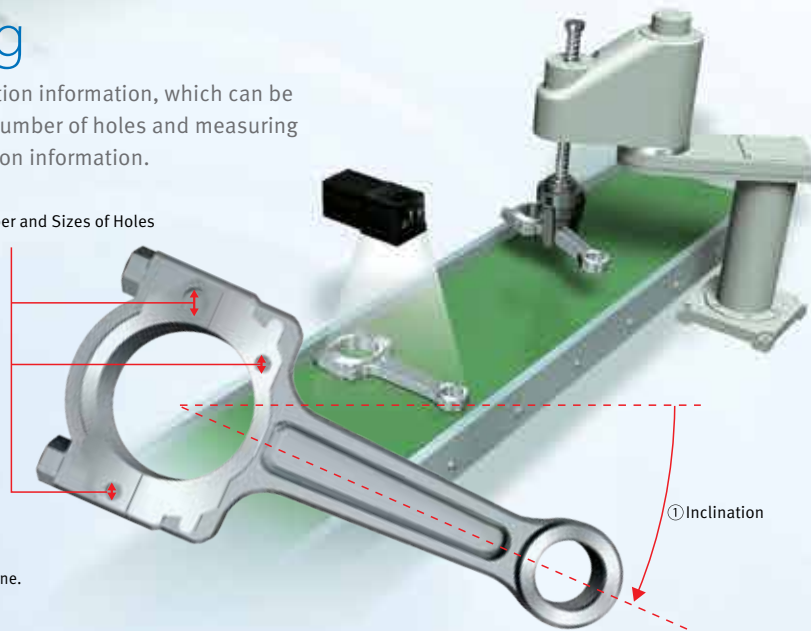
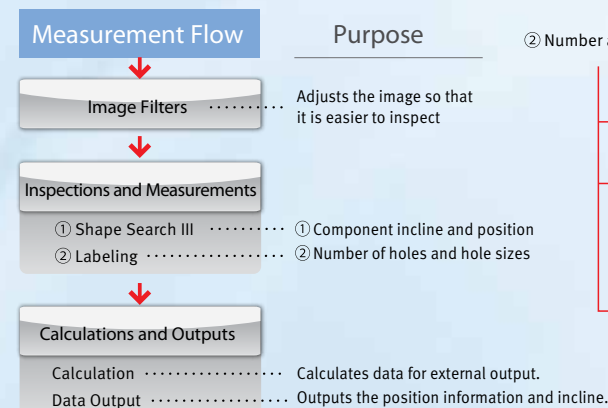
External Inspection

Several external inspections can be completed with a single Sensor as depicted by the figure below checking 5 different points of the IC chip. Furthermore, the position offset of the entire pallet before inspection can be adjusted on the image itself, which reduces the amount of work required to increase mechanical positioning accuracy.



Component Positioning

The Sensor can measure angles of rotation and other position information, which can be used by a robot to position a part correctly. Counting the number of holes and measuring their diameter can also be performed along with the position information.



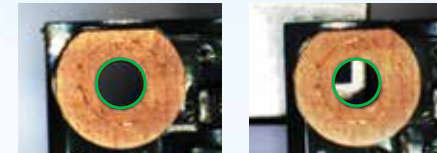
Incorporating the Best-selling Inspection Items from High-end Vision Systems

Searching

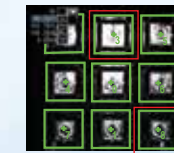


Shape Search III **NEW** *

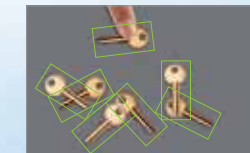
OMRON's unique techniques to search and match registered models at high speed are now included in the FQ2. Shape Search III provides advanced robustness, which is critical on FA sites. High-precision and reliable position detection is possible without being affected by light interference and backgrounds.



The target object can be detected precisely even with the background.



Multiple objects can be detected simultaneously even with different amounts of light.



Stable 360° searching is possible even if objects are overlapped or partially hidden.

Searching

Search

This is a standard search inspection item. This type of search is used to detect items like labels, identify shapes, or positions.



Detection of Promotional Stickers

Sensitive Search

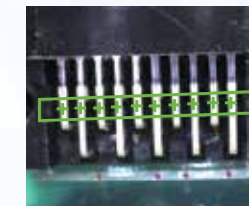
The model image can be automatically divided into small areas, so that tiny differences that cannot be detected with a normal search can be detected with large numerical differences.



Edge Pitch

Edge Pitch

The number of edges in a region can be counted.



Edge Position

This inspection item detects Edges and measures their positions.



Edge Width

This inspection item measures the width between edges.



Area & Color Measurements, Defect & Foreign Matter Detection

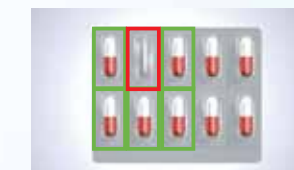
Labeling

Counts how many labels of the specified color and size found. The tool measures the area or center position of the specified label.



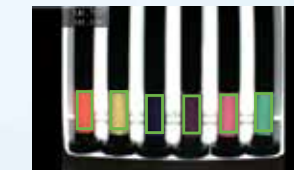
Area

This inspection item measures the area and center position of the specified color.

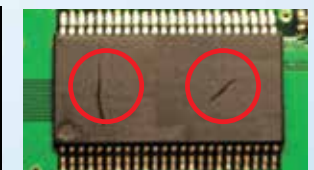


Color Data

Performs inspections that compare the difference in color between the workpiece and a registered model of a good product. It detects objects and foreign matter through the average color value tool.



You can also inspect for defects and foreign matter by looking at the color deviation. (color deviation)



Utility Items

360° Rotational Position Compensation

The correct position of workpieces with inconsistent orientation can be measured. This is done by automatically detecting automatic detection of the offset of the workpiece in relation to a registered standard model.

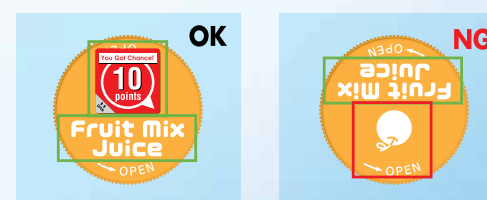


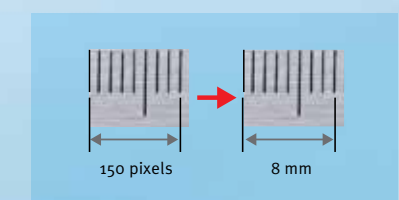
Image Filters

A total of 11 different image filters are provided, including background suppression to help eliminate patterns that can result in unstable measurements, as well as dilation and erosion.



Calibration

If the dimensions or position of a workpiece is difficult to determine by the number of pixels, you can convert these pixels and display actual engineering units.



* The FQ2-CH/S4 unit version 2.10 or later supports the new functions.

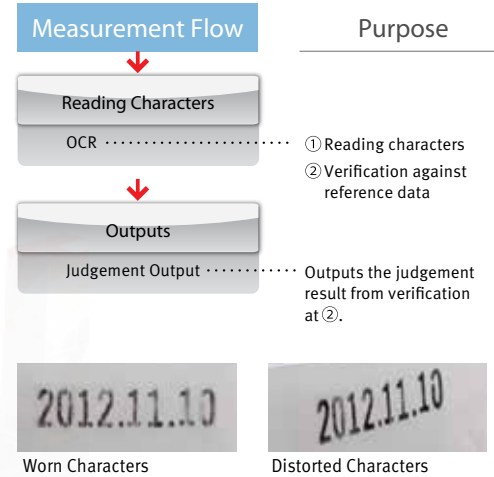
Extended Functionality : Optical Character Recognition (OCR)

New OCR Method to Quickly Read Characters without Dictionary Registration



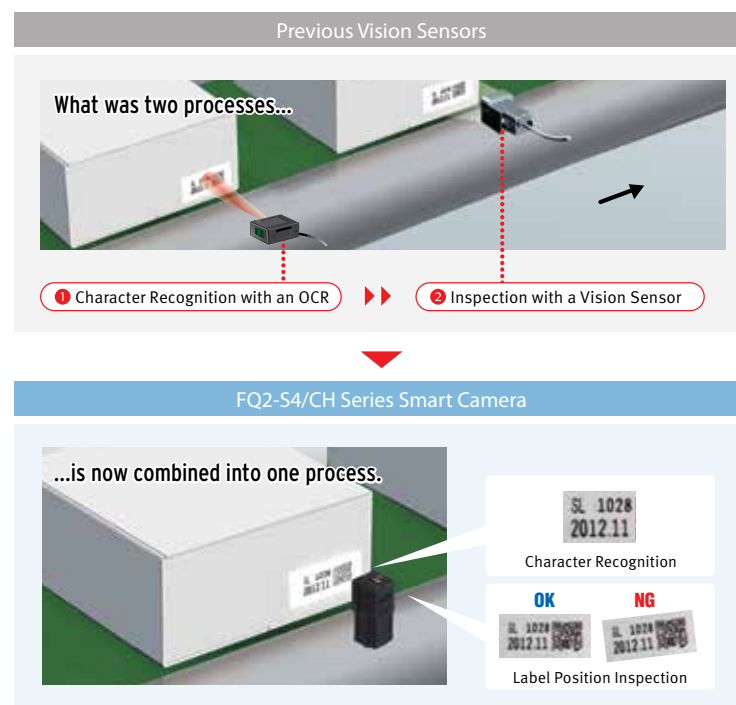
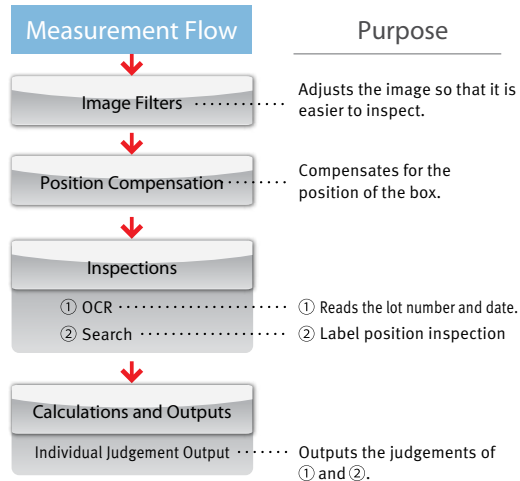
Date Verification

Even if printing is distorted or unclear due to conveyor line conditions, our unique algorithm with built-in dictionary enables stable reading of characters.



Character Recognition and Label Position Inspection

Although previously performed as separate processes, character recognition and inspection tools can now both be performed with a single Sensor. This helps you reduce costs and save space.



OCR with Built-in Dictionary

Conventional OCR

Time is required for character registration in the dictionary.

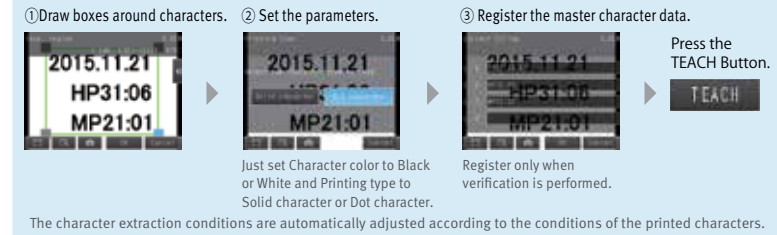
Different printers use different printing devices.

Worn out and/or slanted characters cannot be read.

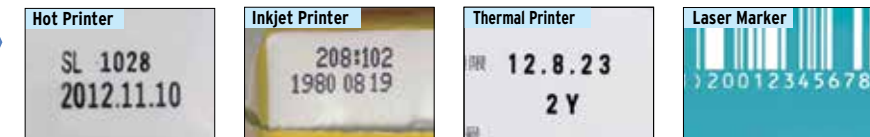
Touching and curved characters cannot be read.

FQ2 OCR

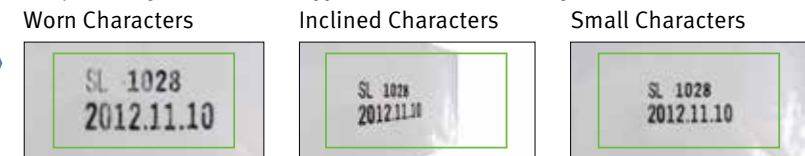
The built-in dictionary eliminates the need for character registration in the dictionary, significantly reducing setup time.



Characters from most printers, including dot and impact printers, can be read with the built-in dictionary. **Handles Approx. 80 Fonts**



Unique recognition technology enables stable reading of worn out or distorted characters.



Touching characters and curved character strings can be segmented correctly.



Utilities That Make Daily Operation Easier

Verification

The character data being read can be verified against the character data registered in the master data. You can register up to 32 character strings in the master data and easily change the current master data with an external signal. With the FQ2-S4, you can also compare against the character strings read from bar codes or 2D codes.



Calendar Function **NEW***

The calendar function eliminates the need to set the date and best-before date manually every day. The date read by the sensor can be automatically compared to the internal sensor date. The date within the sensor can be adjusted via the Touchfinder or using an external device, such as PLC and using the Date command and adjusting it according to the dates set in the printer for example.



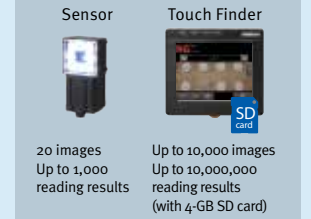
Registration in Model Dictionary

Non conventional characters can be added to the dictionary. Special fonts are difficult to read with the default settings, but add them to the dictionary and the FQ2 provides reliable readings.



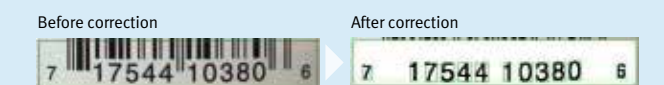
Logging Images and Reading Data

The inspected images and reading results can be temporarily saved in the sensor. Additionally, up to 10,000 images and 10,000,000 reading results can be saved in a 4-GB SD card. You can select logging both OK and NG results or only NG results to aid in traceability.



Boundary Correction

Dark areas around characters, such as bar codes, are removed to achieve stable reading.



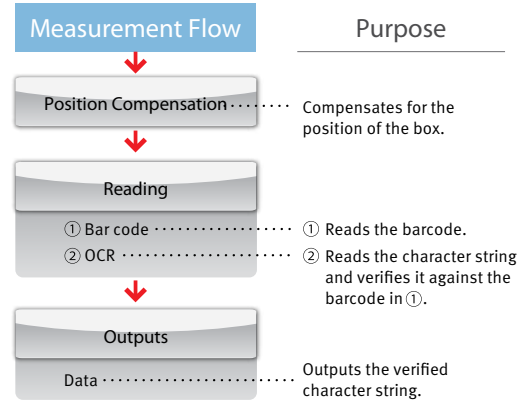
* The FQ2-CH/S4 unit version 2.10 or later supports the new functions.

Expanded Functionality : Code Reader

Read Any of 15 Types of Codes from Paper Labels to Direct Part Marking (DPM)

Code and Character Verification

OCR and Code Reading inspection items can be combined to read 1D or 2D codes and verify them against character strings all within the FQ2. No programming of external devices is required.



Paper Labels

Barcodes

The FQ2 can read the main nine types of barcodes. You can therefore reliably use the FQ2 in pharmaceuticals, where verification of barcodes and characters is required.



JAN/EAN/UPC	Code39	Codabar (NW-7)
ITF (Interleaved 2 of 5)	Code93	Code128 / GS1-128
GS1-DataBar	GS1-128 Composite Code	Pharmacode

2D Codes

The FQ2 can read all the standard 2D code types. 2D codes. You do not need to use more than one code reader even for processing a combination of different code types.

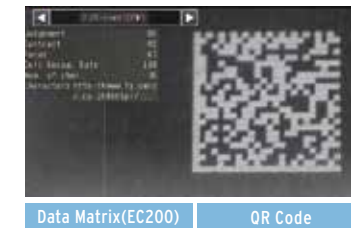


Data Matrix	QR Code	Micro QR Code
PDF417	Micro PDF417	GS1-DataMatrix

Direct Part Marking

2D DPM Codes

When 2D codes are printed on metal, substrates, glass, or many other materials, the printed conditions of the 2D codes can be unstable. But even with these difficult-to-read codes, the FQ2 is equipped with filters and retry processing designed just for DPM to allow you to easily and stably read the codes.



• Types of Filtering

You can apply up to three of the four unique filters developed by OMRON in the desired order to remove printing irregularities and noise, in order to achieve a stable reading.

Smooth	Smooths the image.
Dilate	For white codes, increases the cell size. Effective for reading codes with cell spreading.
Erosion	For white codes, reduces the cell size. Effective for reading separated dot codes.
Median	Removes noise.

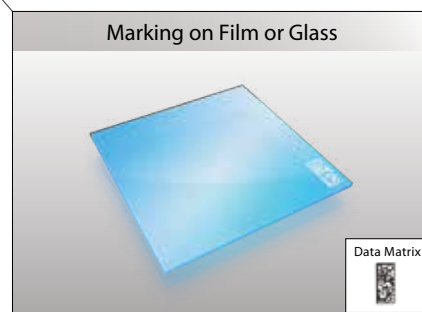
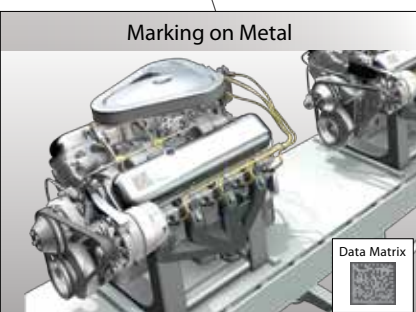
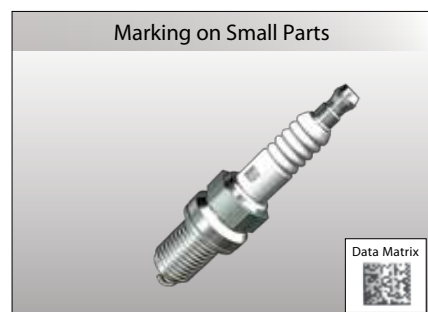
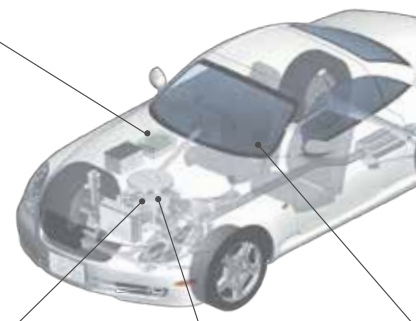
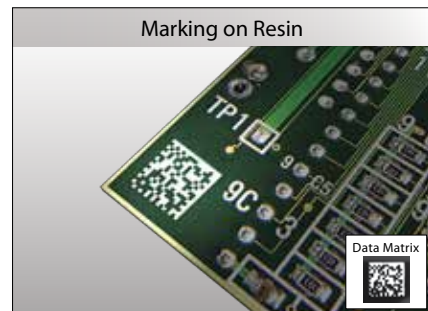
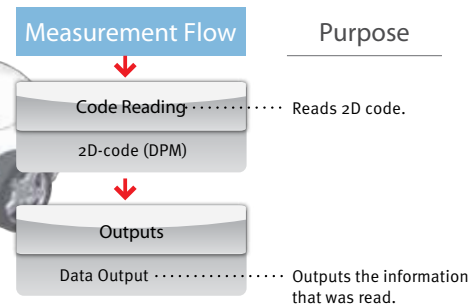
Combining Filtering

Erosion and dilation can be combined to connect dots without changing the dot thickness.



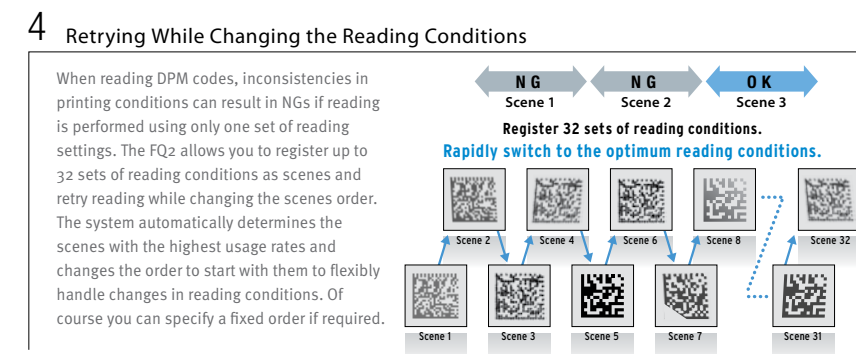
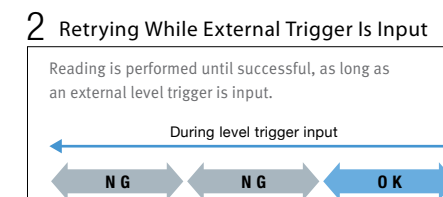
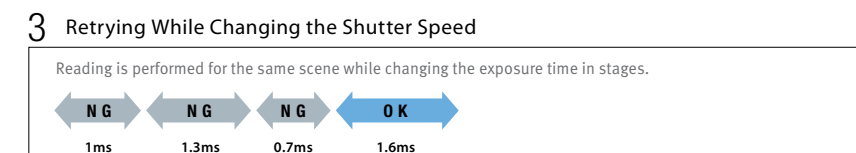
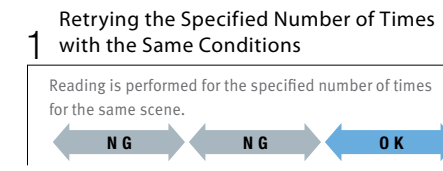
Reading Direct Marking Codes

It has become common to manage information by directly marking codes on products. However, differences in materials often causes instability when reading the printed characters. The FQ2 achieves stable reading with unique functionality designed just for DPM.



• Retry function

Code Readers must be able to read codes even when the quality of printing is poor. The FQ2 retry function can automatically retry reading while changing the exposure time and other reading conditions. Even when the workpiece or environment parameters change, the retry function provides stable reading.



Variety

A Lineup That Fits a Wide Range of Equipment

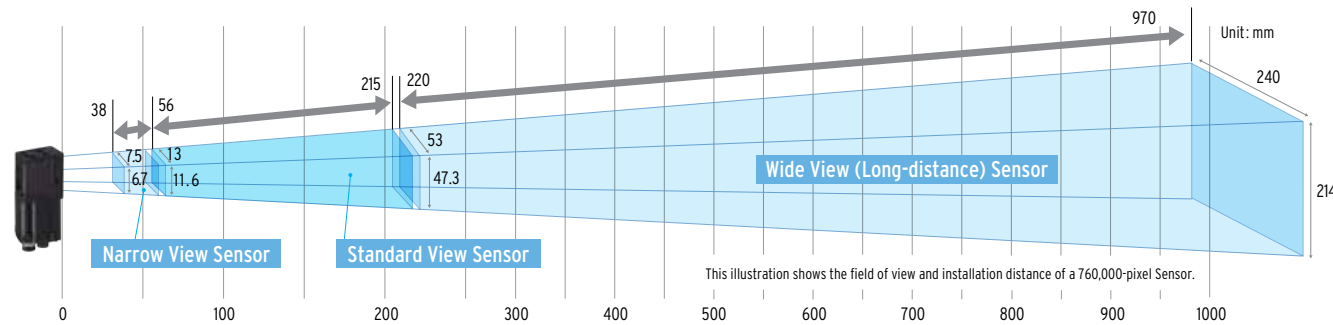
Sensor Types Available

We offer a diverse lineup of Sensors so that you can choose the one with the perfect field of view and installation distance for your needs.

Integrated Sensor Color Monochrome

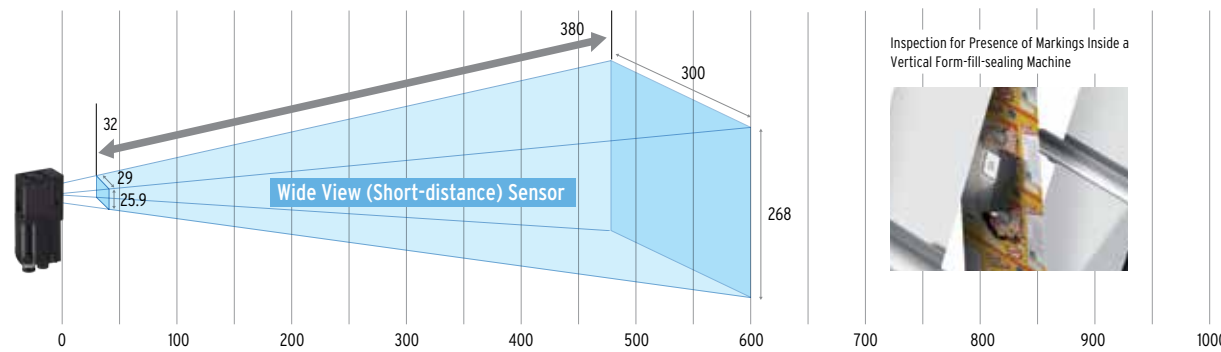
Seamless Field of View Variations

All-in-one Sensors tend to be limited in field of view variations, but we offer a lineup ranging from 7.5 mm up to 240 mm to meet your needs.



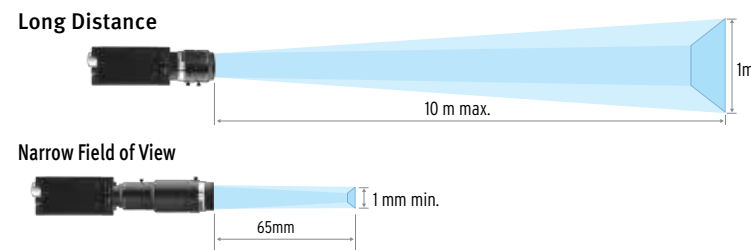
Wide View Sensors -- Perfect for Tight Spaces

A wide-view/wide-angle camera takes images and performs inspections across a wide area, even if the camera is close to the workpiece. Perfect for mounting in locations with limited space. This also enables the Sensor to be installed alongside an assembly line without protruding in order to perform inspections from the side of the conveyor belt.



C-mount Type Sensors Color Monochrome

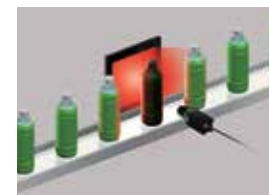
The Sensors with C-mount lens enable freedom of lens selection for long distances over 1 m and narrow fields of view under 1 mm that are not covered by our integrated Sensors. This type of Sensor is also useful when you want to use external illumination.



Note: A commercially available telecentric lens is required for narrow field of view applications.

Lighting Examples

Backlighting



External Shape Inspections

Low-angle Lighting



Defect and Foreign Matter Inspections

Communication Interfaces

The Sensor includes communication interfaces for compatibility with a wide range of host devices. This helps reduce the design work required for data communications between the Sensor and a PLC.

Note: The type of communications interface depends on the model of the Sensor. Refer to page 22 for details.

PLC Link

PLC link greatly reduces the amount of time and work that is required to create ladder programs.

FINS

OMRON's exclusive FINS/TCP communications interface can be used to connect to low-cost OMRON PLCs. With this communications interface, no communications controls are required to process the sending and receiving of complex TCP packets. You get faster, simpler connections to OMRON PLCs.

EtherNet/IP™

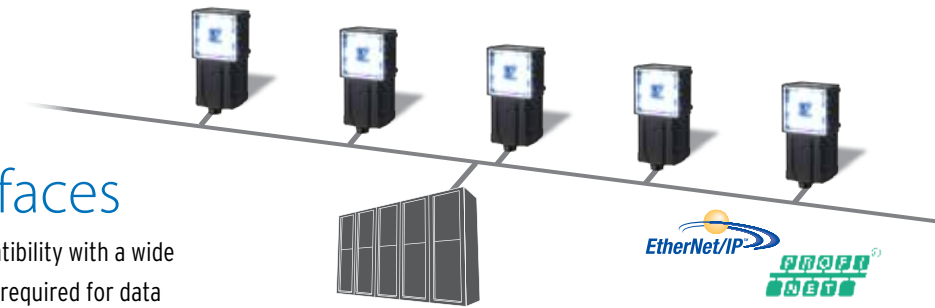
EtherNet/IP™ communications, a standard widely used in communications systems in factories around the world, is also supported. This communication interface enables simple and easy connections to a wide range of EtherNet/IP™ devices, including OMRON PLCs.

I/O Expansion Units

Our expansion units enable expansion to up to three times the number of I/O connections. This enables the output of individual judgement results for each inspection, a feature that has been highly requested.

RS-232C Communications Unit

This Sensor Data Unit supports standard RS-232C communications.



Compatible Models

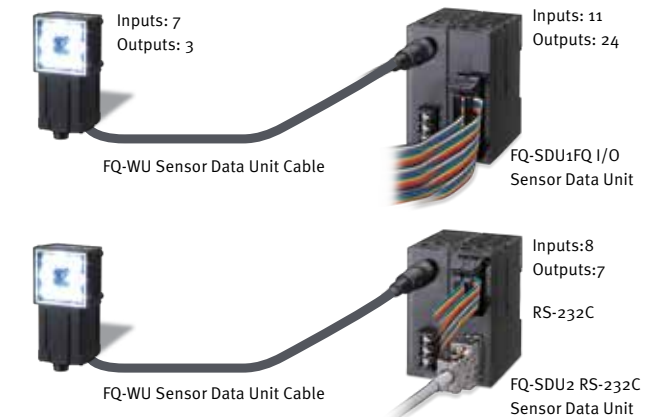
OMRON PLCs: CS, CJ1, CJ2, CP1 and NSJ Series
Mitsubishi Electric PLCs: Q Series

Compatible Models

OMRON PLCs: CS, CJ1, CJ2, CP1 and NSJ Series

Compatible Models

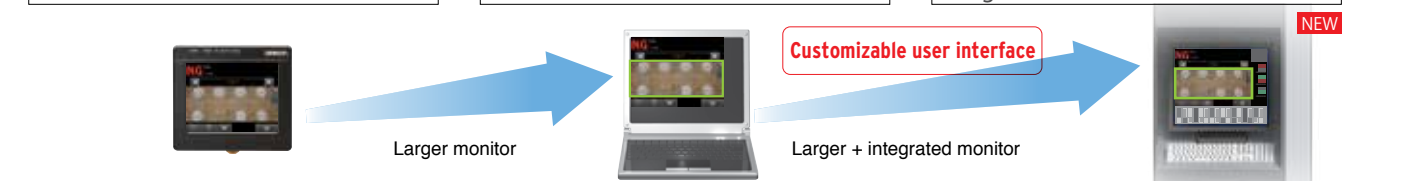
OMRON Machine Automation Controllers: NJ Series
OMRON PLCs: CS, CJ1 and CJ2 Series



Operation Interfaces

You can choose the operation interface and monitor size to suit your application.

Touch Finder Touch Finder for PC Integrated Machine Monitor(.NET controls)



This touch screen monitor with a durable, rugged design is shock-resistant and portable. It has passed our standard 1.3 m drop test. The language displayed can be selected out nine different choices: English, Traditional Chinese, Simplified Chinese, Korean, Japanese, German, French, Italian, and Spanish.

The Setup Tool provides the same functions as those on the Touch Finder, but on a PC. In addition, offline simulation can be performed without the need of a sensor. The software can be downloaded for free by any customer with the purchase of a Sensor. Refer to the member registration sheet that is enclosed with the sensor for details.

Customizing the user interface using .NET controls* makes the onsite monitor easier to read. You can increase or reduce the size of displayed measurement images and text to meet the demands of onsite operators.

*.Custom controls to easily display images and results measured by the FQ2 Series on applications created with Microsoft Visual Studio. The Microsoft® .NET software is used to connect users, information, systems, and devices.

•Microsoft .NET is either a registered trademark or trademark of Microsoft Corporation in the United States and/or other countries.

•EtherNet/IP™ is the trademark of ODVA.

Hardware Advancements

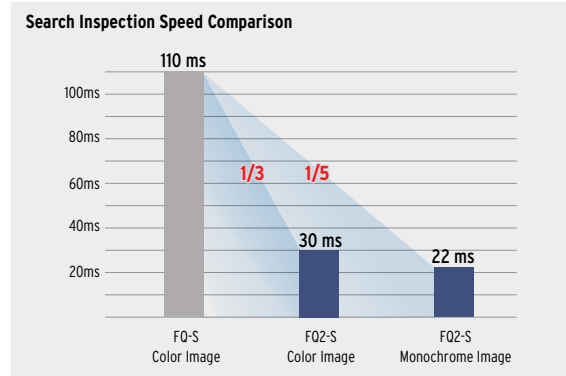
High-speed Image Processor

3X Faster than Previous Models

20 Inspection Items per Second Processing Time

With our new high-speed image processor we are able to achieve a processing time of 50 ms or less for all primary inspection items.

* Processing may take longer than 50 ms depending on the settings.



Note: This comparison was conducted with a 752 x 480 pixel image, with no rotational compensation.

High-speed Image Processor



High-brightness ODR Lighting

Four Times the Brightness

Four times the brightness of conventional LEDs can be achieved with ODR lighting (Optical Double Reflection) that uses a complete new optics technology. High-brightness illumination was achieved by increasing light efficiency and heat dissipation, making it possible to input images this sharply for the first time.



Crystal Clear Images Even through Polarizing Filter

Lighting is fundamental for stable image inspection, but shiny surfaces can reflect light, resulting in incorrect judgments. You can use a polarizing filter to reduce specular reflection, but the entire image will be darker, which can result in insufficient image contrast. The FQ2 Series is equipped with OMRON's own high-power lighting DR optical system for effective use of LED power. This system provides sufficient lighting for inspection even when the supplied polarizing filter is used.



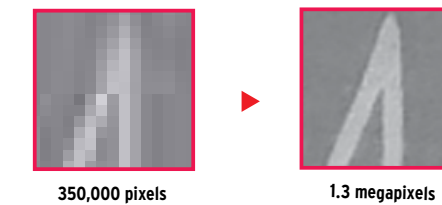
Megapixel CMOS Sensor

4 Times the Pixels × **1,000 Times the Display Resolution**

(Comparisons to previous OMRON models)

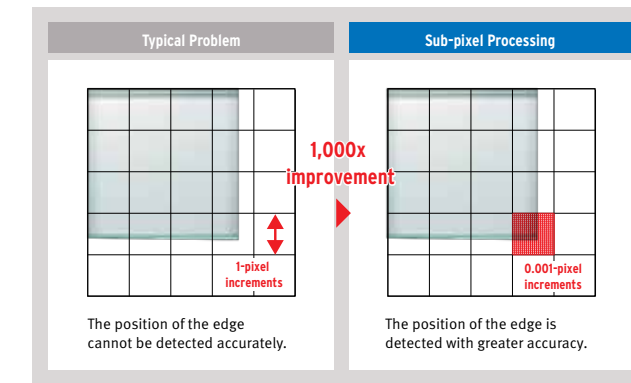
Precision 1.3 Megapixel Camera

Would you like a little more positioning accuracy? Do you need a wider field of view? We hear you, and that is why we have greatly improved the resolution of our camera. The 1.3 megapixels maintain precision and accuracy while also enabling a wider field of view.



Sub-pixel Processing

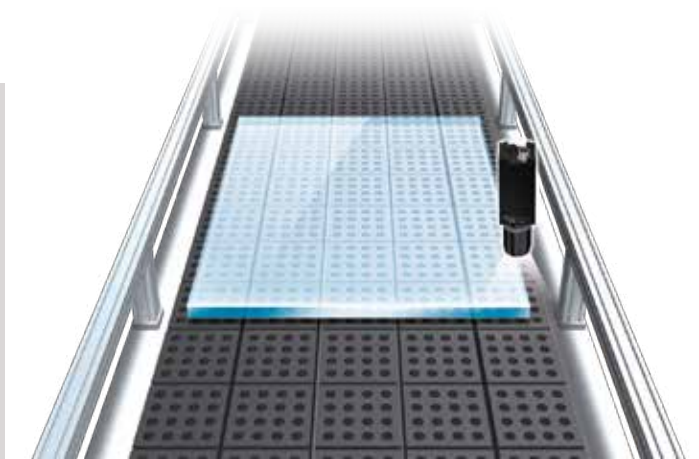
Previously, position information could only be output on a per-pixel basis, but now you can output at a resolution even higher than the number of available pixels. This provides finer measurement values for travel distances and helps to improve positioning accuracy.



Megapixel CMOS Sensor

1.3 Megapixels
Color Monochrome
Sensor with C-mount

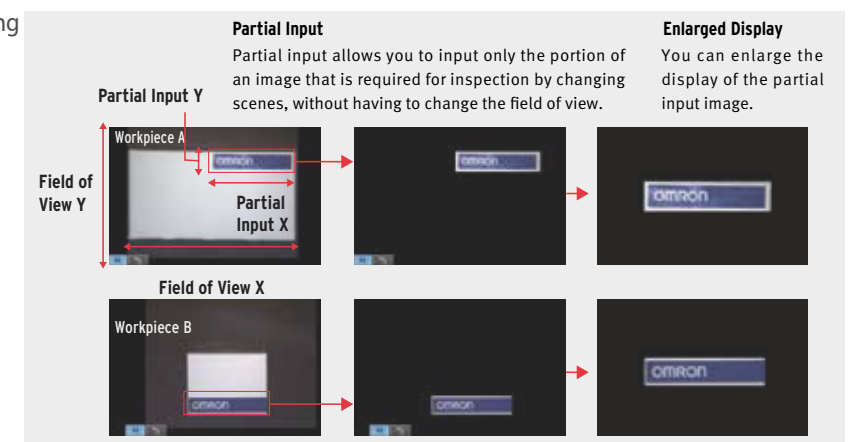
760,000 Pixels
Color Monochrome
Integrated Sensor
* 350,000 pixels types are also available.



Partial Input with DAP (Dual Axis Partial) Processing

Processing time can be further reduced by limiting the camera input to only the area that is required for inspection. Previous models allowed trimming only in the Y direction, but now you can specify a range across both the X and Y axes for trimming. Keep a wide field of view and trim to only the sections that are required for inspection in each scene to reduce processing time.

Note: DAP processing is provided only on 760,000-pixel and 1,300,000-pixel Sensors.



Useful Onsite Utilities

Simulation Software NEW

Without connecting the FQ2 Sensor, the TouchFinder for PC enables offline adjustment of inspection conditions and measurement simulation using logged images. You can verify and adjust the settings using the logged images from a remote location to increase yields in overseas factories.

Operation
Production site

Office
Verification/adjustment

Measure offline
Continuously measures all images in a folder.
Measures the previous/next image.

Count images
Clearly shows the progress of continuous measurement.

Alert judgments
OK or NG image data can be moved to a different folder. This facilitates OK/NG classification.

Note. If you register as a member after purchasing a Sensor, you can download TouchFinder for PC for free. Refer to the member registration sheet for details.

Real-time Threshold Adjustment

The FQ2 smart camera allows fast and easy real-time parameter adjustment. Eliminating the need to stop the machine for fine tuning and optimisation of settings, resulting in zero machine downtime.

Parameter adjustment on Touch Finder
Fine-tuning can be done on the production site. Judgment parameters can be smoothly changed without interrupting inspection.

Adjustment on TouchFinder for PC
Histograms allow you to check the distribution of values measured using logging images to verify the best judgment parameters. After adjustment, the judgment parameters can be reflected in the Sensor as smoothly as using the Touch Finder.

Judgement conditions can be adjusted on the Touch Finder.

Auto Detection

When multiple sensors are connected to the touch finder, the display automatically switches to the image of the sensor which has produced an NG result. This allows dynamic visualisation of reject conditions.

Automatically NG sensor image is displayed!

Note. When 32 sensors are connected, the most recent NG sensor of 8 sensors selected for display is displayed.

Inspection History Logging

Historical results logging is very useful for testing a new line. Samples are fed down the line and inspection results are logged. The logged data can be checked on a time scale in graph form and used to adjust judgement conditions. File Logging is convenient during operation. Large inspection history can be saved on SD cards and used later for traceability.

Recent Results Logging
Displays the most recent 1,000 inspection results in graph form.

File Logging
SD card
Up to 10 million measurement values or more (for a 4-GB SD card)
Up to 10,000 images or more (for a 4-GB SD card)

Shortcuts

Shortcuts to Setup Menu items that are changed frequently can be added to the Run Mode display. This enables the user to quickly perform adjustments when a problem occurs during operation.

Directly access frequently used functions.

Key Technologies

Real-color Sensing

Real-color processing is an image processing technology that performs high-speed processing of full-color images with a total of 16.7 million colors (256 tones per RGB channel). This means that image processing can be performed with the same color information that is visible to the human eye, and stable measurements can be performed under lighting that closely resembles natural light.

Real color image processing
Color variations between 16.7 million different colors can be captured without any color loss.

Color Image Processing
Captured images are converted to a 256-shade monochrome image and processed. This enables more stable inspection compared to binary level processing, but slight changes in color cannot be detected with this method.

Binary image processing
Captured images are converted to a black and white two-color image and processed. This reduces the amount of data and enables high-speed processing.

Previous Image Processing

OMRON FQ2 Series

HDR Sensing

High dynamic range minimizes the effects of lighting such as halation and allows highly precise inspections.

Conventional images
Halation
Underexposure
Dynamic range of the upper image
Dynamic range of the lower image
Defects Are Undetectable Due to Overexposure or Underexposure
Any spot outside the dynamic range is blurred by halation or shadow.

HDR image
Dynamic range after HDR processing
Industry's highest dynamic range
Max. 16 times higher than previous models
Defects Are Detectable Even on Reflective or Shadowy Surfaces
The surface of the workpiece is accurately reproduced and detected even with overexposure or underexposure.

Shape Search III (Same functionality included in high-end sensors) Patent Pending

With Shape Search III, you can visualize comparisons between the registered model data the measurement object to easily compare and see when they are not optimally matched. Visualization of the comparison levels provide the guide for parameter adjustment for acceptable variation and distortion levels to quickly obtain the best performance. This can save you a lot of time and effort that were previously required.

You can see at a glance the difference between the registered model and measurement image.

You can adjust the parameter "Acceptable Distortion Level" to enable measurements without reducing the correlation even if there is distortion. You can easily adjust this parameter while monitoring the comparison.

New OCR Algorithm: Matching with Structural Models

Even special cases where character registration is typically required for image matching, no character registration is required to read the characters. This new OCR algorithm matches the structural characteristic points of each character.

Structural models record the characteristics of each character in approximately 80 fonts.

The position and structure of characteristic points are used to recognize characters.


Background Changes


Size and Font Changes


Worn Characters

Inclined Characters

Lineup ranging from single-function models to full-function models

Inspection Model		FQ2-S2 Series Standard Type Integrated Sensor	
			
Number of pixels		350,000 pixels	
Color		Real color	
Number of simultaneous measurements		32	
Number of registered scenes		32	
Inspection	Shape search III, Shape search II	•	
	Search	•	
	Sensitive search	•	
	Edge position	•	
	Edge width	•	
	Edge pitch	•	
	Area	•	
	Color data	•	
ID	Bar code	•	
	2D code	-	
	2D code (DPM)*	-	
	OCR	-	
I/O specifications	Communications (Ethernet TCP no-protocol, Ethernet UDP no-protocol, Ethernet FINS/TCP no-protocol, EtherNet/IP, PLC Link, or PROFINET)	•	
	Sensor Data Units (I/O)	-	
	Sensor Data Units (RS-232C)	-	
		-	

Inspection/ID Model		FQ2-S4 Series		
		Integrated Sensor	Integrated Sensor	C-mount
				
Number of pixels		350,000 pixels	760,000 pixels	1.3 million pixels
Color		Real color/Monochrome	Real color/Monochrome	Real color/Monochrome
Number of simultaneous measurements		32	32	32
Number of registered scenes		32	32	32
Inspection	Shape search III, Shape search II	•	•	•
	Search	•	•	•
	Sensitive search	•	•	•
	Edge position	•	•	•
	Edge width	•	•	•
	Edge pitch	•	•	•
	Area	•	•	•
	Color data	•	•	•
ID	Bar code	•	•	•
	2D code	•	•	•
	2D code (DPM)*	•	•	•
	OCR	•	•	•
I/O specifications	Communications (Ethernet TCP no-protocol, Ethernet UDP no-protocol, Ethernet FINS/TCP no-protocol, EtherNet/IP, PLC Link, or PROFINET)	•	•	•
	Sensor Data Units (I/O)	•	•	•
	Sensor Data Units (RS-232C)	•	•	•
		•	•	•

ID Model		FQ2-CH Series Optical Character Recognition Sensor	FQ-CR1 Series Multi Code Reader	FQ-CR2 Series 2D Code Reader
		Integrated Sensor	Integrated Sensor	Integrated Sensor
				
Number of pixels		350,000 pixels	350,000 pixels	350,000 pixels
Color		Monochrome	Monochrome	Monochrome
Number of simultaneous measurements		32	32	32
Number of registered scenes		32	32	32
Inspection	Shape search II	•	•	•
	Search	•	•	•
	Sensitive search	•	•	•
	Edge position	-	-	-
	Edge width	-	-	-
	Edge pitch	-	-	-
	Area	-	-	-
	Color data	-	-	-
ID	Bar code	-	•	-
	2D code	-	•	-
	2D code (DPM)*	-	-	•
	OCR	•	-	-
I/O specifications	Communications (Ethernet TCP no-protocol)	•	•	•
	Communications (Ethernet UDP no-protocol, Ethernet FINS/TCP no-protocol, EtherNet/IP, PLC Link, or PROFINET)	•	-	-
	Sensor Data Units (I/O)	•	-	-
	Sensor Data Units (RS-232C)	•	-	-

* Inspection item for directly marked 2D codes.

Ordering Information

Sensor

Inspection Model					
FQ2-S2 Series [Standard Type]					
Field of view		Narrow View	Standard View	Wide View (Long-distance)	Wide View (Short-distance)
Number of pixels		350,000 pixels			
Color	NPN	FQ2-S20010F	FQ2-S20050F	FQ2-S20100F	FQ2-S20100N
	PNP	FQ2-S25010F	FQ2-S25050F	FQ2-S25100F	FQ2-S25100N
Field of view/ Installation distance		Refer to figure 1 on p.20	Refer to figure 2 on p.20	Refer to figure 3 on p.20	Refer to figure 4 on p.20

Inspection / ID Model					
FQ2-S4 Series [Standard Type]					
Field of view		Narrow View	Standard View	Wide View (Long-distance)	Wide View (Short-distance)
Number of pixels		350,000 pixels			
Color	NPN	FQ2-S40010F	FQ2-S40050F	FQ2-S40100F	FQ2-S40100N
	PNP	FQ2-S45010F	FQ2-S45050F	FQ2-S45100F	FQ2-S45100N
Monochrome	NPN	FQ2-S40010F-M	FQ2-S40050F-M	FQ2-S40100F-M	FQ2-S40100N-M
	PNP	FQ2-S45010F-M	FQ2-S45050F-M	FQ2-S45100F-M	FQ2-S45100N-M
Field of view/ Installation distance		Refer to figure 1 on p.20	Refer to figure 2 on p.20	Refer to figure 3 on p.20	Refer to figure 4 on p.20

[High-resolution Type]						
Field of view		Narrow View	Standard View	Wide View (Long-distance)	Wide View (Short-distance)	C-mount
Number of pixels		760,000 pixels				1.3 million pixels
Color	NPN	FQ2-S40010F-08	FQ2-S40050F-08	FQ2-S40100F-08	FQ2-S40100N-08	FQ2-S40-13
	PNP	FQ2-S45010F-08	FQ2-S45050F-08	FQ2-S45100F-08	FQ2-S45100N-08	FQ2-S45-13
Monochrome	NPN	FQ2-S40010F-08M	FQ2-S40050F-08M	FQ2-S40100F-08M	FQ2-S40100N-08M	FQ2-S40-13M
	PNP	FQ2-S45010F-08M	FQ2-S45050F-08M	FQ2-S45100F-08M	FQ2-S45100N-08M	FQ2-S45-13M
Field of view/ Installation distance		Refer to figure 5 on p.20	Refer to figure 6 on p.20	Refer to figure 7 on p.20	Refer to figure 8 on p.20	Refer to optical chart on p.30.

ID Model					
FQ2-CH Series [Optical Character Recognition Sensor]					
Field of view		Narrow View	Standard View	Wide View (Long-distance)	Wide View (Short-distance)
Number of pixels		350,000 pixels			
Monochrome	NPN	FQ2-CH10010F-M	FQ2-CH10050F-M	FQ2-CH10100F-M	FQ2-CH10100N-M
	PNP	FQ2-CH15010F-M	FQ2-CH15050F-M	FQ2-CH15100F-M	FQ2-CH15100N-M
Field of view/ Installation distance		Refer to figure 1 on p.20	Refer to figure 2 on p.20	Refer to figure 3 on p.20	Refer to figure 4 on p.20

FQ-CR1 Series [Multi Code Reader]					
Field of view		Narrow View	Standard View	Wide View (Long-distance)	Wide View (Short-distance)
Number of pixels		350,000 pixels			
Monochrome	NPN	FQ-CR10010F-M	FQ-CR10050F-M	FQ-CR10100F-M	FQ-CR10100N-M
	PNP	FQ-CR15010F-M	FQ-CR15050F-M	FQ-CR15100F-M	FQ-CR15100N-M
Field of view/ Installation distance		Refer to figure 1 on p.20	Refer to figure 2 on p.20	Refer to figure 3 on p.20	Refer to figure 4 on p.20

FQ-CR2 Series [2D Code Reader]					
Field of view		Narrow View	Standard View	Wide View (Long-distance)	Wide View (Short-distance)
Number of pixels		350,000 pixels			
Monochrome	NPN	FQ-CR20010F-M	FQ-CR20050F-M	FQ-CR20100F-M	FQ-CR20100N-M
	PNP	FQ-CR25010F-M	FQ-CR25050F-M	FQ-CR25100F-M	FQ-CR25100N-M
Field of view/ Installation distance		Refer to figure 1 on p.20	Refer to figure 2 on p.20	Refer to figure 3 on p.20	Refer to figure 4 on p.20

Field of view/Installation distance

(Unit: mm)				
Field of view	Narrow View	Standard View	Wide View (Long-distance)	Wide View (Short-distance)
Appearance				
350,000 pixels Type	Figure 1 	Figure 2 	Figure 3 	Figure 4
760,000 pixels Type	Figure 5 	Figure 6 	Figure 7 	Figure 8

Touch Finder

Type	Appearance	Model
DC power supply		FQ2-D30
AC/DC/battery		FQ2-D31 (See note.)

Note: AC Adapter and Battery are sold separately.

Cables

Type	Appearance	Cable length	Model
FQ Ethernet Cables (connect Sensor to Touch Finder, Sensor to PC)		2m	FQ-WN002
		5m	FQ-WN005
		10m	FQ-WN010
		20m	FQ-WN020
I/O Cables		2m	FQ-WD002
		5m	FQ-WD005
		10m	FQ-WD010
		20m	FQ-WD020

Sensor Data Unit (FQ2-S3/S4/CH only)

Type	Appearance	Output type	Model
Parallel Interface		NPN	FQ-SDU10
		PNP	FQ-SDU15
RS-232C Interface		NPN	FQ-SDU20
		PNP	FQ-SDU25

Cables for Sensor Data Unit

Type	Appearance	Cable length	Model
Sensor Data Unit Cable		2m	FQ-WU002
		5m	FQ-WU005
		10m	FQ-WU010
		20m	FQ-WU020
Parallel Cable for FQ-SDU1*		2m	FQ-VP1002
		5m	FQ-VP1005
		10m	FQ-VP1010
Parallel Cable for FQ-SDU2*		2m	FQ-VP2002
		5m	FQ-VP2005
		10m	FQ-VP2010
RS-232C Cable for FQ-SDU2		2m	XW2Z-200S-V
		5m	XW2Z-500S-V

* When using FQ-SDU□□, 2 Cables are required for all I/O signals.

Accessories

Application	Appearance	Name	Model
For Sensor		Mounting Bracket *1	FQ-XL
		Mounting Bracket for high-precision sensing *2	FQ-XL2
		Mounting Base for C-mount type *3	FQ-XLC
		Polarizing Filter Attachment *1	FQ-XF1
For Touch Finder		Panel Mounting Adapter	FQ-XPM
		AC Adapter (for AC/DC/battery model) *4	FQ-A□
		Battery *5 (for AC/DC/battery model)	FQ-BAT1
		Touch Pen *6	FQ-XT
		Strap	FQ-XH
		SD Card (2 GB)	HMC-SD291
	SD Card (4 GB)	HMC-SD491	

Industrial Switching Hubs (Recommended)

Appearance	Number of ports	Failure detection	Current consumption	Model
	3	None	0.22 A	W4S1-03B
	5	None	0.22 A	W4S1-05B
		Supported		W4S1-05C

External Lighting

Type	Model
FLV Series	Refer to Vision Accessory Catalog (Q198)
FL Series	

*1. Included with Integrated Sensor.

*2. A mounting Bracket with improved resistance to vibrations and other external stresses that cause displacement of the optical axis and field of view.

*3. Included with Sensor with C-mount.

*4. AC Adapters for Touch Finder with DC / AC / Battery Power Supply. Select the model for the country in which the Touch Finder will be used.

Plug Type	Voltage	Certified standards	Model
A	125 V max.	PSE	FQ-AC1
	250 V max.	UL/CSA	FQ-AC2
C	250 V max.	CCC mark	FQ-AC3
	---	---	FQ-AC4

*5. The Battery uses a lithium ion secondary battery. Confirm any applicable laws and regulations in the destination country if you export the Battery.

*6. Enclosed with Touch Finder.

Lenses for C-mount Camera

Refer to optical chart on p.30 for selection of a lens.

High-resolution, Low-distortion Lenses

Model	3Z4S-LE SV-0614H	3Z4S-LE SV-0814H	3Z4S-LE SV-1214H	3Z4S-LE SV-1614H	3Z4S-LE SV-2514H	3Z4S-LE SV-3514H	3Z4S-LE SV-5014H	3Z4S-LE SV-7525H	3Z4S-LE SV-10028H
Appearance/Dimensions (mm)									
Focal length	6mm	8mm	12mm	16mm	25mm	35mm	50mm	75mm	100mm
Brightness	F1.4	F1.4	F1.4	F1.4	F1.4	F1.4	F1.4	F2.5	F2.8
Filter size	M40.5 P0.5	M35.5 P0.5	M27 P0.5	M27 P0.5	M27 P0.5	M35.5 P0.5	M40.5 P0.5	M34.0 P0.5	M37.5 P0.5

Extension Tubes

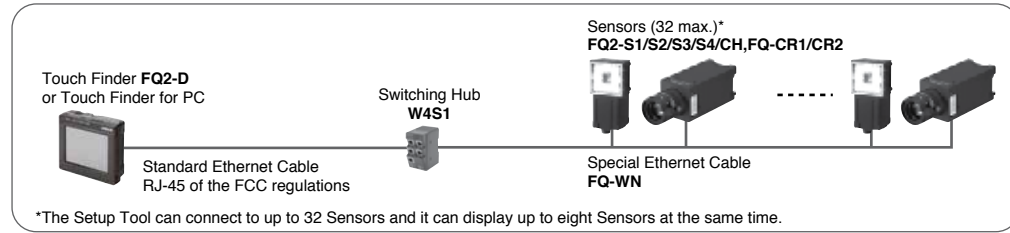
Model	3Z4S-LE SV-EXR
Contents	Set of 7 tubes (40 mm, 20 mm, 10 mm, 5 mm, 2.0 mm, 1.0 mm, and 0.5 mm) Maximum outer diameter: 30 mm dia.

* 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.

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

System Configuration

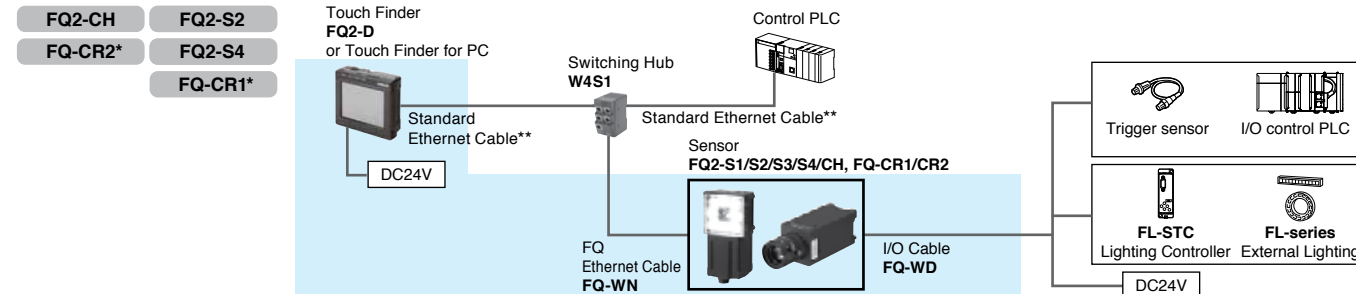
Up to 32 Sensors can be set up and monitored from a single Touch Finder or Touch Finder for PC.
 Various types of Sensors can be used at the same time.
 However, I/O type and wiring method vary depending on the Sensor, so select the necessary devices.



*The Setup Tool can connect to up to 32 Sensors and it can display up to eight Sensors at the same time.

Note: Note: If you register as a member after purchasing a Sensor, you can download free setup software Touch Finder for PC that runs on a PC and can be used in place of Touch Finder. Refer to the member registration sheet for details.

Ethernet (EtherNet/IP, No-protocol, or PLC Link) Connection



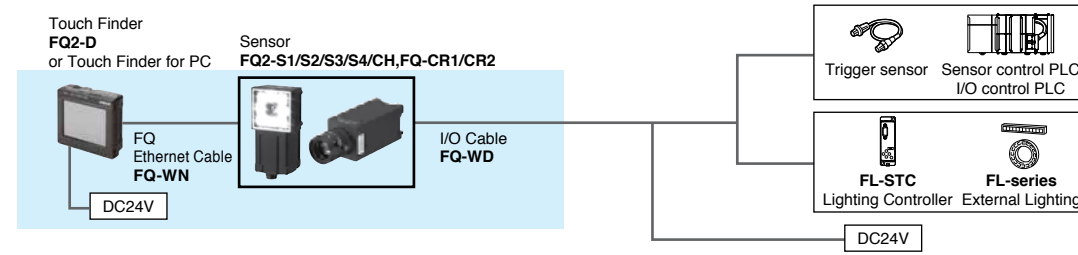
* Note: EtherNet/IP not available for FQ-CR1 and FQ-CR2

** RJ-45 of the FCC regulations

Parallel Interface Connection

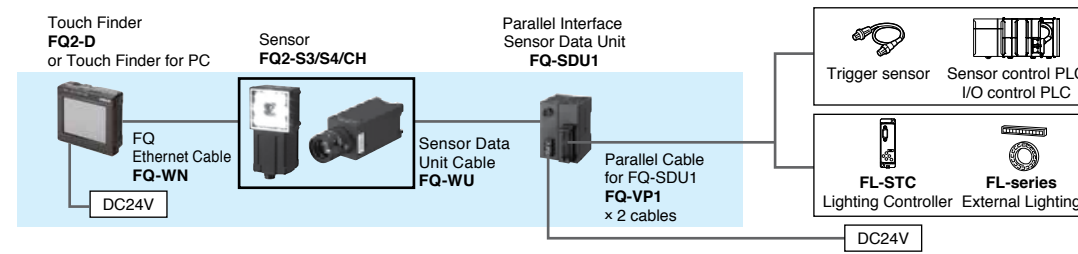
Connection with Standard Parallel Interface of the Sensor

- FQ2-CH
- FQ2-S2
- FQ-CR2
- FQ2-S4
- FQ-CR1



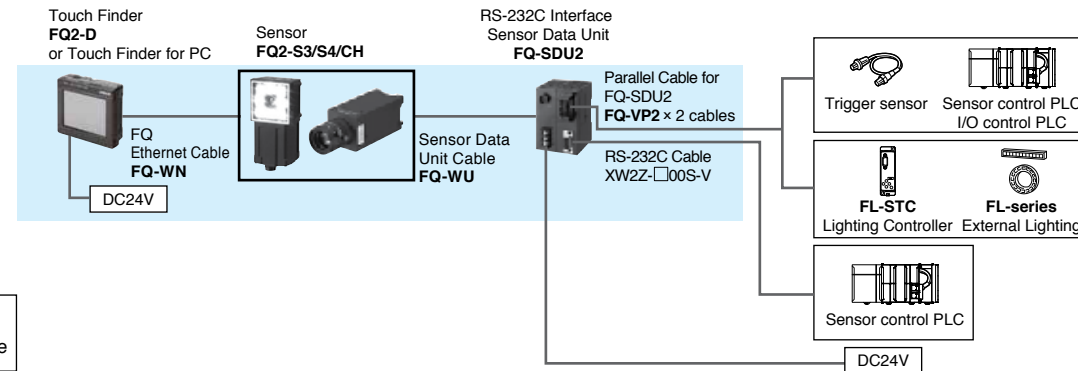
Connection through a Parallel Interface Sensor Data Unit

- FQ2-CH
- FQ2-S2
- FQ-CR2
- FQ2-S4
- FQ-CR1



RS-232C Serial Connection

- FQ2-CH
- FQ2-S2
- FQ-CR2
- FQ2-S4
- FQ-CR1



Model compatible with communications interface

Compatible (Grey box)

Not compatible (White box)

Ratings and Performance

Sensor [Inspection Model FQ2-S2/S3 Series]

Item	Standard type		High-resolution type					
	NPN	PNP	FQ2-S20□□□□	FQ2-S30□□□□-08	FQ2-S30□□□□-08M	FQ2-S30-13	FQ2-S30-13M	
Model	NPN	PNP	FQ2-S25□□□□	FQ2-S35□□□□-08	FQ2-S35□□□□-08M	FQ2-S35-13	FQ2-S35-13M	
Field of view	Refer to Ordering Information on p.19. (Tolerance (field of view): ±10% max.)				Select a lens according to the field of view and installation distance. Refer to the optical chart on p.30.			
Installation distance	Refer to Ordering Information on p.19. (Tolerance (field of view): ±10% max.)							
Main functions	Inspection items	Shape Search III, Shape Search II, Search, sensitive search, area, color data, edge position, edge pitch, edge width, and labeling						
	Number of simultaneous measurements	32						
	Position compensation	Supported (360° Model position compensation, Edge position compensation, Linear correction)						
	Number of registered scenes	32 *						
	Calibration	Supported						
Image input	Image processing method	Real color		Monochrome		Real color		Monochrome
	Image filter	High dynamic range (HDR), image adjustment (Color Gray Filter, Weak smoothing, Strong smoothing, Dilate, Erosion, Median, Extract edges, Extract horizontal edges, Extract vertical edges, Enhance edges, Background suppression), polarizing filter (attachment), and white balance (Sensors with Color Cameras only), Brightness Correction						
	Image elements	1/3-inch color CMOS		1/2-inch color CMOS		1/2-inch Monochrome CMOS	1/2-inch color CMOS	1/2-inch Monochrome CMOS
	Shutter	Built-in lighting ON: 1/250 to 1/50,000s		Built-in lighting ON: 1/250 to 1/60,000s		Built-in lighting OFF: 1/1 to 1/4155s		
	Processing resolution	752 x 480		928 x 828		1280 x 1024		
	Partial input function	Supported horizontally only.		Supported horizontally and vertically				
	Image display	Zoom-in/Zoom-out/Fit, Rotating by 180°						
	Lens mounts	---						C-mount
	Lighting	Lighting method	Pulse					
		Lighting color	White					
Data logging	Measurement data	In Sensor: 1,000 items (If a Touch Finder is used, results can be saved up to the capacity of an SD card.)						
	Images	In Sensor: 20 images (If a Touch Finder is used, images can be saved up to the capacity of an SD card.)						
Auxiliary function	Statistical data, Test Measurements, I/O monitor, Password function, Simulation software, Sensor error history, Calibration, Math (arithmetic, calculation functions, trigonometric functions, and logic functions)							
Measurement trigger	External trigger (single or continuous) Communications trigger (Ethernet TCP no-protocol, Ethernet UDP no-protocol, Ethernet FINS/TCP no-protocol, EtherNet/IP, PLC Link, or PROFINET)							
I/O specifications	Input signals	7 signals						
		<ul style="list-style-type: none"> • Single measurement input (TRIG) • Control command input (IN0 to IN5) 						
	Output signals	3 signals						
		<ul style="list-style-type: none"> • Control output (BUSY) • Overall judgement output (OR) • Error output (ERROR) 						
		Note: The assignments of the three output signals (OUT0 to OUT2) can also be changed to the following:						
		<ul style="list-style-type: none"> • READY • RUN • STG (Strobe trigger) • OR0 (Item0 judgement) to OR31 (Item31 judgement) • Exp.0 judgement to Exp.31 judgement 						
		Ethernet specifications						
	100Base-TX/10Base-T							
	Communications	Ethernet TCP no-protocol, Ethernet UDP no-protocol, Ethernet FINS/TCP no-protocol, EtherNet/IP, PLC Link, or PROFINET						
	I/O expansion	---						
RS-232C	Possible by connecting FQ-SDU1_Sensor Data Unit. 11 inputs and 24 outputs							
Ratings	Power supply voltage	21.6 to 26.4 VDC (including ripple)					0.3 A max.	
	Current consumption	2.4 A max.					0.3 A max.	
Environmental immunity	Ambient temperature range	Operating: 0 to 50°C		Operating: 0 to 40°C		Storage: -25 to 65°C		
	Ambient humidity range	Operating and storage: 35% to 85% (with no condensation)						
	Ambient atmosphere	No corrosive gas						
	Vibration resistance (destruction)	10 to 150 Hz, single amplitude: 0.35 mm, X/Y/Z directions						
	Shock resistance (destruction)	8 min each, 10 times						
Degree of protection	150 m/s ² 3 times each in 6 direction (up, down, right, left, forward, and backward)				IEC 60529 IP40			
	IEC 60529 IP67 (Except when Polarizing Filter Attachment is mounted or connector cap is removed.)				IEC 60529 IP40			
Materials	Sensor: PBT, PC, SUS				Cover: Zinc-plated steel, Thickness: 0.6 mm			
	Mounting Bracket: PBT				Thickness: 0.6 mm			
Weight	Polarizing Filter Attachment: PBT, PC				Case: Aluminum diecast alloy (ADC-12)			
	Ethernet connector: Oil-resistance vinyl compound				Mounting base: Polycarbonate ABS			
Accessories included with sensor	I/O connector: Lead-free heat-resistant PVC				Approx. 160 g without base, Approx. 185 g with base			
	Narrow View/Standard View: Approx. 160 g				Mounting Bracket (FQ-XL) (1)			
LED class	Wide View: Approx. 150 g				Mounting Screw (M3 x 8mm) (4)			
	Mounting Bracket (FQ-XL) (1)				Instruction Manual, Member Registration Sheet			
Applicable standards	Polarizing Filter Attachment (FQ-XF1) (1)				---			
	Instruction Manual, Member Registration Sheet				EC Directive No.2004/108/EC and EN standard EN 61326-1			

* The maximum number of registerable scenes depends on settings due to restrictions on memory.

Sensor [Inspection/ID Model FQ2-S4 Series]

Item		Inspection/ID Model					
Model	NPN	FQ2-S40	FQ2-S40-M	FQ2-S40-08	FQ2-S40-08M	FQ2-S40-13	FQ2-S40-13M
	PNP	FQ2-S45	FQ2-S45-M	FQ2-S45-08	FQ2-S45-08M	FQ2-S45-13	FQ2-S45-13M
Field of view		Refer to Ordering Information on p.19. (Tolerance (field of view): ±10% max.)				Select a lens according to the field of view and installation distance. Refer to the optical chart on p.30.	
Installation distance							
Main functions	Inspection items	Shape Search III, Shape Search II, Search, Sensitive Search, Area, Color Data, Edge Position, Edge Pitch, Edge Width, Labeling, OCR *1, Bar code *2, 2D-code *2, 2D-code (DMP) *3, and Model Dictionary					
	Number of simultaneous measurements	32					
	Position compensation	Supported (360° Model position compensation, Edge position compensation, Linear correction)					
	Number of registered scenes	32 *4					
	Calibration	Supported					
	Retry function	Normal retry, Exposure retry, Scene retry, Trigger retry					
Image input	Image processing method	Real color	Monochrome	Real color	Monochrome	Real color	Monochrome
	Image filter	High dynamic range (HDR), image adjustment (Color Gray Filter, Weak smoothing, Strong smoothing, Dilate, Erosion, Median, Extract edges, Extract horizontal edges, Extract vertical edges, Enhance edges, Background suppression), polarizing filter (attachment), and white balance (Sensors with Color Cameras only), Brightness Correction					
	Image elements	1/3-inch color CMOS	1/3-inch Monochrome CMOS	1/2-inch color CMOS	1/2-inch Monochrome CMOS	1/2-inch color CMOS	1/2-inch Monochrome CMOS
	Shutter	Built-in lighting ON: 1/250 to 1/50,000s Built-in lighting OFF: 1/1 to 1/50,000s		Built-in lighting ON: 1/250 to 1/60,000s Built-in lighting OFF: 1/1 to 1/4155s		1/1 to 1/4155s	
	Processing resolution	752 x 480		928 x 828		1280 x 1024	
	Partial input function	Supported horizontally only.					
	Image display	Zoom-in/Zoom-out/Fit, Rotating by 180°					
	Lens mounts	---					C-mount
	Lighting	Lighting method	Pulse				---
	Lighting color	White				---	
Data logging	Measurement data	In Sensor: 1,000 items (If a Touch Finder is used, results can be saved up to the capacity of an SD card.)					
	Images	In Sensor: 20 images (If a Touch Finder is used, images can be saved up to the capacity of an SD card.)					
Auxiliary function		Statistical data, Test Measurements, I/O monitor, Password function, Simulation software, Sensor error history, Calibration, Math (arithmetic, calculation functions, trigonometric functions, and logic functions)					
Measurement trigger		External trigger (single or continuous) Communications trigger (Ethernet TCP no-protocol, Ethernet UDP no-protocol, Ethernet FINS/TCP no-protocol, EtherNet/IP, PLC Link, or PROFINET)					
I/O specifications	Input signals	7 signals • Single measurement input (TRIG) • Control command input (IN0 to IN5)					
	Output signals	3 signals • Control output (BUSY) • Overall judgement output (OR) • Error output (ERROR) Note: The assignments of the three output signals (OUT0 to OUT2) can also be changed to the following: • READY • RUN • STG (Strobe trigger) • OR0 (Item0 judgement) to OR31 (Item31 judgement) • Exp.0 judgement to Exp.31 judgement					
	Ethernet specifications	100Base-TX/10Base-T					
	Communications	Ethernet TCP no-protocol, Ethernet UDP no-protocol, Ethernet FINS/TCP no-protocol, EtherNet/IP, PLC Link, or PROFINET					
	I/O expansion	Possible by connecting FQ-SDU1_Sensor Data Unit. 11 inputs and 24 outputs					
	RS-232C	Possible by connecting FQ-SDU2_Sensor Data Unit. 8 inputs and 7 outputs					
	Ratings	Power supply voltage	21.6 to 26.4 VDC (including ripple)				
		Current consumption	2.4 A max.		0.3 A max.		
Environmental immunity	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)					
	Ambient atmosphere	No corrosive gas					
	Vibration resistance (destruction)	10 to 150 Hz, single amplitude: 0.35 mm, X/Y/Z directions 8 min each, 10 times					
	Shock resistance (destruction)	150 m/s ² 3 times each in 6 direction (up, down, right, left, forward, and backward)					
	Degree of protection	IEC 60529 IP67 (Except when Polarizing Filter Attachment is mounted or connector cap is removed.)			IEC 60529 IP40		
Materials	Sensor: PBT, PC, SUS Mounting Bracket: PBT Polarizing Filter Attachment: PBT, PC Ethernet connector: Oil-resistance vinyl compound I/O connector: Lead-free heat-resistant PVC			Cover: Zinc-plated steel, Thickness: 0.6 mm Case: Aluminum diecast alloy (ADC-12) Mounting base: Polycarbonate ABS			
Weight	Narrow View/Standard View:Approx.160 g Wide View:Approx.150 g			Approx. 160 g without base, Approx. 185 g with base			
Accessories included with sensor	Mounting Bracket (FQ-XL) (1) Polarizing Filter Attachment (FQ-XF1) (1) Instruction Manual, Member Registration Sheet			Mounting Base (FQ-XLC) (1) Mounting Screw (M3 x 8mm) (4) Instruction Manual, Member Registration Sheet			
LED class	Risk Group 2 (IEC62471)			---			
Applicable standards	EC Directive No.2004/108/EC and EN standard EN 61326-1						

*1. The types of characters to be read are the same as those of FQ2-CH Optical Character Recognition Sensor (p.25).
*2. The types of cedes to be read are the same as those of FQ-CR1 Multi Code Reader (p.25).
*3. The types of cedes to be read are the same as those of FQ-CR2 2D Code Reader (p.25).
*4. The maximum number of registerable scenes depends on settings due to restrictions on memory.

Sensor [ID Model FQ2-CH, FQ-CR1/CR2 Series]

Item		Optical Character Recognition Sensor		Multi Code Reader	2D Code Reader
Model	NPN	FQ2-CH10		FQ-CR10	FQ-CR20
	PNP	FQ2-CH15		FQ-CR15	FQ-CR25
Field of view		Refer to Ordering Information on p.19. (Tolerance (field of view): ±10% max.)			
Installation distance					
Main functions	Inspection items	OCR ⊗ Alphabet A to Z ⊗ Number 0 to 9 ⊗ Symbol ' - . : / Model dictionary		2D Code (Data Matrix (EC200), QR Code, MicroQR Code, PDF417, MicroPDF417, GS1-DataMatrix) Bar Code (JAN/EAN/UPC, Code39, Codabar (NW-7), ITF (Interleaved 2 of 5), Code 93, Code128/GS1-128, GS1 DataBar* (Truncated,Stacked, Omni-directional, Stacked Omnidirectional,Limited, Expanded, Expanded Stacked), Pharmacode, GS1-128 Composite Code (CC-A, CC-B, CC-C))	
	Image filter	Weak smoothing, Strong smoothing, Dilate, Erosion, Median, Extract edges, Extract horizontal edges, Extract vertical edges, Enhance edges, Background suppression		None	Filter function (Smooth, Dilate, Erosion, Median), Code Error Correction Position Display
	Verification function	Supported		Supported	None
	Retry function	Normal retry, Exposure retry, Scene retry, Trigger retry		None	Normal retry, Exposure retry, Scene retry, Trigger retry
	Number of simultaneous measurements	32			
	Position compensation	Supported (360° Model position compensation, Edge position compensation, Linear correction)			
	Number of registered scenes	32			
Image input	Image processing method	Monochrome			
	Image filter	High dynamic range (HDR), polarizing filter (attachment), Brightness Correction		High dynamic range (HDR), polarizing filter (attachment)	
	Image elements	1/3-inch Monochrome CMOS			
	Shutter	Built-in lighting ON: 1/250 to 1/50,000s Built-in lighting OFF: 1/1 to 1/50,000s		1/250 to 1/30,000s	1/250 to 1/32,258s
	Processing resolution	752 x 480			
	Partial input function	Supported horizontally only.			
Lighting	Image display	Zoom-in/Zoom-out/Fit, Rotating by 180°		Zoom-in/Zoom-out/Fit	
	Lighting method	Pulse			
	Lighting color	White			
Data logging	Measurement data	In Sensor: 1,000 items (If a Touch Finder is used, results can be saved up to the capacity of an SD card.)			
	Images	In Sensor: 20 images (If a Touch Finder is used, images can be saved up to the capacity of an SD card.)			
Auxiliary function		Statistical data, Test Measurements, I/O monitor, Password function, Simulation software, Sensor error history, Calibration			
Math function		Arithmetic, calculation functions, trigonometric functions, and logic functions			
Measurement trigger		External trigger (single or continuous) Communications trigger (Ethernet TCP no-protocol, Ethernet UDP no-protocol, Ethernet FINS/TCP no-protocol, EtherNet/IP, PLC Link, or PROFINET)		External trigger (single or continuous) Communications trigger (Ethernet TCP no-protocol)	
I/O specifications	Input signals	7 signals • Single measurement input (TRIG) • Control command input (IN0 to IN5)			
	Output signals	3 signals • Control output (BUSY) • Overall judgement output (OR) • Error output (ERROR) Note: The assignments of the three output signals (OUT0 to OUT2) can also be changed to the following: • READY • RUN • STG (Strobe trigger) • OR0 (Item0 judgement) to OR31 (Item31 judgement) • Exp.0 judgement to Exp.31 judgement		3 signals • Control output (BUSY) • Overall judgement output (OR) • Error output (ERROR) Note: Note:The three output signals can be allocated for the judgements of individual inspection items.	
	Ethernet specifications	100Base-TX/10Base-T			
	Communications	Ethernet TCP no-protocol, Ethernet UDP no-protocol, Ethernet FINS/TCP no-protocol, EtherNet/IP, PLC Link, or PROFINET		Ethernet TCP no-protocol	
	I/O expansion	Possible by connecting FQ-SDU1_Sensor Data Unit. 11 inputs and 24 outputs			
	RS-232C	Possible by connecting FQ-SDU2_Sensor Data Unit. 8 inputs and 7 outputs			
Ratings	Power supply voltage	21.6 to 26.4 VDC (including ripple)			
	Current consumption	2.4 A max.			
Environmental immunity	Ambient temperature range	Operating: 0 to 40°C, Storage: -25 to 65°C (with no icing or condensation)		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)			
	Ambient atmosphere	No corrosive gas			
	Vibration resistance (destruction)	10 to 150 Hz, single amplitude: 0.35 mm, X/Y/Z directions 8 min each, 10 times			
	Shock resistance (destruction)	150 m/s ² 3 times each in 6 direction (up, down, right, left, forward, and backward)			
	Degree of protection	IEC 60529 IP67 (Except when Polarizing Filter Attachment is mounted or connector cap is removed.)			
Materials		Sensor: PBT, PC, SUS, Mounting Bracket: PBT, Polarizing Filter Attachment: PBT, PC Ethernet connector: Oil-resistance vinyl compound, I/O connector: Lead-free heat-resistant PVC			
Weight		Narrow View/Standard View:Approx.160 g Wide View:Approx.150 g			
Accessories included with sensor		Mounting Bracket (FQ-XL) (1), Polarizing Filter Attachment (FQ-XF1) (1), Instruction Manual, Member Registration Sheet			
LED class		Risk Group 2 (IEC62471)			
Applicable standards		EC Directive No.2004/108/EC and EN standard EN 61326-1			

Touch Finder

Item	Model	Type	Model with DC power supply	Model with AC/DC/battery power supply
			FQ2-D30	FQ2-D31
Number of connectable Sensor		Number of sensors that can be recognized (switched): 32 max. number or sensor that can displayed on monitor: 8 max.		
Main functions	Types of measurement displays		Last result display, Last NG display, trend monitor, histograms	
	Types of display images		Through, frozen, zoom-in, and zoom-out images	
	Data logging		Measurement results, measured images	
	Menu language		English, German, French, Italian, Spanish, Traditional Chinese, Simplified Chinese, Korean, Japanese	
Indications	LCD	Display device	3.5-inch TFT color LCD	
		Pixels	320 × 240	
		Display colors	16.7 million	
	Backlight	Life expectancy *1	50,000 hours at 25°C	
		Brightness adjustment	Provided	
		Screen saver	Provided	
Operation interface	Touch screen	Method	Resistance film	
		Life expectancy *2	1,000,000 touch operations	
External interface	Ethernet		100BASE-TX/10BASE-T	
	SD card		SDHC-compliant, Class 4 or higher recommended	
Ratings	Power supply voltage		DC power connection: 21.6 to 26.4 VDC (including ripple) AC adapter (manufactured by Sino-American Japan Co., Ltd) connection: 100 to 240 VAC, 50/60 Hz Battery connection: FQ-BAT1 Battery (1cell, 3.7 V)	DC power connection: 21.6 to 26.4 VDC (including ripple) AC adapter (manufactured by Sino-American Japan Co., Ltd) connection: 100 to 240 VAC, 50/60 Hz Battery connection: FQ-BAT1 Battery (1cell, 3.7 V)
	Continuous operation on Battery *3		---	1.5 h
	Power consumption		DC power connection: 0.2 A max.	DC power connection: 0.2 A max. Charging battery: 0.4 A max.
Environmental immunity	Ambient temperature range		Operating: 0 to 50°C Storage: -25 to 65°C (with no icing or condensation)	Operating: 0 to 50°C when mounted to DIN Track or panel Operation on Battery: 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)	
	Ambient atmosphere		No corrosive gas	
	Vibration resistance (destruction)		10 to 150 Hz, single amplitude: 0.35 mm, X/Y/Z directions 8 min each, 10 times	
	Shock resistance (destruction)		150 m/s ² 3 times each in 6 direction (up, down, right, left, forward, and backward)	
Degree of protection		IEC 60529 IP20 (when SD card cover, connector cap, or harness is attached)		
Weight		Approx. 270 g (without Battery and hand strap attached)		
Materials		Case: ABS		
Accessories included with Touch Finder		Touch Pen (FQ-XT), Instruction Manual		

*1. This is a guideline for the time required for the brightness to diminish to half the initial brightness at room temperature and humidity. The life of the backlight is greatly affected by the ambient temperature and humidity and will be shorter at lower or higher temperatures.

*2. This value is only a guideline. No guarantee is implied. The value will be affected by operating conditions.

*3. This value is only a guideline. No guarantee is implied. The value will be affected by the operating environment and operating conditions.

Sensor Data Units (FQ2-S3/S4/CH only)

Item	Parallel Interface		RS-232C Interface
	NPN	FQ-SDU10	FQ-SDU20
Model	PNP		FQ-SDU15
			FQ-SDU25
I/O specifications	Parallel I/O	Connector 1	16 outputs (D0 to D15)
		Connector 2	11 inputs (TRIG, RESET, IN0 to IN7, and DSA) 8 outputs (GATE, ACK, RUN, BUSY, OR, ERROR, STGOUT, and SHTOUT)
	RS-232C		6 inputs (IN0 to IN5)
	Sensor interface		2 inputs (TRIG and RESET) 7 outputs (ACK, RUN, BUSY, OR, ERROR, STGOUT, and SHTOUT)
Ratings	Power supply voltage		21.6 to 26.4 VDC (including ripple)
	Insulation resistance		Between all DC external terminals and case: 0.5 MΩ min (at 250 VDC)
	Current consumption		2.5 A max. : FQ2-S□□□□□□□□□□ and FQ-SDU□□□, FQ2-CH1□□□□□□□□-M and FQ-SDU□□□□ 0.4 A max. : FQ2-S□□□□□□□□□□ and FQ-SDU□□□□ 0.1 A max. : FQ-SDU□□□□ only
Environmental immunity	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)
	Ambient atmosphere		No corrosive gas
	Vibration resistance (destruction)		10 to 150 Hz, single amplitude: 0.35 mm, X/Y/Z directions, 8 min each, 10 times
	Shock resistance (destruction)		150 m/s ² 3 times each in 6 directions (up, down, right, left, forward, and backward)
Degree of protection		IEC 60529 IP20	
Materials		Case: PC + ABS, PC	
Weight		Approx. 150 g	
Accessories included with Sensor Data Unit		Instruction Manual	

Battery

Item	Model	FQ-BAT1
Battery type	Secondary lithium ion battery	
Nominal capacity	1,800 mAh	
Rated voltage	3.7 V	
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)	
Charging method	Charged in Touch Finder (FQ2-D31). AC adapter (FQ-AC□□) is required.	
Charging time *1	2 h	
Usage time *1	1.5 h	
Battery backup life (See note 2.)	300 charging cycles	
Weight	50 g max.	

*1. This value is only a guideline. No guarantee is implied. The value will be affected by operating conditions

*2. This is a guideline for the time required for the capacity of the Battery to be reduced to 60% of the initial capacity. No guarantee is implied. The value will be affected by the operating environment and operating conditions.

System Requirements for Touch Finder for PC

The following Personal Computer system is required to use the software.

OS	Microsoft Windows XP Home Edition/Professional SP2 or higher (32-bit version) Microsoft Windows 7 Home Premium or higher (32-bit/64-bit version)
CPU	Core 2 Duo 1.06 GHz or the equivalent or higher
RAM	1GB min.
HDD	500 MB min. available space *
Monitor	1,024 × 768 dots min.

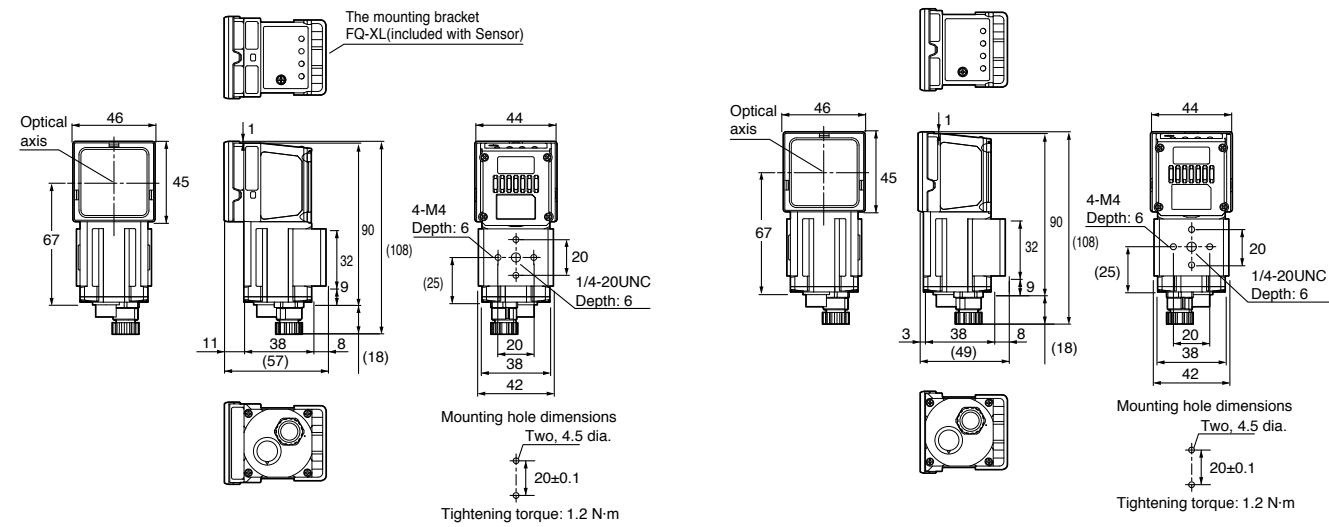
*. Available space is also required separately for data logging.

Sensor
Integrated Sensor

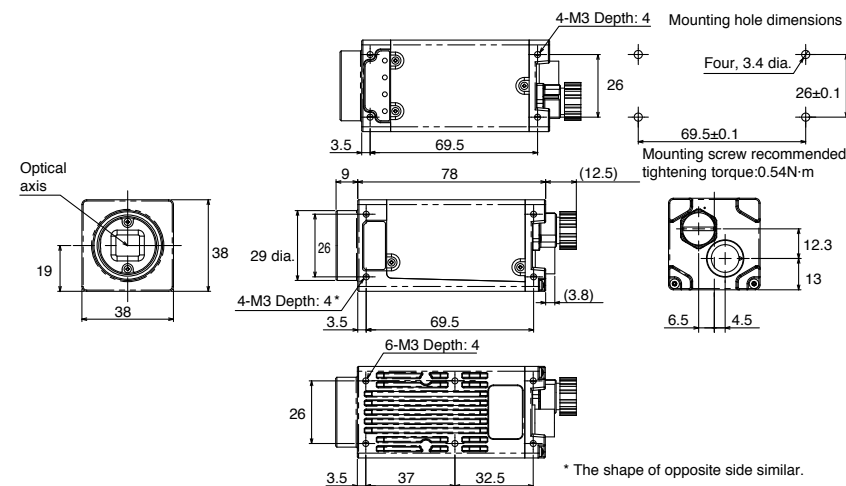
Narrow View
FQ2-S□□□10F-□□□
FQ2-CH□□□10F-M
FQ-CR□□□10F-M

Standard View
FQ2-S□□□50F-□□□
FQ2-CH□□□50F-M
FQ-CR□□□50F-M

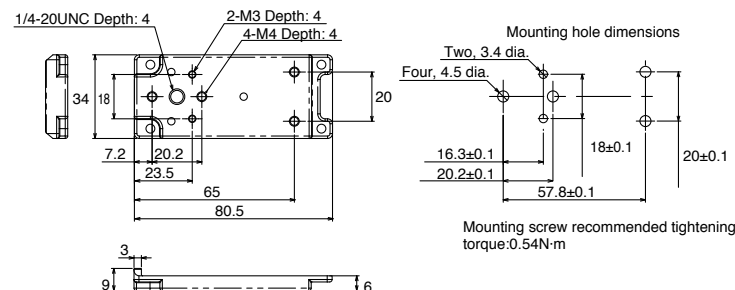
Wide View
FQ2-S□□□100-□□□
FQ2-CH□□□100-M
FQ-CR□□□100-M



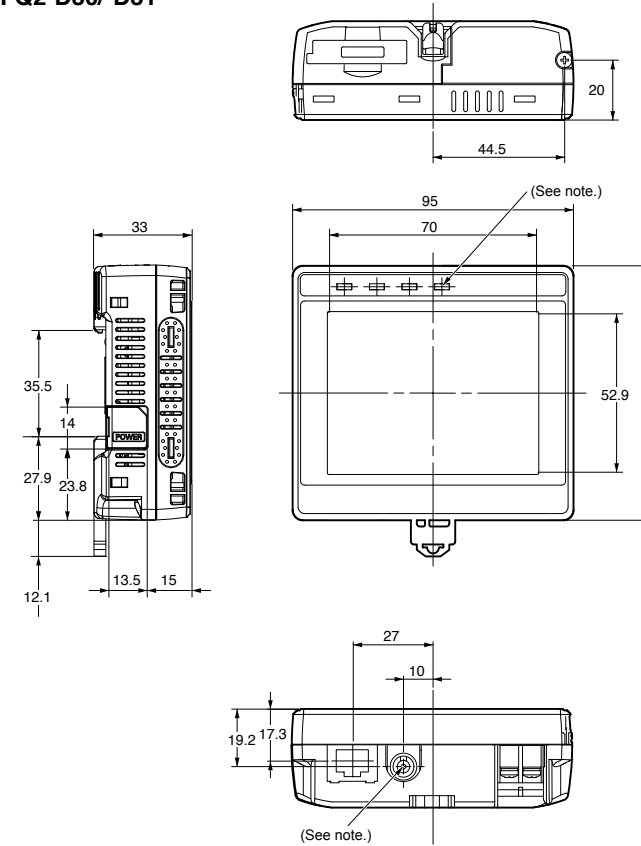
C-mount
FQ2-S3□-13□
FQ2-S4□-13□



Mounting Base FQ-XLC (included with Sensor)

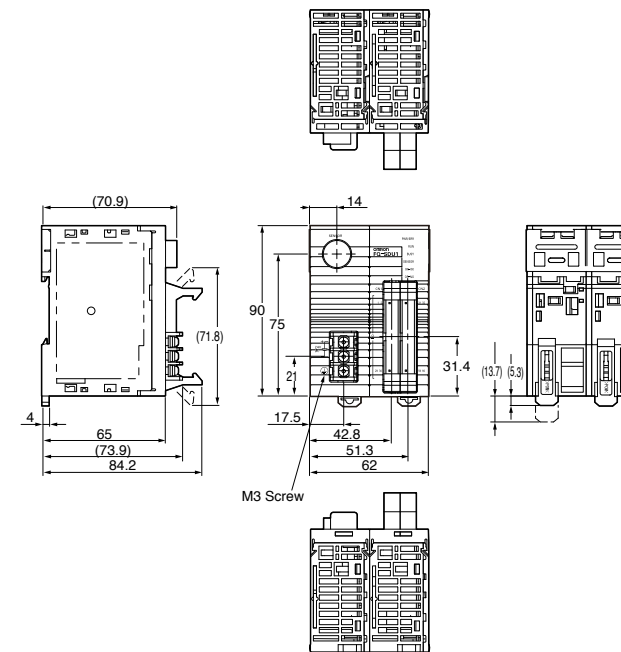


Touch Finder
FQ2-D30/-D31

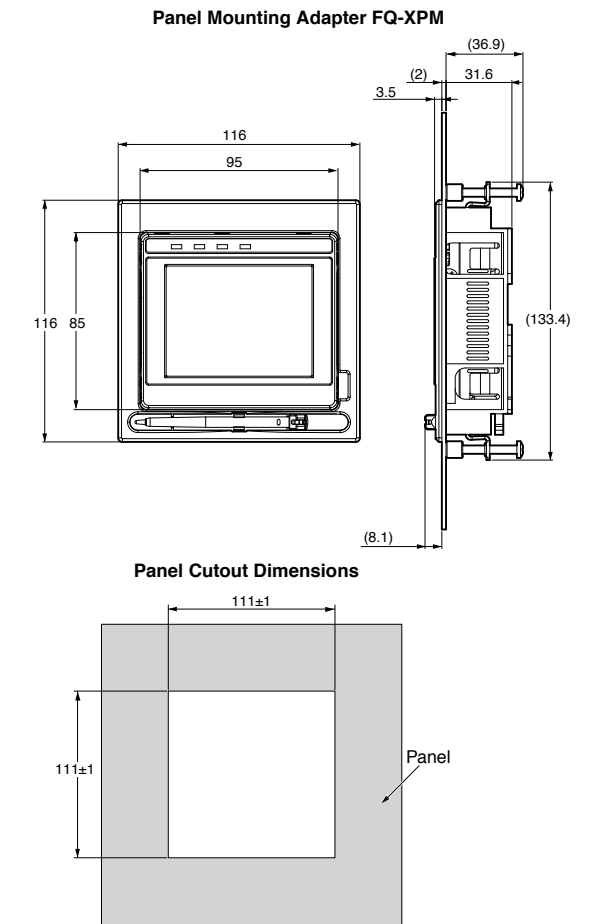
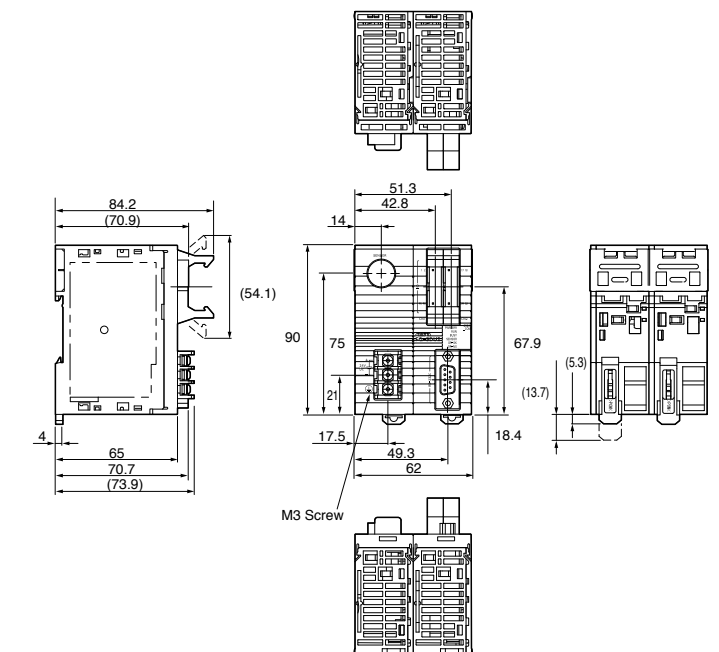


Note: Provided with FQ2-D31 only.

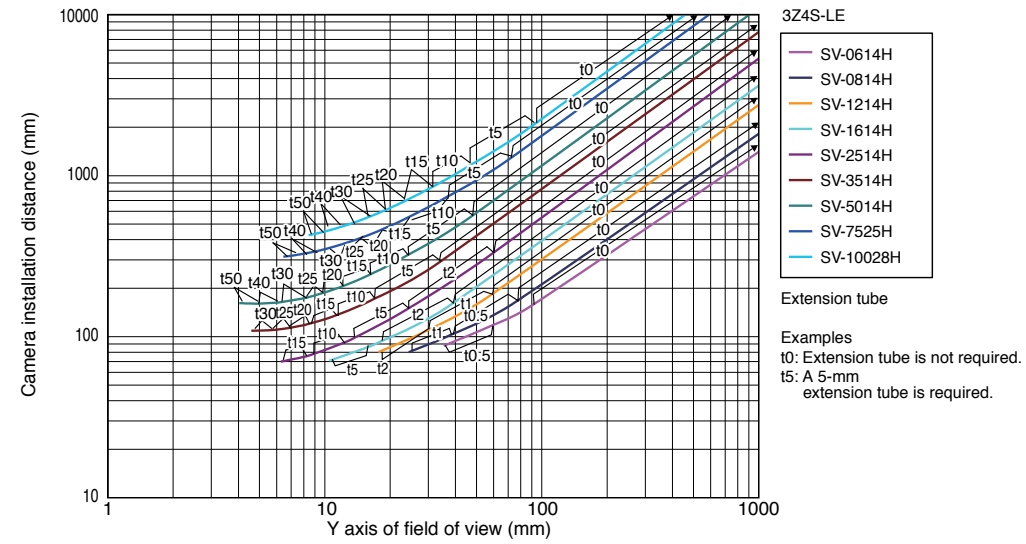
Sensor Data Unit
FQ-SDU10/-SDU15



FQ-SDU20/-SDU25



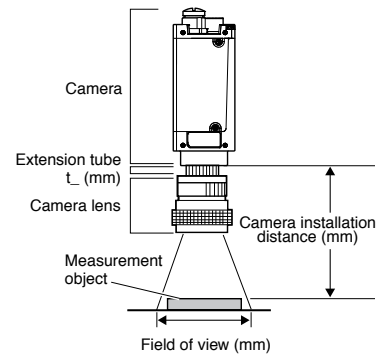
High-resolution, Low-distortion Lenses 3Z4S-LE SV-□□□□H



Meaning of Optical Chart

The X axis of the optical chart shows the field of view (mm) (See Note.), and the Y axis of the optical chart shows the camera installation distance (mm).

Note: The lengths of the fields of view given in the optical charts are the lengths of the Y axis.



Related Manuals

Man.No.	Model number	Manual
Z337	FQ2-S1/S2/S3/S4/CH	Smart Camera FQ2-S/CH Series User's manual
Z338	FQ2-S1/S2/S3/S4/CH	Smart Camera FQ2-S/CH Series User's manual (Communication Settings)
Z329	FQ-CR1-M	Fixed Mount Multi Code Reader FQ-CR1-M User's manual
Z316	FQ-CR2	Fixed Mount 2D Code Reader FQ-CR2 User's manual

Vision Series Lineup

The lineup covers everything from cost-effective Smart Cameras to ultra-high-speed Vision Systems.
Choose the best combination for your budget and needs.



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