

FQ2 VISION SENSOR

The new standard in image inspection and code verification



» Powerful functionality with versatile line-up

» crystal clear images

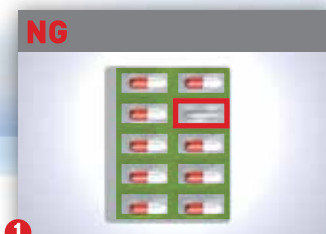
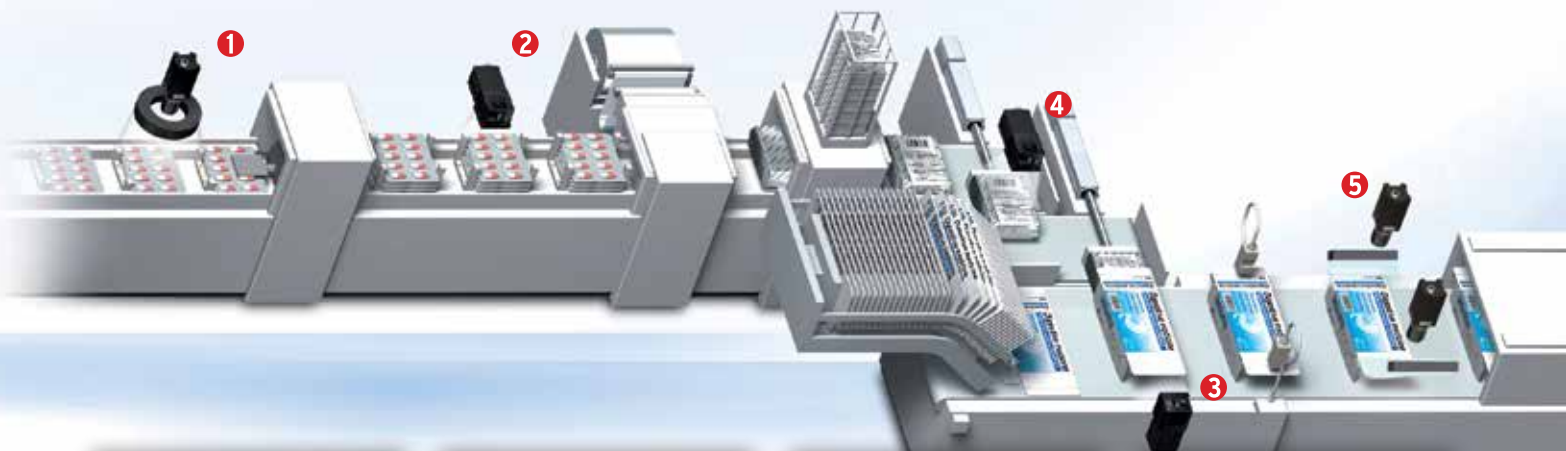
» All-in-one-housing

Introducing the FQ2 Vision Sensor Family

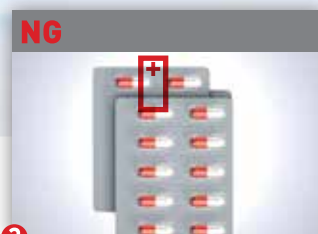
The FQ2 vision sensor family is set to redefine the vision sensor market, providing advanced inspection, code reading and verification only previously available in higher end vision systems. With over 100 camera options, the FQ2 provides users with the ultimate flexibility to solve applications, whether you need high resolution, code reading, integrated lighting, or a cost effective solution to solve a simple application, there is an FQ2 which fits your needs.



| | | | | | | | | | | | |
|-------------|---------------------------|----------------------|---------------------|-------------|---------|--------------------|------------------|---------------------|----------------------------|-------------------------|-------------------|
| Code Reader | Highspeed image processor | Megapixel capacity | Real colour | Mono-chrome | C-mount | 9 inspection items | 11 image filters | 32 camera expansion | 360° position compensation | Ultrawide 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 |



1
Missing Pill



2
Misalignment



3
Package insert detection



4
Reading barcode

All-in-one-housing

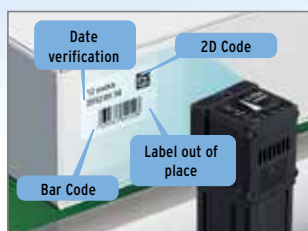
The compact design of the FQ2 means that it fits easily into confined spaces. Furthermore, unlike conventional vision sensors with multiple components, it comes in a single, all-in-one package.



» p.04

Advanced Inspection

The FQ2 supports a diverse range of inspection items, including shape search, colour inspection, OCR, code reading and verification.



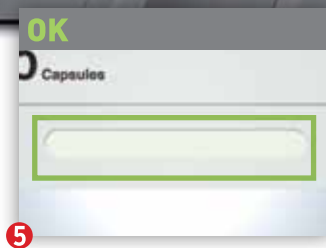
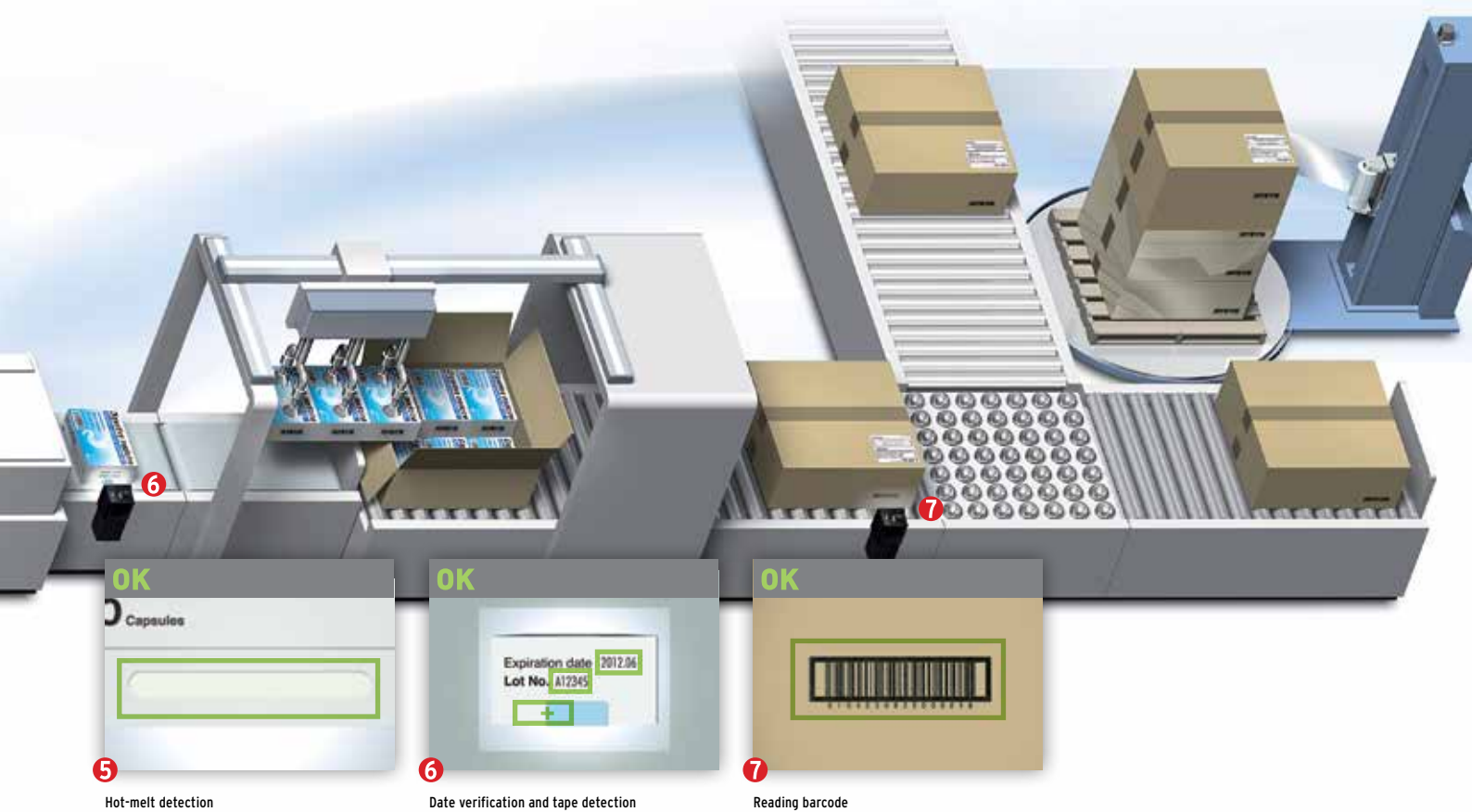
» image inspections p.05
 » OCR p.08
 » code reader p.10

Versatile line-up

Whatever your application, there is an FQ2 to match your requirements, choose the functionality you need, no more and no less!



» p.12



5 Hot-melt detection



6 Date verification and tape detection



7 Reading barcode

All-in-one-housing

Easy product selection

Simply select the camera based on the required field-of-view and installation distance. You don't need to purchase additional lighting or lenses and due to there being only two components, systems are faster and far more simple to configure.

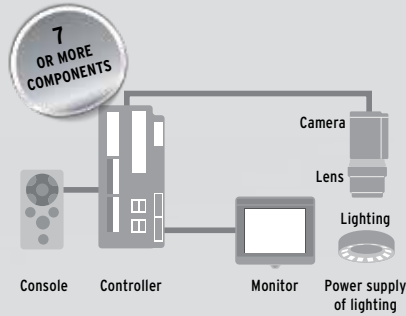
Easy installation

As the camera and lighting have been integrated into a single unit, only one camera mounting bracket is necessary and the requirement for axial alignment is completely eliminated. The multi-directional mounting bracket (provided as standard) can be attached to any of the four sides of the camera.

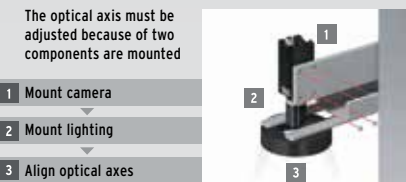
Easy expansion

New cameras can simply be installed where and when you need them. No controllers or panels to house them are required and you don't have to worry about timing input issues, as all cameras can be triggered independently. Up to 32 cameras can be set up from a single Touch Finder (see 'Time-saving set-up tools' on page 13), so there is no need to add new monitors when more cameras are added.

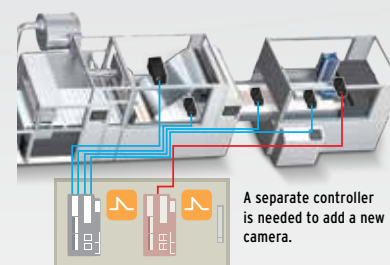
Vision Systems



Current Vision Systems



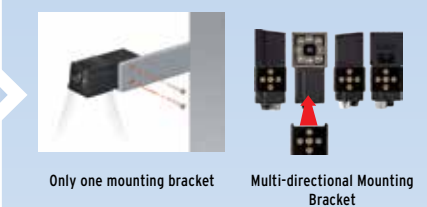
Current Vision Systems



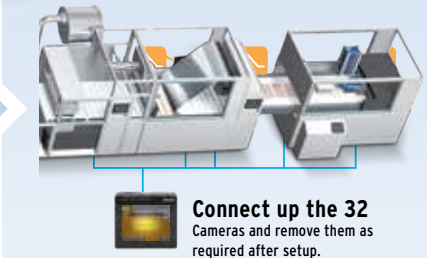
FQ2-series Smart Cameras



FQ2-series Smart Cameras



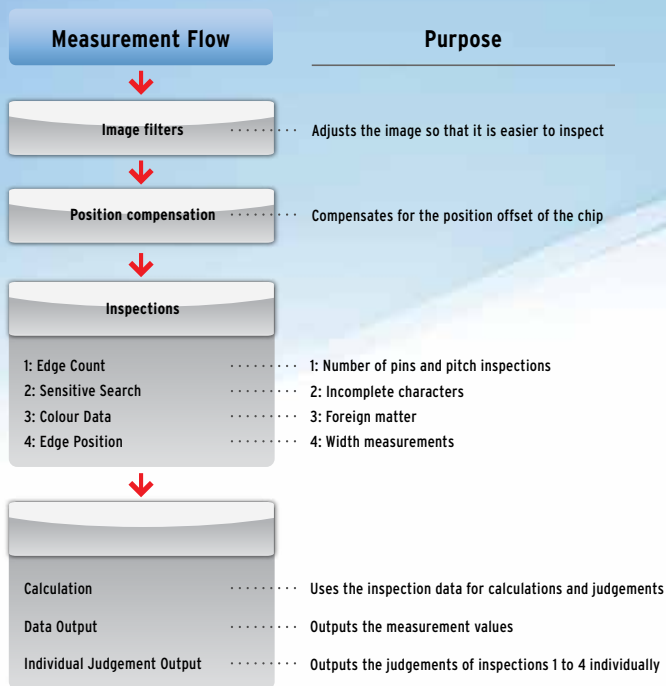
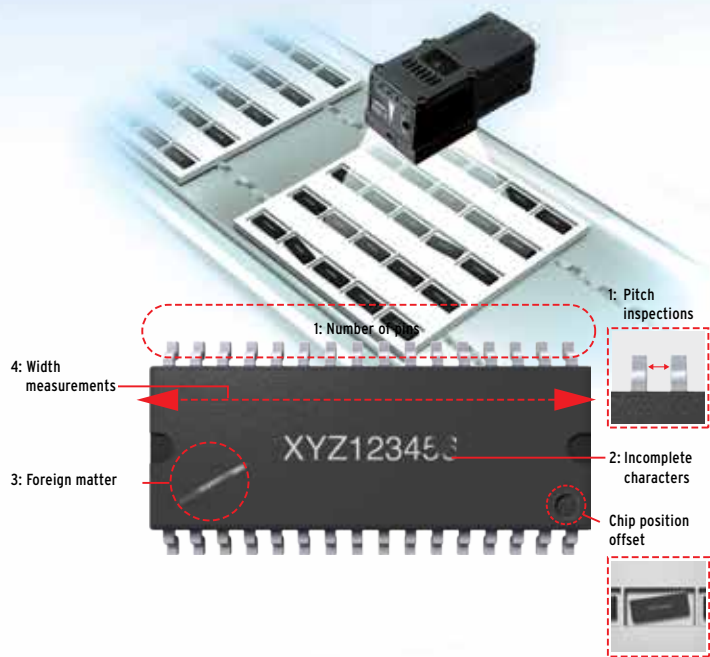
FQ2-series Smart Cameras



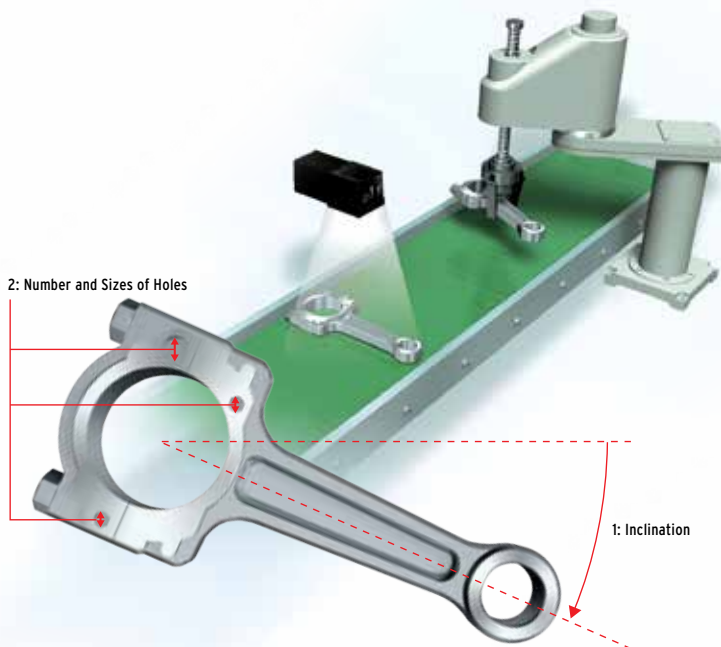
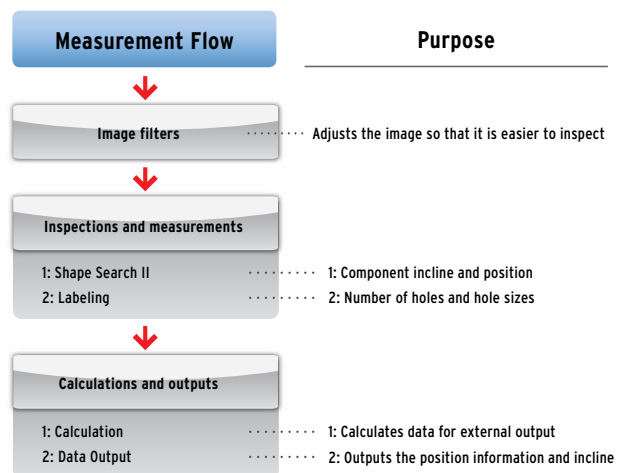
Advanced platform and innovative features

Easy inspection and positioning

Multiple inspection and positioning tasks can be performed using a single sensor. The adjacent example shows external inspection of ICs with a single sensor. The position of the entire tray of ICs can be adjusted on the image itself, prior to inspection. This saves you time by reducing the amount of work required to increase the positioning accuracy.



As the sensor can measure angles of rotation and other positional information, it can also be used for positioning. The adjacent example shows an automotive part being inspected for the number and size of holes.



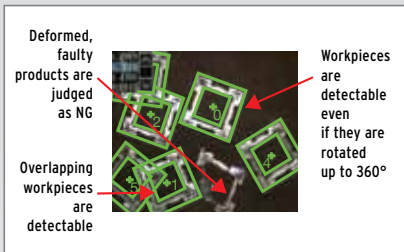
Easy searching with Shape Search II

Searches are carried out to detect items such as labels and identify shapes or positions. Shape searches generally run into difficulties when it comes to an overlap or 360° rotation. However, the FQ2 achieves high-speed (up to 10 times faster), stable searching of any shapes that match the model. Multiple searches can be performed simultaneously, which enables the inspection of a group of items, e.g. in a tray, or picking applications.

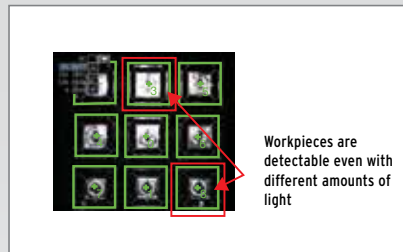
Sensitive searches can also be carried out through automatic division and matching of the model image. This reveals tiny differences that cannot be detected with a normal search.

SEARCHING

Shape search II

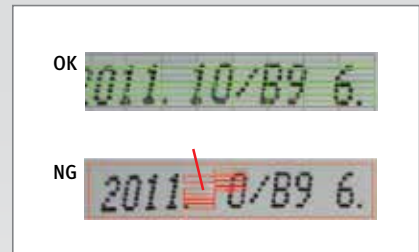


General searches have a difficult time with overlap or 360° rotation, but this Sensor achieves high-speed, stable searching of any shapes that match the model.



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.

SEARCHING

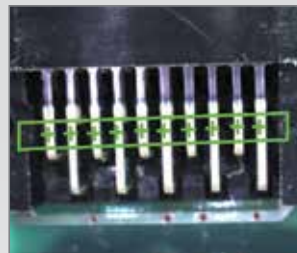
Search



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

EDGE MEASUREMENTS

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.

Stable measurements

A total of 11 different image filters, including background suppression, are provided to stabilize measurements and maximize inspection results. If the dimensions of a workpiece are difficult to determine in a pixel display, the display units can be converted for easier viewing.

Other measurements possible include:

- Position, width and pitch of edges
- Number, colour, size, area and position of labels
- Colour differences in workpieces
- Inclusion of foreign objects and matter
- Rotational orientation of workpieces

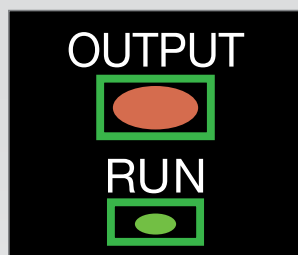
AREA MEASUREMENTS, COLOUR MEASUREMENTS, AND DEFECT & FOREIGN MATTER DETECTION

Labeling



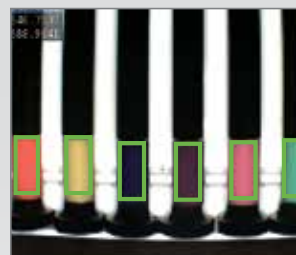
This inspection item counts how many labels there are of the specified colour and size and measures the area or center position of the specified label.

Area



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

Colour Data



Inspections can be performed that compare the difference in colour between the workpiece and a registered image of a good product to detect objects and foreign matter (average colour value). You can also inspect for defects and foreign matter by looking at the colour deviation (colour deviation).



UTILITY ITEMS

360° Rotational Position Compensation



The correct position of workpieces with an inconsistent orientation can be measured through automatic detection of the offset of the workpiece in relation to a registered standard model.

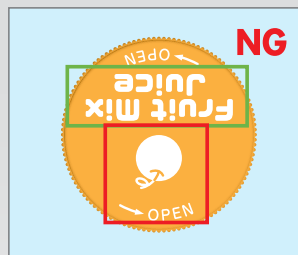
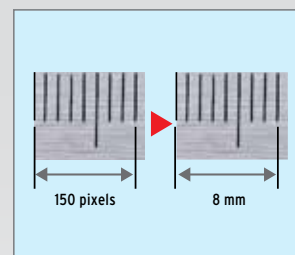


Image Filters



One of 11 different image filters is background suppression to help eliminate patterns that can result in unstable measurements, dilation and erosion.

Calibration

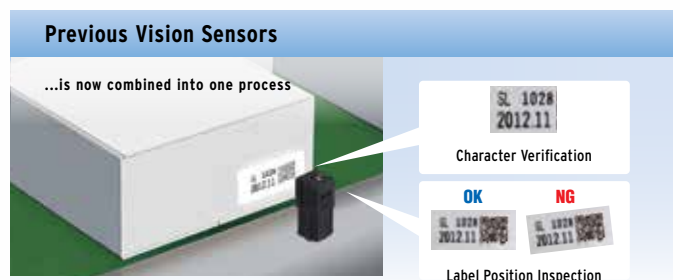
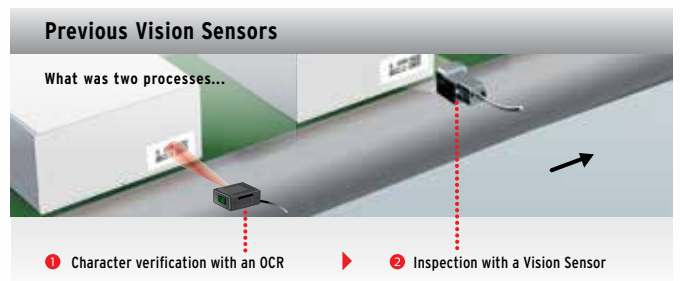
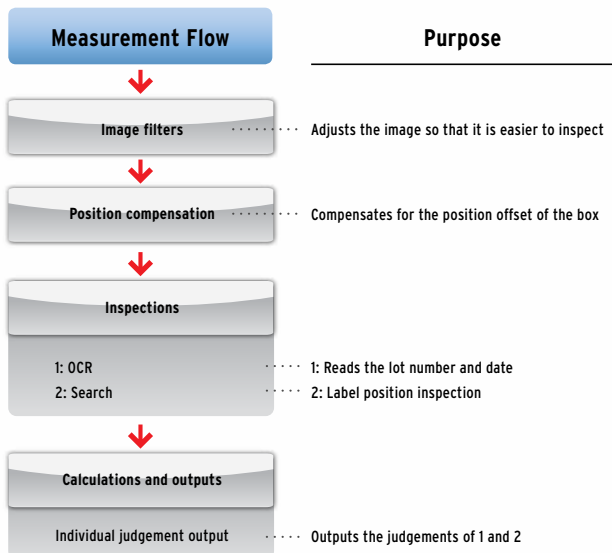
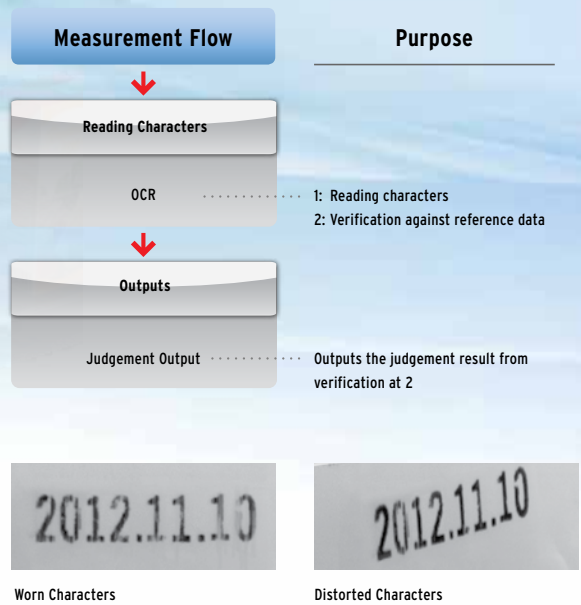


If the dimensions or position of a workpiece is difficult to determine in a pixel display, you can convert the display unit so that it is easier to see.

Position inspection and character verification

Stable character reading and verification

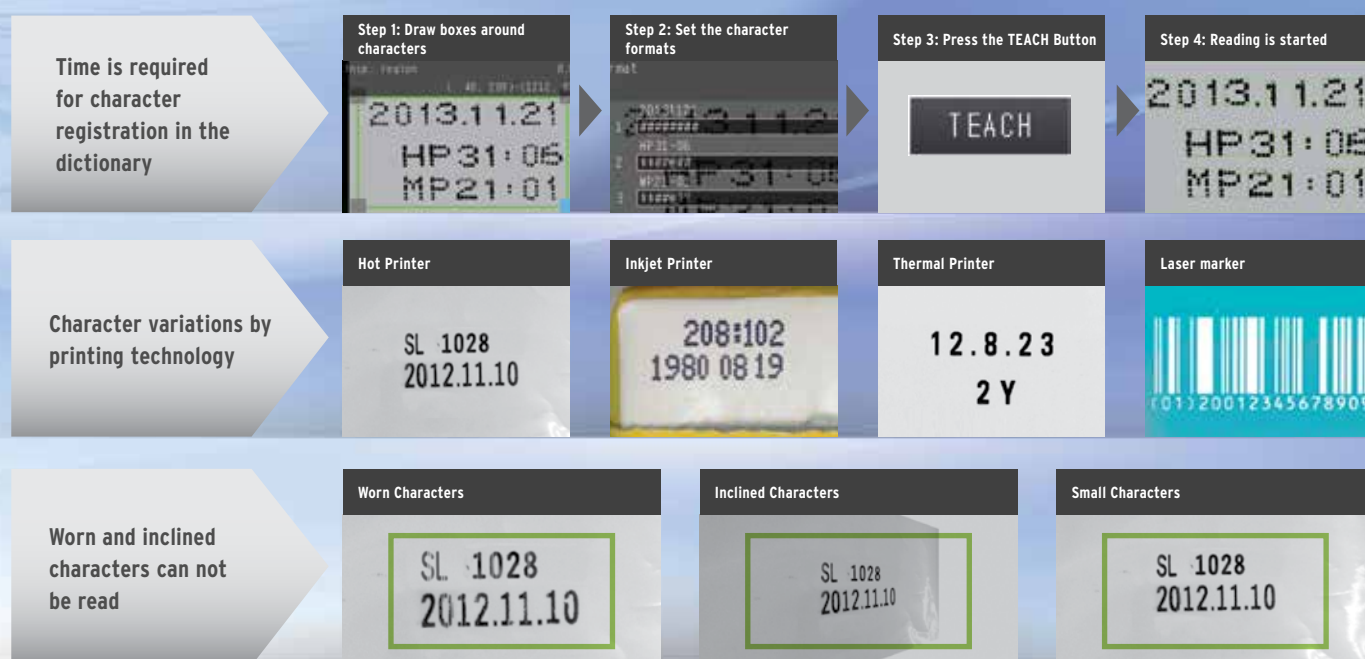
Distorted or unclear printing, e.g. due to conveyor-line conditions, is no problem for the FQ2. Stable and fast character reading is assured thanks to the new OCR method and the built-in dictionary. Furthermore, character verification and label-position inspection can both be performed using one FQ2 sensor. This reduces your costs and saves you space.



Unique OCR technology character verification

With conventional OCR methods:

Character registration in the dictionary requires time, characters printed by different printing devices lead to reading errors, and worn or inclined characters simply can not be read.

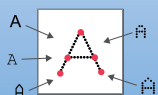


With Omron's unique recognition technology:

All of these problems have been overcome with the FQ2. A large, built-in dictionary with approximately 80 different fonts, including worn, blurred and distorted character variations, as well as size and background variations, enables characters from most printers to be read accurately, including inkjet and thermal printers.

Omron's unique recognition technology enables stable recognition of worn or distorted characters and requires no setting of parameters to compensate for character contrast or positional offsetting. No character registration is required because Omron's new OCR algorithm matches the characteristics of each character with structural models.

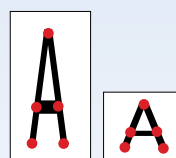
Structural models record the characteristics of each character in approximately 80 fonts.



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



Background changes



Size and font changes

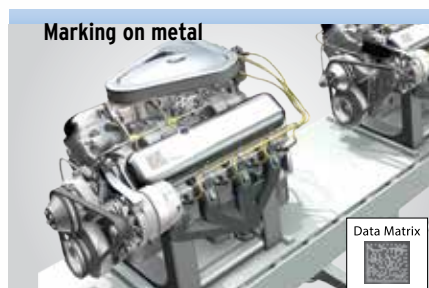
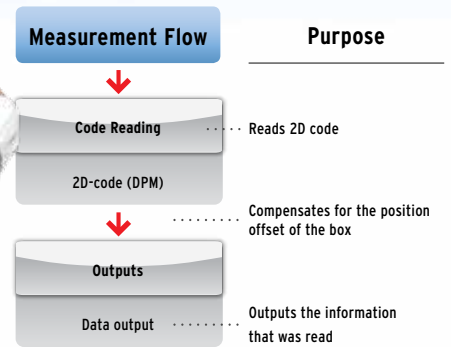
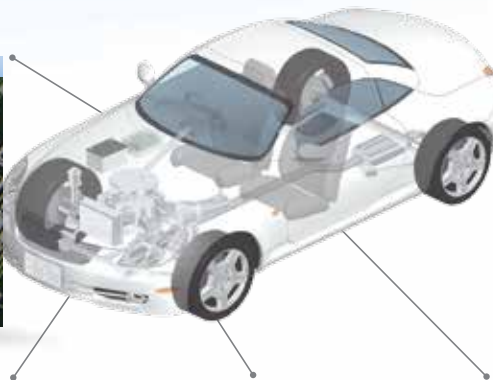
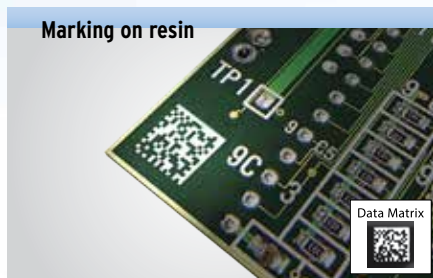
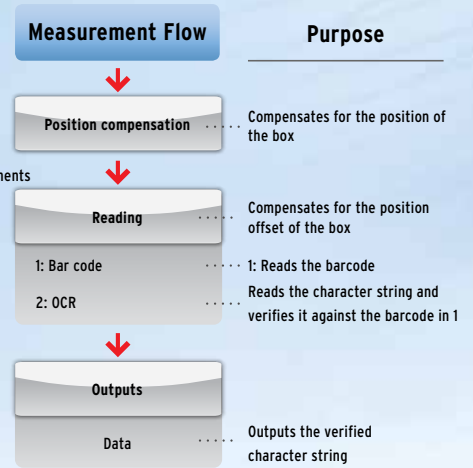


Worn and inclined characters

Code reading and character verification

Code and character verification / reading made easy

OCR and code reading inspection items can be combined within the FQ2 to read codes and verify them against character strings without any programming of external devices. Due to differences in the various materials involved, codes directly marked on products can cause instability when being read by conventional OCR methods. The FQ2's unique functionality, designed specifically for DPM, overcomes these differences and achieves stable reading.



Paper labels

Where reliable verification of barcodes and characters is required on paper labels, e.g. in the pharmaceuticals industry, the FQ2 is the perfect choice. All commonly used types of barcodes and 2D barcodes can be handled. And only one code reader is required, even when different types of code have to be processed.



Direct Part Marked (DPM)

2D codes printed directly onto many materials, including metals, substrates, glass, can be difficult to read with good stability. No problem for the FQ2, which is equipped with filters designed specifically for DPM and allow easy and stable reading. Unique, Omron-developed filters also remove printing irregularities and noise, while erosion and dilation can be combined to connect dots on 2D codes without changing the dot thickness.

| Types of filtering | |
|--------------------|--|
| 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 |



Retry function

Code readers must be able to read codes even with poor printing conditions. The FQ2 enables you to retry reading while changing the exposure time and other reading conditions (even for changing workpieces and environments) to achieve stable reading.

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

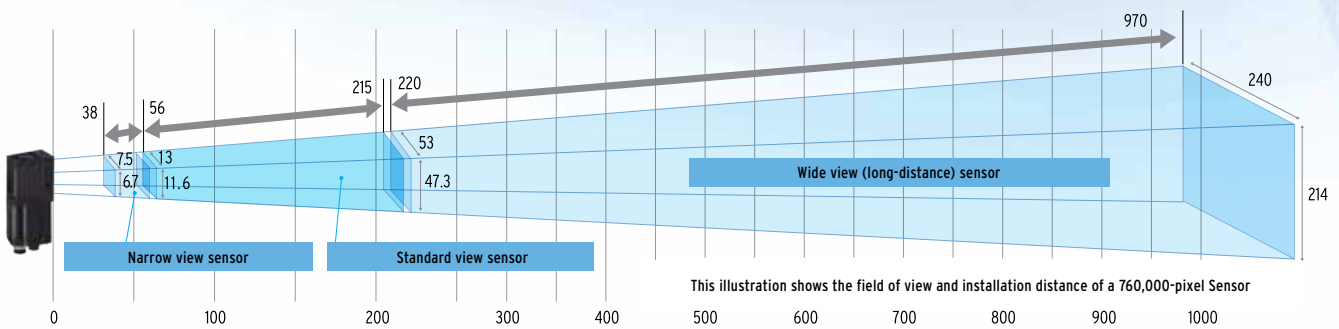
4 - retrying while changing the reading conditions

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.

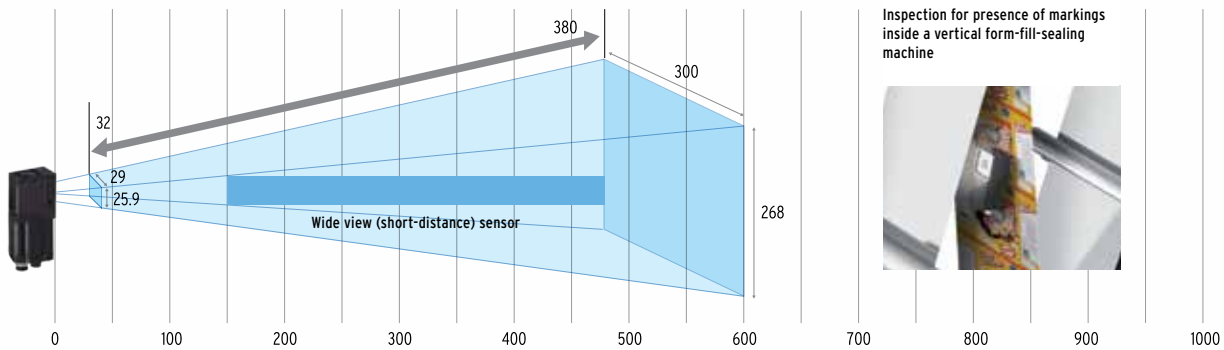
A versatile line-up

Sensors that give crystal clear images

A wide choice of sensors are available to match your precise requirements. All-in-one sensors tend to be limited in field of view, but Omron offers a lineup of integrated sensors ranging from 7.5 mm up to 240 mm, which enable a wider variety of applications to be solved.

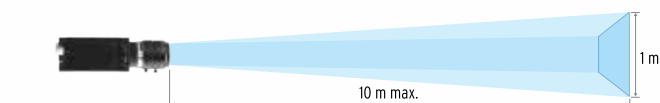


A side-viewing wide-angle camera takes images and performs inspections across a wide area, even if the camera is close to the workpiece. This makes this type of sensor perfect for when you need to mount the camera in locations with limited space. It also enables the sensor to be installed alongside an assembly line without protruding from the side of the conveyor belt.

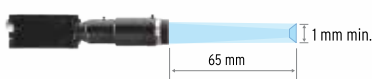


Sensors with C-mount lenses enable freedom of lens selection for longer distances (over 1 metre) and narrow fields of view (under 1 mm), which are not covered by our integrated sensors. This type of sensor is also useful when external illumination is used.

Long Distance

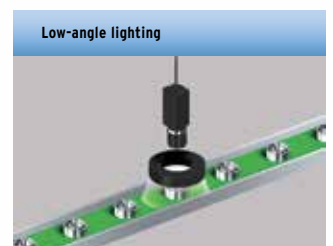


Narrow Field of View



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

Lighting Examples



Integrated communication interfaces

The FQ2 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.

PLC Link

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

FINS

OMRON's exclusive communications interface gives faster, simpler connections to low-cost OMRON PLCs without the need for protocols to process complex TCP packets.

EtherNet/IP

This widely used communication interface enables simple and easy connections to a wide range of EtherNet/IP devices.

I/O Expansion Units

Enable expansion to up to three times the number of I/O connections, allowing the output of individually judged results for each inspection, providing greater flexibility.

RS-232C Communications Unit

This sensor data unit supports standard RS-232C communications.

Time-saving set-up tools

Omron provides two tools for configuration and monitoring of inspection images:

Touch Finder

A small monitor with a touch panel that can be used onsite to change settings and which can be installed on a control panel.

PC Setup Tool

Software providing the same functions as Touch Finder, but on a PC. Customers can download the software free of charge.



PLC Link compatible models

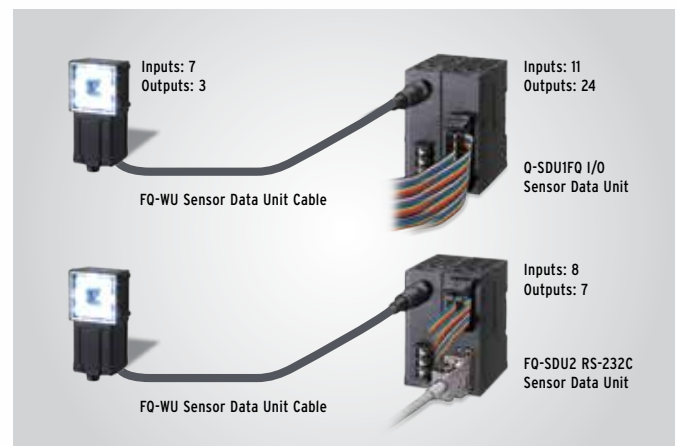
OMRON PLCs: CS, CJ1, CJ2, CP1 and NSJ Series
Mitsubishi Electric: Q Series

FINS Link compatible models

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

EtherNet/IP compatible models

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



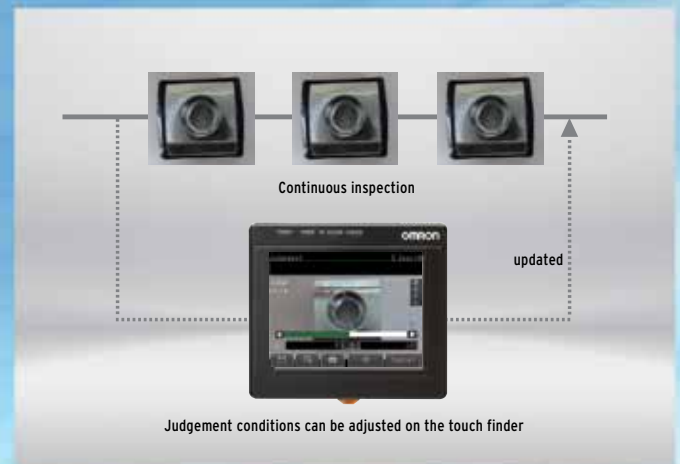
On-screen messages in nine languages

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

Further useful onsite utilities

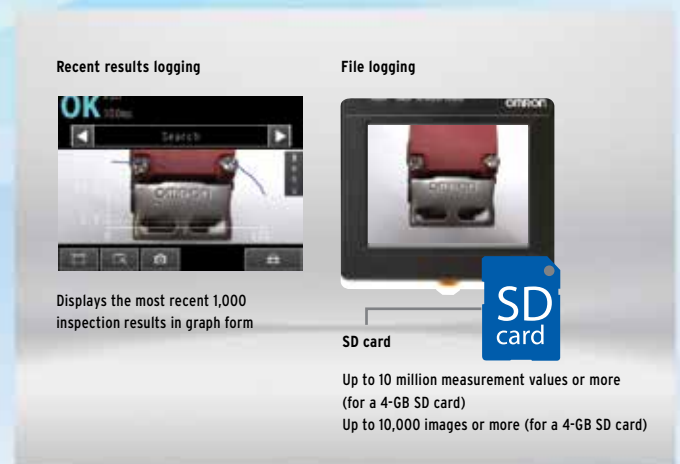
Real-time threshold adjustment

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



Inspection history logging

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. This is very useful for testing a new line during operation. Large inspection histories can be saved on SD cards and used later for traceability.



Auto Detection

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





180° inverted-image display

Images can be inverted by 180° to aid visualisation when the camera can only be mounted in the wrong orientation to the product.



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.







Shortcuts

Shortcuts to the 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.




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

Inspection model

| | | FQ-S1 series Single-function type | FQ-S2 series Standard type | FQ-S3 series High-resolution type | |
|-------------------------------------|--|---|---|---|---|
| | | Integrated sensor | Integrated sensor | Integrated sensor | C-mount |
| | |  |  |  |  |
| Number of pixels | | 350,000 pixels | 350,000 pixels | 760,000 pixels | 1.3 million pixels |
| Color | | Real color | Real color | Real color/Monochrome | Real color/Monochrome |
| Number of simultaneous measurements | | 1 | 32 | 32 | 32 |
| Number of registered scenes | | 8 | 32 | 32 | 32 |
| Inspection | Shape search II | ■ | ■ | ■ | ■ |
| | Search | ■ | ■ | ■ | ■ |
| | Sensitive search | ■ | ■ | ■ | ■ |
| | Edge position | ■ | ■ | ■ | ■ |
| | Edge width | ■ | ■ | ■ | ■ |
| | Edge pitch | ■ | ■ | ■ | ■ |
| | Area | ■ | ■ | ■ | ■ |
| | Color data | ■ | ■ | ■ | ■ |
| ID | Labeling | ■ | ■ | ■ | ■ |
| | Bar code | - | - | - | - |
| | 2D code | - | - | - | - |
| | 2D code (DPM) ^{*1} | - | - | - | - |
| I/O specifications | OCR | - | - | - | - |
| | 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) | - | - | ■ | ■ |




*1 Inspection item for directly marked 2D codes.

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 II | ■ | ■ | ■ |
| | Search | ■ | ■ | ■ |
| | Sensitive search | ■ | ■ | ■ |
| | Edge position | ■ | ■ | ■ |
| | Edge width | ■ | ■ | ■ |
| | Edge pitch | ■ | ■ | ■ |
| | Area | ■ | ■ | ■ |
| | Color data | ■ | ■ | ■ |
| ID | Labeling | ■ | ■ | ■ |
| | Bar code | ■ | ■ | ■ |
| | 2D code | ■ | ■ | ■ |
| | 2D code (DPM) ^{*1} | ■ | ■ | ■ |
| I/O specifications | OCR | ■ | ■ | ■ |
| | 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) | ■ | ■ | ■ |

*1 Inspection item for directly marked 2D codes.

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 | – | – | – |
| | Labeling | – | – | – |
| | ID | Bar code | – | ■ |
| 2D code | | – | ■ | – |
| 2D code (DPM) ^{*1} | | – | – | ■ |
| OCR | | ■ | – | – |
| I/O specifications | Communications (Ethernet TCP no-protocol, Ethernet FINS/TCP no-protocol, EtherNet/IP, or PLC Link) | ■ | – | – |
| | Sensor Data Units (I/O) | ■ | – | – |
| | Sensor Data Units (RS-232C) | ■ | – | – |

*1 Inspection item for directly marked 2D codes.

Ordering Information

Sensor

Inspection model

FQ2-S1 Series [Single-function 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-S10010F | FQ2-S10050F | FQ2-S10100F |
| | PNP | FQ2-S15010F | FQ2-S15050F | FQ2-S15100F |
| Field of vision/Installation distance | Refer to figure 1 on page 18. | Refer to figure 2 on page 18. | Refer to figure 3 on page 18. | Refer to figure 4 on page 18. |

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 |
| | PNP | FQ2-S25010F | FQ2-S25050F | FQ2-S25100F |
| Field of vision/Installation distance | Refer to figure 1 on page 18. | Refer to figure 2 on page 18. | Refer to figure 3 on page 18. | Refer to figure 4 on page 18. |

FQ2-S3 Series [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-S30010F-08 | FQ2-S30050F-08 | FQ2-S30100F-08 | FQ2-S30100N-08 |
| | PNP | FQ2-S35010F-08 | FQ2-S35050F-08 | FQ2-S35100F-08 | FQ2-S35100N-08 |
| Monochrome | NPN | FQ2-S30010F-08M | FQ2-S30050F-08M | FQ2-S30100F-08M | FQ2-S30100N-08M |
| | PNP | FQ2-S35010F-08M | FQ2-S35050F-08M | FQ2-S35100F-08M | FQ2-S35100N-08M |
| Field of vision/Installation distance | Refer to figure 5 on page 18. | Refer to figure 6 on page 18. | Refer to figure 7 on page 18. | Refer to figure 8 on page 18. | Refer to optical chart on p. 27 |

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 |
| | PNP | FQ2-S45010F | FQ2-S45050F | FQ2-S45100F |
| Monochrome | NPN | FQ2-S40010F-M | FQ2-S40050F-M | FQ2-S40100F-M |
| | PNP | FQ2-S45010F-M | FQ2-S45050F-M | FQ2-S45100F-M |
| Field of vision/Installation distance | Refer to figure 1 on page 18. | Refer to figure 2 on page 18. | Refer to figure 3 on page 18. | Refer to figure 4 on page 18. |

[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 page 18. | Refer to figure 6 on page 18. | Refer to figure 7 on page 18. | Refer to figure 8 on page 18. | Refer to optical chart on p. 27 |

ID Model

FQ2-CH Series [Optical Character Recognition Sensor]

| Field of vision | | 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 vision/Installation distance | | Refer to figure 1 on page 18. | Refer to figure 2 on page 18. | Refer to figure 3 on page 18. | Refer to figure 4 on page 18. |

FQ-CR1 Series [Multi Code Reader]

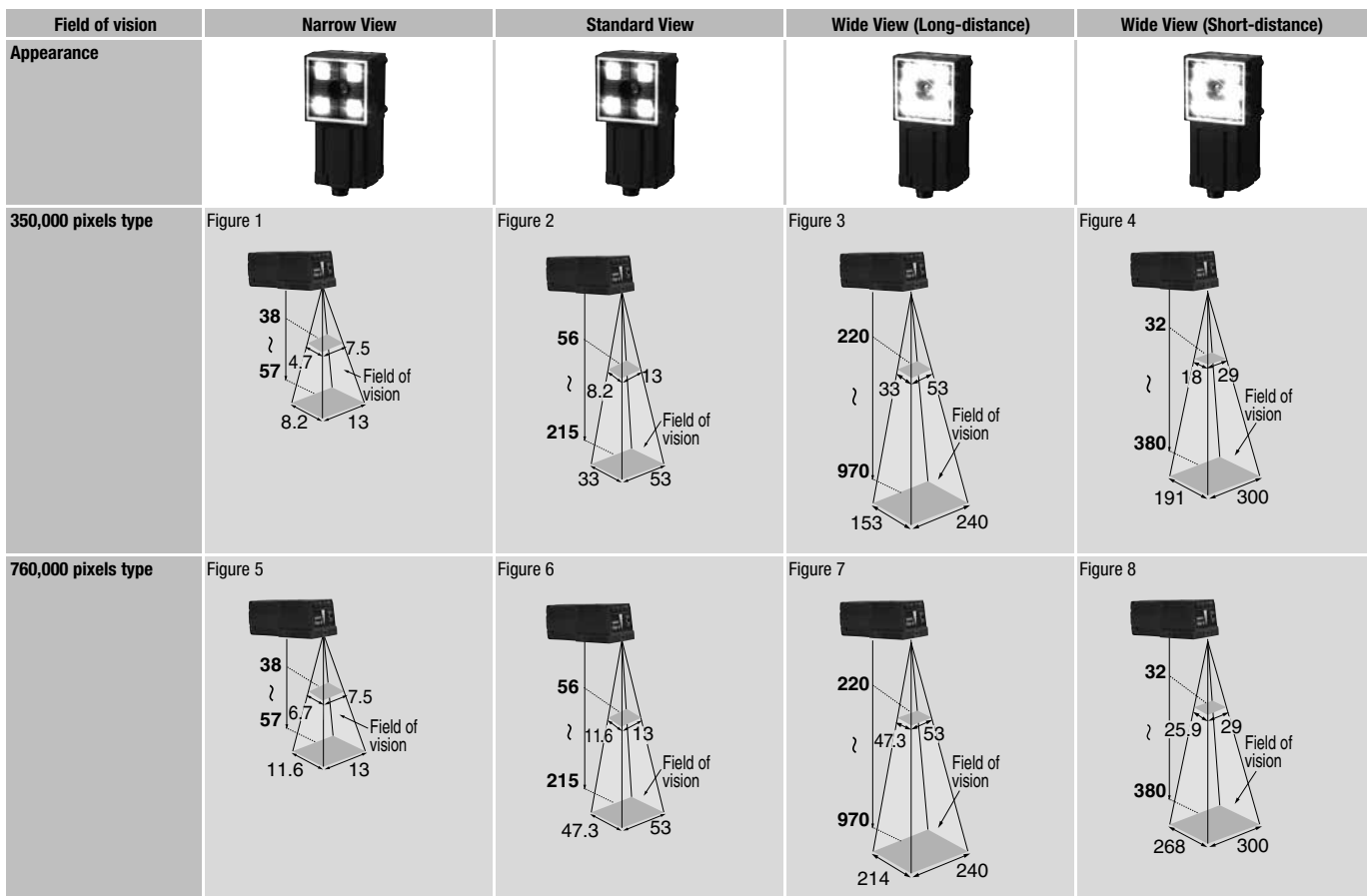
| Field of vision | | Narrow View | Standard View | Wide View (Long-distance) | Wide View (Short-distance) |
|---------------------------------------|-----|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| Number of pixels | | 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 page 18. | Refer to figure 2 on page 18. | Refer to figure 3 on page 18. | Refer to figure 4 on page 18. |

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 page 18. | Refer to figure 2 on page 18. | Refer to figure 3 on page 18. | Refer to figure 4 on page 18. |

Field of vision/Installation distance



(Unit: mm)





Touch Finder

| Type | Appearance | Model |
|-----------------|---|---------|
| DC power supply |  | FQ2-D30 |
| AC/DC/battery | | FQ2-D31 |


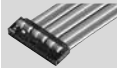


Cables

| 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 |

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 ^{*1} |  | 2m | FQ-VP1002 |
| | | 5m | FQ-VP1005 |
| | | 10m | FQ-VP1010 |
| Parallel Cable for FQ-SDU2 ^{*1} |  | 2m | FQ-VP2002 |
| | | 5m | FQ-VP2005 |
| | | 10m | FQ-VP2010 |
| RS-232C Cable for FQ-SDU2 ^{*1} |  | 2m | XW2Z-200S-V |
| | | 5m | XW2Z-500S-V |

^{*1} When using FQ-SDU□□, 2 cables are required for all I/O signals.

External Lighting

| Type | Model |
|----------------|---|
| 3Z4S-LT Series | Refer to 3Z4S-LT/LE Series Catalog (Q164) |
| FL Series | Refer to FL Series Catalog (Q181) |

Lenses for C-mount Camera. Refer to optical chart on p. 27 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 |  |  |  |  |  |  |  |  |  |
| Focal length | 6 mm | 8 mm | 12 mm | 16 mm | 25 mm | 35 mm | 50 mm | 75 mm | 100 mm |
| 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. |

Accessories

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

^{*1} Included with Integrated Sensor.



^{*2} Included with Sensor with C-mount.

^{*3} 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 |
| | | UL/CSA | FQ-AC2 |
| | 250 V max. | CCC mark | FQ-AC3 |
| C | 250 V max. | – | FQ-AC4 |
| BF | 250 V max. | – | FQ-AC5 |
| C | 250 V max. | – | FQ-AC6 |

^{*4} Enclosed with Touch Finder.

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 |

Note: 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.

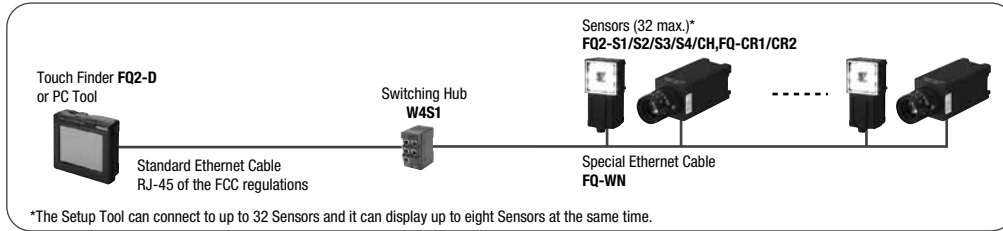
Note: Reinforcement is required to protect against vibration when Extension Tubes exceeding 30 mm are used.

System Configuration

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

Various types of Sensors can be used at the same time.

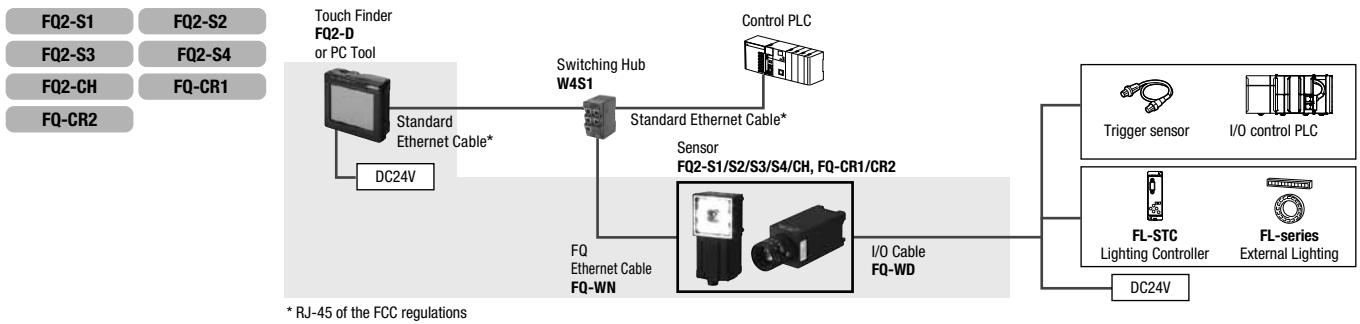
However, I/O type and wiring method vary depending on the Sensor, so select the necessary devices.



*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

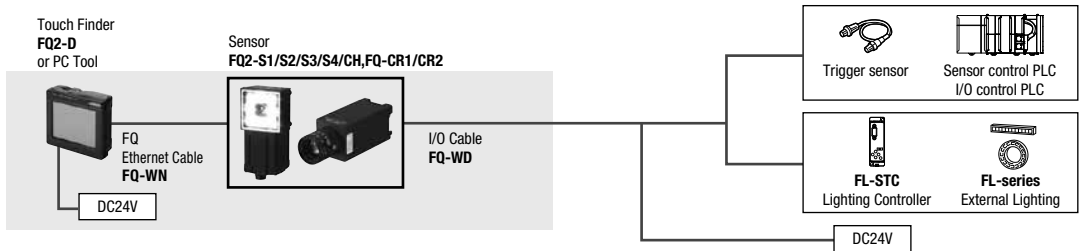


* RJ-45 of the FCC regulations

Parallel Interface Connection

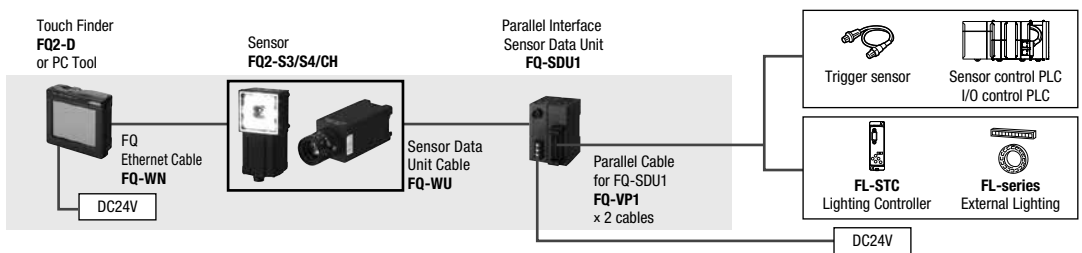
Connection with Standard Parallel Interface of the Sensor

- FQ2-S1
- FQ2-S2
- FQ2-S3
- FQ2-S4
- FQ2-CH
- FQ-CR1
- FQ-CR2



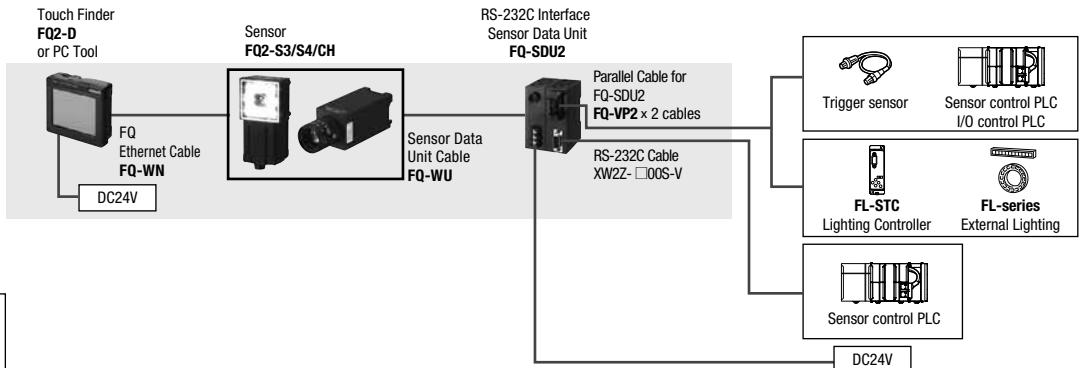
Connection through a Parallel Interface Sensor Data Unit

- FQ2-S1
- FQ2-S2
- FQ2-S3
- FQ2-S4
- FQ2-CH
- FQ-CR1
- FQ-CR2



RS-232C Serial Connection

- FQ2-S1
- FQ2-S2
- FQ2-S3
- FQ2-S4
- FQ2-CH
- FQ-CR1
- FQ-CR2



Model compatible with communications interface

- Compatible
- Not compatible

Ratings and Performance

Sensor

Inspection Model FQ2-S1/S2/S3 Series

| Item | | Single-function type | Standard type | High-resolution type | | | | |
|---|--|--|-------------------------------------|---|---|---------------------|--|--|
| Model | NPN | FQ2-S10□□□□ | FQ2-S20□□□□ | FQ2-S30□□□□-08 | FQ2-S30□□□□-08M | FQ2-S30-13 | FQ2-S30-13M | |
| | PNP | FQ2-S15□□□□ | 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 vision): ±10% max.) | | | | | Select a lens according to the field of vision and installation distance. Refer to optical chart on p. 27. | |
| 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 | 1 | 32 | | | | | |
| | Position compensation | Supported (360° Model position compensation, Edge position compensation) | | | | | | |
| | Number of registered scenes | 8 | 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) | | | | | | |
| | 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 1/50,000 Built-in lighting OFF: 1/1 to 1/50,000 | | Built-in lighting ON: 1/250 to 1/60,000 Built-in lighting OFF: 1/1 to 1/60,000 | | 1/1 to 1/60,000 | | |
| | 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) 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 50°C Storage: -25 to 65°C (with no icing or condensation) | | Operating: 0 to 40°C Storage: -25 to 65°C (with no icing or condensation) | | | | |
| | 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, Quick Startup Guide Member Registration Sheet, Warning Label | | | | Mounting Base (FQ-XLC) (1) Mounting Screw (M3 × 8mm) (4) Instruction Manual, Quick Startup Guide Member Registration Sheet | | | |

| Item | | Single-function type | Standard type | High-resolution type | | | | |
|----------------------|-----|---|---------------|----------------------|---------------------------------|------------|-------------|--|
| Model | NPN | FQ2-S10□□□□ | FQ2-S20□□□□ | FQ2-S30□□□□-08 | FQ2-S30□□□□-08M | FQ2-S30-13 | FQ2-S30-13M | |
| | PNP | FQ2-S15□□□□ | FQ2-S25□□□□ | FQ2-S35□□□□-08 | FQ2-S35□□□□-08M | FQ2-S35-13 | FQ2-S35-13M | |
| LED class | | Class 2(Applicable standards: IEC 60825-1:1993 +A1:1997 +A2:2001, EN 60825-1:1994 +A1:2002 +A2:2001, and JIS C 6802:2005) | | | | | - | |
| Applicable standards | | EN standard EN 61326 and EC Directive No.2004/104/EC | | | EN 61326-1:2006 and IEC 61010-1 | | | |

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 vision): ±10% max.) | | | | Select a lens according to the field of vision and installation distance. Refer to optical chart on p. 27. | |
| Installation distance | | | | | | | |
| Main functions | Inspection items | Search, shape search II, 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) | | | | | |
| | Number of registered scenes | 32 | | | | | |
| | 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 1/50,000 Built-in lighting OFF: 1/1 to 1/50,000 | | Built-in lighting ON: 1/250 to 1/60,000 Built-in lighting OFF: 1/1 to 1/60,000 | | 1/1 to 1/60,000 | |
| | 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 (INO to IN5) | | | | | |
| | Output signals | 3 signals Control output (BUSY) Overall judgement output (OR) Error output (ERROR) 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) | | | | 0.3 A max. | |
| | 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 | |

| 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 |
| 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, Quick Startup Guide Member Registration Sheet, Warning Label | | | | Mounting Base (FQ-XLC) (1) Mounting Screw (M3 × 8mm)(4) Instruction Manual, Quick Startup Guide Member Registration Sheet | |
| LED class | | Class 2(Applicable standards: IEC 60825-1:1993 +A1:1997 +A2:2001, EN 60825-1:1994 +A1:2002 +A2:2001, and JIS C 6802:2005) | | | | - | |
| Applicable standards | | EN 61326-1:2006 and IEC 61010-1 | | | | | |

*1 The types of characters to be read are the same as those of FQ2-CH Optical Character Recognition Sensor.

*2 The types of codes to be read are the same as those of FQ-CR1 Multi Code Reader.

*3 The types of codes to be read are the same as those of FQ-CR2 2D Code Reader.

ID Model FQ2-CH, FQ-CR1/CR2 Series

| Item | | Optical Character Recognition Sensor | Multi Code Reader | 2D Code Reader |
|-----------------------|-------------------------------------|---|---|---|
| Model | NPN | FQ2-CH10□□□□-M | FQ-CR10□□□□-M | FQ-CR20□□□□-M |
| | PNP | FQ2-CH15□□□□-M | FQ-CR15□□□□-M | FQ-CR25□□□□-M |
| Field of view | | Refer to ordering information on page 17. (Tolerance (field of vision): ±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 -Data Matrix) Bar Code (JAN/EAN/UPC, Code39, Codabar (NW-7), ITF (Interleaved 2 of 5), Code 93, Code128/ GS1-128, GS1 DataBar* (Truncated, Stacked, Omnidirectional, 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 | 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 | | |
| | Number of simultaneous measurements | 32 | | |
| | Position compensation | Supported (360° Model position compensation, Edge position compensation) | None | |
| | Number of registered scenes | 32 | | |
| Image input | Image processing method | Monochrome | | |
| | Image filter | High dynamic range (HDR) and polarizing filter (attachment) | | |
| | Image elements | 1/3-inch Monochrome CMOS | | |
| | Shutter | Built-in lighting ON: 1/250 to 1/50,000 Built-in lighting OFF: 1/1 to 1/50,000 | 1/250 to 1/30,000 | 1/250 to 1/32,258 |
| | 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) | | |
| 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) | |

| Item | Optical Character Recognition Sensor | | Multi Code Reader | 2D Code Reader |
|----------------------------------|--|---|---|----------------|
| Model | NPN | FQ2-CH10□□□□-M | FQ-CR10□□□□-M | FQ-CR20□□□□-M |
| | PNP | FQ2-CH15□□□□-M | FQ-CR15□□□□-M | FQ-CR25□□□□-M |
| I/O specifications | Input signals | 7 signals Single measurement input (TRIG) Control command input (INO to IN5) | | |
| | Output signals | 3 signals Control output (BUSY) Overall judgement output (OR) Error output (ERROR) 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). | 3 signals Control output (BUSY) Overall judgement output (OR) Error output (ERROR) 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, Quick Startup Guide, Member Registration Sheet, Warning Label | | | |
| LED class | Class 2(Applicable standards: IEC 60825-1:1993 +A1:1997 +A2:2001, EN 60825-1:1994 +A1:2002 +A2:2001, and JIS C 6802:2005) | | | |
| Applicable standards | EN 61326-1:2006 and IEC61010-1 | | | |

Touch Finder

| Item | Type | Model with DC power supply | | Model with AC/DC/battery power supply |
|------------------------------|--|---|--|---------------------------------------|
| | | Model | 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) | 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:-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) | | | |

| Item | Type | Model with DC power supply | Model with AC/DC/battery power supply |
|--|-------|---|---------------------------------------|
| | Model | FQ2-D30 | FQ2-D31 |
| 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 |
|--|------------------------------------|---|--|
| Model | NPN | FQ-SDU10 | FQ-SDU20 |
| | PNP | FQ-SDU15 | FQ-SDU25 |
| I/O specifications | Parallel I/O | Connector 1 | 6 inputs (IN0 to IN5) |
| | | Connector 2 | 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-S3 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-S3□□-□□□□ 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*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*1 |
| Monitor | 1,024 × 768 dots min. |

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

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Dimensions

(Unit: mm)

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

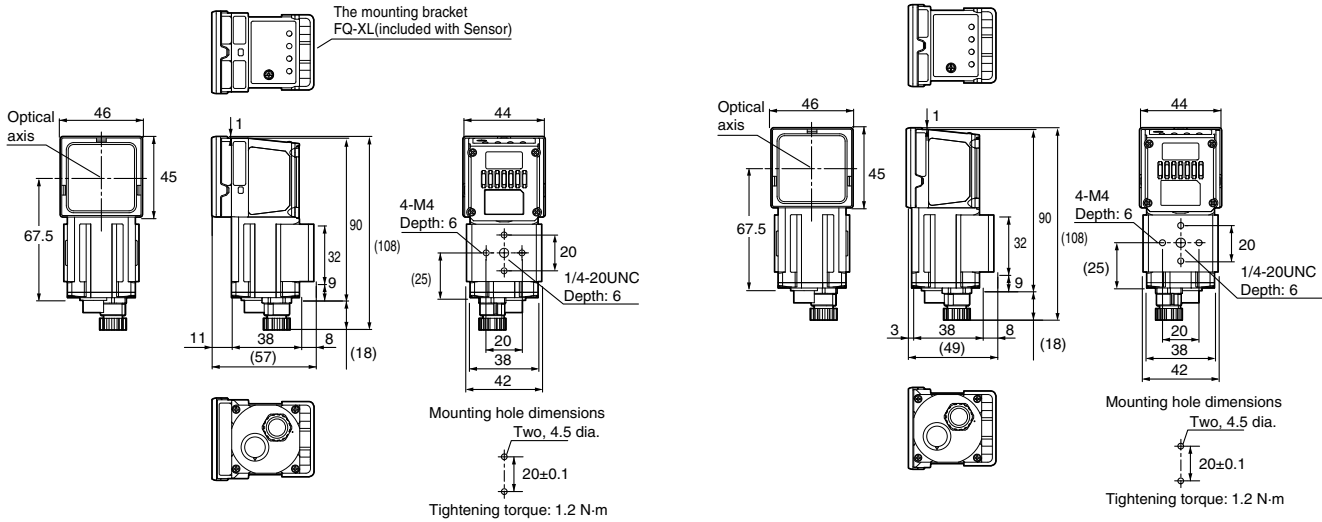
FQ-CR□□□50F-M

Wide View

FQ2-S□□□100□-□□□□

FQ2-CH□□□100□-M

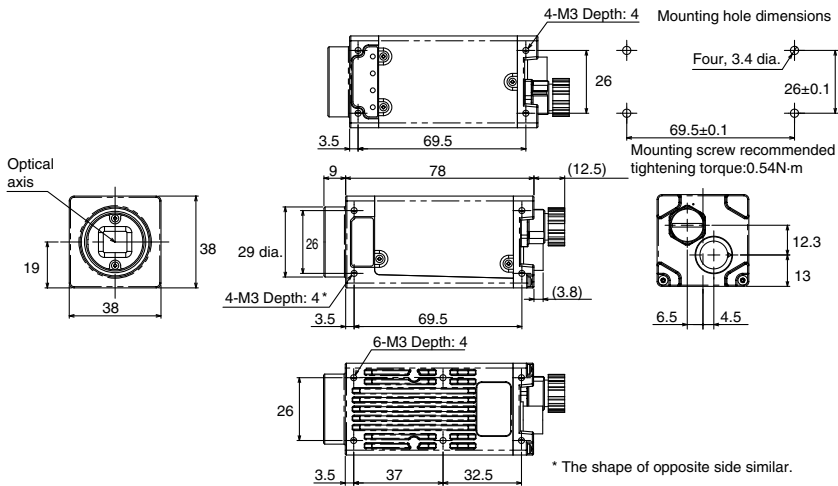
FQ-CR□□□100□-M



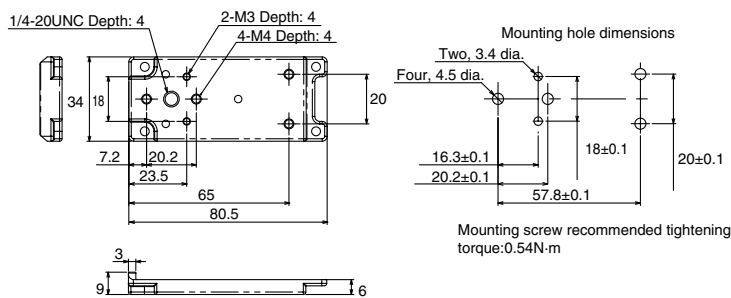
C-mount

FQ2-S3□-13□

FQ2-S4□-13□

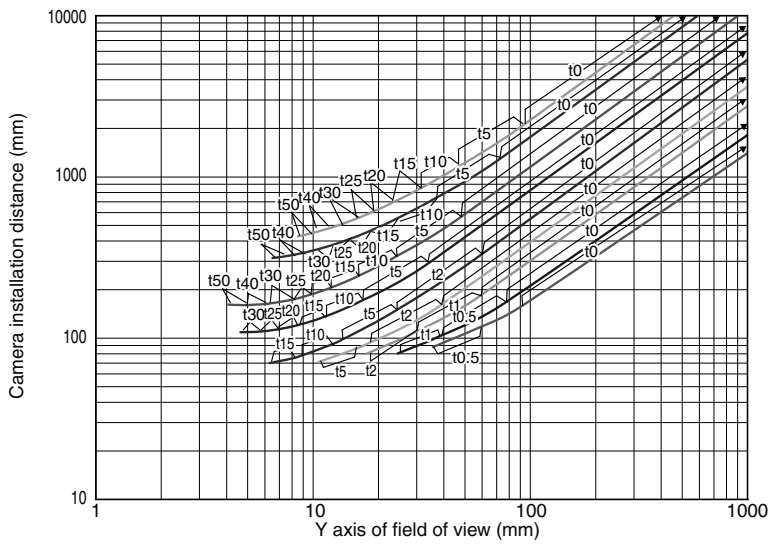


Mounting Base FQ-XLC (included with Sensor)



Optical Chart for C-mount Camera FQ2-S3-13/-S4-13

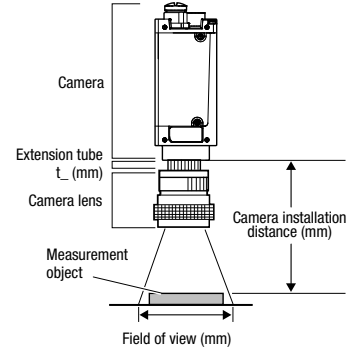
High-resolution, Low-distortion Lenses 3Z4S-LE SV-13-13H



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.



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 |

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- Cable connectors • Displacement & width-measuring sensors • Vision systems
- Safety networks • Safety sensors • Safety units/relay units • Safety door/guard lock switches