The New Standard for Image Inspection
FQ2 Smart Camera

Advanced inspection
In a compact housing.

Expanded
Performance and functionality.

Much more
Camera, communications, software tools.
Introducing the Smart Solution Camera

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

Three Advantages for effective Machine Design

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

- **Image Sensor, OCR, and Code Reader in One**
  - The OCR function with the “build-in” dictionary and the Code Reading ability to recognize 15 code types, add to the solution and provide a powerful upgrade!

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

Image Senor, OCR, and Code Reader in One

- OCR
- HDR
- High-speed Image processor
- Megapixel capacity
- Real color
- Sub-pixel processing
- High-power lighting
- IP67
- E-IP
- PLC
- FINS
- RS-232C
- C-mount
- 360° Partial Input
- DAP
- 34 I/O points
- Password
- Image Inversion

Compact Body

- Sub-pixel processing
- High-speed
- Image processor

Extended Functionality

- Image Inspections
- OCR
- Code Reader

Versatile Lineup

- Missin Pill
- Misalignment
- Package Insert Detection
- Reading Barcode
- Date Verification and Tape Detection
- Reading Barcode
- Hot-melt Detection
- Date Verification and Tape Detection
**All You Need is One**

**All You Need in One Package**

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

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

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

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

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

**Compact**

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

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

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

Easily Perform Both Inspection and Positioning

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

External Inspection

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

Component Positioning

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

Inspections and Measurements

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

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

Search

Shape Search

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

Searching

Search

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

Sensitive Search

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

Edge Pitch

The number of edges in a region can be counted.

Edge Position

This inspection item detects edges and measures their positions.

Edge Width

This inspection item measures the width between edges.

Area & Color Measurements, Defect & Foreign Matter Detection

Labeling

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

Area

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

Color Data

Performs inspections that compare the difference in color between the workpiece and a registered model of a good product. It detects objects and foreign matter by looking at the color deviation. (color deviation)

Utility Items

360° Rotational Position Compensation

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

Image Filters

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

Calibration

If the dimensions or position of a workpiece is difficult to determine by the number of pixels, you can convert these pixels and display actual engineering units.
Extended Functionality - Optical Character Recognition (OCR)

New OCR Method to Quickly Read Characters without Dictionary Registration

**Date Verification**
Even if printing is distorted or unclear due to conveyor line conditions, our unique algorithm with built-in dictionary enables stable reading of characters. This helps you reduce costs and save space.

**Character Recognition and Label Position Inspection**
Although previously performed as separate processes, character recognition and inspection tools can now both be performed with a single Sensor. This reduces costs and save space.

**Measurement Flow**
- **Image Filters**
  - Adjusts the image so that it is easier to inspect.
- **Position Compensation**
  - Compensates for the position of the bus.
- **OCR & Search**
  - Reads the lot number and date.
- **Label position inspection**
  - Outputs the judgements ofhei and i.
- **Calculations and Outputs**
  - Outputs the judgements ofhei and i.

**OCR with Built-in Dictionary**
The large amount of data in the built-in dictionary contains approximately 80 different fonts that are used on FA sites. Variations for worn characters, blurring, distortion, different backgrounds, and size changes have been included to enable stable and highly accurate reading with the built-in dictionary even for some variations in the characters. It is not necessary to set parameters to compensate for character contrast or positional offsetting.

**OCR**
- Time is required for character registration in the dictionary.
- Different printers use different printing devices.
- Worn out and/or slanted characters cannot be read. Unique recognition technology enables stable reading of worn out or distorted characters.

**Character Recognition with an OCR**
- Conventional OCR
  - Reading characters
  - Verification against reference data
- Built-in Dictionary
  - Character extraction conditions are automatically adjusted according to the conditions of the printed characters.

**Inspections**
- Character Recognition
- OK NG
- Worn Characters Inclined Characters Small Characters

**Utilities That Make Daily Operation Easier**
- **Verification**
  - The character data being read can be verified against the character data registered in the master data. You can register up to 10 character strings in the master data and easily change the current master data with an external signal. The character data being read can be verified against the character data registered in the master data.
- **Boundary Correction**
  - The calendar function eliminates the need to set the date and best-before date manually every day. The date read by the sensor can be automatically compared to the internal sensor data. The date within the sensor can be automatically compared to the internal sensor date. The date within the sensor can be automatically compared to the internal sensor date.
- **Logging Images and Reading Data**
  - The inspected images and reading results can be temporarily saved in the sensor. Additionally, up to 10,000 images and up to 10,000 reading results can be saved in a 4-GB SD card. You can select logging both OK and NG results or only NG results to fit in transmissibility.
- **Registration in Model Dictionary**
  - Non conventional characters can be added to the dictionary. Special items are difficult to read with the default settings, but add them to the dictionary and the FQ2 provides reliable readings.
- **Teach Finder**
  - For use of Touchfinder, or using an external device, the sensor can be adjusted via the internal sensor date. The date within the sensor can be automatically compared to the dates set in the printer for example.

**Previous Vision Sensors**
- What was two processes...
  - Character Recognition with an OCR
  - Inspection with a Vision Sensor
- What was two processes...
  - Character Recognition with an OCR
  - Inspection with a Vision Sensor

**FQ2-S4/CH Series Smart Camera**
- It is now combined into one process.
- **Previous Vision Sensors**
  - Character Recognition with an OCR
  - Inspection with a Vision Sensor
- **FQ2-S4/CH Series Smart Camera**
  - Character Recognition
  - OK NG
  - Label Position Inspection

**Measurement Flow Purpose**
- **Reading Characters**
  - Outputs
- **Judgement Output**
  - Outputs the judgement result from verification at hei and i.

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

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

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

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

Expanded Functionality: Code Reader

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

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

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

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

- Smooth
- Dilation
- Erosion
- Median

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

Retrying the Specified Number of Times with the Same Conditions
1. Reading is performed for the specified number of times for the same scene.
   - Reading is performed for the specified number of times for the same scene.
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   - Reading is performed for the specified number of times for the same scene.

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

3. Retrying While Changing the Shutter Speed
   - Re-attempts the specified number of times while changing the shutter speed.
   - Scene 1
   - Scene 2
   - Scene 3
   - Scene 4

4. Retrying While Changing the Reading Conditions
   - Scene 1
   - Scene 2
   - Scene 3

- Code39
- Code93
- GS1-128 Composite Code
- Codabar (NW-7)
A Lineup That Fits a Wide Range of Equipment

Sensor Types Available

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

Integrated Sensor

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

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

C-mount Type Sensors

The Sensors with C-mount lens enable freedom of lens selection for long distances over 5 m and narrow fields of view under 5 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

Name Field of View

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

Variety

Lighting Examples

Backlighting

External Shape Inspections

Defect and Foreign Matter Inspections

Low-angle Lighting

Inspections for Presence of Markings Inside a Vertical Tube in a Casing Machine

Communication Interfaces

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

PLC Link

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

FINX

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

EtherNet/IP™

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

I/O Expansion Units

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

RS-232C Communications

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

Operation Interfaces

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

Touch Finder

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

Touch Finder for PC

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

Integrated Machine Monitor (NET controls)

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

Compatible Models

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

Compatible Models

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

Compatible Models

- Compatible Models
  OMRON Machine Automation Controllers: H Series
  OMRON PLCs: CS, CJ1, CJ2 and CP1 Series

Compatible Models

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

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High-speed Image Processor

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.

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.

20 Inspection Items per Second Processing Time

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.

Partial Input with DAP (Dual Axis Partial) Processing

Partial input allows you to input only the portion of an image that is required for inspection by changing scenes, without having to change the field of view.

High-brightness ODR Lighting

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

Crystal Clear Images Even through Polarizing Filter

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

Megapixel CMOS Sensor

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

Comparisons to previous OMRON models

Partial Input

Partial input allows you to input only the portion of an image that is required for inspection by changing scenes, without having to change the field of view.

Enlarged Display

You can enlarge the display of the partial input image.
Useful Onsite Utilities

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

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

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.

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.

Key Technologies

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

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

Shape Search III (Same functionality included in high-end sensors)
With Shape Search III, you can visualize comparisons between the registered model data the measurement object to easily compare and see the difference. You can see at a glance the difference between the registered model and measurement image.

New OCR Algorithm: Matching with Structural Models
Even special cases where character registration is typically required for image matching, no character registration is required to read the characters. This new OCR algorithm matches the structural characteristic points of each character.
### Lineup ranging from single-function models to full-function models

#### Inspection Model

<table>
<thead>
<tr>
<th>Field of View/Installation Distance</th>
<th>Number of registered scenes</th>
<th>Number of simultaneous measurements</th>
<th>Color</th>
<th>Field of View (Long-distance)</th>
<th>Field of View (Short-distance)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Narrow View</td>
<td>32</td>
<td>350,000 pixels</td>
<td>Real color</td>
<td>FQ2-S45010F</td>
<td>FQ2-S45010F</td>
</tr>
<tr>
<td>Wide View (Long-distance)</td>
<td>32</td>
<td>780,000 pixels</td>
<td>Real color/Monochrome</td>
<td>FQ2-S45050F-M</td>
<td>FQ2-S45050F-M</td>
</tr>
<tr>
<td>Wide View (Short-distance)</td>
<td>32</td>
<td>1.8 million pixels</td>
<td>Real color/Monochrome</td>
<td>FQ2-S45-13</td>
<td>FQ2-S45-13</td>
</tr>
</tbody>
</table>

#### Ordering Information

### Sensor

#### Inspection Model

<table>
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### ID Model

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<tbody>
<tr>
<td>Narrow View</td>
<td>32</td>
<td>350,000 pixels</td>
<td>Monochrome</td>
<td>FQ2-CH10010F</td>
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</tr>
<tr>
<td>Wide View (Long-distance)</td>
<td>32</td>
<td>350,000 pixels</td>
<td>Monochrome</td>
<td>FQ2-CH10050F-M</td>
<td>FQ2-CH10050F-M</td>
</tr>
<tr>
<td>Wide View (Short-distance)</td>
<td>32</td>
<td>350,000 pixels</td>
<td>Monochrome</td>
<td>FQ2-CH15100F-M</td>
<td>FQ2-CH15100F-M</td>
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</table>

### Ordering Information

### FQ-CR1 Series

<table>
<thead>
<tr>
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<th>Field of view (Long-distance)</th>
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</tr>
</thead>
<tbody>
<tr>
<td>350,000 pixels</td>
<td>32</td>
<td>Monochrome</td>
<td>FQ-CR10010F-M</td>
<td>FQ-CR10010F-M</td>
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<tr>
<td>350,000 pixels</td>
<td>32</td>
<td>Monochrome</td>
<td>FQ-CR15010F-M</td>
<td>FQ-CR15010F-M</td>
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<td>Monochrome</td>
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### FQ-CR2 Series

<table>
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<th>Number of pixels</th>
<th>Number of simultaneous measurements</th>
<th>Color</th>
<th>Field of view (Long-distance)</th>
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</thead>
<tbody>
<tr>
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<td>32</td>
<td>Monochrome</td>
<td>FQ-CR20010F-M</td>
<td>FQ-CR20010F-M</td>
</tr>
<tr>
<td>350,000 pixels</td>
<td>32</td>
<td>Monochrome</td>
<td>FQ-CR20050F-M</td>
<td>FQ-CR20050F-M</td>
</tr>
<tr>
<td>350,000 pixels</td>
<td>32</td>
<td>Monochrome</td>
<td>FQ-CR25010F-M</td>
<td>FQ-CR25010F-M</td>
</tr>
</tbody>
</table>
Cables are required for all I/O signals.

**Appearance**
- 355,000 pixels Type
  - Figure 1
  - Figure 2
  - Figure 3
  - Figure 4
- 760,000 pixels Type
  - Figure 5
  - Figure 6
  - Figure 7
  - Figure 8

**Touch Finder**
- **Sensor Data Unit (FQ2-S3/S4/CH only)**
<table>
<thead>
<tr>
<th>Type</th>
<th>Appearance</th>
<th>Output type</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parallel Interface</td>
<td>NPN</td>
<td>FQ-SDU10</td>
<td></td>
</tr>
<tr>
<td>RS-232C Interface</td>
<td>NPN</td>
<td>FQ-SDU20</td>
<td></td>
</tr>
<tr>
<td>RS-232C Cable for FQ-SDU</td>
<td>NPN</td>
<td>FQ-SDU25</td>
<td></td>
</tr>
</tbody>
</table>

**Cables for Sensor Data Unit**
- FQ Ethernet Cables (connect Sensor to Touch Finder, Sensor to PC)
  - Type: 2m, 5m, 10m, 20m, 30m, 50m
- I/O Cables
  - Type: 2m, 5m, 10m, 20m

**Accessories**
- **For Sensor**
  - Mounting Bracket: FQ-XL
  - Mounting Bracket for High-precision sensing: FQ-XL2
  - Mounting Base for C-mount type: FQ-XLC
  - Polarizing Filter Attachment: FQ-XF1
  - Panel Mounting Adapter: FQ-XPM
  - AC Adapter: FQ-AQ
  - Battery: FQ-BAT1
  - Touch Pen: FQ-XT
  - Strap: FQ-KH
  - SD Card (4 GB): FQ-SDU10
  - SD Card (4 GB): FQ-SDU20

**Industrial Switching Hubs (Recommended)**
- **PL Series**
  - Refer to Vision Accessory Catalog (Q198)
  - *4. AC Adapters for Touch Finder with DC / AC / Battery Power
  - *5. The Battery uses a lithium ion secondary battery. Confirm any applicable laws and regulations in the destination country if you export the Battery.

**Lenses for C-mount Camera**
- High-resolution, Low-distortion Lenses
  - Refer to optical chart on p.30 for selection of a lens

**Extension Tubes**
- **325-LE SV-XXX**
  - 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.
  - *4. 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.
  - *5. Reinforcement is required to prevent against vibration when Extension Tubes exceeding 30 mm are used.
System Configuration

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

Main functions
- Inspection Items
  - Internal / external inspection / monitoring
  - Various types of Sensors can be used at the same time. Up to 32 Sensors can be set up and monitored from a single Touch Finder or Touch Finder for PC.
- Communications Interface
  - Standard Ethernet Cable
  - RS-232C Serial Connection

Note:
- *The Setup Tool can connect to up to 32 Sensors and it can display up to eight Sensors at the same time.
- ** RJ-45 of the FCC regulations

Parallel Interface Connection
- Connection with Standard Parallel Interface of the Sensor
- Connection through a Parallel Interface Sensor Data Unit

RS-232C Serial Connection
- Touch Finder FQ2-S20 or Touch Finder for PC
- FQ2-S30
- FQ2-S4
- FQ2-S2
- FQ2-D
- FQ2-CH
- FQ2-S2/S3/S4/CH
- FQ-WN
- FQ-WU
- FQ-WD
- RS-232C Interface
- Sensor Data Unit
- FQ-DXU
- Built-in lighting OFF: 1/1 to 1/50,000s
- Built-in lighting ON: 1/250 to 1/60,000s

Ratings and Performance
Sensor [Inspection Model FQ2-S2/S3 Series]

<table>
<thead>
<tr>
<th>Item</th>
<th>Standard type</th>
<th>High-resolution type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>FQ2-S2</td>
<td>FQ2-S2-1180</td>
</tr>
<tr>
<td>Field of view</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Installation distance</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Installation distance</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Hardware Interface
- Ethernet (EtherCAT protocol, or PL C Link) Connection
- Parallel Interface Connection
- Connection with Standard Parallel Interface of the Sensor
- Connection through a Parallel Interface Sensor Data Unit

Environmental
- Ambient temperature
  - Operating: -25 to 65ºC (with no icing or condensation)
  - Storage: -25 to 65ºC (with no icing or condensation)
- Ambient humidity range
  - Operating and storage: 35% to 85% (with no condensation)

Materials
- Mounting Bracket: PBT
- Polarizing Filter Attachment: PBT, PC
- Ethernet connector: Oil-resistance vinyl compound
- I/O connector: Lead-free heat-resistant PVC
- Screw: Stainless steel
- Mounting base: Polycarbonate ABS

Applications
- Mounting Bracket (FQ2-BT1) x 1
- Polarizing Filter Attachment (FQ2-FP1) x 4
- Mounting Stand (FQ2-M1) x 1
- Instruction Manual, Member Registration Sheet

Applicable standards
- IEC/EN 61800-5-2
- IEC/EN 61800-5-3
- IEC/EN 61800-5-4
- UL standard 637-1

The maximum number of registrable scenes depends on settings due to restrictions on memory.
**Table:**

<table>
<thead>
<tr>
<th>Sensor [Inspection/ID Model FQ2-S4 Series]</th>
<th>Inspected Region/Model</th>
<th>2D Code Reader</th>
<th>Power supply voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Inspection/ID Model</strong></td>
<td>FQ2-S40</td>
<td>FQ2-S45</td>
<td>FQ2-S40-M</td>
</tr>
<tr>
<td><strong>FQ2-S40</strong></td>
<td>24 25</td>
<td>2.4 A max.</td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**
1. The types of codes to be read are the same as those of FQ-CR1 Multicode Reader (p.25).
2. The types of codes to be read are the same as those of FQ-CR2 2D Code Reader (p.25).
3. The maximum number of registerable scenes depends on settings due to restrictions on memory.
4. Supported (2D Model position compensation, Edge position compensation, Linear correction)
5. Supported: Serial interface, 2x parallel interface, Contactless interface
6. Supported: Serial interface, 2x parallel interface, Contactless interface
7. Supported: Serial interface, 2x parallel interface, Contactless interface

---

**Table:**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CR (24-bit)</strong></td>
<td>CR (36-bit)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Maneuver</strong></td>
<td>CR (24-bit)</td>
<td></td>
<td></td>
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<tr>
<td>CR (24-bit)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>CR (36-bit)</td>
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<tr>
<td>CR (24-bit)</td>
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<tr>
<td>CR (36-bit)</td>
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<tr>
<td>CR (24-bit)</td>
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<tr>
<td>CR (36-bit)</td>
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<tr>
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<tr>
<td>CR (36-bit)</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CR (36-bit)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CR (24-bit)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**
1. The types of codes to be read are the same as those of FQ-CR1 Multicode Reader (p.25).
2. The types of codes to be read are the same as those of FQ-CR2 2D Code Reader (p.25).
3. The maximum number of registerable scenes depends on settings due to restrictions on memory.
**Touch Finder**

**Main functions**
- **Model with AC/DC/battery power supply**
  - FQ-SDU10
  - FQ-SDU
  - RS-232C Interface
- **FQ-SDU25**
  - M and FQ-2-CH1 only
- **FQ-BAT1**
  - Parallel Interface

**System Requirements for Touch Finder for PC**
- **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.
- **Power**
  - 500 mW max.

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- Other company names and product names in this document are the trademarks or registered trademarks of their respective companies.

**Sensor Data Units (FQ2-S3/54/CH only)**

<table>
<thead>
<tr>
<th>Item</th>
<th>Model</th>
<th>Parallel Interface</th>
<th>RS-232C Interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item</td>
<td>HPN</td>
<td>FQ-SO/D15</td>
<td>FQ-SO/D15</td>
</tr>
<tr>
<td>I/O specifications</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parallel I/O</td>
<td>Connector 1</td>
<td>16 inputs (DI to DI16)</td>
<td>8-circuit I/O to I/O</td>
</tr>
<tr>
<td></td>
<td></td>
<td>11 inputs (THRC, RESET, RS to IN, and CS1)</td>
<td>8 outputs (ACK, BUSY, OR, ERROR, STGOUT, and SHTOUT)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8 outputs (GATE, ACK, RUN, BUSY, OR, ERROR, STGOUT, and SHTOUT)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Connector 2</td>
<td>1-channel, 115,200 bps max.</td>
<td></td>
</tr>
<tr>
<td>Rating</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sensor power supply</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power consumption</td>
<td>FQ-54 connected with FQ-SDI/FQ-SDI</td>
<td>1-channel, 115,200 bps max.</td>
<td></td>
</tr>
<tr>
<td>Number of connected Sensors</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ratings</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power supply voltage</td>
<td>4.8 to 24.6 VDC (including ripple)</td>
<td>5 V 0.1 A max. (FQ-SDI/FQ-SDI)</td>
<td></td>
</tr>
<tr>
<td>Current consumption</td>
<td>0.5 A max.</td>
<td>2-channel, 115,200 bps max.</td>
<td></td>
</tr>
<tr>
<td>0.3 A max.</td>
<td>FQ-SDI/FQ-SDI</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical immunity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambient temperature range</td>
<td>0 to 50ºC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambient humidity range</td>
<td>30% to 85% (with no icing or condensation)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambient temperature range</td>
<td>40ºC (up to 60ºC)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambient humidity range</td>
<td>50% (up to 60% in 6 directions)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambient temperature range</td>
<td>Operating: 0 to 50ºC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambient humidity range</td>
<td>30% to 85% (with no icing or condensation)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambient temperature range</td>
<td>Operating: 0 to 50ºC</td>
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<td></td>
<td></td>
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<tr>
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<td></td>
<td></td>
</tr>
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<td></td>
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<td>Operating: 0 to 50ºC</td>
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<td></td>
</tr>
<tr>
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<td>30% to 85% (with no icing or condensation)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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**Battery**

<table>
<thead>
<tr>
<th>Item</th>
<th>Model</th>
<th>FQ-BAT1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Battery type</td>
<td>Secondary lithium-ion battery</td>
<td></td>
</tr>
<tr>
<td>Nominal capacity</td>
<td>1,800 mAh</td>
<td></td>
</tr>
<tr>
<td>Rated voltage</td>
<td>3.7 V</td>
<td></td>
</tr>
<tr>
<td>Ambient temperature range</td>
<td>Operating: 0 to 40ºC</td>
<td></td>
</tr>
<tr>
<td>Storage: −20 to 60ºC (with no icing or condensation)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambient humidity range</td>
<td>Operating and storage: 30% to 85% (with no condensation)</td>
<td></td>
</tr>
<tr>
<td>Charging method</td>
<td>Charged in Touch Finder (FQ2-SDI). AC adapter (FQ-AC) is required.</td>
<td></td>
</tr>
<tr>
<td>Charging time</td>
<td>2 h</td>
<td></td>
</tr>
<tr>
<td>Usage time</td>
<td>1.5 h</td>
<td></td>
</tr>
<tr>
<td>Backup battery life (See note 2.)</td>
<td>320 charging cycles</td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>90 g max.</td>
<td></td>
</tr>
</tbody>
</table>

*1. This is a guideline for the time required for the capacity of the Battery to be reduced to 80% of the initial capacity. No guarantee is implied. The value will be affected by operating environment and 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 operating environment and operating conditions.

*3. This value is only a guideline. No guarantee is implied. The value will be affected by operating environment and operating conditions.
Meaning of Optical Chart
The X axis of the optical chart shows the field of view (mm) (See Note.), and the Y axis of the optical chart shows the camera installation distance (mm).

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

Related Manuals

<table>
<thead>
<tr>
<th>Man.No.</th>
<th>Model number</th>
<th>Manual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Z337</td>
<td>FQ2-S1/S2/S3/S4/CH</td>
<td>Smart Camera FQ2-S1/S2/S3/S4/CH Series User's manual</td>
</tr>
<tr>
<td>Z338</td>
<td>FQ2-S1/S2/S3/S4/CH</td>
<td>Smart Camera FQ2-S1/S2/S3/S4/CH Series User's manual (Communication Settings)</td>
</tr>
</tbody>
</table>
Vision Series Lineup

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

Smart Camera
These integrated cameras provide a cost effective solution for a wide range of vision applications.

Vision System
This package-type Vision System provides both high-end inspection capabilities and excellent processing speed.

Note: Refer to the FH Series Catalog (Cat. No. 0197) for details.