

# 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 TouchFinder 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. So you can be sure of a best-fit solution for your particular application.*

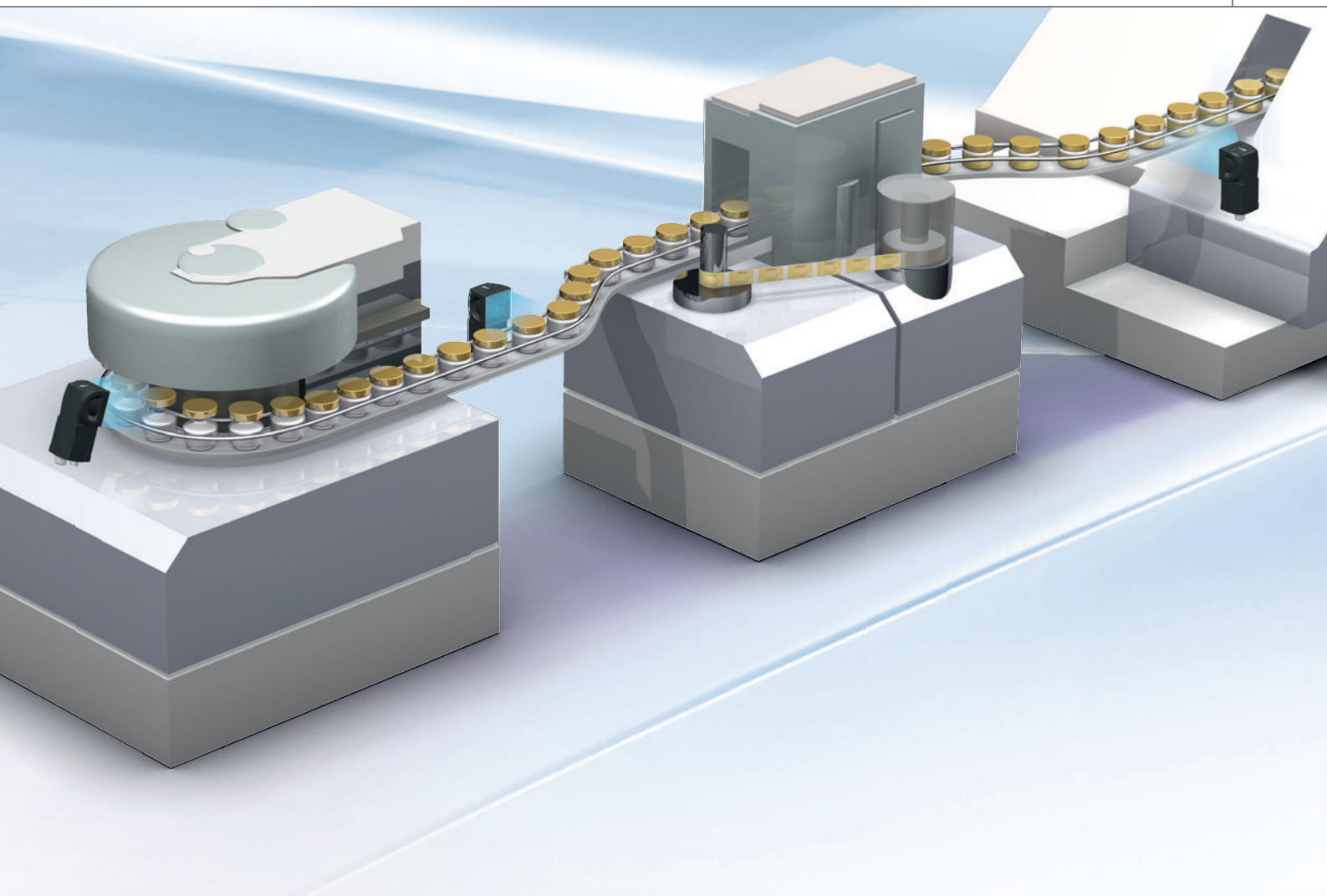
## Features

- One-touch control via simple, icon-driven menu
- Crystal-clear image quality
- Real Color Processing (16 million colors)
- Operation via PC or handy TouchFinder screen

## Benefits

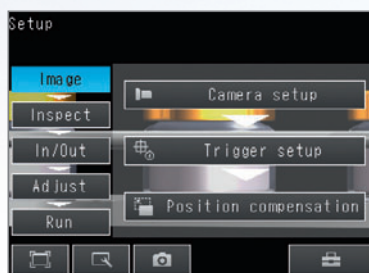
- Simple and guided set-up
- Reliable results on any surface
- Remarkable flexibility – always a perfect match and not a compromise for your application





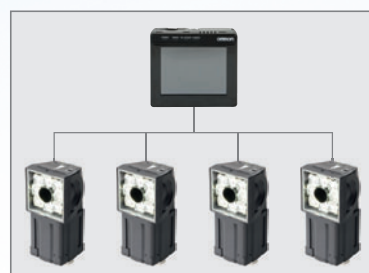
#### Make it sharp

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



#### Simple guided

Always know where you are in operation with the simple navigation menu.



#### 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 the most compact solution combining a camera and an image processor within one housing. No need for costly and space-consuming external lighting, thanks to the built-in lens and high performance LED. The IP67 protection class enables the FQ to be used even in harsh environments.

Compact size and robust housing – fits into any machine

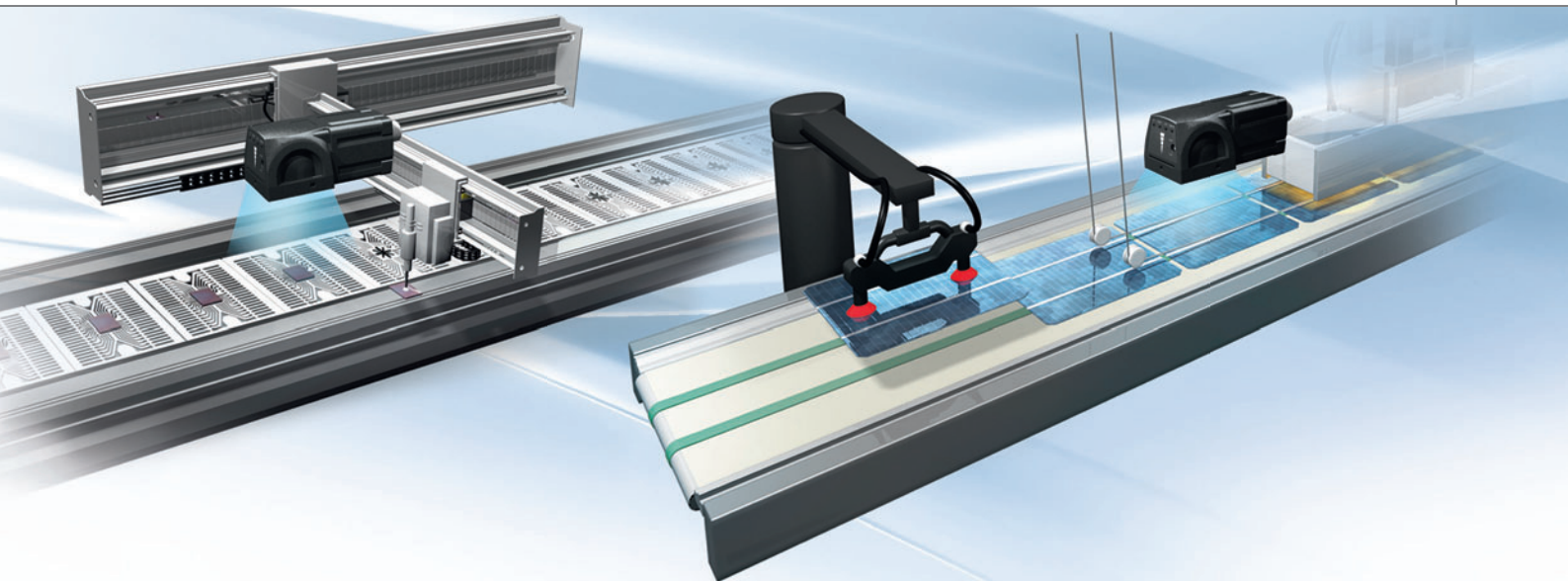
High power LEDs – unique in its class

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.



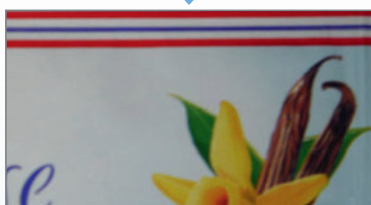


## A new benchmark in image clarity

As well as being a landmark 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. Power LEDs, HDR, polarization and halation filters enable stable inspections 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: multicolor objects



#### Real color sensing

All RGB gradations (16+ million) are processed directly. No grayscale conversion or color 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, it can be tailored to meet even the most demanding requirements, and any operational concept.

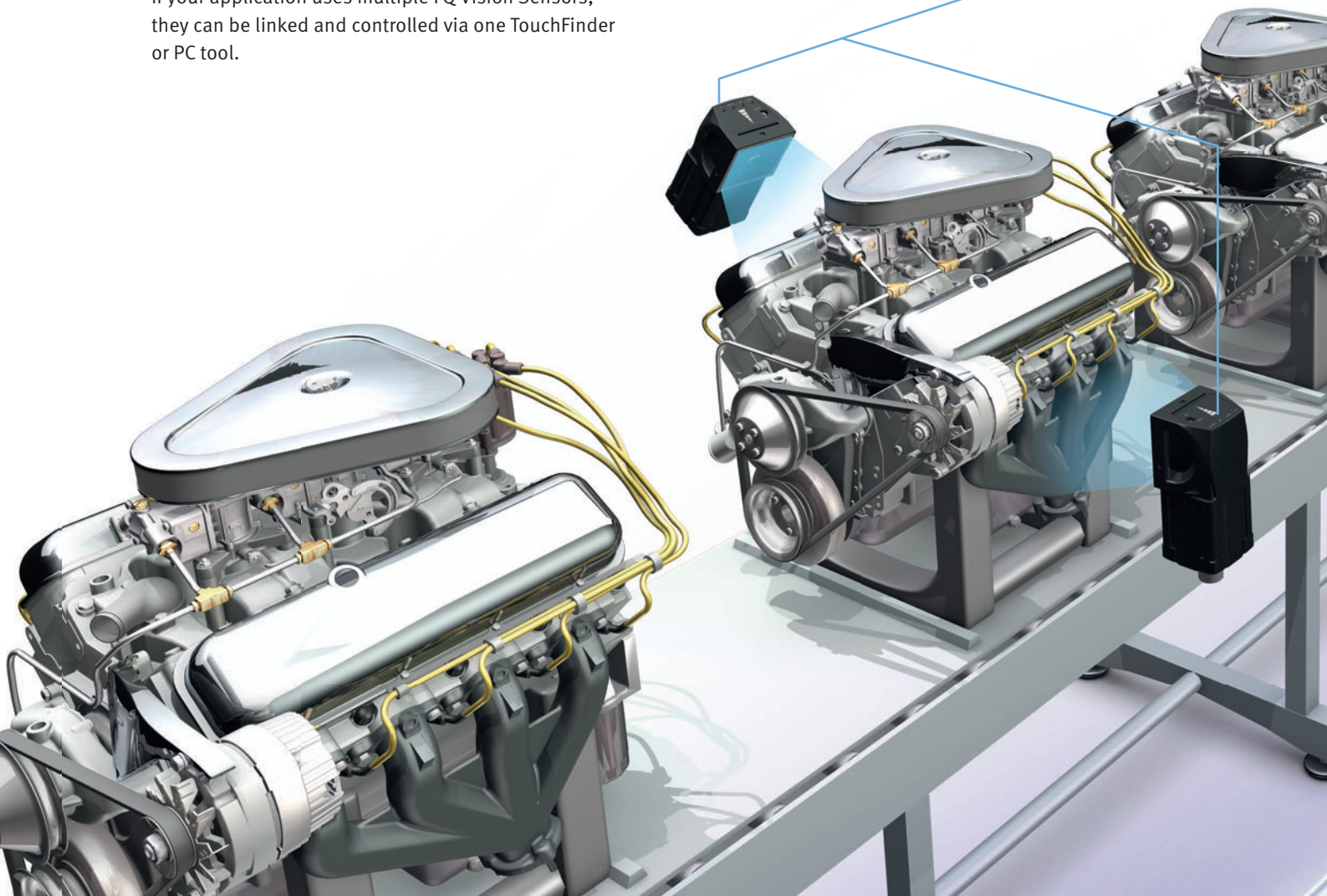
### You decide how to set-up and configure

- 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.

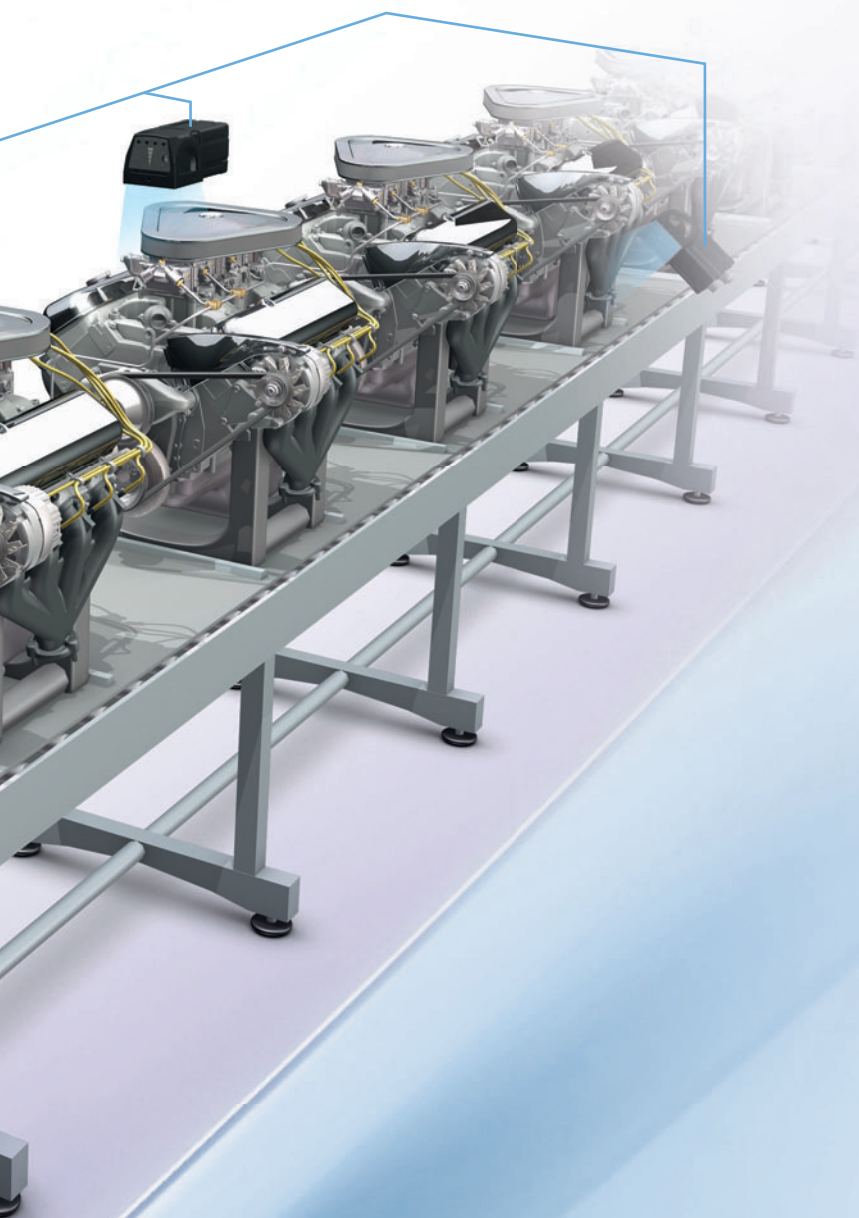
### Multi-control - one for all

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

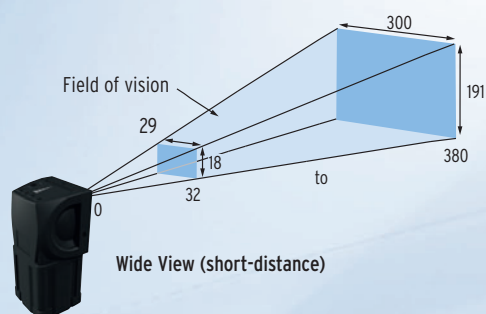
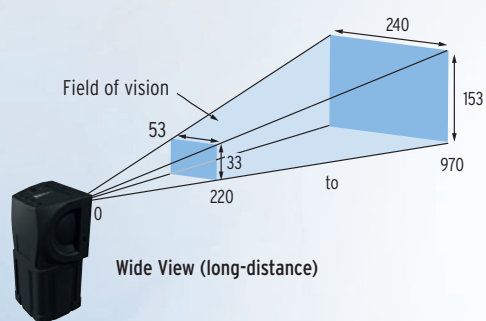
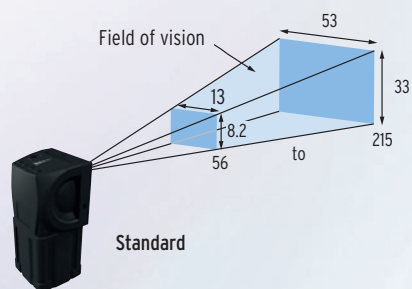
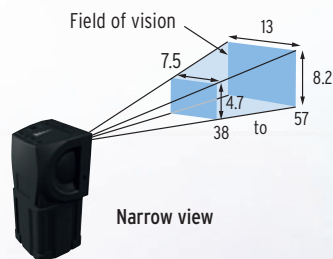


## Match your field of view

No matter whether you handle large or small workpieces, the range of 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 too, enabling you to use the sensor for a variety of applications.



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



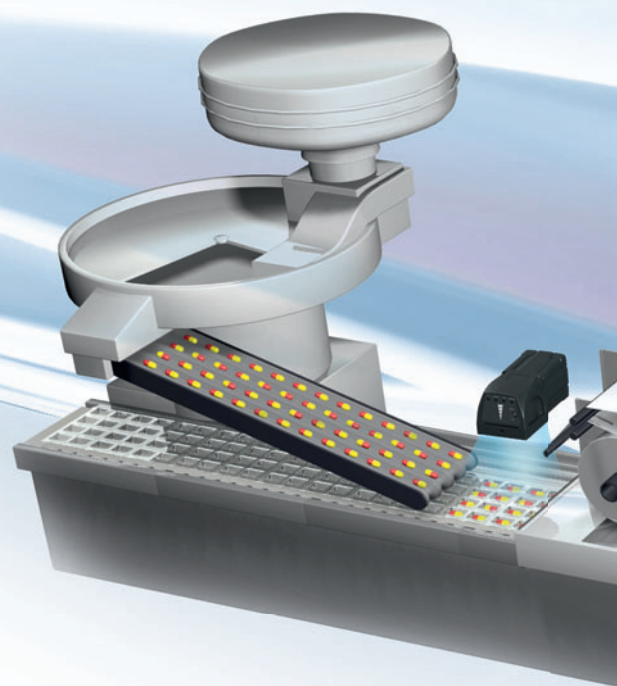


## Guided by simplicity

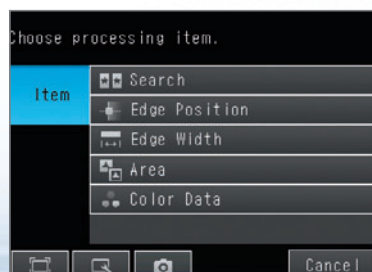
The FQ Vision Sensor takes you into a new dimension of simplicity and intuitive user guidance. Always know where you are thanks to the innovative navigation menu. You are guided step by step, and will quickly learn how to navigate directly to any set-up item.

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 in the unit itself.

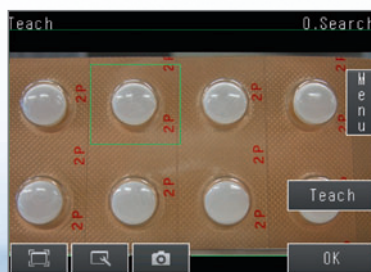
Various inspection result views are available: overview, detail, trend or distribution. The FQ display options give you the results you need to make informed decisions about your production.



### Touch & start – inspection setup



1. Select the inspection item

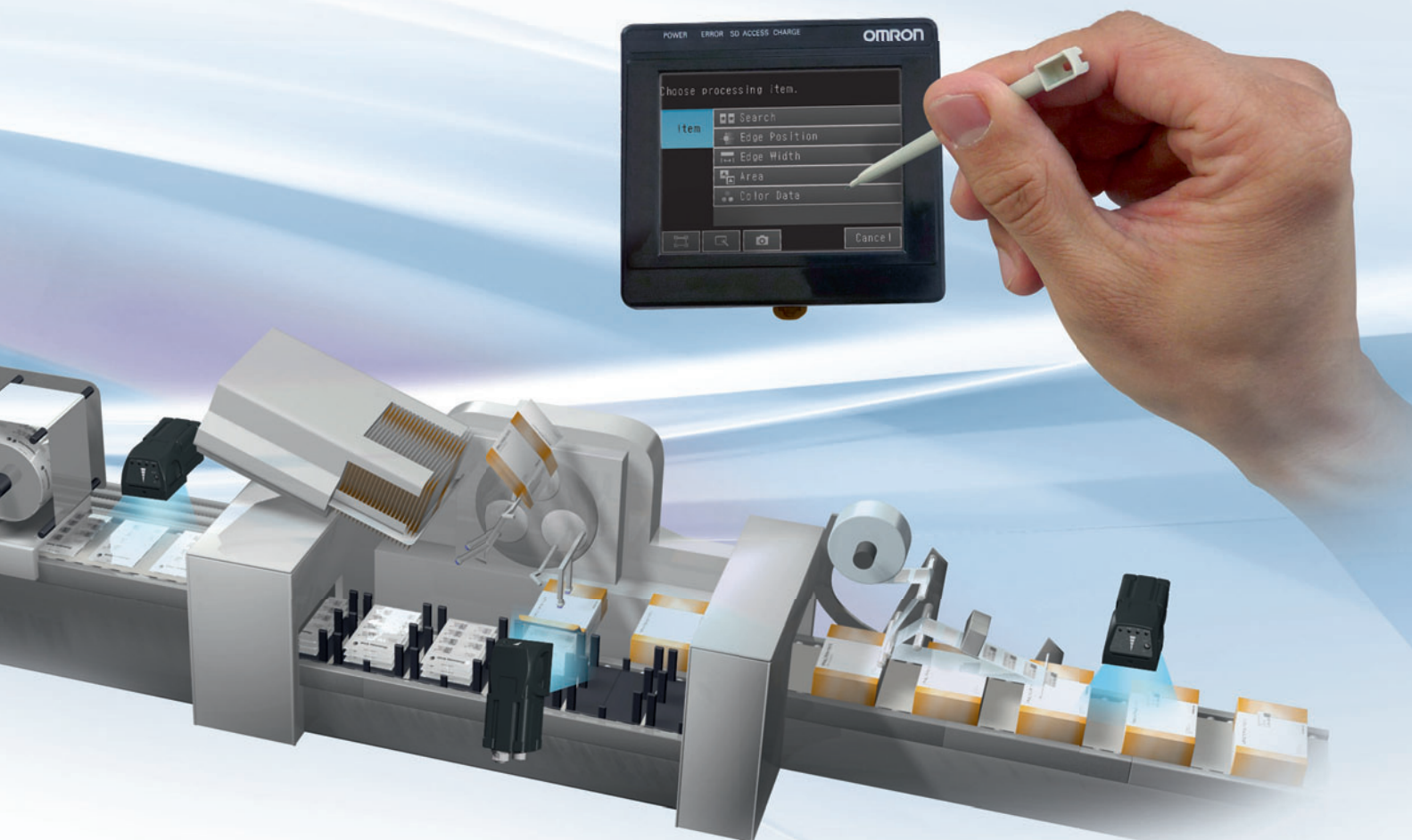


2. Teach the model



3. Set the thresholds





Get the right results every time, in any format



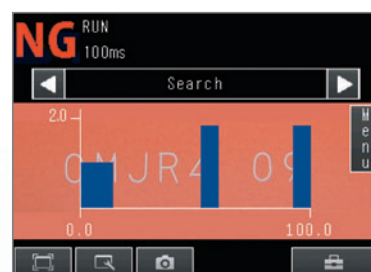
#### Overview of results

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.

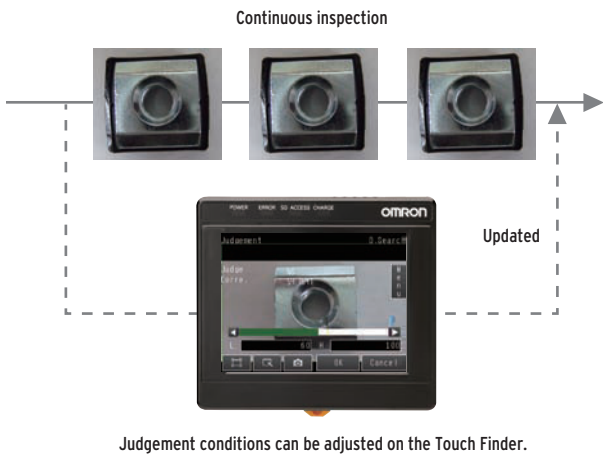


#### Histogram

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

## 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.

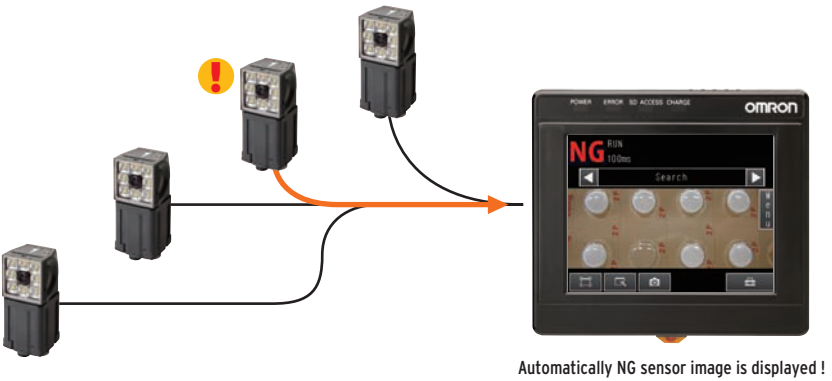
### File Logging



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.

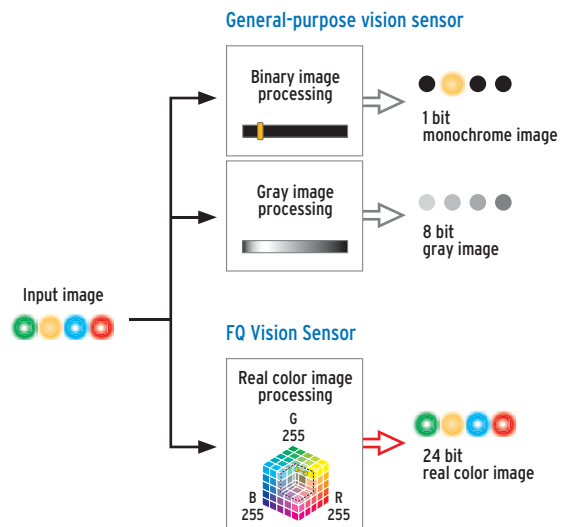




## Real Color Sensing

Most vision sensors on the market operate using greyscale image processing, due to the high demand of processing color images. However, many applications may be unsuitable or unstable using greyscale processing due to the requirement of color 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-color processing technology which enables fast inspections using color images. The same technology is used in Omron's flagship model of vision sensors and is widely utilised throughout industry.



## HDR Sensing

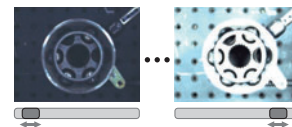
Glossy & highly reflective surfaces can often result in "halation" or uneven brightness across an image, coupled with inconsistent workpiece placement inspections can become unstable and unreliable. Such halation is a result of the narrow dynamic range of standard vision sensors.

Omron independently developed a High Dynamic Range (HDR) function and used it in our flagship model of vision sensors along with Real Color Sensing.

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

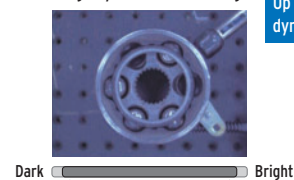
### General-purpose vision sensor

image by narrow dynamic range



### FQ Vision Sensor

image by wide dynamic range



Up to 16 times the dynamic range

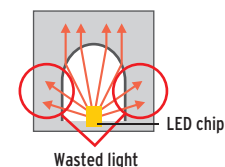
## High Power Lighting

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.

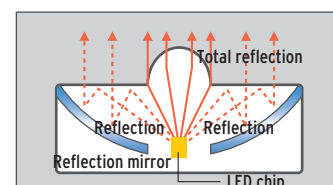
In order to handle such issues, a new DR optical system has been developed for the FQ vision sensor. This system effectively uses all of the LED light to maintain consistent brightness across the field of view at four times the brightness of previous models. Passing light through the polarizing filter cuts off the specular reflection light which can result from highly reflective objects.

DR optical system : Double-reflection optical system

### General-purpose vision sensor



### FQ Vision Sensor

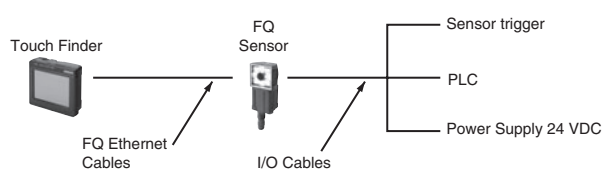


The new DR optical system effectively uses all of the light to achieve four times the brightness of previous models.

# System Configuration

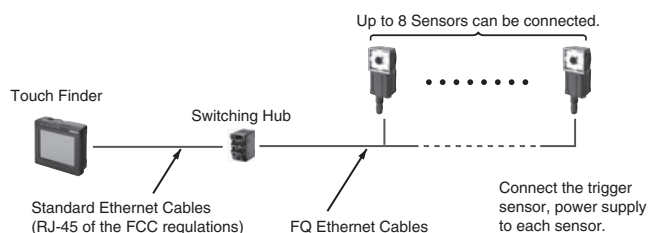
## Standard Configuration

### Control by parallel input/output



## Multiple Connection

### Control by parallel input/output

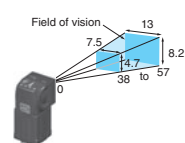


**Note:** If you register as a member after purchasing a Sensor, you can download free setup software that runs on a PC and can be used in place of the Touch Finder. Refer to the member registration sheet for details.

## Ordering Information

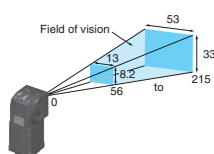
### Sensor

#### Narrow View



	Single-function models	Standard models
NPN	FQ-S10010F	FQ-S20010F
PNP	FQ-S15010F	FQ-S25010F

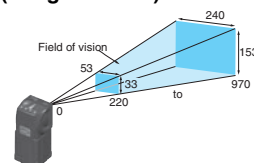
#### Standard



	Single-function models	Standard models
NPN	FQ-S10050F	FQ-S20050F
PNP	FQ-S15050F	FQ-S25050F

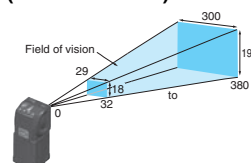
#### Wide View

##### (Long-distance)



	Single-function models	Standard models
NPN	FQ-S10100F	FQ-S20100F
PNP	FQ-S15100F	FQ-S25100F

##### (Short-distance)



	Single-function models	Standard models
NPN	FQ-S10100N	FQ-S20100N
PNP	FQ-S15100N	FQ-S25100N

(Unit: mm)

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

## Touch Finder

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

**Note:** AC Adapter and Battery are sold separately.

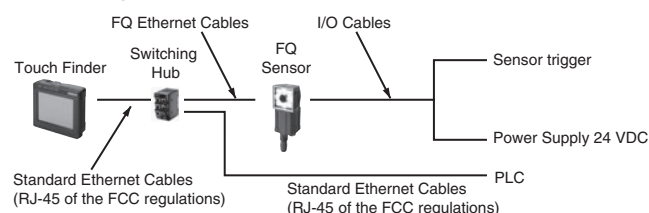
## Cables (Robot cable)

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

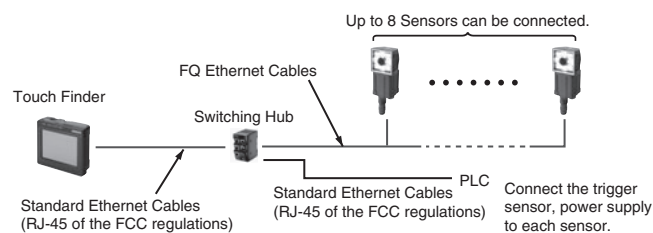
## Industrial Switching Hubs (Recommended)

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

## Control by Ethernet



## Control by Ethernet



## Accessories

Application	Appearance	Name	Model
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□*
		Battery (for models for DC/AC/Battery)	FQ-BAT1
		Touch Pen (enclosed with Touch Finder)	FQ-XT
		Strap	FQ-XH

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

Plug type	Voltage	Certified standards	Model
A	125 V max.	PSE	FQ-AC1
	250 V max.	UL/CSA	FQ-AC2
C	250 V max.	CCC mark	FQ-AC3
BF	250 V max.	---	FQ-AC4
O	250 V max.	---	FQ-AC5
	250 V max.	---	FQ-AC6



## Sensor

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 color, 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 color			
	Image filter		High dynamic range (HDR), polarizing filter (attachment), and white balance			
	Image elements		1/3-inch color CMOS			
	Shutter		1/250 to 1/30,000			
	Processing resolution		752 x 480			
Lighting	Lighting method		Pulse			
	Lighting color		White			
	LED class (See note 1.)		Class 2			
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, geometric functions, and logic functions)			
Measurement trigger			External trigger (single or continuous)			
I/O specifications	Input signals		7 signals • Single measurement input (TRIG) • Control command inputs (IN0 to IN5)			
	Output signals		3 signals • Control output (BUSY) • Overall judgement output (OR) • Error output (ERROR) <b>Note:</b> The three output signals can be allocated for the judgements of individual inspection items.			
	Ethernet specification		Numerical outputs and control commands are supported with no-protocol communications. 100BASE-TX/10BASE-T			
	Connection method		Special connector cables • Power supply and I/O: 1 cable (FQ-WD□□□□) • Touch Finder and computer: 1 cable (FQ-WN□□□□)			
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 (Except when Polarizing Filter Attachment is 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			• Mounting Bracket (FQ-XL) (1) • Polarizing Filter Attachment (FQ-XF1) (1) • Instruction Manual • Quick Startup Guide • Member registration sheet • Warning Label			

Single-function models		Standard models		Field of view (See note 2.) (Horizontal × Vertical)	Installation distance	Weight
NPN	PNP	NPN	PNP			
FQ-S10010F	FQ-S15010F	FQ-S20010F	FQ-S25010F	7.5 × 4.7 to 13 × 8.2 mm	38 to 57 mm	Approx. 160 g
FQ-S10050F	FQ-S15050F	FQ-S20050F	FQ-S25050F	13 × 8.2 to 53 × 33 mm	56 to 215 mm	Approx. 160 g
FQ-S10100F	FQ-S15100F	FQ-S20100F	FQ-S25100F	53 × 33 to 240 × 153 mm	Long-distance model: 220 to 970 mm	Approx. 150 g
FQ-S10100N	FQ-S15100N	FQ-S20100N	FQ-S25100N	29 × 18 to 300 × 191 mm	Short-distance model: 32 to 380 mm	Approx. 150 g

**Note:** 1. Applicable standards: JIS C 6802:2005  
2. Tolerance: ±10% max.

## Touch Finder

Item		Type Model	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 color LCD	
		Pixels	320 x 240	
		Display colors	16,777,216	
	Backlight	Life expectancy (See note 1.)	50,000 hours at 25°C	
		Brightness adjustment	Provided	
		Screen saver	Provided	
Operation interface	Touch screen	Method	Resistance film	
		Life expectancy (See note 2.)	1,000,000	
External interface	Ethernet		100BASE-TX	
	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 (See note 3.)		---	1.5 h
	Power consumption		DC power connection: 0.2 A	DC power connection: 0.2 A, Charging battery: 0.4 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	
Accessories			Touch Pen (FQ-XT), Instruction Manual	

**Note: 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	Model	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 (See note 1.)	2 h	
Battery backup life (See note 2.)	300 charging cycles	
Weight	50 g max.	

**Note: 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 (See note 1.) Microsoft Windows 7 Home Premium or higher (See note 1.)
CPU	Core 2 Duo 1.06 GHz or the equivalent or higher
RAM	1GB min.
HDD	500 MB min. available space (See note 2.)
Monitor	1,024 x 768 dots min.

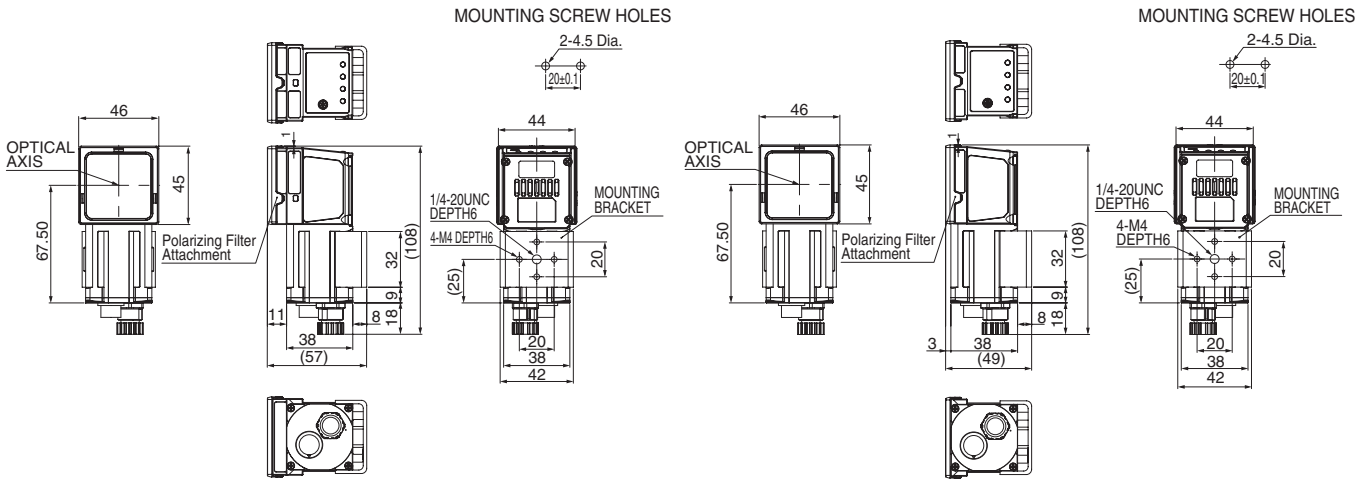
**Note: 1.** The Japanese and English versions support only 32-bit OS versions.  
**2.** Available space is also required separately for data logging.



Sensor (Dimensional drawings are provided here only for the products that have undergone design changes as of June 2012.)

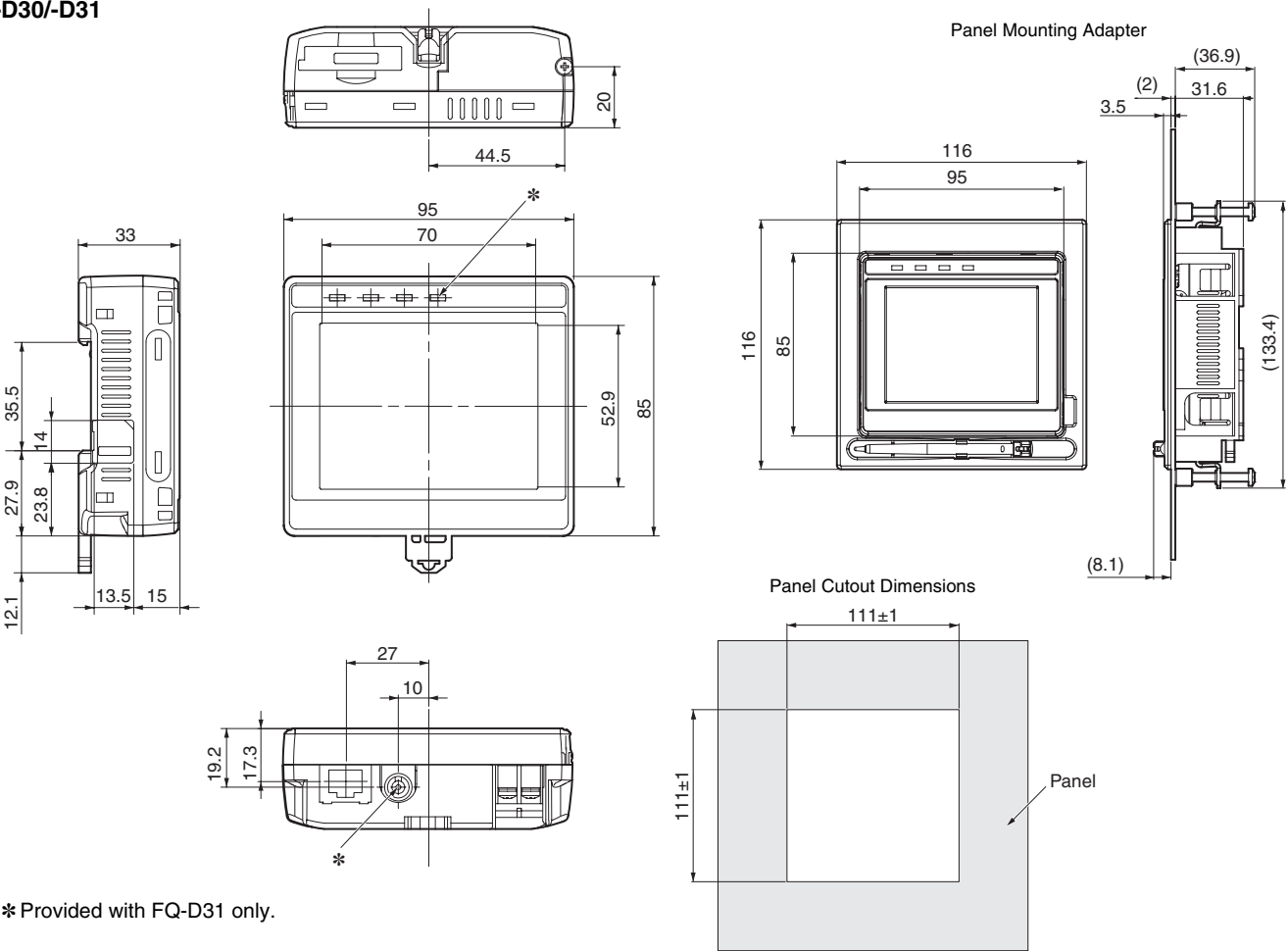
FQ-S10010F/-S10050F  
FQ-S15010F/-S15050F  
FQ-S20010F/-S20050F  
FQ-S25010F/-S25050F

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



Touch Finder

FQ-D30/-D31



\* Provided with FQ-D31 only.

## **READ AND UNDERSTAND THIS DOCUMENT**

Please read and understand this document before using the products. Please consult your OMRON representative if you have any questions or comments.

## **WARRANTY**

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## **LED Safety**

### **WARNING**

The Sensor emits visible light, which may adversely affect the eyes in rare instances.

Do not look directly into the light emitted from the Sensor. When the subject is a specular reflective object, protect your eyes from reflected light.



### Displaying LED Labels

Attached the enclosed warning label in a readily visible location near the product, such as on the cable.



**Note: Do not use this document to operate the Unit.**

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CSM\_2\_1\_0612  
**Cat. No. Q180-E1-03**