Tecnología en Electrónica y Control SRL

Ficha Técnica

Cámara Inteligente

OMRON

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OMRON
AUTOMATION & SAFETY

FQ2 Smart Camera

Offering a wide range of solutions for your inspection needs

EtherNet/IP™

PROFINET® INDUSTRIAL ETHERNET

» Simple to advanced inspection in a compact housing

» Expanded performance and functionality

» Camera, Communications, Software Tools, and Much More

Introducing the Smart Heavyweight

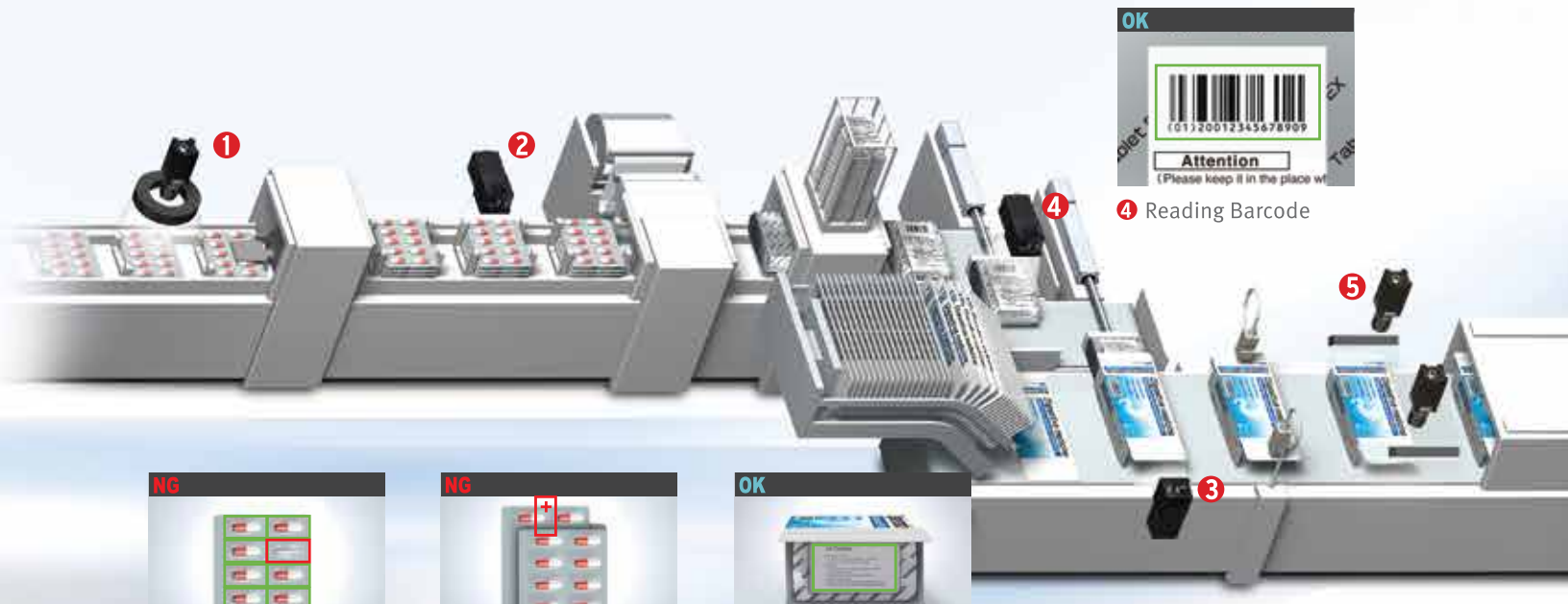
New Models with Code Reading and OCR with Built-in Dictionary

Flexible inspection capabilities, multiple cameras and communication options – this powerful vision sensor has it all.

Omron's FQ2 Series was designed to solve your toughest inspection challenges.

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



❹ Reading Barcode

❶ Missing Pill

❷ Misalignment

❸ Package Insert Detection

Three Advantages for Effective Machine Design

Compact Body

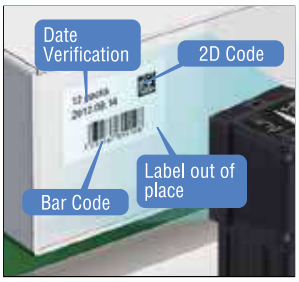
All in One Vision Sensor

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

Extended Functions

Image Sensor, OCR, and Code Reader in One

The OCR function adds to the sensing solution and provides a powerful upgrade. It features a "built-in" dictionary ability to recognize 15 Code types.



Diverse Lineup

A Lineup That Fits a Wide Range of Applications

Expanded inspection menu, camera variations, and communication interfaces. With a wide range of sensors, an option for every application now becomes a standard option.

❺ Hot-melt Detection

❻ Date Verification and Tape Detection

❼ Reading Barcode

Compact

All You Need is One

Combined Lighting, Controller and Communications

Image Processor

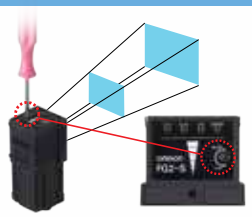
Although previous Vision Sensors placed the image processor in a separate Controller, now we have built the processor into the camera unit.

High-power Lighting

Built-in high-power lighting capable of evenly lighting across a wide field of view. Providing sufficient lighting even when the polarizing filter is used.

Adjustable Lens

The focus of the lens can be adjusted for the specific field of view and installation distance you need.



Focus adjustment screw

I/O Power Supply Connector

The external output line for inspection results, the input line for changing the setup, and the power supply line are all combined into one connector.

Ethernet Connector

Commands can be input from a PLC to control the FQ2, and inspection results and measurement results can be output from the FQ2 to a PLC. You can also transfer images to a computer.

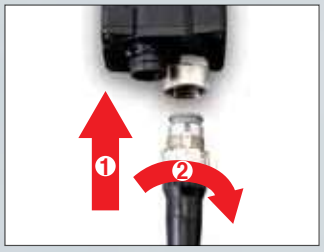
IP67 Water Resistance

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



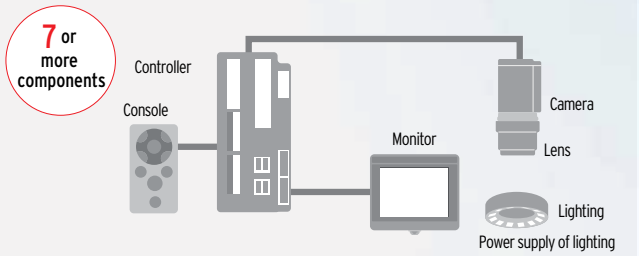
Connection is made quick and easy with a clear, definitive click-into-place mechanism.

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 additional lighting or lenses. Furthermore, the time required to wire everything has been drastically reduced due to the low number of components.

Other Vision Systems



FQ2-series Smart Cameras

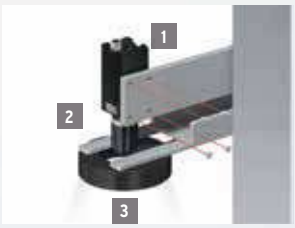
Easy Installation

The camera and lighting have been integrated into a single unit, so only one 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. Axis alignment is not required because the lighting and the camera are integrated into a single unit.

Other Vision Cameras

The optical axis must be adjusted because of two components are mounted.

1. Mount camera.
2. Mount lighting.
3. Align the optical axes.

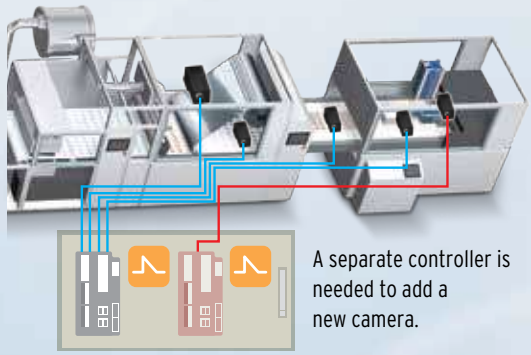


FQ2-series Smart Cameras

Easy Expansion Up to 32 Cameras

Simply install the cameras where you need them, when 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. Up to 32 cameras can be set up from a single Touch Finder without adding new monitors when you need more cameras.

Other Vision Systems



FQ2-series Smart Cameras

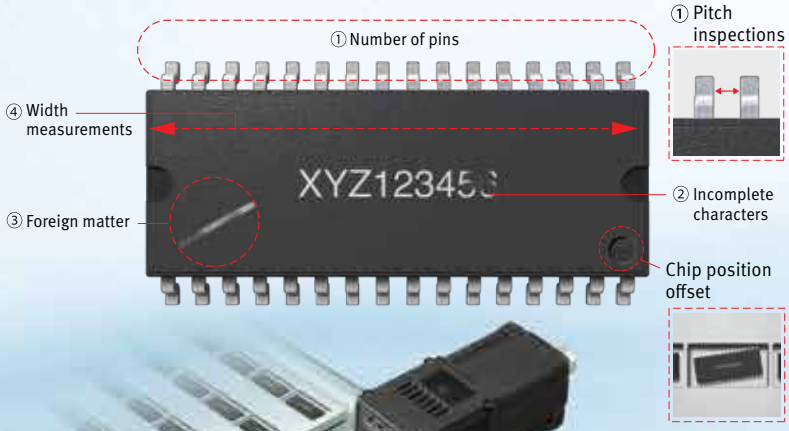
Triggers

Easily Perform Both Inspection and Positioning

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

External Inspection

External inspection of ICs can be completed with a single Sensor.
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.

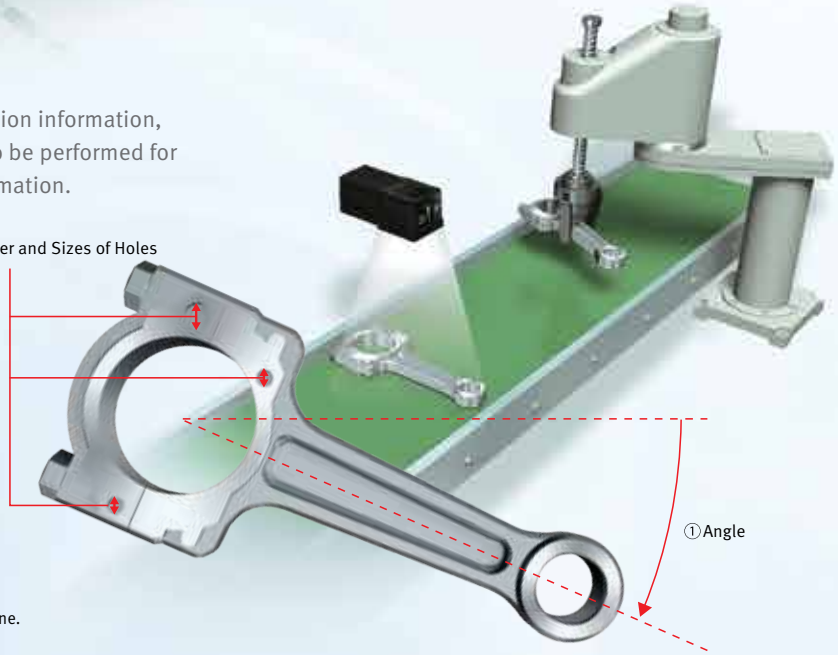


Measurement Flow	Purpose
Image Filters	Adjusts the image so that it is easier to inspect
Position compensation	Compensates for the position offset of the chip.
Inspections	
① Edge Count	① Number of pins and pitch inspections
② Sensitive Search	② Incomplete characters
③ Color Data	③ Foreign matter
④ Edge Position	④ Width measurements
Calculations and Outputs	
Calculation	Uses the inspection data for calculations and judgements.
Data Output	Outputs the measurement values.
Individual Judgement Output	Outputs the judgements of inspections ① to ④ individually.

Component Positioning

The Sensor can measure angles of rotation and other position information, so it can also be used for positioning. Inspections can also be performed for the number and size of holes along with the position information.

Measurement Flow	Purpose
Image Filters	Adjusts the image so that it is easier to inspect
Inspections and Measurements	
① Shape Search II	① Component incline and position
② Labeling	② Number of holes and hole sizes
Calculations and Outputs	
Calculation	Calculates data for external output.
Data Output	Outputs the position information and incline.



Incorporating the Best - Inspection Tools from the High-end Vision Systems

Search Tools

Shape Search II

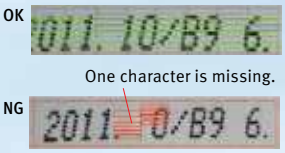
Ten Times Faster Than Previous Searching

General searches have a difficult time with overlap or 360° rotation, but this Sensor achieves high-speed, stable searching of any shapes that match the model.

Multiple searches can be performed simultaneously, which enables the inspection of the number of items in a pallet or picking applications.

Sensitive Search

Through automatic division and matching of the model image, tiny differences that cannot be detected with a normal search can be detected with large numerical differences.



Search Tools

Search

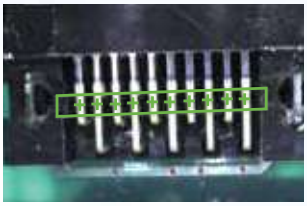
This is a standard search inspection item. This type of search is used to detect items like labels, identify shapes, or positions.

Detection of Promotional Stickers

Edge Tools

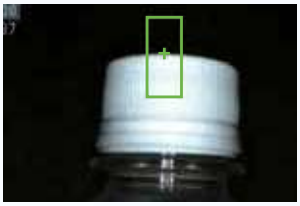
Edge Pitch

The number of edges in a region can be counted.



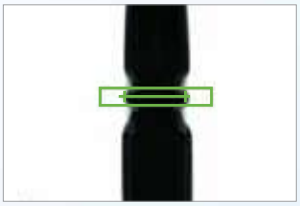
Edge Position

This inspection item detects edges and measures their positions.



Edge Width

This inspection item measures the width between edges.



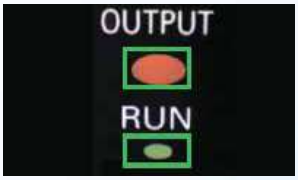
Area and Color Tools

Labeling

This inspection item counts how many labels there are of the specified color and size and 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

Inspections can be performed that compare the difference in color between the workpiece and a registered image of a good product to detect objects and foreign matter.

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

Utility Items

360° Rotational Position Compensation

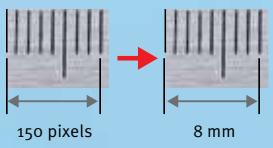
Inspections for products with inconsistent position can easily be corrected. Compensation of the placement of inspection regions simplifies the manufacturing process with the ease of product tracking.

Image Filters

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

Calibration

Pixel unit measurement can be converted to user units for the dimensions of a workpiece, providing a user display that is easy to understand.

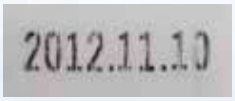


New OCR Method without Character Registration into a Dictionary

Date Verification

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

Measurement Flow	Purpose
Reading Characters OCR	① Reading characters ② Verification against reference data
Outputs Judgement Output	Outputs the judgement result from verification at ②.



Worn Characters

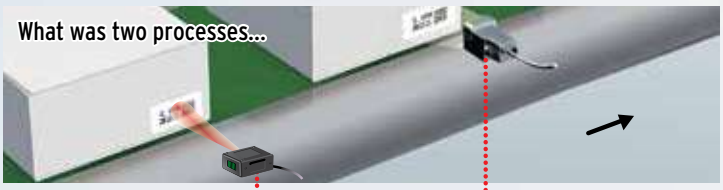
Distorted Characters

Character Verification and Label Position Inspection

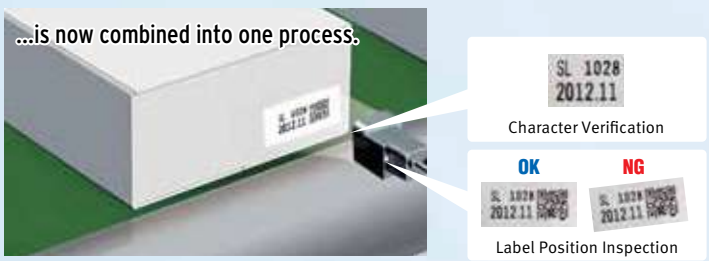
Although previously performed as separate processes, character verification and inspections can now both be performed with one FQ2 Sensor. This helps you reduce costs and save space.

Measurement Flow	Purpose
Image Filters	Adjusts the image so that it is easier to inspect.
Position Compensation	Compensates for the position of the box.
Inspections ① OCR ② Search	① Reads the lot number and date. ② Label position inspection
Calculations and Outputs Individual Judgement Output	Outputs the judgements of ① and ②.

Other Vision Sensors



FQ2-S4/CH Series Smart Camera



OCR with Built-in Dictionary

OCR

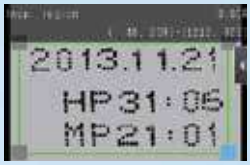
The built-in dictionary contains approximately 80 different fonts that are used on the factory floor. Variations for worn characters, blurred, distorted, different backgrounds, and size changes have been included to enable stable and highly accurate readings. It is not necessary to set parameters to compensate for character contrast or positional offsetting.

Conventional OCR

Time is required for character registration into the dictionary.

Built-in Dictionary

① Draw boxes around characters.

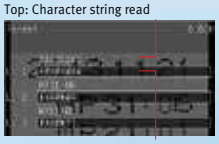


Up to four lines can be read.
The following characters can be read.

- Letters of the alphabet: A to Z (uppercase)
- Numbers: 0 to 9
- Symbols: ' - . : /

② Set the character formats.

Top: Character string read



Bottom: Character format

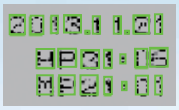
The character format is displayed from the read results. Set the character format according the format of the characters to read.

- Letter: $
- Number: #
- Symbol: @
- Not read: *
- Number or letter: ?

③ Press the TEACH Button.

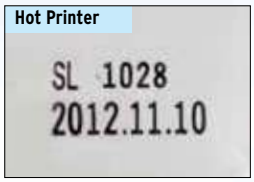
The character extraction conditions are automatically adjusted according to the conditions of the printed characters.

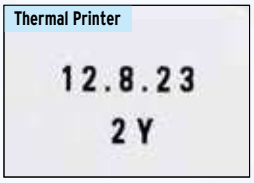
Reading is started.



Different printers use different printing methods.

Characters from most printers can be read, including dot and impact printers. Handles Approx. 80 Fonts



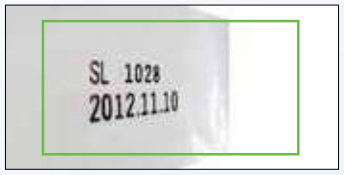


Worn and inclined characters cannot be read.

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

Worn Characters

Inclined Characters

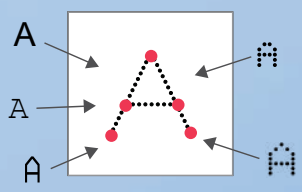


Small Characters

New OCR Tool: Character Matching with Structural Models

In some applications it is required for image matching methods, but thanks to the structural model matching of specific characteristic points there is no need for character registration.

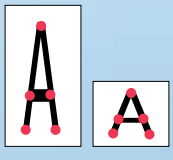
Structural models record the characteristics of each character in approximately 80 fonts.



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

Background Changes

Size and Font Changes



Worn Characters

Inclined Characters

Capability to Read Any of 15 Code Types from Paper Labels to Direct Marking

Code and Character Verification

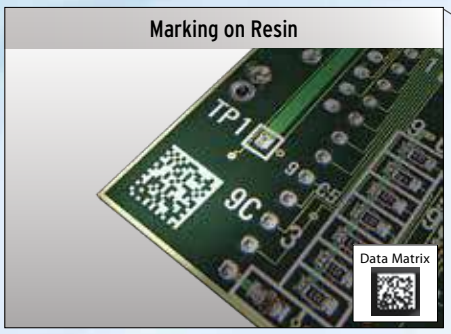
OCR and Code Reading inspection items can be combined to read codes and verify them against character strings all within the FQ2. No programming of external devices is required.

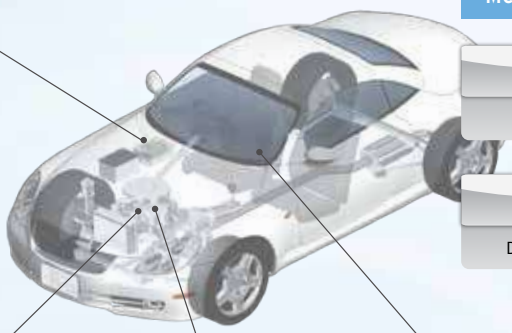
Measurement Flow	Purpose
Position Compensation	Compensates for the position of the box.
Reading	
① Bar code	① Reads the barcode.
② OCR	② Reads the character string and verifies it against the barcode in ①.
Outputs	
Data	Outputs the verified character string.

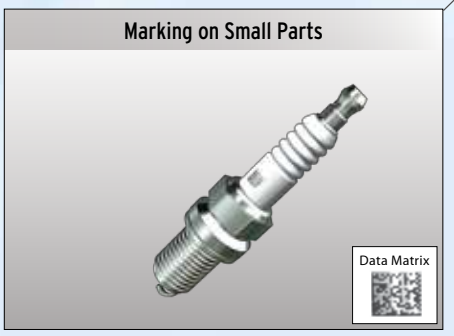
Reading Direct Marking Codes

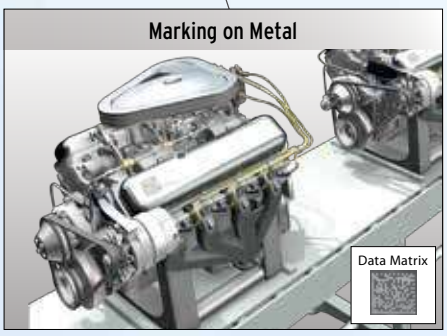
It is common to manage information by using direct marking codes on products. However, differences in materials often causes instability when reading the printed characters. The FQ2 achieves stable reading with unique functionality designed just for DPM (Dot Peen Marking).

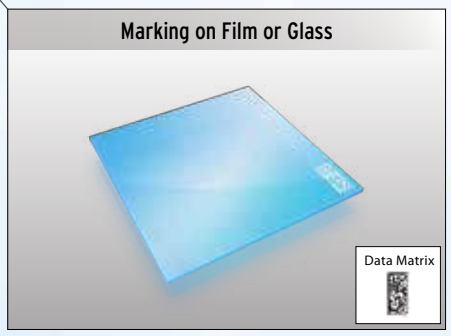
Measurement Flow	Purpose
Code Reading	Reads 2D code.
2D-code (DPM)	
Outputs	
Data Output	Outputs the information that was read.







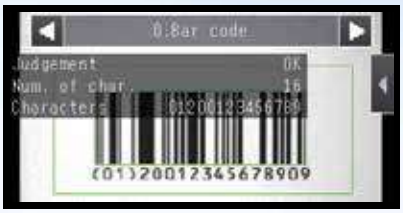




Paper Labels

Barcodes

The FQ2 can read the main nine types of barcodes. Additionally, the FQ2 can be used in pharmaceutical applications, 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 the main six types of 2D codes. You do not need to use more than one code reader even for processing that combines different types of codes.

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

Direct Marking

2D DPM (Dot Peen Marking) Codes

When 2D codes are printed on metal, substrates, glass, or other materials, the printed 2D codes can be inconsistent. 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.

Data Matrix(EC200)	QR Code

• Types of Filtering

In order to achieve stable readings you can remove printing irregularities and noise by applying up to three of the four unique filters developed by OMRON.

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.

• Retry function

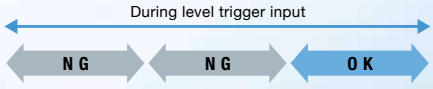
Code readers must overcome environmental and poor printing conditions that cause unstable readings. The FQ2 has a retry function that retries readings by changing the exposure time and other reading conditions.

1 Retrying the Specified Number of Times with the Same Conditions

Reading is performed for the specified number of times for the same scene.

2 Retrying While External Trigger Is Input

Reading is performed until successful, as long as an external level trigger is input.

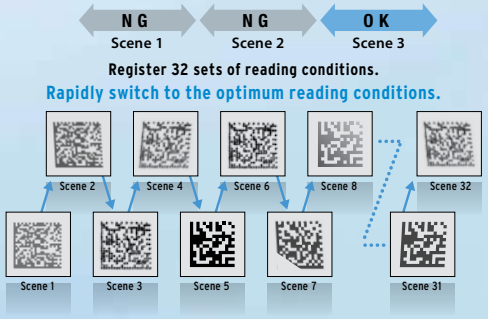


3 Retrying While Changing the Shutter Speed

Reading is performed for the same scene while changing the exposure time in stages.

4 Retrying While Changing the Reading Conditions

When reading DPM codes, inconsistencies in printing conditions can result in NGs if reading is performed with only one set of reading settings. The FQ2 allows you to register up to 32 sets of reading conditions as scenes and retry reading while changing the scenes in order. The system automatically determines the scenes with the highest usage rates and changes the order to start with them to flexibly handle changes in reading conditions. Of course you can specify a fixed order if required.



Versatile

A Lineup That Fits a Wide Range of Equipment

Sensors

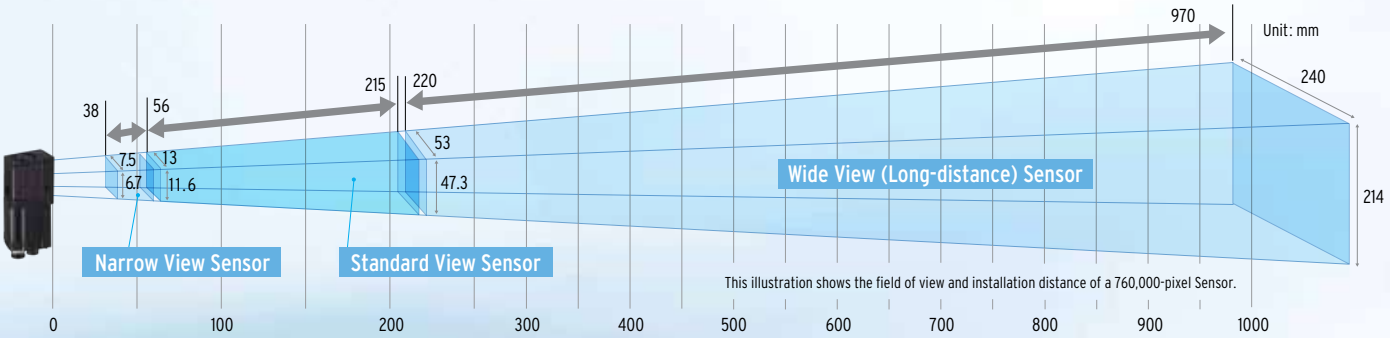
We offer a diverse lineup of Sensors so that you can choose the one with the perfect field of view and installation distance for your needs.

Integrated Sensor

Color Monochrome

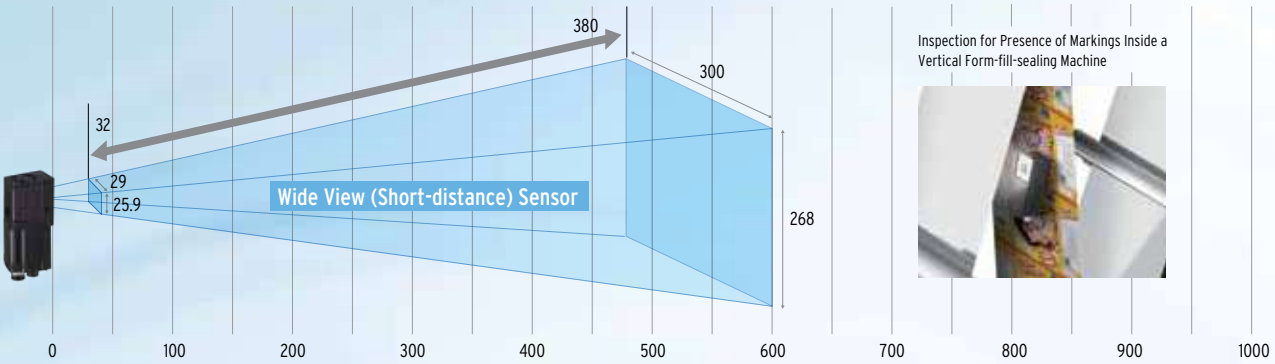
• Seamless Field of View Variations

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 side-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 the sensor 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.



Inspection for Presence of Markings Inside a Vertical Form-fill-sealing Machine

Sensors with C-mount lens

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.

Long Distance

Narrow Field of View

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 to connect with a wide range of host devices. Saving setup time for communications between the sensor and the 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 required to create ladder programs.

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

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.

Compatible Models | OMRON PLCs: CS, CJ1, CJ2, CP1 and NSJ Series

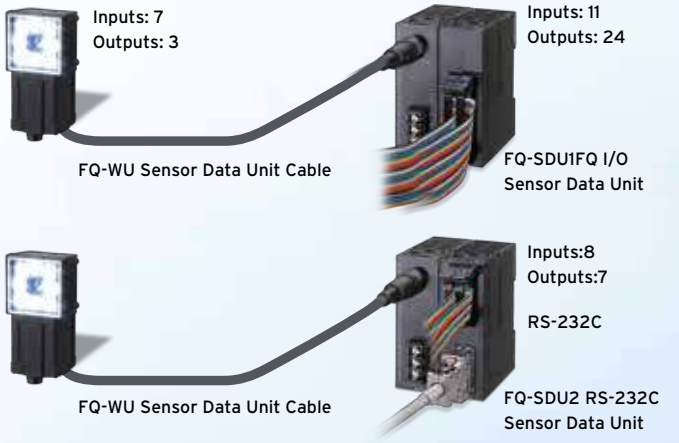
EtherNet/IP

EtherNet/IP communications enable simple and easy connections to a wide range of EtherNet/IP devices, including OMRON PLCs.

Compatible Models | OMRON Machine Programmable Controllers: NJ Series
OMRON PLCs: CS, CJ1 and CJ2 Series

I/O Expansion Units

Our expansion units enable expansion of up to three times the number of I/O points. This enables the output of individual judgement results for each inspection.



RS-232C Communications Unit

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

Setup Tools

We provide two tools for configuration and monitoring of inspection images: the Touch Finder, which can be used onsite to change settings and which can be installed on a control panel, and the Touch Finder for PC software which is Windows XP/7 (32/64 bit compatible).

Touch Finder

This is a small monitor with a touch panel. It's durable, rugged design is shock-resistant and portable. It has passed our standard 1.3 m drop test.

PC Tool

Emulates TouchFinder functionality on a PC.

On-screen Messages in Nine Languages

- English
- German
- Traditional Chinese
- French
- Simplified Chinese
- Italian
- Korean
- Spanish
- Japanese

Hardware Advancements

High-speed Image Processor

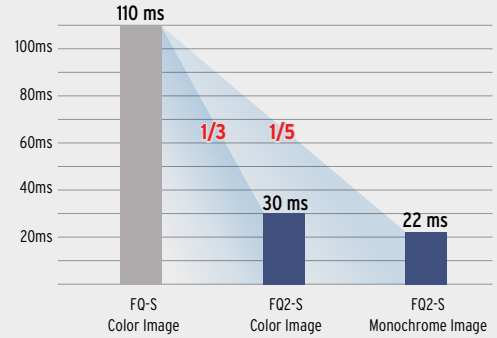
3X Faster than Previous Models

600 mHz Processor provides faster throughput times!

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.

Search Inspection Speed Comparison



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

Partial Input with DAP (Dual Axis Partial) Processing

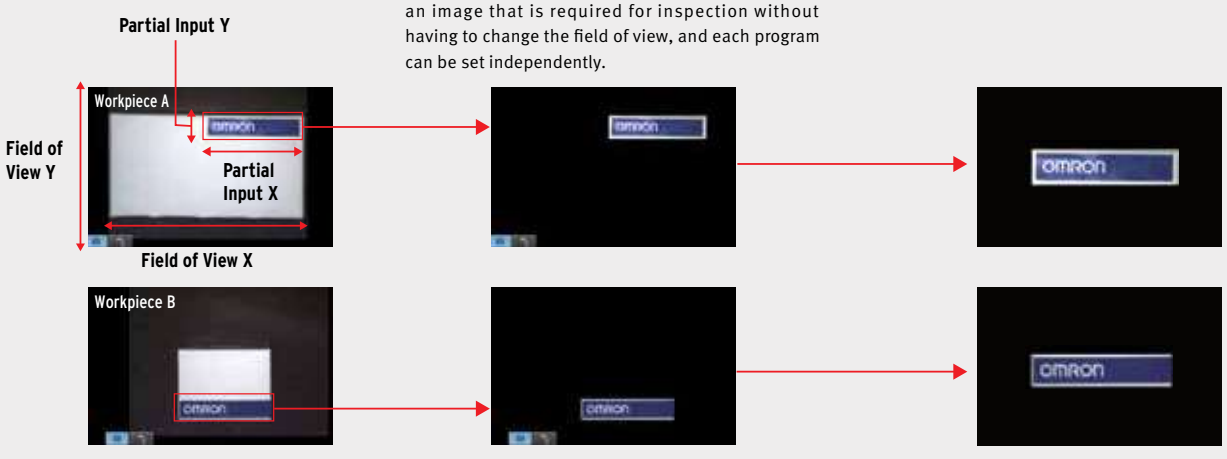
Processing time can be further reduced by limiting the camera image size to an area focused for the inspection. Previous models allowed trimming only in the Y direction, but now you can specify a range across both the X and Y axes while keeping a wide field of view, trim the sections that are not required for inspection in each scene to reduce inspection time.

Partial Input

Partial input allows you to input only the portion of an image that is required for inspection without having to change the field of view, and each program can be set independently.

Enlarged Display

You can enlarge the display of the partial input image.



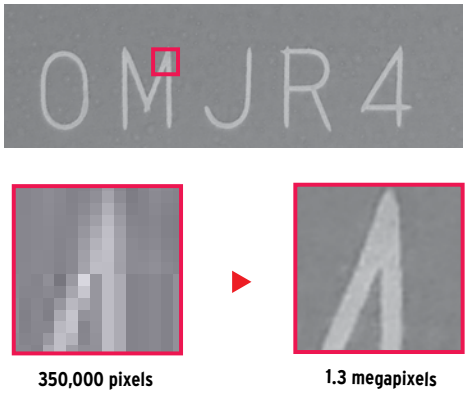
Megapixel CMOS Sensor

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.



1.3 Megapixels
Color Monochrome

Sensor with C-mount

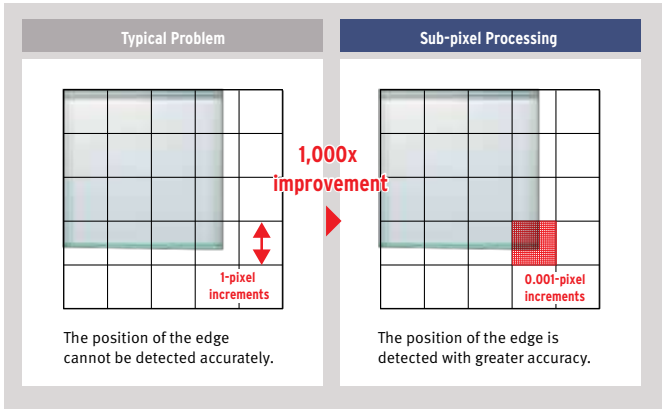
760,000 Pixels *
Color Monochrome

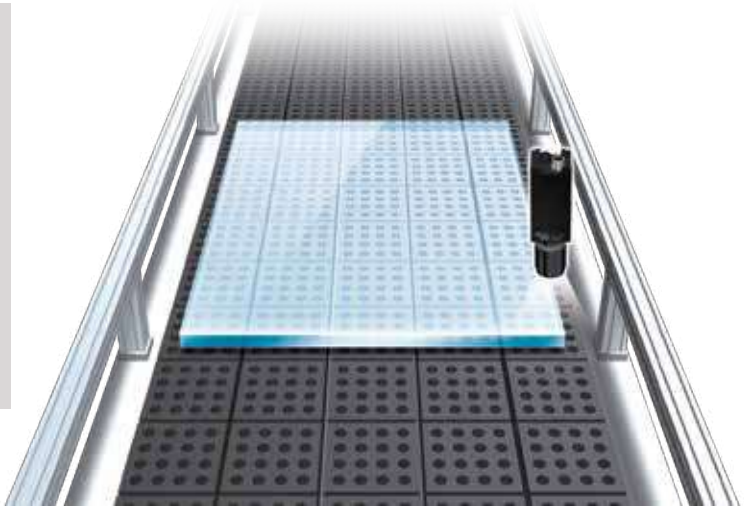
Integrated Sensor

*.350,000 pixels types are also available.

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.



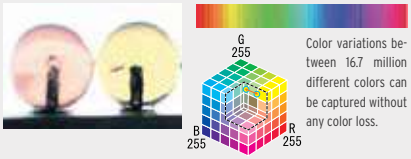


Three Key Technologies for Crystal Clear Images

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.

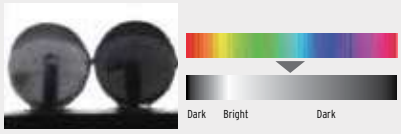
Real color image processing



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

The camera image is processed as-is without any loss of quality.
This enables even the slightest of color differences to be captured with high accuracy.

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.

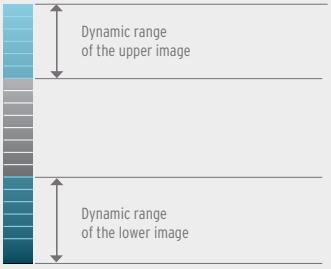
Previous Image Processing

OMRON FQ2 Series

HDR Sensing

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

Conventional images



Defects Undetectable Due to Overexposure or Underexposure

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

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.

Polarizing Filter + High-power Lighting

Lighting is required for stable image inspection, but shiny surfaces can reflect light, resulting in incorrect judgements. 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 enclosed polarizing filter is used.

Standard Lighting

Light is reflected.

Standard Lighting + Polarizing Filter

The overall image is dark;
inspection becomes unstable.

High-power Lighting + Polarizing Filter

Overall image contrast is maintained,
and only reflections are eliminated.

Useful Onsite Utilities

Real-time Threshold Adjustment

The FQ2 smart camera allows fast and easy judgement adjustment. This eliminates the need to stop the machine for fine tuning of settings, resulting in zero machine downtime.

Judgement conditions can be adjusted on the Touch Finder.

180° Inverted Image Display

Invert images by 180° when an image can only be taken in the incorrect orientation due to the position that the Sensor was mounted in.

The image is displayed in the direction opposite of the actual travel direction, which makes the position difficult to adjust.

The image is displayed in the same direction as it is actually traveling.

Inspection History Logging

"Recent results logging" is very useful for tracking inspections, logged data can be checked on a time scale in graph form and used to adjust judgement conditions. File Logging is useful in documenting manufacturing history. Large inspection records 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

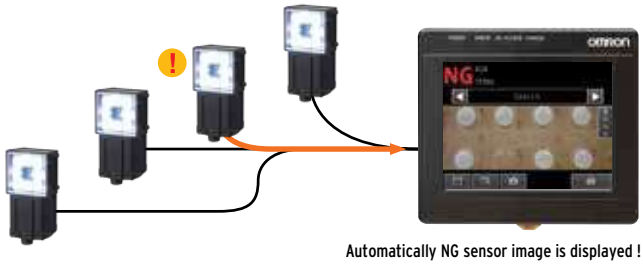
SD card
Up to 10 million measurement values or more
(for a 4-GB SD card)
Up to 10,000 images or more
(for a 4-GB SD card)

Password Protection

A password can be set to prevent changes to settings during operation by restricting the ability to change from Run Mode to Setup Mode.

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.

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.

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

		Inspection Model FQ2-S2 Series	Inspection and ID Model FQ2-S4 Series			ID Model FQ-CR1 Series	ID Model FQ-CR2 Series
		Integrated Sensor	Integrated Sensor	Integrated Sensor	C-mount	Integrated Sensor	Integrated Sensor
							
Number of pixels		350,000 pixels	350,000 pixels	760,000 pixels	1.3 million pixels	350,000 pixels	350,000 pixels
Color		Real color	Real color monochrome	Real color monochrome	Real color monochrome	Monochrome	Monochrome
Number of simultaneous measurements		32	32	32	32	32	32
Number of registered scenes		32	32	32	32	32	32
Inspection tools	Shape search II, Search, Sensitive search, Edge position, Edge width, Edge pitch, Area, Color data, Labeling	•	•	•	•	N/A	N/A
ID tools	OCR	N/A	•	•	•	N/A	N/A
	Bar code	N/A	•	•	•	•	N/A
	2D code	N/A	•	•	•	•	N/A
	2D code (DPM) *	N/A	•	•	•	N/A	•
I/O specifications	Ethernet TCP no-protocol	•	•	•	•	•	•
	EthernetUDP no-protocol, Ethernet FINS/TCPno-protocol, EtherNet/IP, PLC Link, PROFINET	•	•	•	•	N/A	N/A
	Sensor Data Units (I/O)	N/A	•	•	•	N/A	N/A
	Sensor Data Units(RS-232C)	N/A	•	•	•	N/A	N/A

* Inspection item for directly marked 2D codes

Ordering Information

Sensors

Inspection Model

FQ2-S2 Series [Standard Type]

Field of vision		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 vision/ Installation distance		Refer to figure **1** on p.19	Refer to figure **2** on p.19	Refer to figure **3** on p.19	Refer to figure **4** on p.19

Inspection / ID Model

FQ2-S4 Series [Standard Type]

Field of vision		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 vision/ Installation distance		Refer to figure **1** on p.19	Refer to figure **2** on p.19	Refer to figure **3** on p.19	Refer to figure **4** on p.19

[High-resolution Type]

Field of vision		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 vision/ Installation distance		Refer to figure **5** on p.19	Refer to figure **6** on p.19	Refer to figure **7** on p.19	Refer to figure **8** on p.19	Refer to optical chart on p.20.

ID Model

FQ-CR1 Series [Multi Code Reader]

Field of vision		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 vision/ Installation distance		Refer to figure **1** on p.19	Refer to figure **2** on p.19	Refer to figure **3** on p.19	Refer to figure **4** on p.19

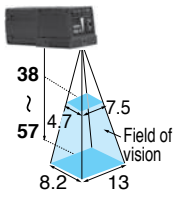
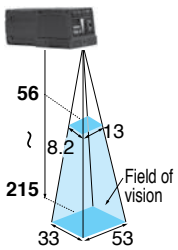
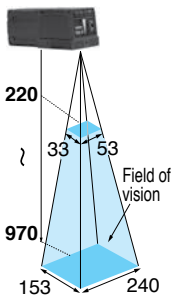
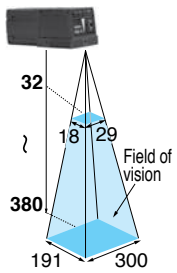
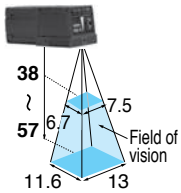
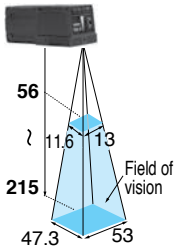
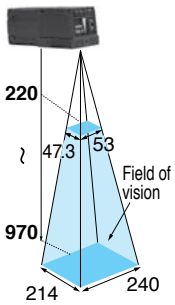
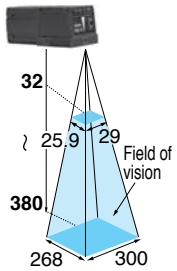
FQ-CR2 Series [2D Code Reader]

Field of vision		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 vision/ Installation distance		Refer to figure **1** on p.19	Refer to figure **2** on p.19	Refer to figure **3** on p.19	Refer to figure **4** on p.19

Specifications

Sensors Field of vision/Installation distance

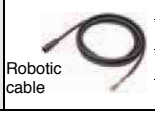
(Unit: mm)

Field of vision	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

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

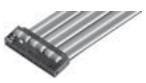
Industrial Switching Hubs (Recommended)

Appearance	Number of ports	Failure detection	Current consumption	Model
	3	None	0.08 A	W4S1-03B
	5	None	0.12 A	W4S1-05B
		Supported		W4S1-05C

Sensor Data Units (FQ2-S4 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 Units

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.

Specifications

Accessories

Application	Appearance	Name	Model
For Sensor		Mounting Bracket (Included with Integrated Sensor)	FQ-XL
		Mounting Bracket (Improved resistance to vibrations for Integrated Sensor)	FQ-XL2
		Mounting Base (Included with C-mount Sensor)	FQ-XLC
		Polarizing Filter Attachment (Included with Integrated Sensor)	FQ-XF1

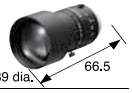
For Touch Finder		Panel Mounting Adapter	FQ-XPM
		AC Adapter (for AC/DC/battery model)	FQ-AC2
		Battery (for AC/DC/battery model)	FQ-BAT1
		Touch Pen (Enclosed with Touch Finder)	FQ-XT
		Strap	FQ-XH
		SD Card (2 GB)	HMC-SD291

External Lighting

Type	Model
FLV Serie	Refer to Vision Accessory Catalog (Q198)
FL Series	Refer to FL Series Catalog(Q181)

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	 42 dia. 57.5	 39 dia. 52.5	 30 dia. 51.0	 30 dia. 47.5	 30 dia. 36.0	 44 dia. 45.5	 44 dia. 57.5	 36 dia. 49.5	 39 dia. 66.5
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

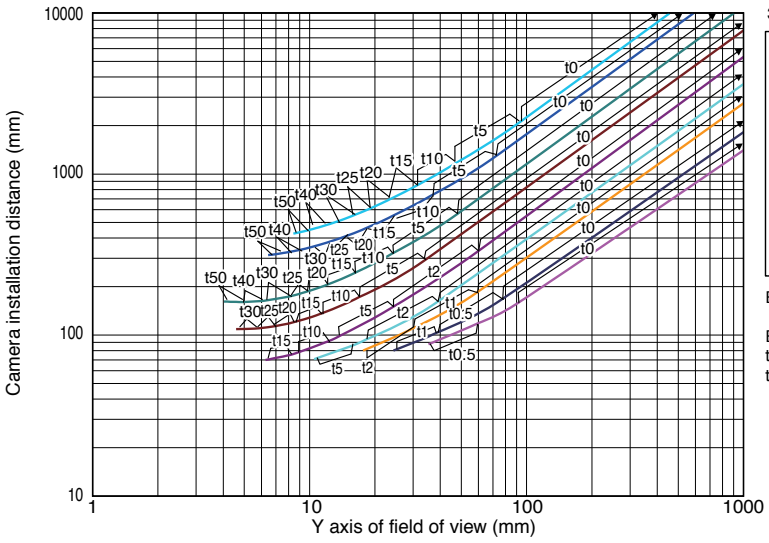
Extension Tubes

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 ExtensionTubes 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.

Optical Chart for C-mount Camera FQ2-S4 □-13□

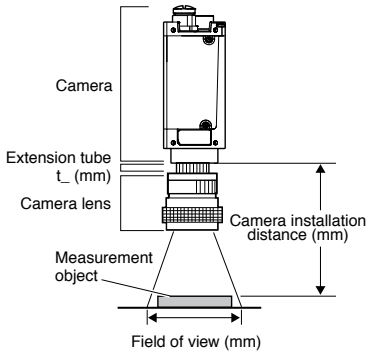
High-resolution, Low-distortion Lenses 3Z4S-LE SV-□□□□H



Meaning of Optical Chart

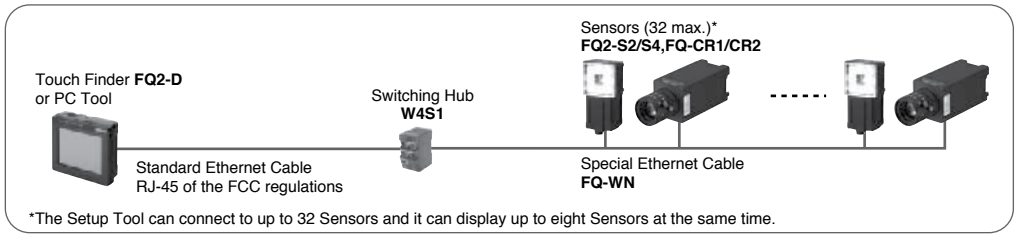
The X axis of the optical chart shows the field of vision (mm) (See Note.), and the Y axis of the optical chart shows the camera installation distance (mm).

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



System Configuration

Up to 32 Sensors can be set up and monitored from a single Touch Finder or PC Tool.
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.

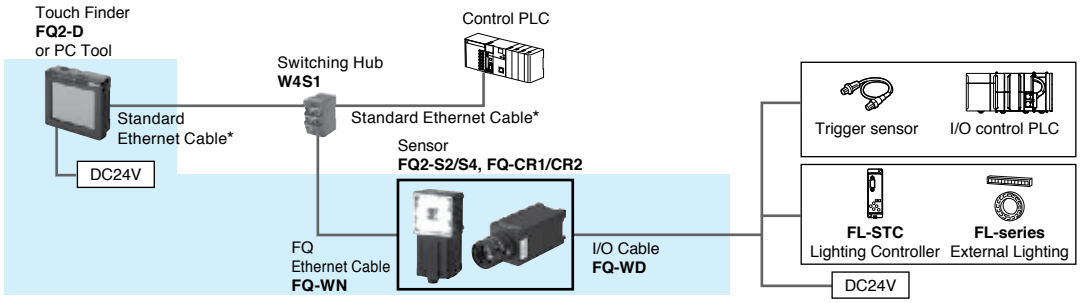


*The Setup Tool can connect to up to 32 Sensors and it can display up to eight Sensors at the same time.

Note: Note: If you register as a member after purchasing a Sensor, you can download free setup software 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

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

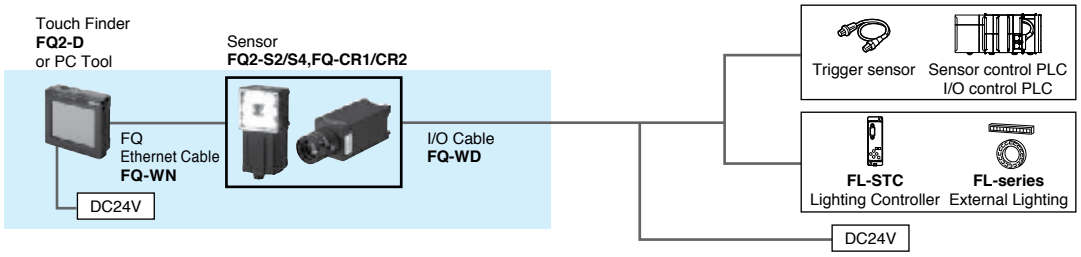


* RJ-45 of the FCC regulations

Parallel Interface Connection

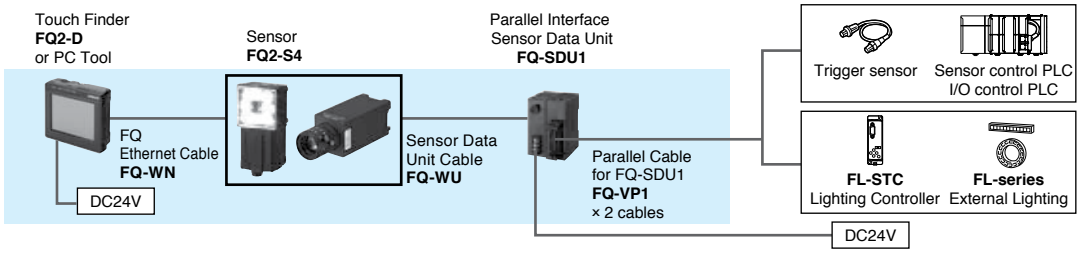
Connection with Standard Parallel Interface of the Sensor

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



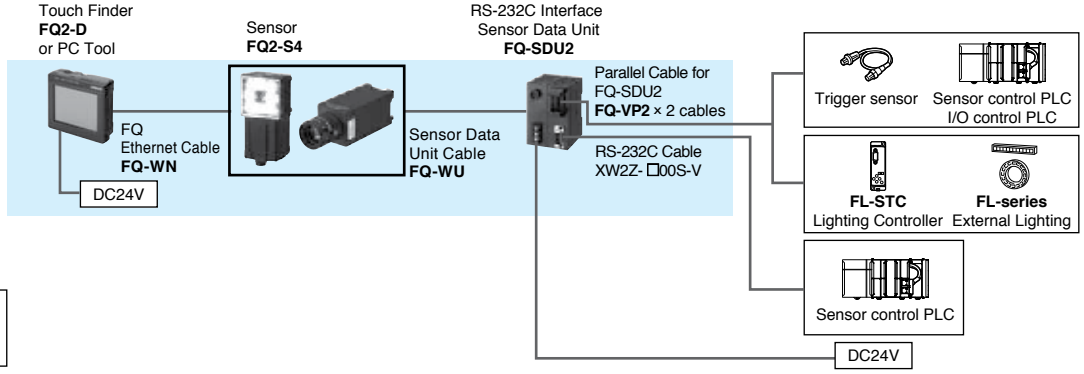
Connection through a Parallel Interface Sensor Data Unit

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



RS-232C Serial Connection

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



Model compatible with communications interface

	Compatible
	Not compatible

Ratings and Performance

Sensor [Inspection Model FQ2-S2 Series]

Item		Inspection Model
Model	NPN	FQ2-S20□□□□
	PNP	FQ2-S25□□□□
Field of view		Refer to Ordering Information on p.18. (Tolerance (field of vision): ±10% max.)
Installation distance		
Main functions	Inspection items	Search, shape search II, sensitive search, area, color data, edge position, edge pitch, edge width, and labeling
	Number of simultaneous measurements	32
	Position compensation	Supported (360º Model position compensation, Edge position compensation)
	Number of registered scenes	32
	Calibration	Supported
Image input	Image processing method	Real color
	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
	Image elements	1/3-inch color CMOS
	Shutter	Built-in lighting ON: 1/250 to 1/50,000S Built-in lighting OFF: 1/1 to 1/50,000S
	Processing resolution	752 × 480
	Partial input function	Supported horizontally only.
	Lens mounts	---
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		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 be changed to the individual judgements of the inspection items, the image input ready output (READY), or the external lighting timing output (STGOUT).
	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	---
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 50ºC Storage: -25 to 65ºC (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		EN standard EN 61326 and EC Directive No.2004/104/EC

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.18. (Tolerance (field of vision): ±10% max.)				Select a lens according to the field of vision and installation distance. Refer to the optical chart on p.30.	
Installation distance							
Main functions	Inspection items	Search, shape search II, sensitive search, area, color data, edge position, edge pitch, edge width, labeling, OCR, Bar code *1, 2D-code *1, 2D-code(DMP) *2, and Model dictionary					
	Number of simultaneous measurements	32					
	Position compensation	Supported (360º Model position compensation, Edge position compensation)					
	Number of registered scenes	32 (*The maximum number of registrable scenes depends on settings due to restrictions on memory.)					
	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)					
	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 × 480		928 × 828		1280 × 1024	
	Partial input function	Supported horizontally only.		Supported horizontally and vertically			
	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		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 be changed to the individual judgements of the inspection items, the image input ready output (READY), or the external lighting timing output (STGOUT).					
	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 40ºC Storage: -25 to 65ºC (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 × 8mm)(4) Instruction Manual Member Registration Sheet	
LED class		Risk Group 2 (IEC62471)				---	
Applicable standards		EN 61326-1:2006 and IEC 61010					

*1. The types of codes to be read are the same as those of FQ-CR1 Multi Code Reader (p.24).
*2. The types of codes to be read are the same as those of FQ-CR2 2D Code Reader (p.24).

Item		Multi Code Reader	2D Code Reader
Model	NPN	FQ-CR10□□□□-M	FQ-CR20□□□□-M
	PNP	FQ-CR15□□□□-M	FQ-CR25□□□□-M
Field of view / Installation distance		Refer to Ordering Information on p.18. (Tolerance (field of vision): ±10% max.)	
Main functions	Inspection items	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))	2D Code (Data Matrix(EC200), QR Code)
	Image filter	None	Filter function (Smooth, Dilate, Erosion, Median), Code Error Correction Position Display
	Verification function	Supported	None
	Retry function	Normal retry, Exposure retry, Scene retry, Trigger retry	
	Number of simultaneous measurements	32	
	Position compensation	None	
	Number of registered scenes	32 (*The maximum number of registrable scenes depends on settings due to restrictions on memory.)	
Image input	Image processing method	Monochrome	
	Image filter	High dynamic range (HDR) and polarizing filter (attachment)	
	Image elements	1/3-inch Monochrome CMOS	
	Shutter	1/250 to 1/30,000s	1/250 to 1/32,258s
	Processing resolution	752 × 480	
	Partial input function	Supported horizontally only.	
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		Math (arithmetic, calculation functions, trigonometric functions, and logic functions) Supported in only Multi code Reader	-
Measurement trigger		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:** 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	
	I/O expansion	---	
	RS-232C	---	
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 50ºC, Storage: -25 to 65ºC (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		EN 61326-1:2006 and IEC61010-1	

Touch Finder

Item			Type / Model	Model with DC power supply FQ2-D30	Model with AC/DC/battery power supply 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 25ºC	
		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)	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 50ºC Storage: –25 to 65ºC (with no icing or condensation)	Operating: 0 to 50ºC when mounted to DIN Track or panel Operation on Battery: 0 to 40ºC Storage: –25 to 65ºC (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/s² 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-S4 only)

Item			Parallel Interface	RS-232C Interface
Model	NPN		FQ-SDU10	FQ-SDU20
	PNP		FQ-SDU15	FQ-SDU25
I/O specifications	Parallel I/O	Connector 1	16 outputs(D0 to D15)	6 inputs(IN0 to IN5)
		Connector 2	11 inputs(TRIG, RESET, IN0 to IN7, and DSA) 8 outputs(GATE, ACK, RUN, BUSY, OR, ERROR, STGOUT, and SHTOUT)	2 inputs(TRIG and RESET) 7 outputs(ACK, RUN, BUSY, OR, ERROR, STGOUT, and SHTOUT)
	RS-232C		---	1 channel, 115,200 bps max.
	Sensor interface		FQ2-S4 connected with FQ-WU□□□ : OMRON interface *Number of connected Sensors: 1	
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□□ 0.4 A max. : FQ2-S4□-□□□ and FQ-SDU□□ 0.1 A max. : FQ-SDU□□ only	
Environmental immunity	Ambient temperature range		Operating: 0 to 50ºC, Storage: -20 to 65ºC (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/s² 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 40ºC Storage: −25 to 65ºC (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 PC tool for FQ

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.

Dimensions

(Unit: mm)

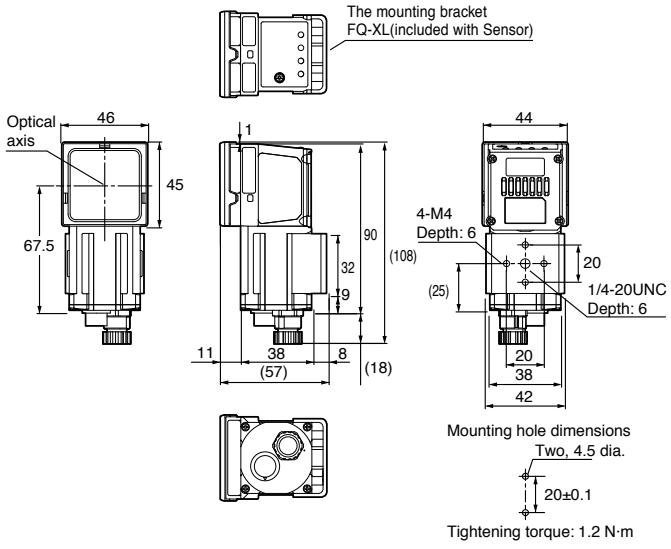
Sensors

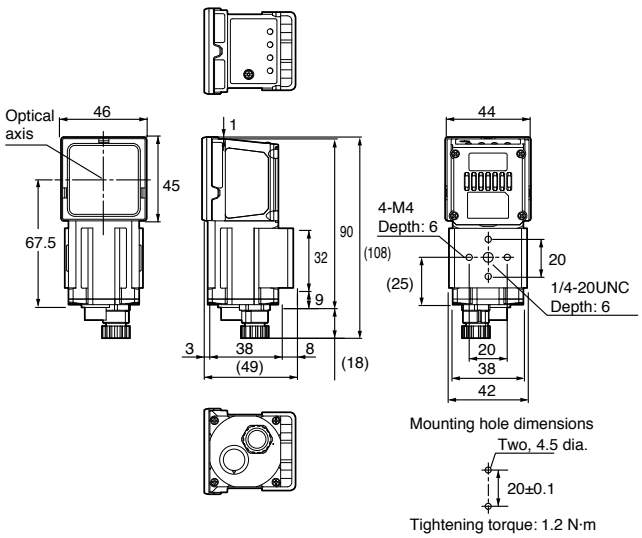
Integrated Sensor

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

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

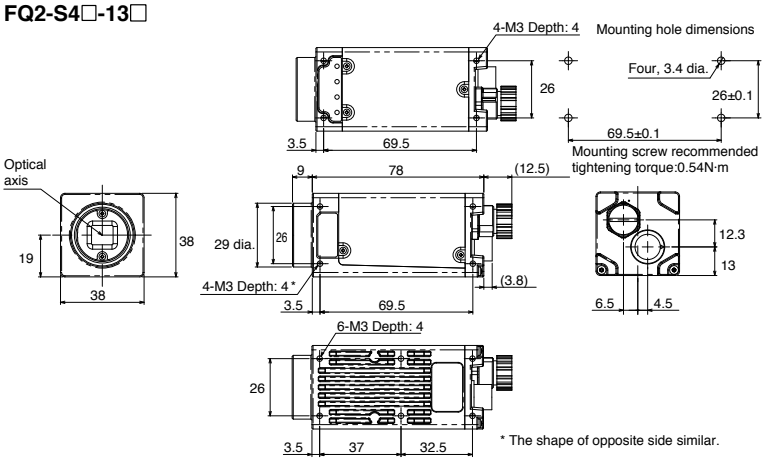
Standard View
FQ2-S□□□50F-□□□
FQ-CR□□□50F-M



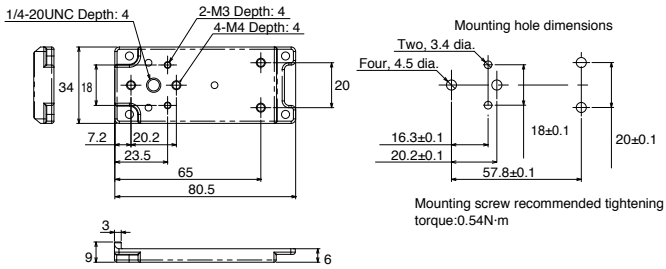


C-mount

FQ2-S4□-13□



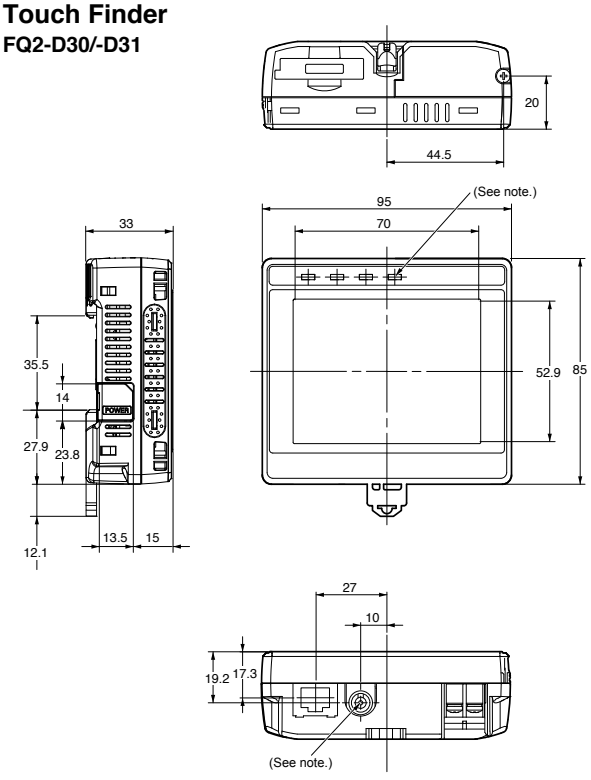
Mounting Base FQ-XLC (included with Sensor)



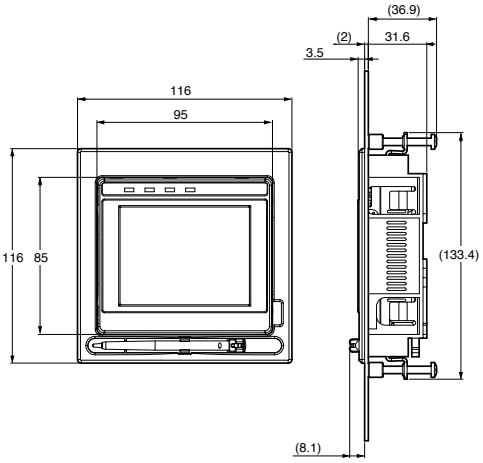
(Unit: mm)

Touch Finder

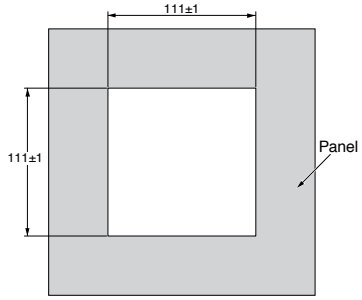
FQ2-D30/-D31



Panel Mounting Adapter FQ-XPM



Panel Cutout Dimensions



Note: Provided with FQ-D31 only.

Related Manuals

Man.No.	Model number	Manual
Z337	FQ2-S1/S2/S3/S4/CH	Smart Camera FQ2-S/CH 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

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Q40I-E-03 Note: Specifications are subject to change.

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