

FQ VISION SENSOR

Beyond simplicity



» One-touch operation

» Crystal-clear imaging

» Flexible platform

Simply guided & crystal clear

Omron defines a new era of simplicity and performance with the new FQ vision sensor range. Now you can benefit from state-of-the art technology without complex operation instructions or technical know-how. With one-touch control via PC or the intuitive Touch Finder console, you can access all functions and settings quickly and easily. Excellent image quality is achieved from even the most challenging surfaces, with advanced processing tools. And because the FQ Vision Sensor is available in a wide range of models, you won't have to compromise with a choice that has too many or too few features for your needs. Therefore you can be sure of a best-fit solution for your particular application.

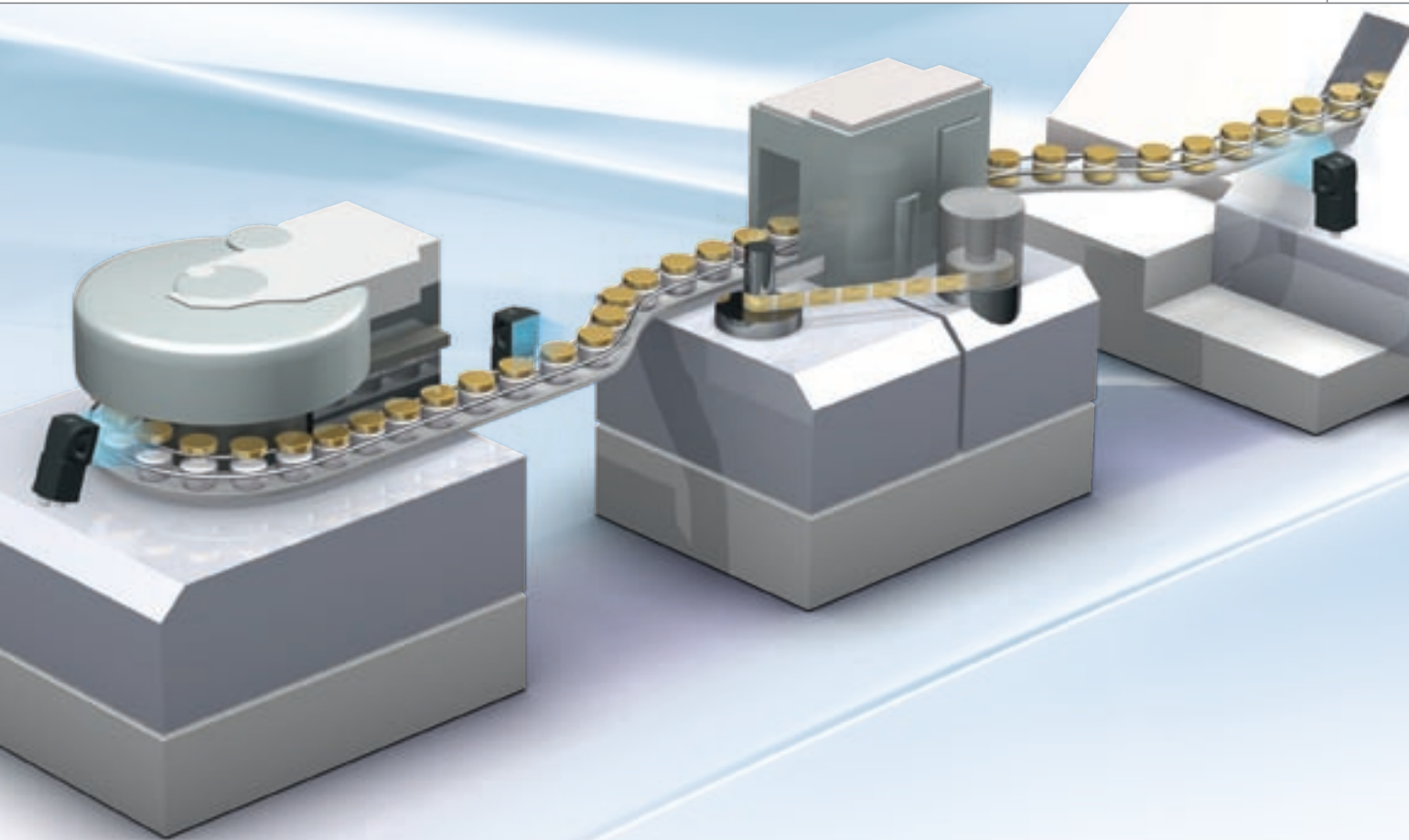
Features

- One-touch control via simple, icon-driven menu
- Crystal-clear image quality
- Real Colour Processing (16 million colours)
- Operation via PC or Touch Finder screen

Benefits

- Simple and guided set-up
- Reliable results on any surface
- Remarkable flexibility – always a perfect match and not a compromise for your application





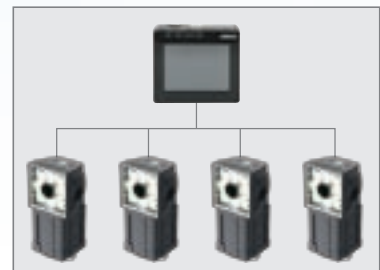
Make it sharp

High performance LEDs and powerful filtering deliver clear images on even the most difficult surfaces.



Simple guidance

With the simple navigation menu, you always know where you are with your production.



Flexible platform

Select the vision sensor that best fits your application and decide how you want to operate it.

Compact and robust

The FQ Vision Sensor is our most compact solution, combining a camera and an image processor within one housing. There is no need for costly and space-consuming external lighting, thanks to the built-in lens and high performance LED. The IP67 protection rating enables the FQ to be also used in harsh environments.

Compact size and robust housing – fits into any machine

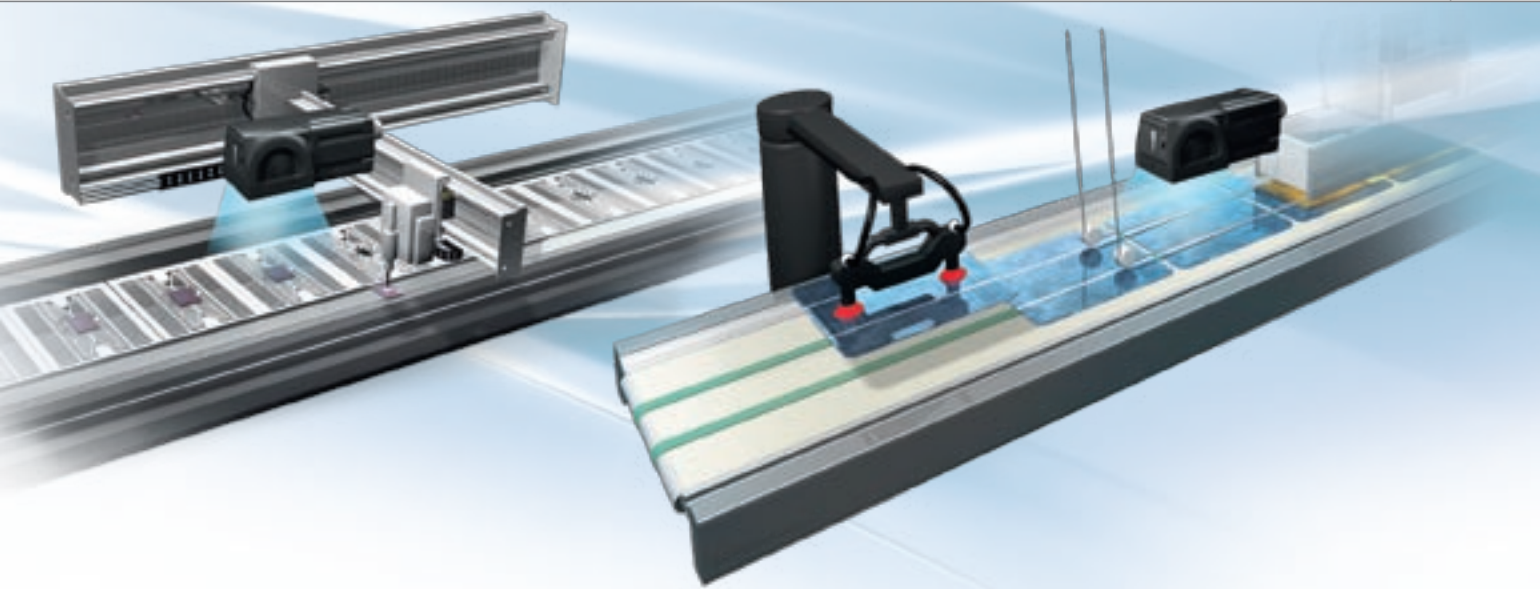
High power LEDs – unique in its class

Built-in lens – simple fine tuning of camera focus

Powerful image processor – high speed inspection, outstanding filtering

Industry grade connectors for trigger and I/O, Ethernet and power.

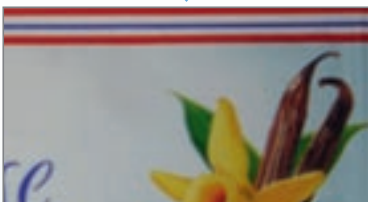




A new benchmark in image clarity

As well as being a breakthrough in simplicity, the Omron FQ Vision Sensor also gives you the very best in image quality and clarity. For the first time in this class you can now benefit from a range of advanced image capture and processing features. Powerful LEDs, HDR, polarization and halation filters enable stable inspection on surfaces where conventional vision sensors see nothing. The clear image enables a simple installation, as the angle of view is not critical anymore.

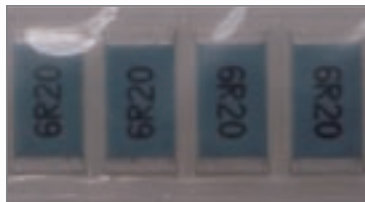
Print industry: multicolour objects



Real colour sensing

All RGB gradations (16+ million) are processed directly. No grayscale conversion or colour filtering required.

Electrical parts: lowest contrast



High power lighting

Contrast was once a major issue in image processing. With the FQ Vision Sensor however, every image is bright and clear, with perfect contrast for reliable results.

Automotive: shiny and reflective



HDR sensing

Variations in lighting conditions can cause unwanted glare or halation. HDR minimizes these effects, maximizing the stability of inspection results, even countering piece-to-piece variation or misalignment.

Simply the most flexible product of its type

Flexibility meets simplicity in the Omron FQ Vision Sensor, in design, functionality and ease of use. Suitable for all types of processing and packaging applications, the FQ can be tailored to meet even the most demanding requirements, and any operational concept.

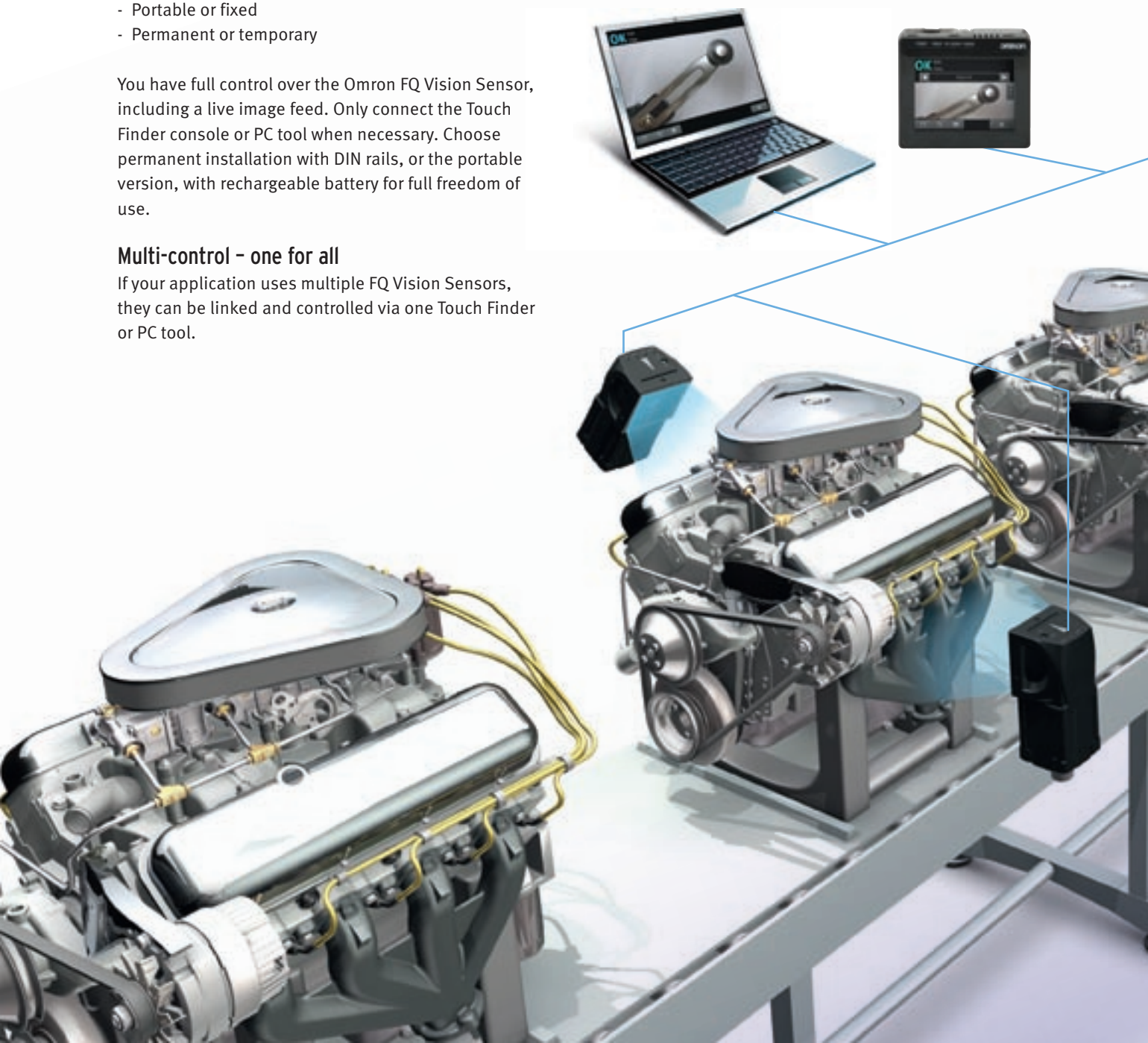
You decide how to set-up and configure

- PC or standalone
- Local or remote
- Portable or fixed
- Permanent or temporary

You have full control over the Omron FQ Vision Sensor, including a live image feed. Only connect the Touch Finder console or PC tool when necessary. Choose permanent installation with DIN rails, or the portable version, with rechargeable battery for full freedom of use.

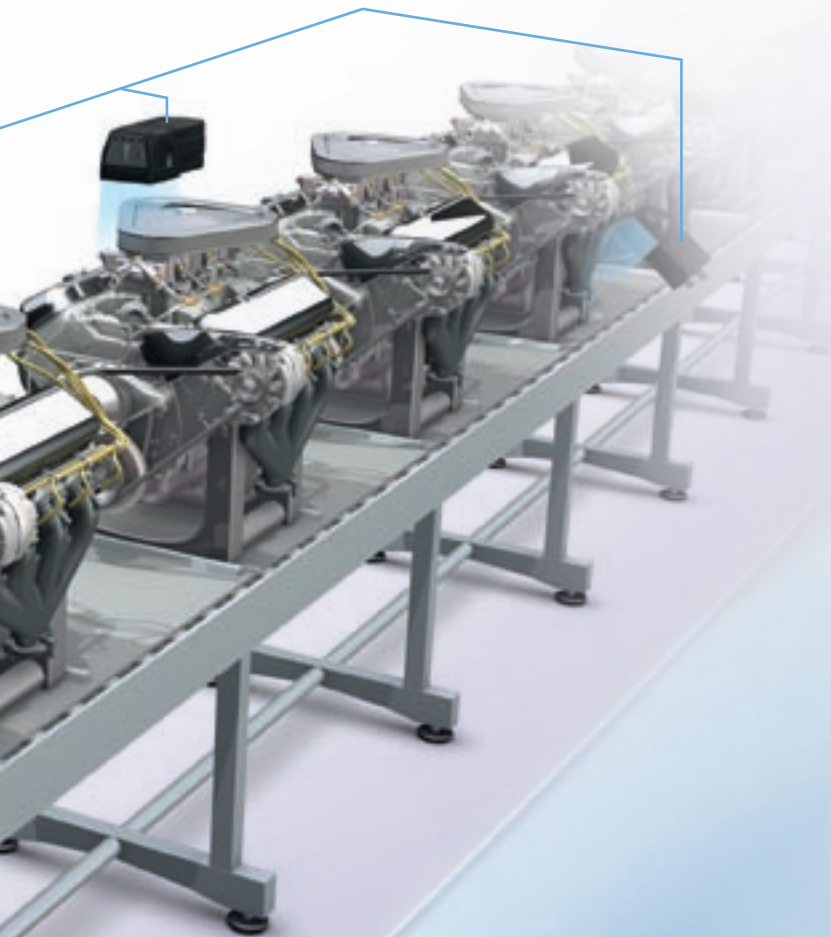
Multi-control – one for all

If your application uses multiple FQ Vision Sensors, they can be linked and controlled via one Touch Finder or PC tool.

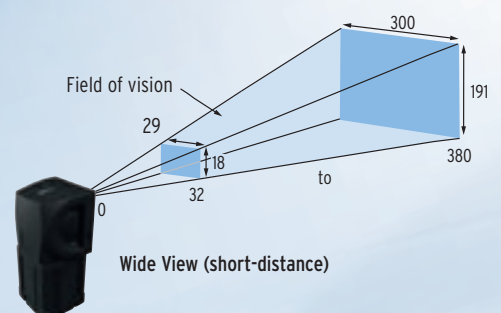
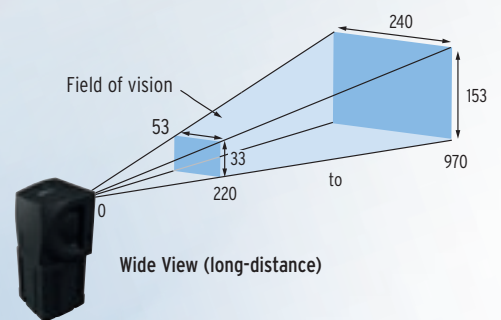
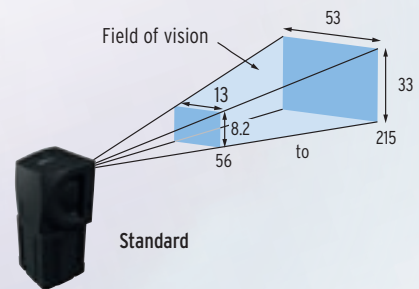
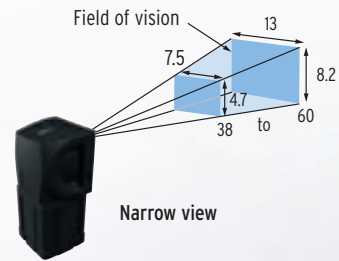


Match your field of view

No matter whether you handle large or small workpieces, the range of the Omron FQ Vision Sensors offers a perfect match. Select the FQ model with the appropriate range and adjust the field of view to your application. Focusing is quick and easy, enabling you to use the sensor for a variety of applications.



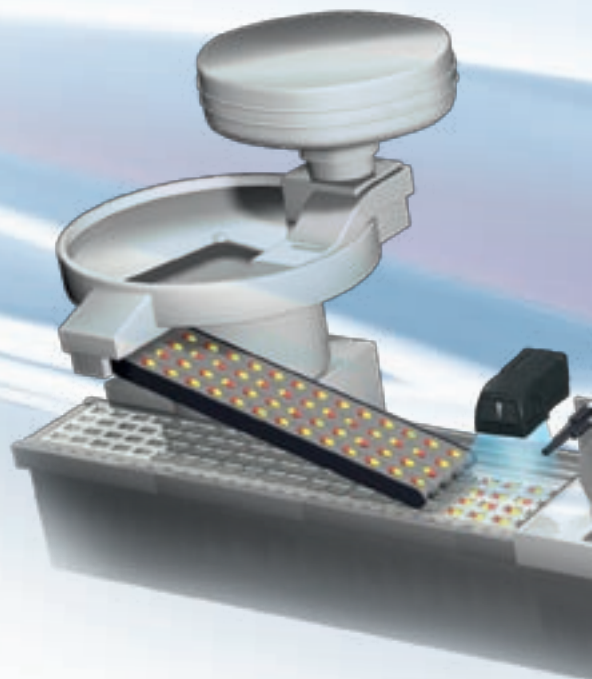
Extensive range: field of view from 7.5 - 300mm.



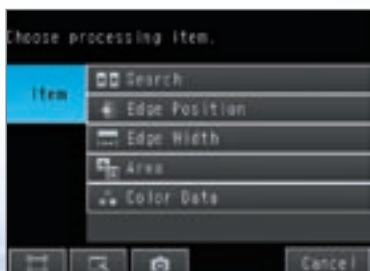
Guided by simplicity

The FQ Vision Sensor takes you into a new dimension of simplicity and intuitive user guidance. Thanks to the innovative navigation menu, you always know where you are. You are guided step by step, and will quickly learn how to navigate directly to any set-up item. Use the powerful auto-functions of the FQ to find the ideal settings. Let the FQ support you through the initial set up and any fine tuning or configuration changes. Users do not need to be experts in image sensors, since the processing intelligence is incorporated into the unit.

Various inspection result views are available: overview, detail, trend or distribution. The FQ display options give you the results you need to make informed decisions about your production.



Touch & start – inspection setup



1. Select the item for inspection



2. Teach the model



3. Set the thresholds



Get the right results every time, in any format



Overview of results

Display the results of all inspection items in one view. Navigate directly to each result with one touch to see the details.



Trend monitor

See the history of inspection results over time. The trend of the production quality can be easily monitored. Countermeasures can be implemented immediately if quality goes down.



Histogram

Show the distribution of all measurement results, giving you an instant overview of overall production quality.

Trouble-free Operation On Site

Real-time Threshold Adjustment

The FQ vision sensor 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 histories can be saved in SD cards and used later for traceability.

Recent Results Logging



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

File Logging



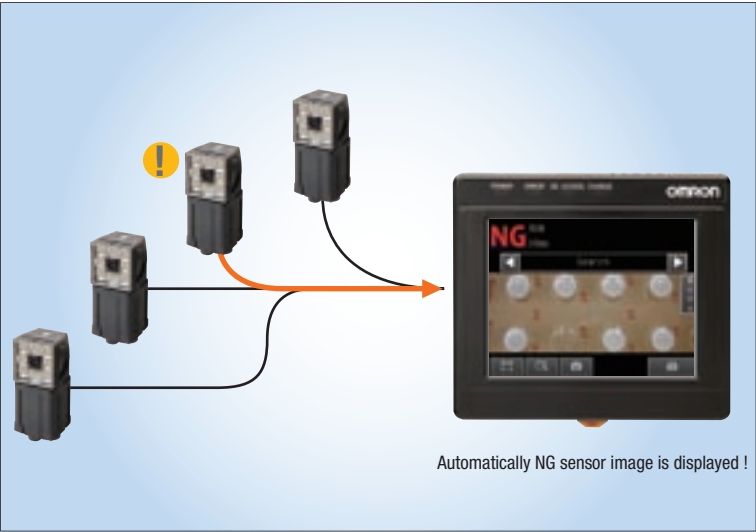
SD card

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

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.

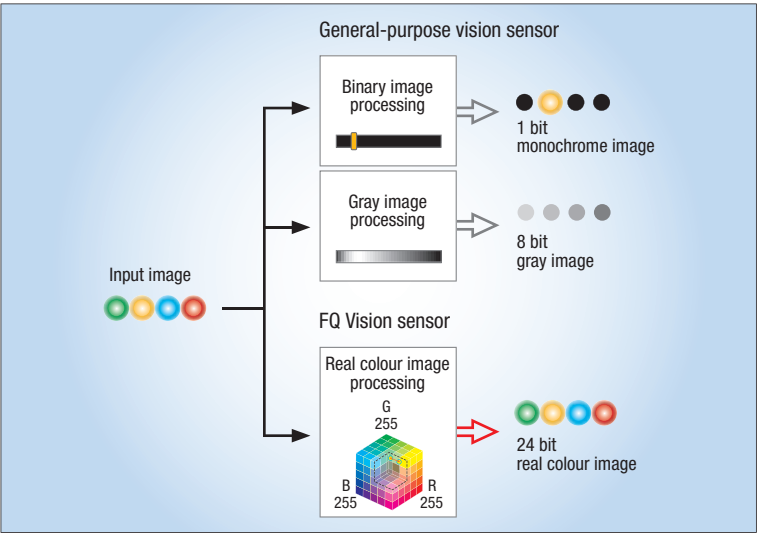


Authentic Vision Technologies are Gathered on FQ

Real Colour Sensing

Most vision sensors on the market operate using greyscale image processing, due to the high demand of processing colour images. However, many applications may be unsuitable or unstable using greyscale processing due to the requirement of colour inspection or poor image contrast.

In order to offer solutions for such issues, the FQ vision sensor combines a high power processor unit and real-colour processing technology which enables fast inspections using colour images. The same technology is used in Omron's flagship model of vision sensors and is widely utilised throughout industry.

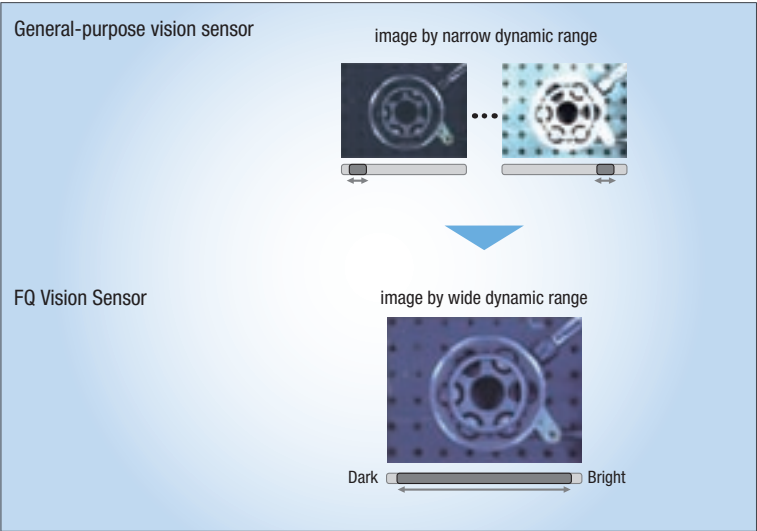


HDR Sensing

Glossy & highly reflective surfaces can often result in "halation" or uneven brightness across an image, coupled with inconsistent workpiece placement inspections can become unstable and unreliable. Such halation is a result of the narrow dynamic range of standard vision sensors.

The FQ vision sensor uses Omron's High Dynamic Range (HDR) processing technology, which increases the dynamic range of the system up to 16 times that of conventional vision sensors.

The result is stable detection of objects which are highly reflective, even if workpiece placement is not consistent.



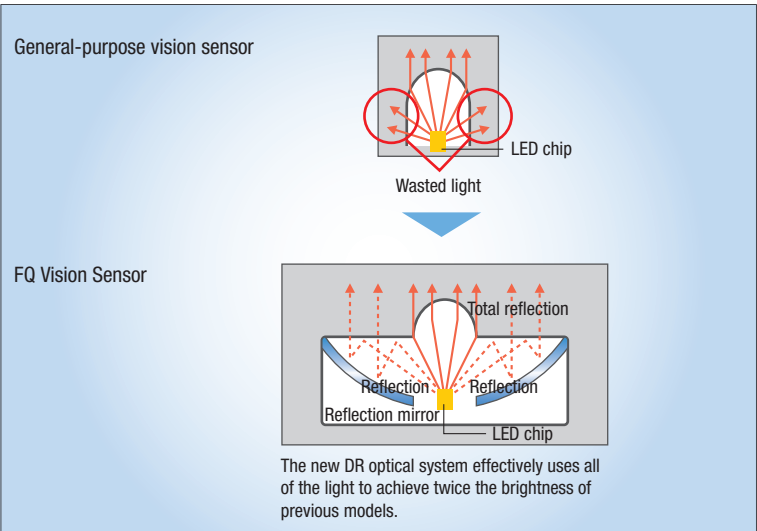
High Power Lighting

Providing suitable illumination for inspections can often be the deciding factor between application success or failure. Especially when inspecting large field of views, even and consistent lighting can be difficult to achieve.

In order to handle such issues, a new DR optical system has been developed for the FQ vision sensor. This system effectively uses all of the LED light to maintain consistent brightness across the field of view at twice the brightness of previous models.

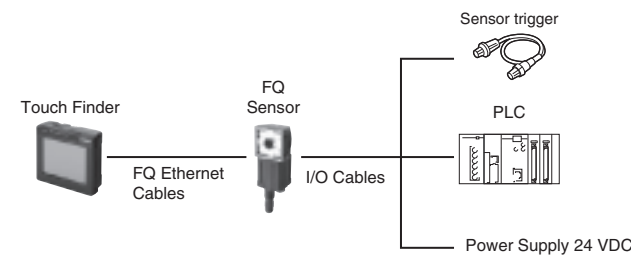
The FQ vision sensor also has a polarisation filter, to cut off the specular reflection light which can result from highly reflective objects, resulting in reliable and consistent inspections.

DR optical system : Double-reflection optical system



System Configuration

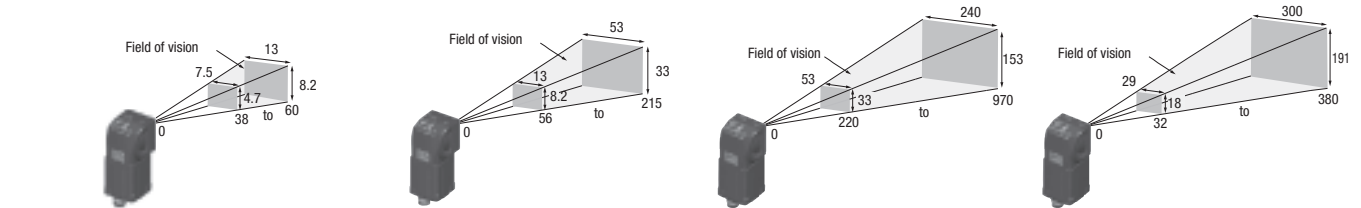
Standard Configuration



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 the Touch Finder. Refer to the member registration sheet for details.

Ordering information

Sensor



| Type | Narrow View | | Standard | | Wide View | | | |
|------|------------------------|-----------------|------------------------|-----------------|------------------------|-----------------|------------------------|-----------------|
| | Single-function models | Standard models | Single-function models | Standard models | Long-distance | | Short-distance | |
| | | | | | Single-function models | Standard models | Single-function models | Standard models |
| NPN | FQ-S10010F | FQ-S20010F | FQ-S10050F | FQ-S20050F | FQ-S10100F | FQ-S20100F | FQ-S10100N | FQ-S20100N |
| PNP | FQ-S15010F | FQ-S25010F | FQ-S15050F | FQ-S25050F | FQ-S15100F | FQ-S25100F | FQ-S15100N | FQ-S25100N |

Note: Tolerance (field of vision): $\pm 10\%$ max.

Touch Finder

| Type | Order code |
|-----------------|----------------------|
| DC power supply | FQ-D30 |
| AC/DC/battery | FQ-D31 ^{*1} |

^{*1} AC Adapter and Battery are sold separately.

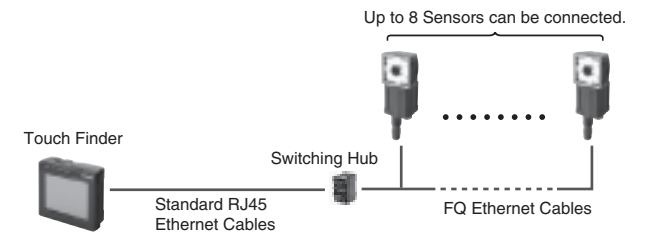
Cables

| Type | Cable length | Order code |
|---|--------------|------------|
| FQ Ethernet Cables (connect Sensor to Touch Finder, Sensor to PC) | 2 m | FQ-WN002 |
| | 10 m | FQ-WN010 |
| | 20 m | FQ-WN020 |
| I/O Cables | 2 m | FQ-WD002 |
| | 10 m | FQ-WD010 |
| | 20 m | FQ-WD020 |

Industrial switching hubs (Recommended)

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

Multiple Connection



Accessories

| Application | Appearance | Name | Order code |
|------------------|------------|---|----------------------|
| For Sensor | | Mounting Bracket (enclosed with Sensor) | FQ-XL |
| | | Polarizing Filter Attachment (enclosed with Sensor) | FQ-XF1 |
| For Touch Finder | | Panel Mounting Adapter | FQ-XPM |
| | | AC Adapter (for models for DC/AC/Battery) | FQ-AC_ ^{*1} |
| | | Battery (for models for DC/AC/Battery) | FQ-BAT1 |
| | | Touch Pen (enclosed with Touch Finder) | FQ-XT |
| | | Strap | FQ-XH |

^{*1} 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 | Order code |
|-----------|------------|---------------------|------------|
| C | 250 V max. | Europlug | FQ-AC4 |
| BF | 250 V max. | UK | FQ-AC5 |

| Specifications | | | |
|------------------------|------------------------------------|---|-----------------|
| Item | Type | Single-function models | Standard models |
| Model | NPN | FQ-S10_ | FQ-S20_ |
| | PNP | FQ-S15_ | FQ-S25_ |
| Field of vision | | Refer to the table below. | |
| Installation distance | | Refer to the table below. | |
| Main functions | Inspection items | Search, area, average colour, edge position, and edge width | |
| | Number of simultaneous inspections | 1 | 32 |
| | Position compensation | None | Supported |
| | Number of registered scenes | 8 | 32 |
| Image input | Image processing method | Real colour | |
| | Image filter | High dynamic range (HDR), polarizing filter (attachment), and white balance | |
| | Image elements | 1/3-inch colour CMOS | |
| | Shutter | 1/250 to 1/30,000 | |
| | Processing resolution | 752 x 480 | |
| Lighting | Lighting method | Pulse | |
| | Lighting colour | 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.) | |
| Measurement trigger | | External trigger (single or continuous) | |
| I/O specifications | Input signals | 7 signals <ul style="list-style-type: none">Single measurement input (TRIG)Command input (IN0 to IN5) | |
| | Output signals | 3 signals <ul style="list-style-type: none">Control output (BUSY)Overall judgement output (OR)Error output (ERROR) Note: The three output signals can be allocated for the judgements of individual inspection items. | |
| | Ethernet specification | 100BASE-TX/10BASE-T | |
| | Connection method | Special connector cables <ul style="list-style-type: none">Power supply and I/O: 1 cableTouch Finder and computer: 1 cable | |
| Ratings | Power supply voltage | 20.4 to 26.4 VDC (including ripple) | |
| | Current consumption | 2.4 A max. | |
| Environmental immunity | Ambient temperature range | Operating: 0 to 50°C Storage: -25 to 65°C (with no icing or condensation) | |
| | Ambient humidity range | Operating and storage: 35% to 85% (with no condensation) | |
| | Ambient atmosphere | No corrosive gas | |
| | Degree of protection | IEC 60529 IP67 (with polarizing filter attachment mounted.) | |
| 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 | | Depends on field of vision and installation distance. Refer to the table below. | |
| Accessories | | <ul style="list-style-type: none">Mounting Bracket (FQ-XL) (1)Polarizing Filter Attachment (FQ-XF1) (1)Instruction ManualQuick Startup GuideMember registration sheet | |

| Single-function models | | Standard models | | Field of view*1 (Horizontal x Vertical) | Installation distance | Weight |
|------------------------|------------|-----------------|------------|--|------------------------------------|---------------|
| NPN | PNP | NPN | PNP | | | |
| FQ-S10010F | FQ-S15010F | FQ-S20010F | FQ-S25010F | 7.5x4.7 to 13x8.2 mm | 38 to 60 mm | Approx. 160 g |
| FQ-S10050F | FQ-S15050F | FQ-S20050F | FQ-S25050F | 13x8.2 to 53x33 mm | 56 to 215 mm | Approx. 160 g |
| FQ-S10100F | FQ-S15100F | FQ-S20100F | FQ-S25100F | 53x33 to 240x153 mm | Long-distance model: 220 to 970 mm | Approx. 150 g |
| FQ-S10100N | FQ-S15100N | FQ-S20100N | FQ-S25100N | 29x18 to 300x191 mm | Short-distance model: 32 to 380 mm | Approx. 150 g |

*1 Tolerance: ±10% max.

Touch Finder

| Item | | | Model with DC power supply | Model with AC/DC/battery power supply |
|-------------------------------|---|-------------------------------|--|---|
| | | | FQ-D30 | FQ-D31 |
| Number of connectable Sensors | | | 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 colour LCD | |
| | | Pixels | 320 x 240 | |
| | | Display colours | 16,777,216 | |
| | 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 | |
| External interface | Ethernet | | 100BASE-TX/10BASE-T | |
| | SD card | | SDHC-compliant, Class 4 or higher recommended | |
| Ratings | Power supply voltage | | DC power connection: 20.4 to 26.4 VDC (including ripple) | DC power connection: 20.4 to 26.4 VDC (including ripple) AC adapter connection: 100 to 240 VAC, 50/60 Hz Battery connection: FQ-BAT1 Battery |
| | Continuous operation on Battery ^{*3} | | --- | 1.5 h |
| | Power consumption | | DC power connection: 0.2 A | |
| Environmental immunity | Ambient temperature range | | Operating: 0 to 50°C Storage: -25 to 65°C (with no icing or condensation) | Operating: 0 to 50°C when mounted to DIN Track or panel Operation on Battery: 0 to 40°C Storage: -25 to 65°C (with no icing or condensation) |
| | Ambient humidity range | | Operating and storage: 35% to 85% (with no condensation) | |
| | Ambient atmosphere | | No corrosive gas | |
| | Degree of protection | | IEC 60529 IP20 (when SD card cover, connector cap, or harness is attached) | |
| Weight | | | Approx. 270 g (without Battery and hand strap attached) | |
| Materials | | | Case: ABS, Hand strap: Nylon | |
| Accessories | | | 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.

Battery Specifications

| Item | FQ-BAT1 |
|---------------------------|--|
| Battery type | Secondary lithium ion battery |
| Nominal capacity | 1,800 mAh |
| Rated voltage | 3.7V |
| 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 (FQ-D31). AC adapter (FQ-AC_) is required. |
| Charging time*1 | 2.5 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*1 Microsoft Windows 7 Home Premium or higher*1 |
| CPU | Core 2 Duo 1.06 GHz or the equivalent or higher |
| RAM | 1GB min. |
| HDD | 500 MB min. available space*2 |
| Monitor | 1,024 x 768 dots min. |

*1 The Japanese and English versions support only 32-bit OS versions.

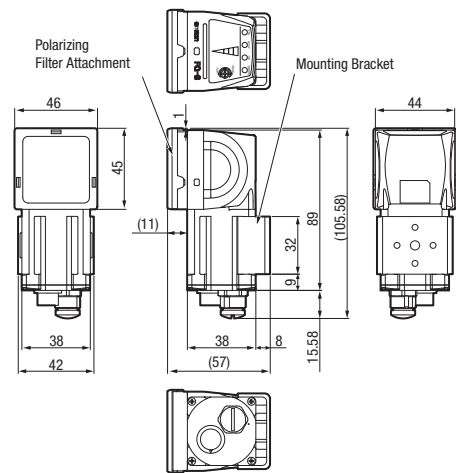
*2 Available space is also required separately for data logging.

Dimensions

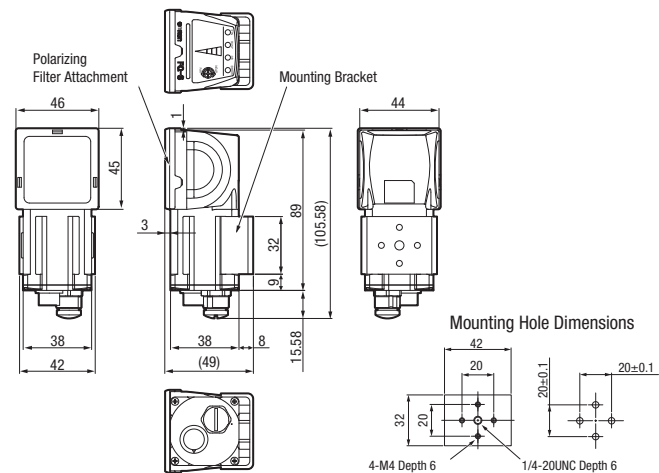
(Unit: mm)

Sensor

FQ-S10010F/-S10050F/-S15010F/-S15050F
FQ-S20010F/-S20050F/-S25010F/-S25050F

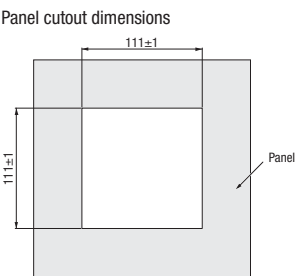
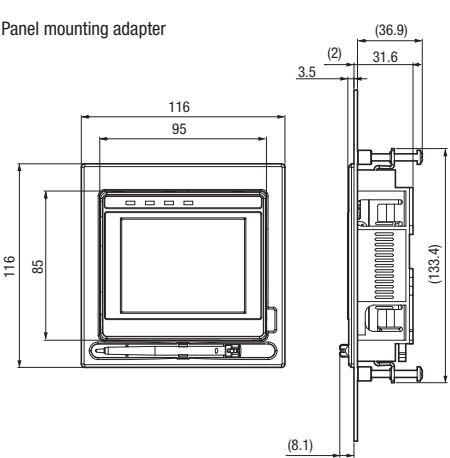
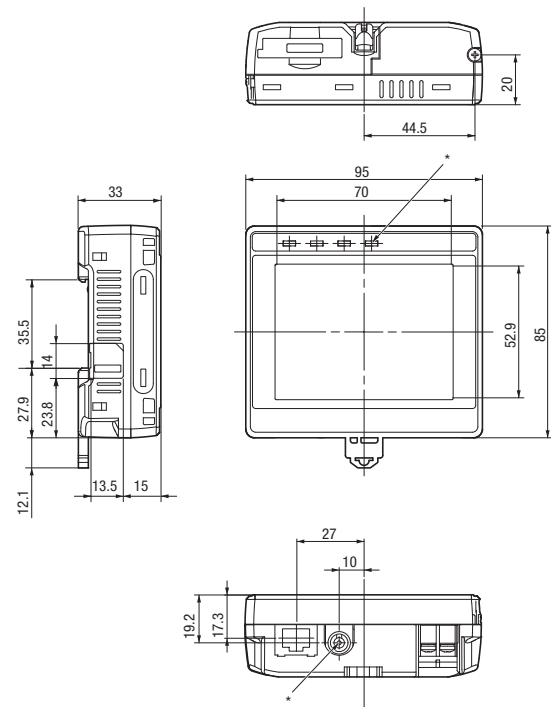


FQ-S10100F/-S10100N/-S15100F/-S15100N
FQ-S20100F/-S20100N/-S25100F/-S25100N



Touch Finder

FQ-D30/-D31



* Provided with FQ-D31 only.

Automation Systems

- Programmable logic controllers (PLC) • Human machine interfaces (HMI) • Remote I/O
- Industrial PC's • Software

Motion & Drives

- Motion controllers • Servo systems • Inverters

Control Components

- Temperature controllers • Power supplies • Timers • Counters • Programmable relays
- Digital panel indicators • Electromechanical relays • Monitoring products • Solid-state relays
- Limit switches • Pushbutton switches • Low voltage switch gear

Sensing & Safety

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