

CODE READER FQ-CR SERIES

Exceptional Reading Performance with Easy Operation



Multi Code Reader
FQ-CR1 Series

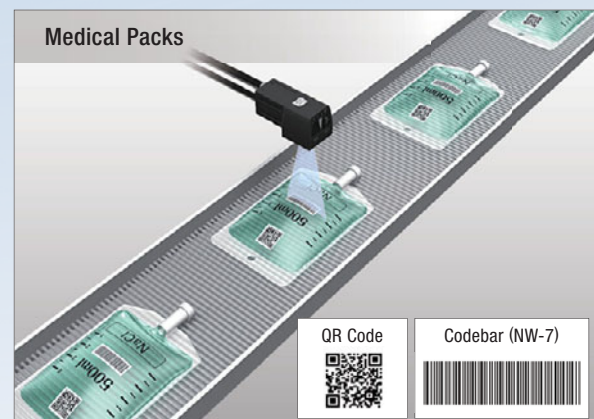
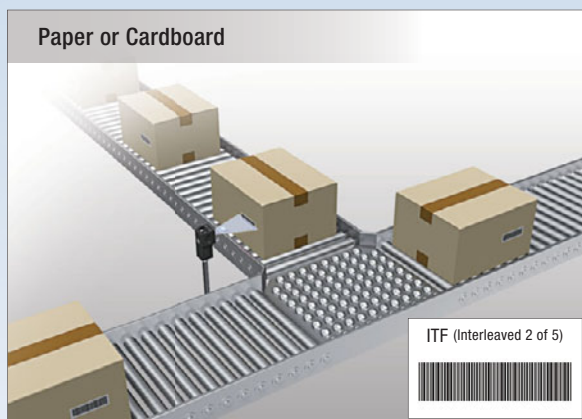
2D Code Reader for Direct Part Marking codes
FQ-CR2 Series

» Read from everything from paper and labels to metal, PCBs, and glass for a wide range of applications.

Solve a variety off different applications with one product series

Read Codes Printed on Paper or Labels

Multi Code Reader **FQ-CR1 Series**



Reads 17 Different Codes

FQ-CR1

Many different codes are used for different applications. And for some products, different codes are printed together. The FQ-CR1 can read many different codes without requiring any changes to its settings.

Barcodes: Reads 9 different codes.	JAN/EAN/UPC	Code39	Codabar (NW-7)
	ITF (Interleaved 2 of 5)	Code93	Code128 / GS1-128
	GS1-DataBar	GS1-128 Composite Code	Pharmacode
2D codes: Reads 8 different codes.	Data Matrix	QR Code	Micro QR Code
	PDF417	Micro PDF417	Maxi Code
	Aztec Code	Codablock	

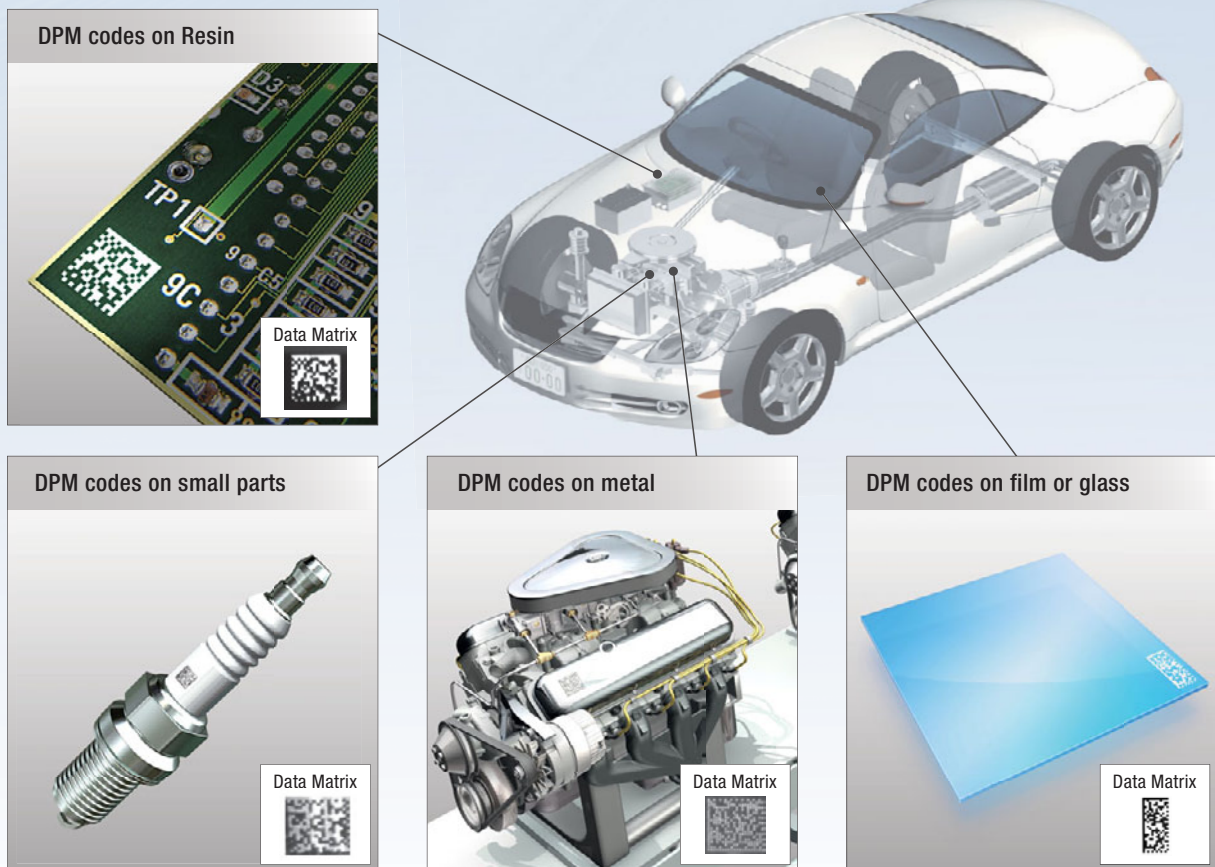
There are many instances when different barcode or 2D code systems are used together in the same manufacturing process. Code printing quality can also vary due to imperfect printing or low contrast.

The FQ-CR Series handles these and many other conditions.

The FQ-CR Series can be easily introduced without using different code readers and operating procedures for each of the different processes.

Reads Direct Part Marking (DPM) Codes

2D Code Reader for Direct Part Marking (DPM) codes **FQ-CR2 Series**



Easily reads difficult codes

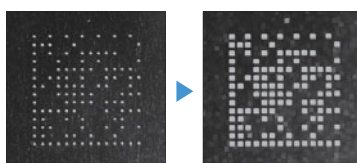
FQ-CR2

Just read the code and register it, and then let the following functions automatically tune the settings.

Depending on the conditions of the code, the automatic retry and code error correction functions let, essentially anyone, easily adjust the settings.

Filter function

Three stages of filtering are automatically selected for the read image from Smooth, Dilate, Erosion, and Median filtering.

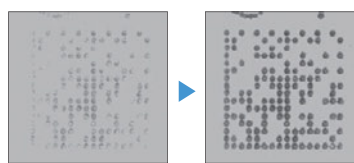


Before Dilate

After Dilate

Retry function

You can retry the settings until reading is successful while automatically changing the exposure time and other reading parameters.



Before Retry

After Retry

Code Error Correction

Code omissions and errors are automatically corrected when the code is read.



Before Processing

After Processing

OMRON's Unique Algorithm Provides Superior Reading Ability for Direct Part Marking codes



Removal of Printing Irregularities or Noise

Filter function

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.

Types of Filtering

Smooth	Smooths the image.	Erosion	For white codes, reduces the cell size. Effective for reading separated dot codes.
Dilate	For white codes, increases the cell size. Effective for reading codes with cell spreading.	Median	Removes noise.

Combining Filtering

Erosion and dilation can be combined to connect dots without changing the dot thickness.



Reading



Automatic Parameter Adjustment Until Reading is Successful

Retry function

Code Readers must be able to read codes even for poor printing conditions. You can automatically retry reading while changing the exposure time and other reading conditions, even for changing workpieces or environments, to enable a stable reading.

The following retry functions are provided.

- 1 Retrying the Specified Number of Times with the Same Conditions**
Reading is performed the specified number of times for the same scene.
- 2 Retrying While External Trigger Is Input**
Reading is performed until successful, as long as an external level trigger is input.
- 3 Retrying While Changing the Shutter Speed**
Reading is performed for the same scene while changing the exposure time in stages.
- 4 Retrying While Changing the Reading Conditions**
When reading DPM codes, inconsistencies in printing conditions can result in NGs if reading is performed with only one set of reading settings. The FQ-CR allows you to register up to 32 sets of reading conditions as scenes and retry reading while changing the scenes in order. The system automatically determines the scenes with the highest usage rates and changes the order to start with them to flexibly handle changes in reading conditions. Of course you can specify a fixed order if required.

Easy Confirmation of Code Quality

Code Error Correction Position Display

Red circles are displayed on cells for which the code was corrected on the display. This clearly shows where the code quality was poor.



FQ-CR1

FQ-CR2

Stable Reading Functions Packed into a Compact Body



Detection and Connection

Reads Codes Even with Low Contrast

High-power LEDs

The wider the field of view, the more difficult it is to maintain consistent lighting within the field, causing errors in reading. The built-in LEDs of the FQ-CR Series use a unique OMRON DR optical system for effective light usage to maintain consistent lighting within the field of vision at a brightness that is four times that of previous models.



Previous Lighting



High-power Lighting

Cuts Light Interference

HDR Function

The HDR (high dynamic range) function minimizes the influence of changes in lighting conditions and light reflection. This enables stable inspections even for materials that are difficult to light evenly, such as metal parts or glossy films, or in locations subject to external light interference.



Halation



Stable Detection for
Metal Surfaces Subject to
Gloss and Inconsistent Lighting

Cuts Specular Reflections

Polarizing Filter

A polarizing filter is included to cut specular reflection from glossy surfaces. This enables stable code reading even for metallic or other glossy surfaces.



Without Polarizing Filter

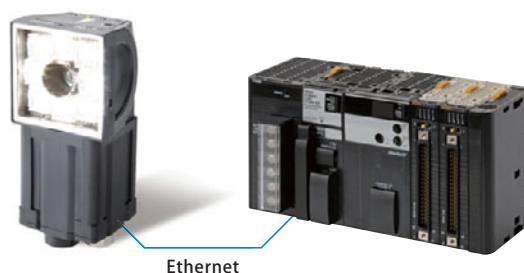


With Polarizing Filter

Communications with Host Devices

Ethernet Connection

The compact body also provides an Ethernet connector so that you can transfer read data and images via Ethernet. Smoothly transfer data to PLCs, computers, or other host devices.



Ethernet

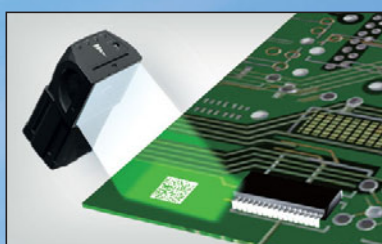
Essentially, Simple Enough for Anyone to Set Up

Setup is as easy as displaying codes on the monitor and registering settings with a simple procedure.

Then, the FQ-CR will automatically tune the settings to achieve the optimum conditions.

You can automatically tune all of these reading conditions just by making the basic settings.

Read a code.



Optimum Tuning in Three Steps

Select the type of code.



Touch Finder

Two Set-up Tools

Use the convenient Touch Finder for on-site settings and control panel installations, or use a set-up tool on a computer.



PC Tool (Free)

After purchasing the Code Reader, you can download the PC Tool free from the member's website.

Set-up and Adjustment

Exposure Time

Gain

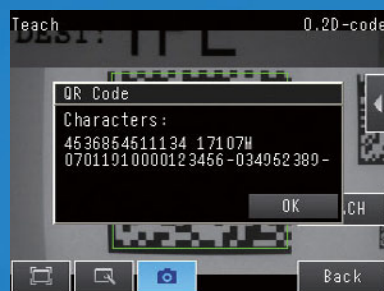
Dynamic Range

Filtering

Press the TEACH Button.



Check to see if the conditions are correct as a reference.



END

Menu Displays in Nine Languages

The nine language support for menus means that you can easily introduce systems into factory sites in other countries.

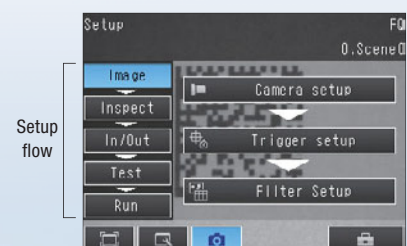
In addition, you can easily change the language on a menu.

English	German
Japanese	French
Traditional Chinese	Italian
Simplified Chinese	Spanish
Korean	



Operation Navigation

Navigation menus for operating procedures from image adjustment through to testing and starting operation are provided so that even beginners can operate the Code Reader.



FQ-CR1

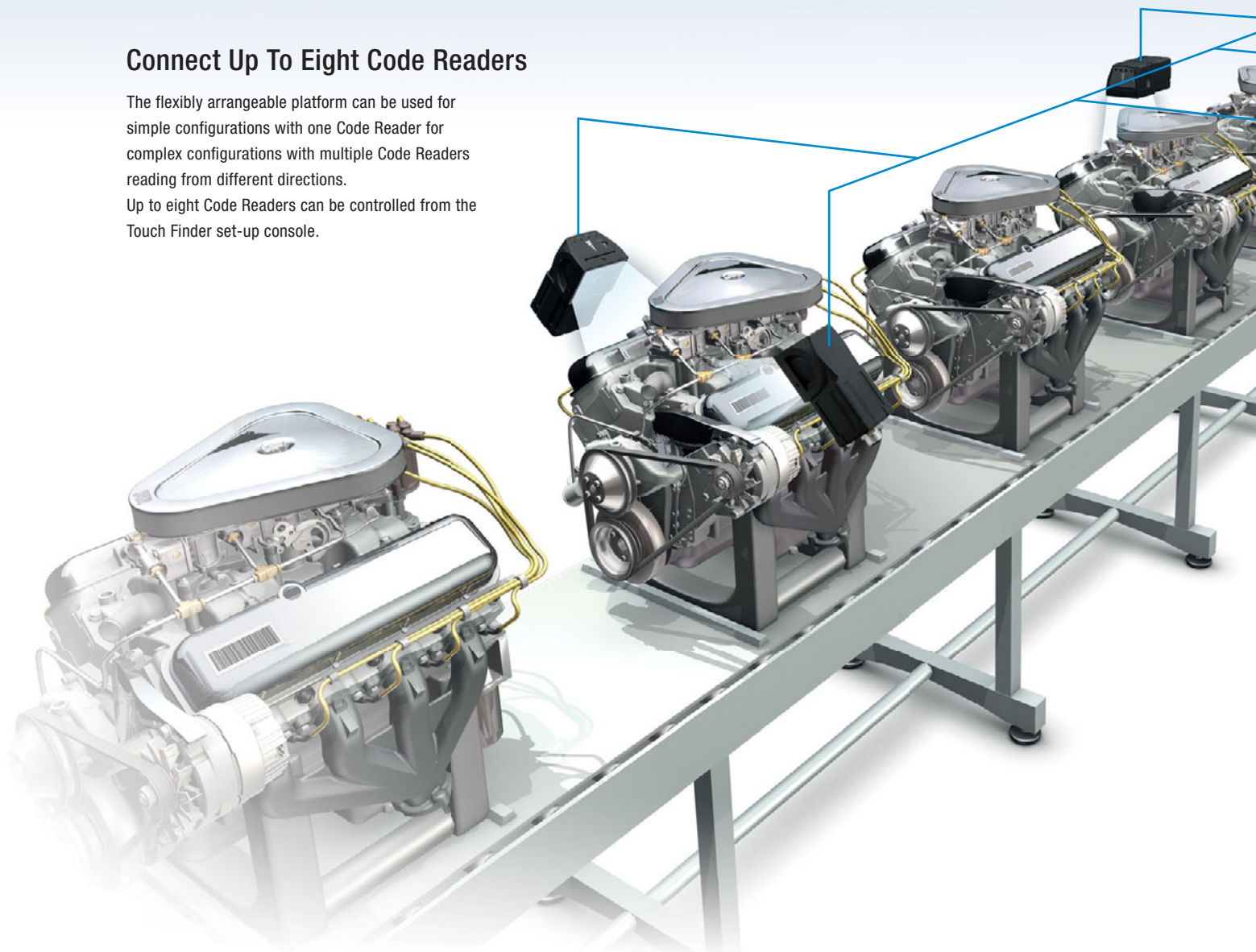
FQ-CR2

Flexible System Configuration

Connect Up To Eight Code Readers

The flexibly arrangeable platform can be used for simple configurations with one Code Reader for complex configurations with multiple Code Readers reading from different directions.

Up to eight Code Readers can be controlled from the Touch Finder set-up console.



Code Quality Management

The FQ-CR2 contains state-of-the-art algorithms that enable the reading of codes even with poor reading quality. However, even if the code quality continues to deteriorate for some reason, auto-correction and retrying are used to enable reading, making it impossible to tell where quality was lost simply from the OK/NG reading information. Here, you can use the cell recognition rate information. The cell recognition rate changes with code printing quality, position inconsistency, installation conditions, and noise. You can log the cell recognition rate and image together to manage quality trends. The logging of recent results is useful for testing when commissioning a line. Run through some sample products and log the cell recognition rate. You can then display the results in a time-based graph to see how much leeway there is in reading performance.

* For the FQ-CR1, the number of detected characters is logged instead of the cell recognition rate.

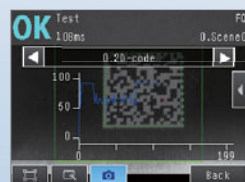
File Logging



SD Card

Cell recognition rate
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)

Logging of Recent Results



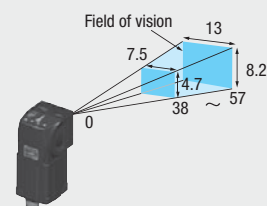
Displays the most recent 1,000 cell recognition rate in graph form.

Commissioning and Operation

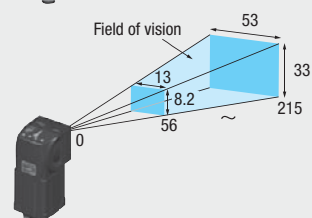
Match your field of view

No matter whether you handle large or small workpieces, the range of Omron FQ-CR Code Readers offers a perfect match. Select the FQ-CR 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.

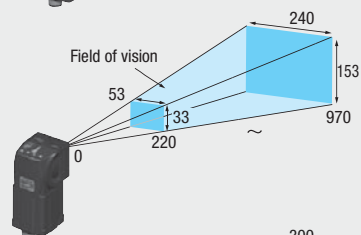
Narrow view



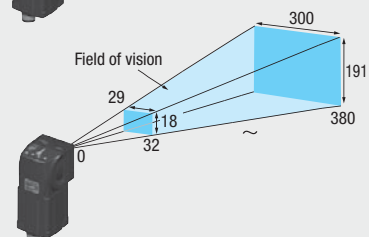
Standard



Wide View
(long-distance)

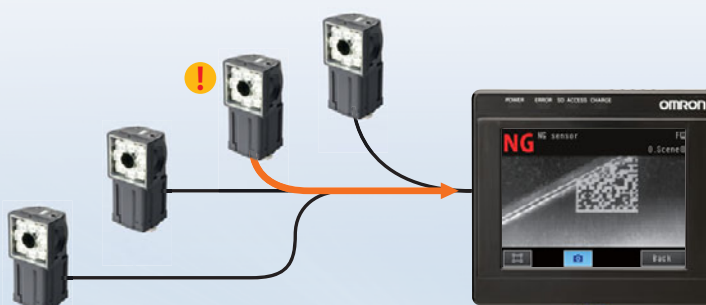


Wide View
(short-distance)



Automatic Notification of NGs

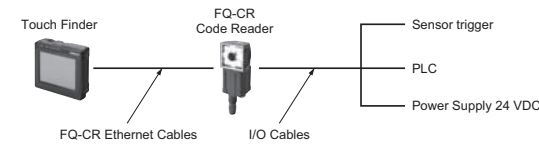
If you leave the Touch Finder installed on-site, the recent NG sensor display is very useful. Even if you are monitoring more than one Code Reader with the Touch Finder, the display automatically changes to the Code Reader where an NG occurred so that you can quickly confirm conditions.



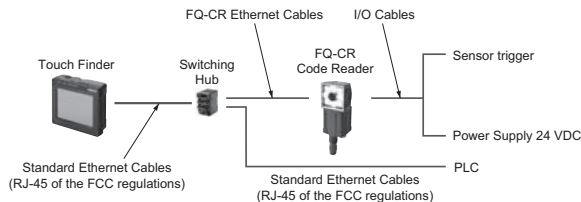
System Configuration

Connections for One Code Reader

Control by parallel input/output

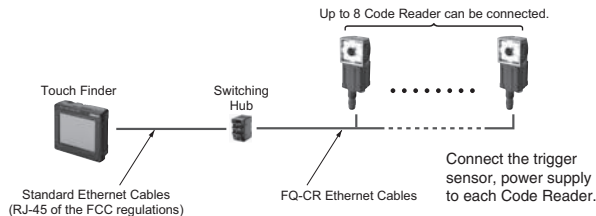


Control by Ethernet

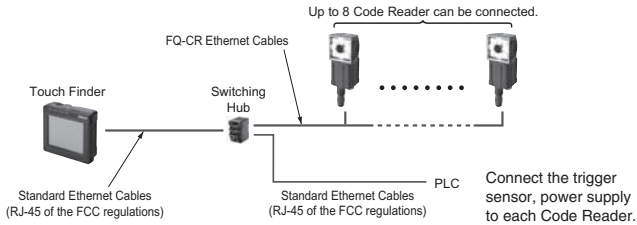


Connections for Multiple Code Reader

Control by parallel input/output



Control by Ethernet

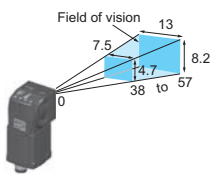


Note: If you register as a member after purchasing a Code Reader, you can download the free set-up software that runs on a PC and can be used in place of the Touch Finder. Refer to the member registration sheet for details.

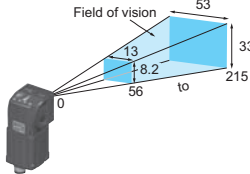
Ordering Information

Code Reader

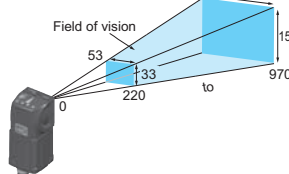
Narrow View



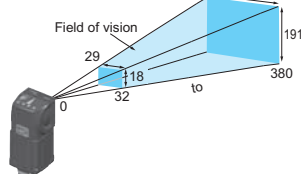
Standard



Wide View (Long-distance)



(Short-distance)



	2D Code Reader	Multi Code Reader
NPN	FQ-CR20010F-M	FQ-CR10010F
PNP	FQ-CR25010F-M	FQ-CR15010F

	2D Code Reader	Multi Code Reader
NPN	FQ-CR20050F-M	FQ-CR10050F
PNP	FQ-CR25050F-M	FQ-CR15050F

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 Code Reader to Touch Finder, Code Reader 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	Model
	3	None	0.22 A	W4S1-03B
	5	None	0.22 A	W4S1-05B
		Supported		W4S1-05C

Accessories

Application	Appearance	Name	Model
For Code Reader		Mounting Bracket (enclosed with Code Reader)	FQ-XL
		Mounting Bracket (sold separately)	FQ-XL2
		Polarizing Filter Attachment (enclosed with Code Reader)	FQ-XF1
For Touch Finder		Panel Mounting Adapter	FQ-XPM
		AC Adapter (for models for DC/AC/Battery)	FQ-AC1
		Battery (for models for DC/AC/Battery)	FQ-BAT1
		Touch Pen (enclosed with Touch Finder)	FQ-XT
		Strap	FQ-XH
		SD Card (2 GB)	HMC-SD291

Code Reader

Item		Type	2D Code Reader	Multi Code Reader
Model	NPN		FQ-CR20□□□□-M	FQ-CR10□□□□
	PNP		FQ-CR25□□□□-M	FQ-CR15□□□□
Field of vision			Refer to the table below.	
Installation distance				
Minimum resolution				
			FQ-CR2□010F-M/-CR1□010F: 0.040 mm FQ-CR2□100F-M/-CR1□100F: 0.282 mm	FQ-CR2□050F-M/-CR1□050F: 0.070 mm FQ-CR2□100N-M/-CR1□100N: 0.155 mm
Main functions	Code		2D Code (DataMatrix (EC200), QR Code)	2D Code (DataMatrix (EC200), QR Code, MicroQR Code, PDF417, MicroPDF417, Maxi Code, Aztec Code and Codablock)
				Bar code (JAN/EAN/UPC, Code39, Codabar (NW-7), ITF (Interleaved 2 of 5), Code 93, Code128/GS1-128, GS1 DataBar* (Truncated, Stacked, Omni-directional, Stacked Omni-directional, Limited, Expanded and Expanded Stacked), Pharmacode and GS1-128 Composite Code (CC-A, CC-B, CC-C))
	Image filter	Filter function (Smooth, Dilate, Erosion,Median), Retry function, Code Error Correction Position Display	None	
	Verification function	None	Supported	
	Number of simultaneous inspections	32		
	Number of registered scenes	32		
Image input	Image filter	High dynamic range (HDR), polarizing filter (attachment)	Real color, high dynamic range (HDR), polarizing filter (attachment), white balance	
	Image elements	1/3-inch monochrome CMOS	1/3-inch color CMOS	
	Shutter	1/250 to 1/32,258	1/250 to 1/30,000	
	Processing resolution	752 × 480		
Lighting	Lighting method	Pulse		
	Lighting color	White		
	LED class (See note 1.)	Class 2		
Data logging	Measurement data	In Code Reader:1,000 items (If a Touch Finder is used, results can be saved up to the capacity of an SD card.)		
	Images	In Code Reader: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 • Single measurement input (TRIG) • Control command inputs (IN0 to IN5)		
	Output signals	3 signals • Control output (BUSY) • Overall judgement output (OR) • Error output (ERROR) Note: The three output signals can be allocated for the judgements of individual inspection items.		
	Ethernet 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			Code Reader: 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	
Accessories			• Mounting Bracket (FQ-XL) (1) • Polarizing Filter Attachment (FQ-XF1) (1) • Instruction Manual • Quick Startup Guide • Member registration sheet • Warning Label	

2D Code Reader		Multi Code Reader		Field of view (See note 2.) (Horizontal × Vertical)	Installation distance	Weight
NPN	PNP	NPN	PNP			
FQ-CR20010F-M	FQ-CR25010F-M	FQ-CR10010F	FQ-CR15010F	7.5 × 4.7 to 13 × 8.2 mm	38 to 57 mm	200 g max.
FQ-CR20050F-M	FQ-CR25050F-M	FQ-CR10050F	FQ-CR15050F	13 × 8.2 to 53 × 33 mm	56 to 215 mm	
FQ-CR20100F-M	FQ-CR25100F-M	FQ-CR10100F	FQ-CR15100F	53 × 33 to 240 × 153 mm	Long-distance model: 220 to 970 mm	
FQ-CR20100N-M	FQ-CR25100N-M	FQ-CR10100N	FQ-CR15100N	29 × 18 to 300 × 191 mm	Short-distance model: 32 to 380 mm	

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 Code Reader			8 max.	
Main functions	Types of measurement displays		Last result display, Last NG display, trend monitor, histograms	
	Types of display images		Through, frozen, zoom-in, and zoom-out images	
	Data logging		Measurement results, measured images	
	Menu language		English, German, French, Italian, Spanish, Traditional Chinese, Simplified Chinese, Korean, Japanese	
Indications	LCD	Display device	3.5-inch TFT color LCD	
		Pixels	320 × 240	
		Display colors	16,777,216	
	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	3.7 V	
Ambient temperature range	Operating: 0 to 40°C Storage: -25 to 65°C (with no icing or condensation)	
Ambient humidity range	Operating and storage: 35% to 85% (with no condensation)	
Charging method	Charged in Touch Finder (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.

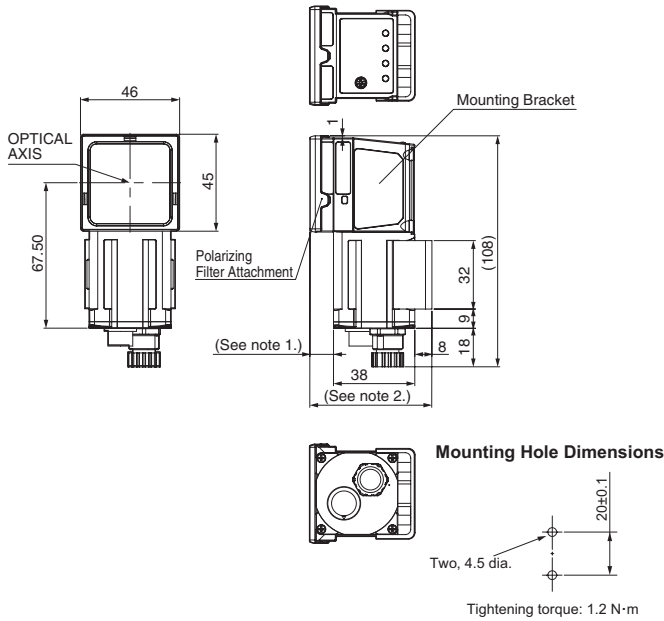
OS	Microsoft Windows XP Home Edition/Professional SP2 or higher (See note 1.) Microsoft Windows 7 Home Premium or higher (See note 1.)
CPU	Core 2 Duo 1.06 GHz or the equivalent or higher
RAM	1GB min.
HDD	500 MB min. available space (See note 2.)
Monitor	1,024 × 768 dots min.

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

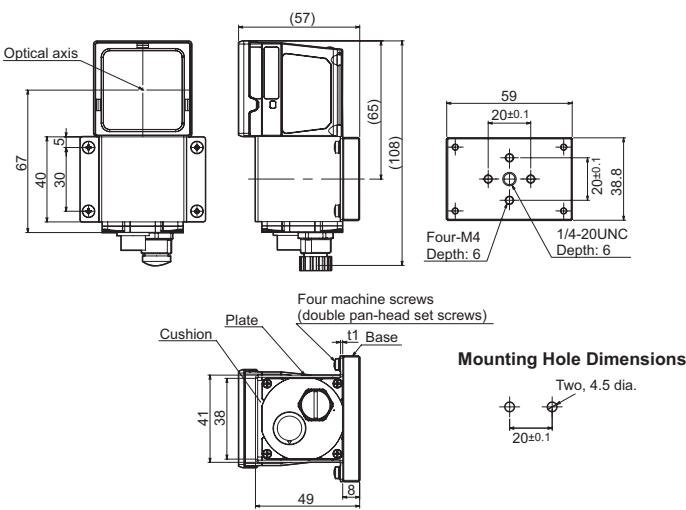
Code Reader (Dimensional drawings are provided here only for the products that have undergone design changes as of June 2012.)

FQ-CR

Mounting with the FQ-XL Mounting Bracket



Mounting with the FQ-XL2 Mounting Bracket

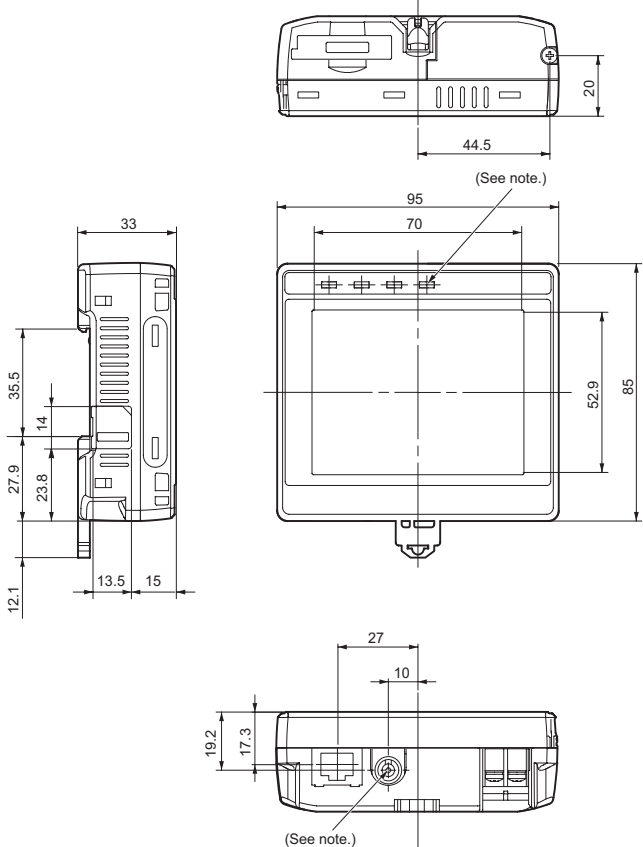


* Dimensions with the FQ-XL Mounting Bracket

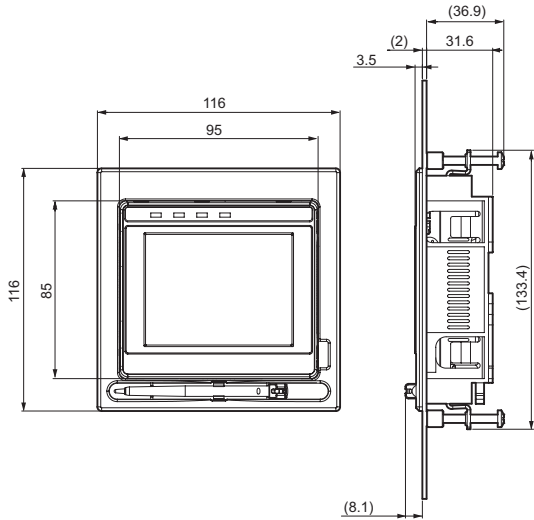
Type	Model	Note 1.	Note 2.
Narrow View, Standard	FQ-CR1□010F/-CR2□010F-M/-CR1□050F/-CR2□050F-M	11	57
Wide View	FQ-CR1□100F/-CR2□100F-M/-CR1□100N/-CR2□100N-M	3	49

Touch Finder

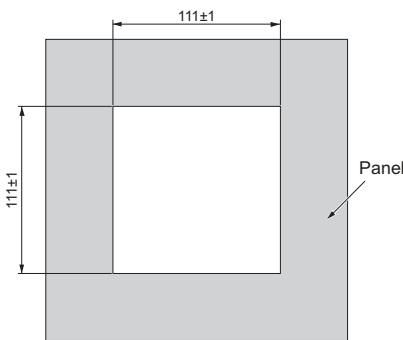
FQ-D30/-D31



Panel Mounting Adapter



Panel Cutout Dimensions



Note: 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

OMRON's exclusive warranty is that the products are free from defects in materials and workmanship for a period of one year (or other period if specified) from date of sale by OMRON.

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OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of products in the customer's application or use of the product.

At the customer's request, OMRON will provide applicable third party certification documents identifying ratings and limitations of use that apply to the products. This information by itself is not sufficient for a complete determination of the suitability of the products in combination with the end product, machine, system, or other application or use.

The following are some examples of applications for which particular attention must be given. This is not intended to be an exhaustive list of all possible uses of the products, nor is it intended to imply that the uses listed may be suitable for the products:

- Outdoor use, uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this document.
- Nuclear energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, and installations subject to separate industry or government regulations.
- Systems, machines, and equipment that could present a risk to life or property.

Please know and observe all prohibitions of use applicable to the products.

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PERFORMANCE DATA

Performance data given in this document is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of OMRON's test conditions, and the users must correlate it to actual application requirements. Actual performance is subject to the OMRON Warranty and Limitations of Liability.

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It is our practice to change model numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the product may be changed without any notice. When in doubt, special model numbers may be assigned to fix or establish key specifications for your application on your request. Please consult with your OMRON representative at any time to confirm actual specifications of purchased products.

DIMENSIONS AND WEIGHTS

Dimensions and weights are nominal and are not to be used for manufacturing purposes, even when tolerances are shown.

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OMRON shall not be responsible for the user's programming of a programmable product, or any consequence thereof.

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LED Safety



warning

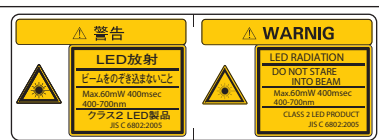
The Code Reader emits visible light, which may adversely affect the eyes in rare instances. Do not look directly into the light emitted from the Code Reader.

If the subject is a specular reflective object, protect your eyes from reflected light.



Warning Label

Attach the enclosed LED warning label to the cable or other location so that it can be seen from the side of the Code Reader.



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

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