OMRON

Smart Camera FQ2-S/CH Series



User's Manual



Introduction

Thank you for purchasing the FQ2-S/CH.

This manual provides information regarding functions, performance and operating methods that are required for using the FQ2-S/CH.

When using the FQ2-S/CH, be sure to observe the following:

- The FQ2-S/CH must be operated by personnel knowledgeable in electrical engineering.
- To ensure correct use, please read this manual thoroughly to deepen your understanding of the product.
- Please keep this manual in a safe place so that it can be referred to whenever necessary.

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User's Manual

Smart Camera FQ2-S/CH

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Errors and Omissions

Information presented by Omron Companies has been checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical or proofreading errors or omissions.

Meanings of Signal Words

The following signal words are used in this manual.

Indicates a potentially hazardous situation which, if not avoided, will result in minor or moderate injury, or may result in serious injury or death. Additionally there may be significant property damage.

Meanings of Alert Symbols

The following alert symbols are used in this manual



Anti-virus protection Install the latest commercial-quality antivirus software on the computer connected to the control system and maintain to keep the software up-to-date.
Security measures to prevent unauthorized access Take the following measures to prevent unauthorized access to our products.
Install physical controls so that only authorized personnel can access control systems and equipment.
Reduce connections to control systems and equipment via networks to prevent access from untrusted devices.
Set strong passwords and change them frequently.
Scan virus to ensure safety of USB drives or other external storages before connecting them to control systems and equipment.

area, entrance management, etc., by yourself. This product is not designed or rated for ensuring safety of persons. Do not use it for such purposes. 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. A lithium ion battery is built into the Touch Finder and may occasionally combust, explode, or burn if not treated properly. Dispose of the Touch Finder as industrial waste, and never disassemble, apply pressure that would deform, heat to 100 °C or higher, or incinerate the Touch Finder. High-voltage parts inside; danger of electrical shock. Do not open the product cover.

When constructing an intranet, communication failure may occur due to cable disconnection or the influence of unauthorized network equipment.

When using an intranet environment through a global address, connecting to an unauthorized terminal such as a SCADA. HMI or to an unauthorized server may result in network security

You must take sufficient measures such as restricting access to the terminal, using a terminal

Take adequate measures, such as restricting physical access to network devices, by means

When using a device equipped with the USB flash drive or SD Memory Card function, there is a security risk that a third party may acquire, alter, or replace the files and data in the removable media by removing the removable media or unmounting the removable media. Please take sufficient measures, such as restricting physical access to the Controller or taking appropriate management measures for removable media, by means of locking the installation

such as locking the installation area.

Data input and output protection Validate backups and ranges to cope with unintentional modification of input/output data to

- control systems and equipment.
- · Checking the scope of data

issues such as spoofing and tampering.

- · Checking validity of backups and preparing data for restore in case of falsification and abnormalities
- · Safety design, such as emergency shutdown and fail-soft operation in case of data tampering and abnormalities

Data recovery

Backup data and keep the data up-to-date periodically to prepare for data loss.

equipped with a secure function, and locking the installation area by yourself.











Precautions for Safe Use

The following points are important to ensure safety, so make sure that they are strictly observed.

- 1. Installation Environment
- Do not use the product in environments where it can be exposed to inflammable/explosive gas.
- To secure the safety of operation and maintenance, do not install the product close to high-voltage devices and power devices.
- Install the product in such a way that its ventilation holes are not blocked.
- Tighten mounting screws at the torque specified in this manual.

2. Power Supply and Wiring

- The power supply voltage must be within the rated range (24 VDC ±10%), and an AC voltage must not be used.
- · Reverse connection of the power supply is not allowed. Do not short the load of the open collector output.
- The load must be within the rated range.
- High-voltage lines and power lines must be wired separately from this product. Wiring them together or placing them in the same duct may cause induction, resulting in malfunction or damage.
- Use the products within the power supply voltages specified in this manual.
- Use the specified size of crimp terminals to wire connections. Do not connect wires that have been simply twisted together directly to the power supply or terminal block.
- Use a DC power supply with safety measures against high voltages (safety extra low-voltage circuit).
- Use independent power sources for the products. Do not use a shared power source.
- Tighten mounting screws at the torque specified in this manual.
- Always turn OFF the power supply before connecting or disconnecting cables or the power supply wiring.

3. Battery

- Do not short the positive and negative terminals of the Battery.
- Do not use the Touch Finder in an environment that exceeds the operating temperature range of the Battery. If the Touch Finder is used at temperatures that exceed the operating temperature range, the protective device may activate and prevent charging.
- Do not connect the Battery directly to a power supply or car cigarette lighter socket.
- Do not use the Touch Finder with any other type of battery.
- Turn OFF the power supply immediately if the Battery leaks or produces an odor. Electrolyte leaked from the Battery may ignite, possibly causing smoke, rupture, or fire.
- If during usage, charging, or storage, the Battery produces an odor, heats, becomes discolored, becomes misshapen, or exhibits any other unusual conditions, remove it and do not use it. Continuing to use such a Battery may result in the Battery heating, smoking, rupturing, or igniting.
- If the Touch Finder (FQ2-D31) will be installed permanently or semi-permanently, remove power supplies other than the Battery (FQ-BAT1). If the rated temperature is exceeded with the Battery inserted, the protective circuit may activate and stop the Touch Finder.

4. AC Adapter

- Use an AC cable that is suitable for the power supply and power voltage you are using.
- Do not touch the power plug with a wet hand. Doing so may result in electrical shock.
- If you notice an abnormal condition, such as smoke, abnormal heating of the outer surface, or a strange odor, immediately stop using the AC Adapter, turn OFF the power, and remove the power plug from the outlet.

Consult your dealer, as it is dangerous to attempt to repair the AC Adapter yourself.

• If the AC Adapter is dropped or damaged, turn OFF the power, remove the power plug from the outlet, and contact your dealer. There is a risk of fire if you continue using the AC Adapter.

5. Handling

Connector Cover

Always attach the connector cover when you disconnect the cable. If you do not attach the connector cover, foreign matter may enter the connection, causing malfunctions or damage.

Lens Cap

Always attach a C-mount lens cap to the lens mount when you remove the lens. If dust or dirt adhere to the imaging elements, false detection or failure may occur.

Sensor Waterproof Sheets

Do not remove or damage the waterproof sheets on the sides of the Sensor. Doing so may allow dust, dirt, or water drops to enter the Sensor and damage it.

6. EMC Standard

- EU Directive 2014/30/EU
- EN61326-1
- Electromagnetic environment : Industrial electromagnetic environment(EN/IEC 61326-1 Table 2)
- The following condition is applied to the immunity test of this product: If the level of disturbance of the video is such that characters on the monitor are readable, the test is a pass.

7. Other

- Do not use this product in safety circuits associated with nuclear power and human life.
- Do not disassemble, repair, modify, deform by pressure, or incinerate this product.
- Dispose of this product as industrial waste.
- If you notice an abnormal condition, such as a strange odor, extreme heating of any product, or smoke, immediately stop using the product, turn OFF the power, and consult your dealer.
- The Sensor surfaces become hot during use. Do not touch them.
- Do not drop or subject the products to shock.
- Use the special Sensor (FQ2-S/CH), Touch Finder (FQ2-D), Sensor Data Unit (FQ-SDU), Cables (FQ-WN, FQ-WD, FQ-WU, and FQ-VP), Battery (FQ-BAT1), and AC Adapter (FQ-AC). Using other than the specified products may cause fire, burning, malfunction or failure.
- If the product has a lock mechanism, always make sure it is locked before using the product.

Precautions for Correct Use

Observe the following precautions to prevent failure to operate, malfunctions, or undesirable effects on product performance.

1. Installation Site

Do not install this product in locations subjected to the following conditions:

- · Ambient temperature outside the rating
- · Rapid temperature fluctuations (causing condensation)
- Relative humidity outside the range of 35 to 85%
- · Direct vibration or shock
- · Strong ambient light (such as other laser beams, light from arc-welding machines, or ultraviolet light)
- · Direct sunlight or near heaters
- Strong magnetic or electric field

Also, do not install this product in locations subjected to the following conditions to ensure its protective performance as described in the specifications:

- · Presence of corrosive or flammable gases
- · Presence of dust, salt, or iron particles
- · Water, oil, or chemical fumes or spray, or mist atmospheres

Installing and Using a Sensor with Built-in Lighting

- The front-panel plate may occasionally become fogged from the inside if the Sensor is used in location with high humidity and the temperature changes drastically.
- Do not install any objects except for the special mounting brackets within the dotted lines in the following figure. The front-panel plate may become fogged from the inside.



2. Power Supply, Connection, and Wiring

- When using a commercially available switching regulator, make sure that the FG terminal is grounded.
- If surge currents are present in the power lines, connect surge absorbers that suit the operating environment.
- Before turning ON the power after the product is connected, make sure that the power supply voltage is correct, there are no incorrect connections (e.g. load short-circuit) and the load current is appropriate. Incorrect wiring may result in breakdown of the product.
- · For cables, use only the special products specified in this manual.
- · Do not subject the Cables to twisting stress. Doing so may damage the Cables.
- Always turn OFF the power supply before connecting or disconnecting Cables. The Sensor may fail if a Cable is connected or disconnected while power is being supplied.

____ p.571, p.572, p.574

- Use only combinations of the Sensor and Touch Finder specified in this manual. Using other combinations may cause malfunction or damage.
- Do not turn the power OFF in the following instances. Doing so will damage data that is in the process of being saved.

- While data is being saved in internal memory

- While data is being saved on the SD card
- The LCD panel has been made using precision technology, and sometimes a few pixels are missing in the panel. This is due to the structure of the LCD panel, and is not a malfunction.
- Influence of Temperature Changes on Optical Axis
 Due to the characteristics of the materials that are used in the Sensor, changes in the ambient temperature may cause the center of the optical axis to change by several pixels.
- Imaging Elements

Due to the specifications of the CMOS image sensors that are used in then Sensor, lines may appear in images for some measurement conditions or gain settings. These do not indicate defects or faults in the Sensor. Also, there may be some pixel defects, but these do not indicate defects or faults in the Sensor.

3. Battery

- Do not use or charge the Battery with other than the specified products.
- Do not charge the Battery with other than the specified AC adapter.
- When using the Touch Finder, the battery cover screw must be tightened.

4. AC Adapter

- During maintenance and when not using the Touch Finder for an extended time, remove the power plug from the outlet.
- Do not bend the power cable past its natural bending radius.
- Do not use the AC Adapter with other than the specified products.
- If a voltage higher than 380 V is applied, there is a risk that the capacitor will be damaged, the pressure valve will open, and vaporized gas will be emitted. If there is a possibility that a voltage higher than 380 V will be applied, use a protective device.

5. Maintenance and Inspection

Do not use thinner, alcohol, benzene, acetone or kerosene to clean the Sensor and Touch Finder. If large dust particles adhere to the Camera, use a blower brush (used to clean camera lenses) to blow them off. Do not use breath from your mouth to blow the dust off. To remove dust particles from the Camera, wipe gently with a soft cloth (for cleaning lenses). Do not use excessive force to wipe off dust particles. Scratches to the Camera might cause error.

Product manuals

The information required to use the FQ2-S/CH Series is divided into two manuals by objective: "FQ2-S/CH Series User's Manual" and "FQ2-S/CH Series User's Manual for Communications Settings". Read each manual as appropriate for your objective.

Manual	Description	Contents
(This manual) FQ2-S/CH Series User's Manual (Cat. No. Z337)	Describes the product specifications, basic settings, and other information required to use the FQ2-S/CH Series.	Product specifications Connections, wiring Camera, image adjustment Inspection item settings Test measurement, operation Troubleshooting
FQ2-S/CH Series User's Manual for Communications Settings (Cat. No. Z338)	Provides information required to oper- ate the sensor by remote control.	System configuration Sensor control method Data input/output specifications Connectable network types Communication settings Output data settings

Editor's Note

Meaning of Symbols

Menu items that are displayed on the Touch Finder LCD screen, and windows, dialog boxes and other GUI elements displayed on the PC are indicated enclosed by brackets "[]".

Visual Aids



Indicates points that are important to achieve the full product performance, such as operational precautions.



Indicates application procedures.



Indicates pages where related information can be found.



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1-1 FQ2-S/CH-series Sensors

FQ2-S1 FQ2-S2 FQ2-S3 FQ2-S4 FQ2-CH

Overview of FQ2-S/CH Series

The FQ2-S/CH Series features Sensors with integrated cameras and controllers. They can be used to easily achieve simple inspections^{*1} and measurements^{*1} and to easily read and verify IDs^{*2}.

You can use parallel controls, no-protocol communications on Ethernet, PLC Link communications on Ethernet, and EtherNet/IP communications on Ethernet as standard features. You can also use a Sensor Data Unit to enable control with full-scale parallel communications or RS-232C communications.

To set up and monitor the Sensor, you can use either the Touch Finder or the dedicated setting tool, TouchFinder for PC (hereinafter also referred to as PC Tool). For actual operation, you can use the Sensor on a stand-alone basis.

*1: FQ2-S1/S2/S3/S4 series only

*2: FQ2-S4/CH series only



After the Sensor has been set up, it can be operated alone to perform measurements without the Touch Finder or PC Tool.

Note

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Sensor Simulation function in TouchFinder for PC version.2.00 or later.

The FQ2-S Series sensor comes in a C-mount type that allows you to change the lens, and an integrated lighting type with built-in lighting. The FQ2-S/CH Series consists of the following lineup.

• FQ2-S1/S2/S3 Series

A standard full-function type to an easy-to-use single-functional type are available.

Models	els Single-function Standard High-resolution		solution	
Туре	Sensors with Built-in Lighting			Sensors with C-mounts
Model number	FQ2-S10000	FQ2-S2	FQ2-S30000-08	FQ2-S3□-13□
Number of simultane- ous measurements	1		32	
Number of registered scenes	8	32		
Partial input	Horizontally only		Horizontally and vertically	
Lens mount			C-mount	
Image processing method	Real color		Real color or monochrome (Model numbers for Monochrome Sensors end in "M.")	
Connection to Sensor Data Unit	Not possible.		Possible.	
Processing resolution	752×480		928 × 828	1,280 × 1,024

• FQ2-S4 Series

A standard type (350,000 pixels) to high-resolution types with substantially increased resolution (760,000 pixel type and 1.3 million pixel type) are available.

Pixels	350,000		760,000		1,300,000	
Туре	Sensors with		Built-in Lighting		Sensors with C-mounts	
Model	FQ2-S40000	FQ2-S4aaaa-M	FQ2-S40000-08	FQ2-S40000-08	FQ2-S4□-13	FQ2-S4□-13M
Number of simul- taneous measure- ments	32					
Number of regis- tered scenes	32					
Partial input Horizontally only		Horizontally and vertically				
Lens mount				C-mount		
Image processing method	Real color	Monochrome	Real color	Monochrome	Real color	Monochrome
Connection to Sensor Data Unit	Possible.					
Processing resolu- tion	752	2 × 480	928	8×828	1,280	0×1,024

• FQ2-CH Series

This model is specialized for ID verification and reading.

Models	Single-function		
Туре	Sensors with Built-in Lighting		
Model	FQ2-CH10M, FQ2-CH15M		
Number of simultaneous measurements	32		
Number of registered scenes	32		
Partial input	Horizontally only		
Lens mount			
Image processing method	Monochrome		
Connection to Sensor Data Unit	Possible.		
Processing resolution	752 × 480		

Comparison of functions by FQ2 Series model

 \mathbf{O} : Yes, \times : No

		Model						
F	unction	FQ2-S1/S2	FQ2-S3	FQ2-S4	FQ2-CH			
	OCR	×	×	О	O			
	Bar code	×	×	О	×			
Inspection item	2D-code	×	×	0	×			
	2D-code (DPM)	×	×	О	×			
	Search	0	0	О	Х			
	Sensitive Search	0	0	О	×			
	Shape Search II	0	О	О	×			
	Shape Search III	0	0	О	Х			
	Edge Position	0	0	О	Х			
	Edge Width	0	О	О	×			
	Edge Pitch	0	О	О	×			
	Area	0	0	О	Х			
	Color Data	0	О	О	×			
	Labeling	0	О	О	×			
	Partial input function	Horizontal only	Both horizontal and vertical	Both horizontal and vertical	Horizontal only			
Main functions	Retry Function	×	×	О	O			
	I/O expansion	×	0	o o o	О			
	RS-232C	×	0	О	О			

1-2 Measurement Process

FQ2-S1 FQ2-S2 FQ2-S3 FQ2-S4 FQ2-CH

This section describes the basic flow of the measurement process.



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1-3 Basic Operational Flow

FQ2-S1 FQ2-S2 FQ2-S3 FQ2-S4 FQ2-CH

The following flow shows the basic operation of FQ2-S/CH-series Sensors.



*1: In Setup Mode, the Sensor can be set up and adjusted, but it does not output signals on the I/O lines.

*2: In Run Mode, the Sensor performs measurements and outputs signals on the I/O lines.



Even when a Touch Finder is not connected, you can monitor parallel I/O signals and control output states using only communication commands.

The following commands are used for this purpose:

- Run Mode settings
- Terminal information get/set commands

For details on each command, refer to the following.

FQ2-S/CH Series User's Manual for Communications Settings (Cat. No. Z338) 5-1 Command Control

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1-4 Startup Display and Display Elements

FQ2-S1 FQ2-S2 FQ2-S3 FQ2-S4 FQ2-CH

Startup Display

1 When the Sensor and Touch Finder are powered on, the language selection display appears and then the Sensor List.

Select the Sensor you want to connect, and press [OK].

Sensor List		I	P Address
		1	0.5.5.101
🗹 (FQ)		1	0.5.5.100
	Ó	OK	

- **2** Sensor connection processing takes place.
- **3** If the Sensor is not detected, press the [Sensor List] button to move to the Sensor List, and check the connection settings.

Trying to communicate a sensor.
if you want to change the communication setting, please push a sensor list button.
Sensor List
Ø

Selecting the Sensors to Connect: p.388

Note

Touch Finder [DHCP] setting is OFF. In the following cases, the Sensor List will not appear. The screen of Step 4 is displayed immediately after you turn on the power.

- · The Sensor to be connected is already set
- "Auto sensor detection" is set to ON
- "Specify sensor" is set to ON

4 When the Sensor is detected, the following display will appear.

• The Setup Mode will appear if a Sensor that has not been set up is connected.



• The Run Mode will appear if a Sensor that has been set up is connected.



Note

When the Touch Finder is started, IP addresses are automatically set for each Sensor. To allocate specific IP addresses, set the IP address of each Sensor and the Touch Finder.

2-6 Setting Up Ethernet: p.67

Display Elements

This Sensor has a Setup Mode and a Run Mode.

Refer to 9-1 Menu Tables: p. 440

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Installation and Connections

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2-6 Setting Up Ethernet	67

2-1 System Configuration

FQ2-S1 FQ2-S2 FQ2-S3 FQ2-S4 FQ2-CH



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Product	Model number	Remarks
FQ Sensor	FQ2-Saaaaaaaa FQ2-Saa-aaa FQ2-CH1aaaaaM	This is the Sensor.
Touch Finder	FQ2-Doo	This is a setup console.
PC Tool		The PC Tool can be used instead of the Touch Finder. If you register as a member, you can download the free PC Tool as a special service to purchasers. Refer to the <i>Member Registration Sheet</i> that is enclosed with the Sensor for the member registration procedure and the download procedure for special member software.
Parallel Interface Sensor Data Unit ^{*1}	FQ-SDU10	You can connect a Sensor Data Unit to the I/O cable connec- tor on the Sensor and connect the Parallel Interface Sensor Data Unit to an external device. This allows you to output the results of judgment conditions, measurements from inspection items, and the results of expressions with parallel communica- tions.
RS-232C Interface Sensor Data Unit ^{*1}	FQ-SDU2	You can connect a Sensor Data Unit to the I/O cable connec- tor on the Sensor and connect the RS-232C Interface Sensor Data Unit to an external device. This allows you to use no-pro- tocol communications to send and receive commands, inspec- tion item parameters, and other data between the Sensor and the external control device that is connected with the RS-232C cable. You can also use the ACK signal (parallel command normal completion signal) for a parallel output from the Sensor Data Unit.
FQ Ethernet Cable	FQ-WN0□□-	Connects the Sensors to external devices such as the Touch Finder, computers, and PLCs.
Standard RJ45 Ethernet Cable ^{*2}		Connects the Switching Hub to the Touch Finder, computers, and PLCs. Use a connector that complies with the FCC RJ45 standard. (STP (shielded twisted-pair) cable, category 5e or 6, impedance: 100 Ω)
I/O Cable	FQ-WD000-	Connects the Sensor to the power supply and external devices.
Switching Hub	W4S1-0□□-	Used to connect multiple Sensors to one Touch Finder or PC Tool.
Sensor Data Unit cable	FQ-WU000-	This cable connects the FQ2-S3/S4/CH Sensor to the Sensor Data Unit.
Parallel cable for FQ-SDU1	FQ-VP1000-	This cable connects the Parallel Interface Sensor Data Unit to an external device.
Parallel cable for FQ-SDU2	FQ-VP2000-	This cable connects the RS-232C Interface Sensor Data Unit to an external device.
RS-232C cable (to connect to a PLC)	Recommended: XW2Z-200S-V (2 m) or XW2Z-500S- V (5 m)	This cable connects the RS-232C Interface Sensor Data Unit to an external device.

*1: *2:

FQ2-S1______and FQ2-S2______re not supported. The shape and dimensions of the Ethernet connector plug and jack are specified in ISO/IEC8877:1992 (JIS X 5110:1996) and RJ-45 of the FCC regulations. To prevent connector connection failures, the structure of the jack of this product does not allow insertion of plugs that do not comply with the standard. If a commercially available plug cannot be inserted, it is likely that the plug is non-compliant.

N

Important

Do not connect network devices other than PLCs on the same network as the Touch Finder or computer. If another device is connected, the responsiveness of displays and settings of the Touch Finder or computer may become slow.

Connection Compatibility

		Other connection								
Type of connection to FQ2-S/CH		EtherNet/ n IP	PLC Link on Ether- P net IN	PROF- INET	TCP no- protocol communi- cations on Ethernet	UDP no- protocol communi- cations on Ether- net	FINS/ TCP no- protocol communi- cations on Ethernet	RS-232C *1	Parallel communica- tions	
									Sensor's standard parallel commu- nications	Parallel Inter- face ^{*2}
EtherNet/	IP		No	No	Yes	Yes	Yes	Yes	Yes	Yes
PLC Link on Ethernet		No		No	Yes	Yes	Yes	Yes	Yes	Yes
PROFINET		No	No		Yes	Yes	Yes	Yes	Yes	Yes
TCP no-protocol com- munications on Ethernet		Yes	Yes	Yes		No	No	No	Yes	Yes
UDP no-protocol com- munications on Ethernet		Yes	Yes	Yes	No		No	No	Yes	Yes
FINS/TCP no-protocol communications on Ethernet		Yes	Yes	Yes	No	No		No	Yes	Yes
RS-232C *1		Yes	Yes	Yes	No	No	No		Yes	No
Parallel commu- nications	Sensor's standard par- allel commu- nications	Yes	Yes	Yes	Yes	Yes	Yes	Yes		No
	Parallel Inter- face ^{*2}	Yes	Yes	Yes	Yes	Yes	Yes	No	No	

*1: *2 This applies when an RS-232C Interface Sensor Data Unit is connected.

This applies when a Parallel Interface Sensor Data Unit is connected.

Note

Connections Across Network Routers

You can connect to a Sensor on a different network than the Touch Finder or PC Tool through a router.

- If you are connecting to the Sensor from the Touch Finder / PC Tool, directly specify the IP address of the Sensor to connect. Auto Sensor Connection cannot be used to connect to a sensor on a different network over a router because the Sensor cannot be detected.
- · Set a fixed IP address for the Sensor.
- · When connected over a router, the connection recovery function cannot be used.

Yes: Supported, No: Not supported
2-2 Part Names and Functions

FQ2-S1 FQ2-S2 FQ2-S3 FQ2-S4 FQ2-CH

FQ2-Socoolaria (Sensors with Built-in Lighting) FQ2-CH1ocoolaria (Sensors with Built-in Lighting)



No.	Name		Description
(1)	Lighting		LEDs for illumination
(2)	Camera lens		This lens can be focused.
(3)	I/O Cable connector		An FQ-WD or FQ-WU I/O Cable is used to connect the Sensor to the power supply and external I/O.
(4)) Ethernet cable connector		An FQ-WN Ethernet Cable is used to connect the Sensor to external devices such as PLCs, the Touch Finder, or computers.
(5)	Focus adjustment screw		Used to adjust the focus of the image.
	Operation indicators	OR	Lights orange when the overall judgment output (OR) signal turns ON.
		ETN	Lights orange during Ethernet communications.
(6)		ERROR	Lights red when an error occurs. 8-1 Error Histories: p.432
		BUSY	Lights green when the Sensor is executing a process. * You can change the BUSY indicator to a RUN indicator. This indicator is set by Default to a BUSY indicator, but if you change it to a RUN indicator, it will light green during operation. Changing the Sensor's BUSY Indicator: p.429
(7)	(7) Mounting Bracket		Used to mount the Sensor. The Mounting Bracket can be attached to the front, left side, right side, or back of the Sensor.

FQ2-Society (Sensors with C-mounts)



No.	Name		Description
(1)	C-mount lens mounting surface		The C-mount lens and extension tube are attached here. Determine the appropriate CCTV lens (C-mount lens) to use based on the field of view required for the size of the measurement object.
(2)	I/O Cable con	nector	An FQ-WD or FQ-WU I/O Cable is used to connect the Sensor to the power supply, external I/O, and Sensor Data Unit.
(3)	Ethernet Cable	e connector	An FQ-WN Ethernet Cable is used to connect the Sensor to external devices such as the Touch Finder or computers.
		OR	Lights orange when the overall judgement output (OR) signal turns ON.
		ETN	Lights orange during Ethernet communications.
(4)	Operation indicators	ERROR	Lights red when an error occurs. 8-1 Error Histories: p.432
(4)		BUSY	Lights green when the Sensor is executing a process. * You can change the BUSY indicator to a RUN indicator. This indicator is set by Default to a BUSY indicator, but if you change it to a RUN indicator, it will light green during operation. Changing the Sensor's BUSY Indicator: p.429
(5)	(5) Mounting holes		These mounting holes for M3 screws are used to mount the Camera and to mount to the base. There are mounting holes on the top, bottom, left, and right surfaces.
(6)	Mounting base (enclosed)		The mounting base has 1/4-20UNC threads and is used to mount the Sen- sor. The base can be attached to the bottom, top, left, or right side of the Sensor. * We recommend mounting the Sensor with the mounting screw holes. The mounting base does not necessarily need to be used.
(7)	C-mount cover		This cover is attached to the C-mount lens fitting when a lens is not attached.
(8)	Connector cover		This cover is attached to the connection when an Ethernet Cable is not connected.

Touch Finder



No.	N	lame	Description		
		POWER	Lights green when the Touch Finder is turned ON.		
(1)	Operation	ERROR	Lights red when an error occurs. 8-1 Error Histories: p.432		
	indicators	SD ACCESS	Lights yellow when an SD card is inserted. Flashes yellow when the SD card is being accessed.		
		CHARGE ^{*1}	Lights orange when the Battery is charging.		
(2)	LCD/touch par	nel	Displays the setting menu, measurement results, and images input by the camera.		
(3)	SD card slot		An SD card can be inserted.		
(4)) Battery cover ^{*1}		The Battery is inserted behind this cover. Remove the cover when mounting or removing the Battery.		
(5)	Power supply switch		Used to turn the Touch Finder ON and OFF.		
(6)	Touch pen holder		The touch pen can be stored here when it is not being used.		
(7)	Touch pen		Used to operate the touch panel.		
(8)	DC power sup	ply connector	Used to connect a DC power supply. Image: Wiring the Touch Finder: p. 63		
(9)	Slider		Used to mount the Touch Finder to a DIN Track.		
(10)	D) Ethernet port		Used when connecting the Touch Finder to the Sensor with an Ethernet cable. Insert the connector until it locks in place.		
(11)	Strap holder		This is a holder for attaching the strap.		
(12)	AC power sup	ply connector ^{*1}	Used to connect the AC adapter.		

*1: Applicable to the FQ2-D31 only.



Front Surface of Parallel Interface Sensor Data Unit



Back Surface of Parallel Interface Sensor Data Unit



RS-232C Interface Sensor Data Unit

No.	Name		Description
(1)	Sensor connector		Connects to the FQ2-S3/S4/CH.
(2)	Power supply and ground terminal block		Connects to the 24-V power source and the ground line.
(3)	Parallel I/O co	nnector	Connects to the I/O connector.
		POWER/ ERROR	Lights green when power is being supplied. Lights red when an error occurs.
	I/O indicators	RUN	Lights green during operation.
		BUSY	Lights yellow when the Sensor is executing a process.
(4)		SENSOR	Lights yellow when the Sensor is connected.
		OR-OK	Lights green when the overall judgment result is OK.
		OR-NG	Lights red when the overall judgment result is OFF or an error occurs.
		232C_COM	Lights yellow during RS-232C communications. (Provided only on the FQ-SDU2□.)
(5)	DIN Track mounting section		Mounts the Sensor Data Unit to a DIN Track.
(6)) Slider		Used to secure the Sensor Data Unit to a DIN Track.
(7)	RS-232C conr	nector	Connects to the RS-232C connector.
(8)	Parallel I/O connector		Connects to the I/O connector.

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Installing the Sensor

FQ2-Saaaaa/FQ2-CH1aaaa-M (Sensors with Built-in Lighting)

Installation Procedure

1 Align the tabs on one side of the Mounting Bracket with the slot on the Sensor.

The FQ-XL Mounting Bracket can be attached to the back, side, or front of the Sensor.

2 Press the Mounting Bracket onto the Sensor until the other tabs click into place.



3 Use the following optical charts to check the field of view and installation distance of the Sensor so that it is mounted at the correct position.

Tightening torque (M4): 1.2 N·m



Important

 There is a certain amount of deviation among Sensors in the center of the optical axis. For this reason, when installing the Sensor, check the center of the image and the field of view on the LCD monitor of the Touch Finder and in the PC Tool.

Removal Procedure

1 Insert a flat-blade screwdriver between the Mounting Bracket and the Sensor case on either side and remove the Mounting Bracket.



Installation

Installation Procedure

Directly Mounting the Sensor



Mount the Sensor with M3 screws.

Tightening torque: 0.54 N·m Effective depth of mounting holes: 4 mm

Important

Refer to the dimension drawings in the appendix for the positions of the screw holes.



Mounting the Sensor to the Base

1 You can attach the mounting base to the bottom, top, left, or right surface. (Recommended mounting screw tightening torque: 0.54 N·m)

Tightening torque: 0.54 N·m Effective depth of mounting holes: 4 mm



Mount the Sensor with M3 screws.

Tightening torque: 0.54 N·m Effective depth of mounting holes: 4 mm



Lens Selection

Use the following optical diagrams to determine the Lens, camera installation distance, and detection range.

Optical Diagrams

The following values are estimates only. Adjustment is required after installing the camera.

3Z4S-LE SV-DDDH High-resolution, Low-distortion Lenses



3Z4S-LE SV-



The X axis in the above optical diagrams represent field of view (mm)^{*1}.

The Y axis represents the camera installation distance (mm) or WD (mm). These optical diagrams show the relationship between the detection range and installation distance for different CCTV Lenses. The values vary for each Lens.

Pay close attention to the Lens that you are using when you refer to these optical diagrams.

The extension tube thickness to be used is given as, for example "t5.0," on the graphs. "t0" means that a extension tube is not required. "t5.0" means that you must use a 5-mm extension tube.



*1: The Y axis in the optical charts represents the height of the field of view.

Example: If you use an 3Z4S-LE SV-2514H Lens for a measurement object that requires field of view of 35 mm, the camera installation distance must be 200 mm and a 2-mm extension tube is required.



Lens Models and Dimensions



Lens model	Focal length	Brightness	Maximum out- side diameter	Total length	Filter size
3Z4S-LE SV-0614H	6.1 mm	F1.4	42 mm	57.5 mm	M40.5 P0.5
3Z4S-LE SV-0814H	8.0 mm	F1.4	39 mm	52.5 mm	M35.5 P0.5
3Z4S-LE SV-1214H	12.3 mm	F1.4	30 mm	51.0 mm	M27 P0.5
3Z4S-LE SV-1614H	16.2 mm	F1.4	30 mm	47.5 mm	M27 P0.5
3Z4S-LE SV-2514H	25.0 mm	F1.4	30 mm	36.0 mm	M27 P0.5
3Z4S-LE SV-3514H	35.01 mm	F1.4	44 mm	45.5 mm	M35.5 P0.5
3Z4S-LE SV-5014H	50.0 mm	F1.4	44 mm	57.5 mm	M40.5 P0.5
3Z4S-LE SV-7525H	75 mm	F2.5	36 mm	49.5 mm	M34.0 P0.5
3Z4S-LE SV-10028H	100 mm	F2.8	39 mm	66.5 mm	M37.5 P0.5

3Z4S-LE SV-DDDH High-resolution, Low-distortion Lenses

3Z4S-LE SV-□□□□V-series Lenses

Lens model	Focal length	Brightness	Maximum out- side diameter	Total length	Filter size
3Z4S-LE SV-03514V	3.5 mm	F1.4	29.5 mm	30.4 mm	-
3Z4S-LE SV-04514V	4.5 mm	F1.4	29.5 mm	29.5 mm	-
3Z4S-LE SV-0614V	6.20 mm	F1.4	29 mm	30.0 mm	M27 P0.5
3Z4S-LE SV-0813V	8.05 mm	F1.3	28 mm	34.0 mm	M25.5 P0.5
3Z4S-LE SV-1214V	12.43 mm	F1.4	29 mm	29.5 mm	M27 P0.5
3Z4S-LE SV-1614V	16.34 mm	F1.4	29 mm	24.0 mm	M27 P0.5
3Z4S-LE SV-2514V	25.17 mm	F1.4	29 mm	24.5 mm	M27 P0.5
3Z4S-LE SV-3518V	34.75 mm	F1.8	29 mm	33.5 mm	M27 P0.5
3Z4S-LE SV-5018V	47.97 mm	F1.8	32 mm	37.0 mm	M30.5 P0.5
3Z4S-LE SV-7527V	76.71 mm	F2.7	32 mm	42.0 mm	M30.5 P0.5
3Z4S-LE SV-10035V	95.4 mm	F3.5	32 mm	43.9 mm	M30.5 P0.5

Extension tubes

Extension tubes are inserted between the Lens and the camera to adjust the focus. You can use up to seven extension tubes to achieve the required thickness.



Model	Maximum out- side diameter			Thicknes	S		
3Z4S-LE SV-EXR	31 mm	7-piece set Thickness: 0.5 mm	1 mm 2 mm	5 mm 10	0 mm	20 mm	40 mm
					Ę	Į.	Log Log

Important

- Do not stack 0.5 mm, 1.0 mm, and 2.0 mm extension tubes. These sizes fit between the Lens and the threaded portion of other extension tubes. If two or more are stacked together, the screw cannot be tightened securely.
- The extension tubes may need to be reinforced depending on the vibration conditions if over 30 mm is used.

Installing the Touch Finder

Installation Precautions

Install the Touch Finder in the following orientation to allow sufficient heat dissipation.



Do not mount it in the following orientations.



Important

• To improve ventilation, leave space on both sides of the Touch Finder. The distance between the Touch Finder and other devices should be at least that shown in the following diagram.



- Make sure that the ambient temperature is 50°C or lower. If it exceeds 50°C, install an cooling fan or an air conditioner and maintain the temperature at 50°C or lower.
- To prevent interference by noise, do not mount the Sensor on panels which contain high-voltage devices.
- To keep the level of noise from the surrounding environment to a minimum, install the Sensor and Touch Finder at least 10 m away from power lines.

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Mounting to DIN Track

Installation Procedure

- **1** Press the slider on the Touch Finder to the top.
- 2 Hook the clip at the top of the Touch Finder on to the DIN Track.
- **3** Press the Touch Finder onto the DIN Track until the bottom clip clicks into place.



Important

- Attach End Plates (sold separately) on the sides of the Touch Finder on the DIN Track.
- If other devices will be installed next to the Touch Finder on the same DIN Track, make sure that sufficient space is kept between the devices as indicated on previous page.
- Always hook the clip at the top of the Touch Finder on the DIN Track first. If the lower clip is hooked on first, the Touch Finder will not be mounted very securely.

Removal Procedure

- **1** Pull down on the slider on the Touch Finder.
- 2 Lift the Touch Finder at the bottom and remove it from the DIN Track.



Mounting to a Control Panel

The Touch Finder can be mounted on a panel using the FQ-XPM Panel Mounting Adapter.

Important

• Always turn OFF the Touch Finder power before attaching or detaching the Panel Mount Adapter. Attaching or detaching with the power turned ON may cause a failure.

Installation Procedure

1 Set the Touch Finder in the Panel Mount Adapter.



2 Press the slider up on the Touch Finder.



3 Create holes in the panel for mounting. Refer to the following page for hole dimensions.



Dimensions: p.564



Connect the cable to the Touch Finder.

- 5 Mount the Touch Finder with the Panel Mount Adapter from the front of the panel.
- 6 Hook the hooks on the Mounting Bracket in the four holes of the Panel Mount Adapter and secure them with screws. (Tightening torque: 1.2 N·m)

Check that the Touch Finder is attached properly to the Panel.





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1 Take off the 4 Panel Mount Adapter's crews, then remove these Mounting Bracket.



- **2** Remove the Touch Finder with the Panel Mount Adapter from the panel.
- **3** Take off a cable from the Touch Finder.



- **4** Press down the look, then you are able to unlock.
- **5** There are four Snap-fit parts on the back of the Touch Finder. For remove the Snapfit part's hooks, put in a slotted screwdriver to these parts with pushing the Touch Finder.
- 6 Remove the Panel Adapter from the Touch Finder.



Using the Touch Finder as a Portable Device (with Battery)

The Touch Finder with a Battery can be used as a portable device. Use the strap when carrying it to prevent dropping it.

There are two types of straps (FQ-XH, sold separately), a Neck Strap and a Hand Strap.



1 Attach the Mini-strap to the Touch Finder.

There are a total of four holes for attaching the Mini-strap on the left and on the right of the Touch Finder.



2 Connect the Neck Strap or Hand Strap to the Mini-strap.



Mini-strap

Neck Strap or Hand Strap

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Mounting Sensor Data Units

Mounting to DIN Track

Installation Procedure

- 1 Lock the sliders at the top and bottom of the Sensor Data Unit.
- **2** Press the slider on the Sensor Data Unit to the top.
- **3** Hook the clip at the top of the Sensor Data Unit on to the DIN Track.
- **4** Press the Sensor Data Unit onto the DIN Track until the bottom clip clicks into place.

Important

- Attach End Plates (sold separately) on the sides of the Sensor Data Unit on the DIN Track.
- Always hook the clip at the top of the Sensor Data Unit on the DIN Track first. If the lower clip is hooked on first, the Touch Finder will not be mounted very securely.

Removal Procedure

- **1** Pull down on the slider on the Sensor Data Unit.
- 2 Lift the Sensor Data Unit at the bottom and remove it from the DIN Track.



2-4 Launching the Program for First Time

FQ2-S1 FQ2-S2 FQ2-S3 FQ2-S4 FQ2-CH

Set the Language settings at the first launch of TouchFinder or TouchFinder for PC. If you use Logging function or Calendar validation of OCR, Time settings is also required.

Language settings

The Language setting window appears at the first launch.





2 A dialog for selecting language appears.

Langu	lage	
日本	n Language	^
Engl		
Deuts	Change the setting to the specified language.	
Frang		
Ital	Yes No	
Espai	io I	\sim
	Ó	

3 The screen changes to the selected language.

Time settings

· When using the TouchFinder

TouchFinder uses Day and Time information of your PC.



- (Run Mode) [TF settings]
 - 1 Touch the Time settings of TouchFinder.



- 2
- Set day and time of TouchFinder.

Adjust the time and date.						
Year		Month		Day		
	2015		11		2	
Hour		Min		Sec		
	15		53		33	
	Z	Ø	OK		Cancel	

- 3
- Touch the OK button.

When you use the PC Tool

If you want to change these, perform the following procedure:



Click the Day and Time in Control Panel of Windows.



Set the Day and Time.



Wiring the Sensor

Connect the I/O Cable to the I/O Cable connector located at the bottom of the Sensor.



Important

- Cut off lines that are not required so that they do not come into contact the other signal lines.
- Do not allow the load current to exceed 50 mA.

The output circuit may be damaged if the load current exceeds 50 mA.

Classification	Signal	Application
	Power supply (24 V)	These terminals are for the external power supply (24 V).
Power supply	GND	Important Wire the power supply separately from other devices. If the wiring for other devices is placed together or in the same duct as the wiring for the Sensor, the influences of electromagnetic induction may cause the Sensor to mal- function or may damage it.
Inputs	TRIG	This terminal is the trigger signal input.
	IN0 to IN5	These are the command input terminals.
	OUT0 (OR)	By Default, this is the OR output signal (overall judgment). The assignment can be changed to RUN, READY, an individual judgment signal from OR0 to OR31, the STGOUT (strobe trigger output), or an expression judgment from 0 to 31.
Outputs	OUT1 (BUSY)	By Default, this is the BUSY output signal. The assignment can be changed to RUN, READY, an individual judgment signal from OR0 to OR31, the STGOUT (strobe trigger output), or an expression judgment from 0 to 31.
	OUT2 (ERROR)	By Default, this is the ERROR output signal. The assignment can be changed to RUN, READY, an individual judgment signal from OR0 to OR31, the STGOUT (strobe trigger output), or an expression judgment from 0 to 31.

Note

For the IN/OUT type of the Sensor and Sensor Data Unit, use the same IN/OUT type (NPN/PNP).

I/O Signal Circuit Diagrams



Important

Preventing Chattering

- The Sensor is equipped with an anti-chattering function, but if the chattering is 100 µs or longer, a faulty input may occur. (Input signals of 99 µs or shorter are ignored. Signals of 100 µs or longer are treated as input signals.)
- Use no-contact output devices (e.g., SSR or PLC transistor output) for the input signals. If contacts (e.g., relay) are used, chattering may cause the trigger to be input again during execution of a measurement.

Power Supply Specifications When a Switching Regulator Is Connected

Use a power supply that meets the following specifications. (The power supply is sold separately.)

	Description			
	When connected to	When connected to		
Item	FQ2-Saaaaa-aaa or	FQ2-Soo-ooo		
	FQ2-CH10000-M			
Power supply voltage	24 VDC (21.6 to 26.4 V)			
Recommended Power Supply	S8VS-06024 (24 VDC, 2.5 A)	S8VS-01524□ (24 VDC, 0.65 A)		
External power supply terminal screws	M4 (tightening torque: 1.2 N·m)	·		

Important

Supply power from a DC power supply for which measures have been applied to prevent high voltages (e.g., a safety extra low voltage circuit).

If UL certification is required for the overall system, use a UL Class II DC power supply.

Wiring Sensor Data Units

Parallel Interface Sensor Data Unit (FQ-SDU1)



Pins 1 to 30 and pins 31 to 60 are for separate connectors. One FQ-VP1 == is required for each connector.

Application
These terminals are for the external power supply (24 V).
 Important Wire the power supply separately from other devices. If the wiring for other devices is placed together or in the same duct as the wiring for the Sensor, the influence of electromagnetic induction may cause the Sensor to malfunction or may damage it. Do not allow the load current to exceed 50 mA. The output circuit may be damaged if the load current exceeds 50 mA.
This is the frame ground terminal. Connect the ground wire by a D-type ground (ground resistance of 1000 or less)

Note

For the IN/OUT type of the Sensor and Sensor Data Unit, use the same IN/OUT type (NPN/PNP).

FQ-SDU10/SDU15 Terminal Signal Names

Pin	Signal	FQ-VP1 Wire color	IN/ OUT	Function	Pin	Signal	FQ-VP1 Wire color	IN/ OUT	Function
1	COMOUT1	Brown	-	Output signal com- mon (DO0 to DO15)	31	COMIN0	Brown	-	Input signal common (all inputs except TRIG)
2	NC*1	Red	-		32	COMIN1	Red	-	Input signal common (TRIG)
3	D0	Orange	OUT	Data output	33	TRIG	Orange	IN	Measurement trigger input
4	D1	Yellow	OUT	Data output	34	NC ^{*1}	Yellow	-	
5	D2	Green	OUT	Data output	35	NC ^{*1}	Green	-	
6	D3	Blue	OUT	Data output	36	RESET	Blue	IN	Reset input
7	D4	Purple	OUT	Data output	37	IN0	Purple	IN	Command input
8	D5	Gray	OUT	Data output	38	IN1	Gray	IN	Command input
9	D6	White	OUT	Data output	39	IN2	White	IN	Command input
10	D7	Black	OUT	Data output	40	IN3	Black	IN	Command input
11	D8	Brown	OUT	Data output	41	IN4	Brown	IN	Command input
12	D9	Red	OUT	Data output	42	IN5	Red	IN	Command input
13	D10	Orange	OUT	Data output	43	IN6	Orange	IN	Command input
14	D11	Yellow	OUT	Data output	44	IN7	Yellow	IN	Command input
15	D12	Green	OUT	Data output	45	NC ^{*1}	Green	-	
16	D13	Blue	OUT	Data output	46	NC ^{*1}	Blue	-	
17	D14	Purple	OUT	Data output	47	DSA	Purple	IN	Data send request signal
18	D15	Gray	OUT	Data output	48	NC ^{*1}	Gray	-	
19	NC ^{*1}	White	-		49	NC ^{*1}	White	-	
20	NC ^{*1}	Black	-		50	NC ^{*1}	Black	-	
21	NC ^{*1}	Brown	-		51	NC ^{*1}	Brown	-	
22	NC ^{*1}	Red	-		52	ACK	Red	OUT	Command execution completed flag
23	NC ^{*1}	Orange	-		53	RUN	Orange	OUT	ON during measure- ment mode
24	NC ^{*1}	Yellow	-		54	BUSY	Yellow	OUT	ON during process execution
25	NC ^{*1}	Green	-		55	OR	Green	OUT	Overall judgement result
26	NC ^{*1}	Blue	-		56	ERROR	Blue	OUT	ON during error
27	NC ^{*1}	Purple	-		57	STGOUT	Purple	OUT	Strobe trigger out- put ^{*2, *3}
28	NC ^{*1}	Gray	-		58	SHTOUT	Gray	OUT	Shutter trigger out- put ^{*4}
29	NC ^{*1}	White	-		59	GATE	White	OUT	ON during the set out- put time.
30	NC ^{*1}	Black	-		60	COMOU T0	Black	-	Output signal common (ACK, RUN, BUSY, OR, ERROR, STGOUT, SHTOUT, and GATE)

- *1: Leave all signal terminals that are labeled "NC" open.
- *2: You can select whether to turn the external lighting ON (Positive) or OFF (Negative) when the signal turns ON. (The setting is called the strobe output polarity.)
 - FQ2-S/CH Series User's Manual for Communications Settings (Cat. No. Z338) Section 2 Controlling Operation and Outputting Data with a Parallel Connection
- *3: This control signal is used to turn ON external lighting when an image is taken. Connect this signal to external lighting.
- *4: This signal is output to an external device when exposure of the imaging elements is completed. If you want to move the Sensor to the next measurement location after a measurement is completed, move the Sensor only after this signal turns ON. Shutter Output Signal (SHTOUT)



The SHTOUT signal turns ON for approximately 10 ms (fixed) when the shutter time (exposure period) elapses after the trigger is input from an external device.

RS-232C Interface Sensor Data Unit (FQ-SDU2)



For the I/O connector harness, use an FQ-VP2 = Parallel Cable for the FQ-SDU2 or a MIL-standard harness, such as the OMRON XZ2F. (The Cables are sold separately.)

Pins 1 to 16 and pins 17 to 32 are for separate connectors. One FQ-VP2 == is required for each connector.

Application
These terminals are for the external power supply (24 V).
 Important Wire the power supply separately from other devices. If the wiring for other devices is placed together or in the same duct as the wiring for the Sensor, the influence of electromagnetic induction may cause the Sensor to malfunction or may damage it. Do not allow the load current to exceed 50 mA. The output circuit may be damaged if the load current exceeds 50 mA.
This is the frame ground terminal. Connect the ground wire by a D-type ground (ground resistance of 100Ω or less).

FQ-SDU20/SDU25 Parallel Pin Signal Names

Pin	Signal	FQ-VP2 Wire color	IN/ OUT	Function
1	IN0	Brown	IN	Command input
2	IN1	Red	IN	Command input
3	IN2	Orange	IN	Command input
4	IN3	Yellow	IN	Command input
5	IN4	Green	IN	Command input
6	IN5	Blue	IN	Command input
7	NC ^{*1}	Purple	-	
8	NC ^{*1}	Gray	-	
9	NC ^{*1}	White	-	
10	NC ^{*1}	Black	-	
11	NC ^{*1}	Brown	-	
12	NC ^{*1}	Red	-	
13	NC ^{*1}	Orange	-	
14	NC ^{*1}	Yellow	-	
15	NC ^{*1}	Green	-	
16	NC ^{*1}	Blue	-	

<u> </u>	0. 1			_
Pin	Signal	FQ-VP2	IN/	Function
		Wire color	OUT	
17	COMIN0	Brown	-	Input signal common (RESET and IN0 to IN5)
18	COMIN1	Red	-	Input signal common (TRIG)
19	TRIG	Orange	IN	Measurement trigger input
20	NC ^{*1}	Yellow	-	
21	NC ^{*1}	Green	-	
22	RESET	Blue	IN	Reset input
23	NC*1	Purple	-	
24	ACK	Gray	OUT	Command execution completed flag
25	RUN	White	OUT	ON during measurement mode
26	BUSY	Black	OUT	ON during process exe- cution
27	OR	Brown	OUT	Overall judgment result
28	ERROR	Red	OUT	ON during error
29	STGOUT	Orange	OUT	Strobe trigger output
30	SHTOUT	Yellow	OUT	Shutter trigger output
31	NC ^{*1}	Green	-	
32	COMOUT0	Blue	-	Output signal common (ACK, RUN, BUSY, OR, ERROR, STGOUT, and SHTOUT)

*1: Leave all signal terminals that are labeled "NC" open.

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RS-232C Connector

	Pin No.	Signal name	Function
	1	NC	Not connected
5 0	2	RD	For RS-232C
4	3	SD	For RS-232C
3 8	4	NC	Not connected
2 7	5	GND	Signal ground
	6	NC	Not connected
	7	NC	Not connected
	8	NC	Not connected
	9	NC	Not connected

Pin numbers will depend on the external device being connected. Refer to the manual for the personal computer or PLC being connected.

Use a compatible connector. The followings are recommended items.

	Manufacturer	Model
Socket	OMRON Corporation	XM3D-0921
Hood OMRON Corporation		XM2S-0911

Wiring

The maximum cable length is 15m.

• RS-232C



Connection Method

Align the connector with the socket and press it straight into place, then fix it with the screws on both sides of the connector.

Important

Turn OFF the power supply before connecting or disconnecting a Cable. Peripheral devices may be damaged if the cable is connected or disconnected with the power ON.

I/O Signal Circuit Diagrams

NPN



Important

Preventing Chattering

- The Sensor is equipped with an anti-chattering function, but if the chattering is 100 µs or longer, a faulty input may occur. (Input signals of 99 µs or shorter are ignored. Signals of 100 µs or longer are treated as input signals.)
- Use no-contact output devices (e.g., SSR or PLC transistor output) for the input signals. If contacts (e.g., a relay) are used, chattering may cause the trigger to be input again during execution of a measurement.

Use a power supply that meets the following specifications. (They are sold separately.)

	Description			
Item	When connected to	When connected to		
	FQ2-Saaaaa-aaa or	FQ2-S=====		
	FQ2-CH10000-M			
Power supply voltage	24 VDC (21.6 to 26.4 V)			
Recommended Power Supplies	S8VS-06024□(24 VDC, 2.5 A)	S8VS-03024 (24 VDC, 1.3 A)		
External power supply terminal screws	M4 (tightening torque: 1.2 N·m)			

Important

Supply power from a DC power supply for which measures have been applied to prevent high voltages (e.g., a safety extra-low-voltage circuit).

If UL certification is required for the overall system, use a UL Class II DC power supply.

Wiring the Touch Finder

Power Supply Wiring

Connecting the Power Supply

1 Loosen the two terminal screws using a Phillips screwdriver.



Attach crimp terminals to the power lines. Secure the positive and negative lines as indicated using M3 screws.

Power supply tightening torque: 0.54 N·m

3 In environments where there is excessive noise, attach a ferrite core (ZCAT1730-0730 from TDK or the equivalent) to the power supply cable.





When you attach the ferrite core to the power supply cable, wrap the cable only one time. 1

Remove the cover from the power switch on the left side of the Touch Finder.

2

Press the switch toward ON.



Power Supply Specifications

Use a power supply that meets the following specifications. (The power supply is sold separately.)

Item	Description
Power supply voltage	24 VDC (21.6 to 26.4 V)
Output current	0.65 A min.
Recommended Power Supply	S8VS-01524□ (24 VDC, 0.65 A)
External power supply terminal screws	M3.5 (tightening torque: 1.0 N·m)
Recommended power line wire size	AWG16 to AWG22 (length of 5 m max.)

Important

• Supply power from a DC power supply for which measures have been applied to prevent high voltages (e.g., a safety extra-low-voltage circuit).

If UL certification is required for the overall system, use a UL Class II DC power supply.

• When using the FQ2-D31, do not connect a switching regulator and AC Adapter (FQ-AC□) at the same time.

N

Charging the Battery

This section describes how to charge and install the FQ2-D31 Battery and provides applicable precautions. Charge the Battery while it is attached to the Touch Finder. Use the AC adapter to charge the battery.

Mounting the Battery in the Touch Finder

- **1** Remove the screw from the battery cover on the top of the Touch Finder, slide the cover in the direction of the arrow, and open the battery cover.
- **2** Face the rounded side of the battery toward the back of the Touch Finder and insert the battery.

Important

3

Do not insert the battery in the wrong orientation.

Close the battery cover, slide the battery cover in the direction of the arrow, and tighten the

screw on the battery cover.







The CHARGE indicator will be lit while the battery is being charged.



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The Touch Finder will operate even if the AC adapter is connected when no battery is mounted in the Touch Finder.

Important

- If the Touch Finder (FQ2-D31) will be installed permanently or semi-permanently, remove the Battery (FQ-BAT1). If the rated temperature is exceeded with the Battery inserted, the protective circuit may activate and stop the Touch Finder.
- The battery complies with the following recycling regulation.



2-6 Setting Up Ethernet

FQ2-S1 FQ2-S2 FQ2-S3 FQ2-S4 FQ2-CH

Connecting to Sensors from the Touch Finder

Configurations Consisting of Only Sensors and the Touch Finder

When only Sensors and a Touch Finder are used, IP addresses are automatically assigned. No settings are required to use Ethernet.

Connections on Existing Networks

If a Sensor or Touch Finder is connected to a network where a PLC or computer is already connected, the Ethernet settings must be made compatible with the existing network.

Set the IP addresses with one of the following methods.

Sensor

🕨 🚘 (Setup Mode) – [Sensor settings] – [Network] – [Ethernet] – [IP address setting]

Press [Fixed].

2 Set the IP address and subnet mask according to the network settings.

Note

• If you connect the Touch Finder or PC Tool to a Sensor on a different network through a router, set fixed IP addresses.

• When connecting by EtherNet/IP or PROFINET, set fixed IP addresses for the Sensors.

TouchFinder

Setup Mode) – [TF settings] – [Ethernet] – [AUTO]

Press [OFF].

Z Set the IP address and subnet mask according to the network settings.

Using a DHCP Server

Sensor

Setup Mode) – [Sensor settings] – [Network] – [Ethernet] – [IP address setting]

1 Press [DHCP].

TouchFinder

Setup Mode) – [TF settings] – [Ethernet] – [AUTO]

1 Press [ON].

Connecting to Sensors from External Devices Such as PLCs

Set the IP address of the Sensor according to the network where the external devices, such as PLCs, are connected.

Setup Mode) – [Sensor settings] – [Network] – [Ethernet] – [IP address setting]

1 Press [Fixed].

2 Set the IP address and subnet mask according to the network where the external devices, such as PLCs, are connected.

Note

If you connect OMRON CS/CJ-series PLCs to the Ethernet, the following Default IP addresses are assigned to the PLCs.

• IP address: 192.168.250.node_address

Connecting to Sensors from a Computer Using the PC Tool

Configurations Consisting of Only Sensors and a Computer (PC Tool)

If the configuration consists only of Sensors and a Touch Finder, set the network settings on the computer as described below.

(No IP address settings are required on the Sensors.)

The following procedure is for Windows 7.

- **1** Select [Control Panel] from the Windows Start.
 - Click [Network and Internet] on Control Panel.



Click [Network and Sharing Center].

- 4 Click [Change adapter settings] on the left side of [Network and Sharing Center].
- **5** Click the [Local Area Connection] icon in the Network connection window.



Select [Internet Protocol Version 4 (TCP/IPv4)] in [Local Area Connection Properties], and click [Properties].



7 Select the Use the following IP address Option and enter the following IP address and subnet mask.

- IP address: 10.5.5.101
- Subnet mask: 255.255.255.0
- 8 Click the [OK] Button. This completes the settings.

Internet Protocol Version 4 (TCP/IPv4) Properties					
General					
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.					
Obtain an IP address automatically					
Use the following IP address:					
IP address:	10 . 5 . 5 . 101				
Subnet mask:	255.255.255.0				
Default gateway:	· · ·				
Obtain DNS server address automatically					
Use the following DNS server addresses:					
Preferred DNS server:	· · ·				
Alternate DNS server:					
Validate settings upon exit					
OK Cancel					

Connections on Existing Networks

Set the Ethernet settings of the Sensors and the computer (PC Tool) to the same settings as the existing network. Refer to *Connecting to Sensors from the Touch Finder* on page 67 for the IP address settings in the Sensors.

Note

• If you connect the PC Tool to a Sensor on a different network through a router, set fixed IP addresses.

• When connecting by EtherNet/IP or PROFINET, set fixed IP addresses for the Sensors.

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The computer IP address, subnet address, and Default gateway that are used by the PC Tool are displayed. If multiple IP addresses (network cards) exist in the computer, the IP address to be used for the PC Tool can be selected.



1 A list of the computer IP addresses that can be used by the PC Tool appears. Touch the list to select an IP address.



2 The Sensor List appears.

The connected sensor is temporarily disconnected.

To refresh the list, touch [Update list] of any sensor.

3 Select the sensor that you want to connect and touch [OK]. (The sensor is reconnected.)

Sensor List		P Address
	1	0.5.5.100
🗹 ¥(FQ)		10.5.5.10
🗹 !!:No response	1	0.5.5.136
	OK	Ę

Sensor List		P Address
	1	0.5.5.100
✔ *(FQ)		10.5.5.10
<pre>!!:No response</pre>	1	0.5.5.136
	nκ	

Note

- If you want to change the IP address, change the network settings of the computer and then select the IP address using the above procedure.
- If the list does not appear, check if the LAN is correctly connected.

N

MEMO

Taking Images

3-1 Selecting a Sensor for Configuration
3-2 Setting Conditions for Taking Images
3-3 Adjusting Image Quality
3-4 Adjusting the Timing of Taking Images
3-5 Adjusting the Images That Were Taken

3-1 Selecting a Sensor for Configuration

FQ2-S1 FQ2-S2 FQ2-S3 FQ2-S4 FQ2-CH

If multiple Sensors are connected to a single Touch Finder or computer, a list of the Sensors that are connected is displayed by Default. Use the following procedure to change to the Sensor to set up.

- 1 Press 📥 [Switch Sensor].
- 2 Touch the image of the sensor to be set, and touch [OK].

() will be displayed for Sensors that are not yet set.



Note

Once the Touch Finder detects and records a Sensor, the display order for showing more than one Sensor is fixed. Even if the system configuration is changed to reduce the number of Sensors, the previous display location will remain for Sensors that were removed.

To update the displays of multiple Sensors to the current connection status, go to Run display - [Sensor monitor]

- [Multi sensor], and touch [] - [Display position] - [] - [Auto position] on the right of the display.

- 3 Press [Sensor settings] to return to Setup Mode.
- Run FO Oms O.Scene O Ca Select display Ca Select display Ca Sensor settings Sensor settings Sensor monitor Switch sensor



Note

4

Press [Yes].

There are different methods that you can use to connect the Sensors. For example, you can automatically connect to the Sensors that are recognized by the Touch Finder, or you can manually register the Sensors to connect.

7-5 Connecting to More Than One Sensor: p. 386

3-2 Setting Conditions for Taking Images

FQ2-S1 FQ2-S2 FQ2-S3 FQ2-S4 FQ2-CH

You can set the conditions for taking images to use in inspections.

To enable accurate judgments, the following adjustments are made for the conditions for taking images and the images themselves.

Taking Clear Images (Camera Setup)
Adjusting the Focus D p. 76
Adjust the focus of the Lens.
Taking Bright Images of Dark Objects and Taking Clear Images of Moving Objects Image: p. 77 Adjust the shutter speed and gain.
Improving the Image Quality of Metallic and Other Shiny Surfaces (HDR) Make adjustments for shiny objects or metallic surfaces. For a Sensor with built-in lighting, attach a polarizing filter to cut specular reflections.
Adjusting the Colors of the Image (White Balance)
Adjust the white balance so that the colors match those of the actual measurement object.
Adjusting the Timing of Taking Images (Trigger Setting)
Trigger Delay D p. 87
Adjust the timing of taking an image with the Sensor.
Adjusting the Images That Were Taken (Image Adjustment)
Filtering the Images (Filter Items)
Apply filters to adjust the images that were taken.
Compensating for Position Offset (Position Compensation Items)

Recognize measurement objects that are not in a consistent location and move them to the center of the image.

3-3 Adjusting Image Quality

FQ2-S1 FQ2-S2 FQ2-S3 FQ2-S4 FQ2-CH

Adjusting the Focus

[Image] – [Camera setup]

1 Display the Camera Setup Display.

The focus can be seen as a numerical value. The higher the value, the better the focus.



Focus Level

2 Adjust the focus of the Sensor while checking the image and focus value on the Touch Finder.

For a Sensor with Built-in Lighting, manually adjust the focus using the focus adjustment screw on the Sensor.

In the Default settings, the field of view is set to the narrowest setting.

For a Sensor with a C-mount, use the focus ring on the lens to adjust the focus of the image.

3 Press [Back].

Focus adjustment screw



Turn the screw counterclockwise to focus on objects at a distance. (The field of view will widen.)



Sensor with Built-in Lighting

Important

- Turn the focus adjustment screw clockwise or counterclockwise a little bit to make sure that it has not already reached the dead stop. Do not force the screw if it does not rotate anymore. This will damage the Sensor.
- Do not turn the focus adjustment screw with a force that is greater than 0.1 N·m. This may damage it.

Adjusting Image Brightness with External Lighting

You can adjust image brightness with external lighting or by setting the Sensor sensitivity.

Using a Strobe Trigger Signal to Control External Lighting

If a Sensor Data Unit is connected, you can change the output time of the strobe trigger signal (STGOUT) to adjust the brightness.



FQ2-S/CH Series User's Manual for Communications Settings (Cat. No. Z338) Section 2 Controlling Operation and Outputting Data with a Parallel Connection

Adjusting the Brightness

You can adjust the shutter speed/gain or the brightness to make images brighter. The setting method depends on whether HDR Mode is ON or OFF. The setting methods are described below.

 \square HDR Function: p. 83

Important

The exposure time will be longer for higher values of the shutter speed or brightness. This may cause the image to blur if the object is moving fast. If the Sensor is used on a high-speed line, check that the images are not blurred under actual operating conditions.

Brightness Correction Mode (FQ2-S1aaaa/FQ2-S2aaaa/FQ2-S4aaaa-M)

If the brightness changes inconsistently with each image, turn ON the Brightness Correction Mode.

When HDR is ON:
[Brightness] –
[Gain] – [Brightness correction]
When HDR is OFF:
[Gain] – [Brightness correction]

When Brightness Correction Mode is ON, the brightness will be consistent but the timing of image capture will be delayed by 25 ms (when the shutter speed is 1/250 or faster, i.e., the exposure time is shorter). When built-in lighting is OFF and the shutter speed is slower than 1/250, i.e., the exposure time is longer, the image capture timing will be further delayed.

Make sure that appropriate images of the measured objects are captured when Brightness Correction Mode is ON.

Timing Chart When the Brightness Correction Mode Is ON



FQ2-S/CH Series User's Manual for Communications Settings (Cat. No. Z338) Section 2 Controlling Operation and Outputting Data with a Parallel Connection

Important

If the gain is increased, the brightness will not be stable and measurement values may be inconsistent. We recommend that you turn ON the Brightness Connection Mode.

When HDR Is OFF

The brightness of the image is adjusted by adjusting the shutter speed. If the brightness cannot be improved by adjusting the shutter speed, the gain is adjusted.

Relationship between the Shutter Speed/Gain and the Image Brightness (For FQ2-S3/S4 series)



Note

• Adjust the shutter speed not only to adjust the brightness of the image, but also to adjust for the travel speed of the measurement object.

Taking Clear Images of Moving Objects: p. 82

• Increasing the gain will make the image brighter, but it will also reduce image quality to the point that the noise component in the images will stand out. Select a suitable factor for the inspection.

[Image] – [Camera setup]

1 Press [◀] – [Shutter speed] on the right of the display.

2 Move the bar to the left or right to adjust the shutter speed.

Moving it to the left will make the shutter speed slower and the image brighter. Moving it to the right will make the shutter speed faster and the image darker.



3 Press [OK].

If you cannot obtain the required brightness by adjusting the shutter speed, adjust the gain

- 4 Press [◀] – [Gain] on the right of the display.
- 5 Move the bar to the left or right to adjust the gain.

Moving it to the right will increase the gain and make the image brighter. Moving it to the left will reduce the gain and make the image darker.

6 Press [OK].

7 Press [Back].



Gain

FQ Series

Important

- To ensure stable operation when the FQ2-S10000/FQ2-S20000/FQ2-S40000-M is connected, we recommend that you set the gain to 16.
- If the recommended value is exceeded, the brightness will not be stable and measurement values may be inconsistent. We recommend that you turn ON the Brightness Connection Mode.

If a slow shutter speed (1/1 to 1/10) and a high gain are set, fixed-pattern noise (fleck and striped noise) will sometimes occur. Be sure to thoroughly check the images and the measurement results when you set the shutter speed and gain.





Set the brightness adjustment value.

The higher the brightness adjustment value, the brighter the image.



[Image] – [Camera setup]

1 Press [**4**] – [Brightness] on the right side of the display.

2 Move the bar to the left or right to adjust the brightness.

Moving it to the right will make the image brighter, while moving it to the left will reduce the brightness of the image.



3 Press [OK].

Taking Clear Images of Moving Objects

For quick moving objects, the effect of blurring can be reduced by decreasing the shutter speed. In HDR Mode, set the brightness value to a low setting.



Relationship between Shutter Speed and the Brightness Adjustment Value in HDR Mode

Refer to the following page for the setting methods for the shutter speed and brightness.

Adjusting the Brightness: p. 77

Important

The lower the shutter speed/gain and brightness settings are, the darker the image becomes.

If the Sensor is used in a dark environment, make sure that the darkness of the image does not cause the measurements to be unstable.

Improving the Image Quality of Metallic and other Shiny Surfaces

When objects with shiny surfaces are being measured, the lighting may be reflected off the surface and affect the image.

To remove reflections, one of the following two functions can be used.

Function	Description
HDR (High Dynamic Range)	If objects have contrasting light and dark areas, the dynamic range can be made wider to improve the quality of the images.
Polarizing filter (for Sensors with Built-in Lighting)	Specular reflections can be eliminated from an image by attaching a polarizing filter to the Sensor. If the measurement object must be moving, use a polarizing filter. Also, if reflections cannot be sufficiently removed by using the HDR function, use a polarizing filter as well.

HDR Function

The HDR function is used for objects that have a large difference between light and dark areas. For this kind of object, clear images cannot be achieved with the standard brightness setting.

The HDR function combines several images of different brightnesses (shutter speed) so that the resulting image has a lower degree of contrast and can be measured stably for the desired characteristic.

Inputting Images with a Limit Range of Brightness



Observe the following precautions.

Use the HDR function only for objects that are not moving to avoid image blurring. Several images are taken with different shutter speeds and combined. If the object moves while the image is being taken, the image will become blurred.

Images with different brightnesses are combined, so the resulting image will have a lower degree of contrast.

Combining Images to Create an Image

[Image] – [Camera setup]

1 Press $[\blacktriangleleft] - [HDR]$ on the right side of the display.

2 Set the best level for the HDR Mode.

As shown below, the higher the level, the wider the combined dynamic range will be.





Using a Polarizing Filter (Only for Sensors with Built-in Lighting)

Specular reflections can be eliminated from an image by attaching an FQ-XF1 Polarizing Filter to the Sensor.



Observe the following precautions.

- The image will be darker compared to when no filter is used.
- If the image becomes too dark, adjust the brightness.

Adjusting the Brightness

When HDR Is OFF: p. 79 When HDR Is ON: p. 81

• Mounting the Filter

1 Hook the filter in the hole at the top of the Sensor.



2 Using the top section as a pivot point, pull down the filter so that it attaches to the Sensor.

Adjusting the Colors of the Image (White Balance) (Only for Sensors with Color Cameras)

If external lighting is used, the image may appear as having different colors than the actual object. If this is the case, adjust the white balance.

If the lighting built in to the Sensor is used, the white balance is already adjusted. No setting is required in this case.

- [Image] [Camera setup]
 - **1** Input a picture of white paper or cloth.
 - 2 Press [◀] [White balance] on the right side of the display.

- **3** Press the [Auto] Button. The Sensor will automatically adjust the colors.
- **4** Move the bar to the left (light) or right (dark) to fine-tune the colors.
- 5 Press [OK].



Rotating the Touch Finder Image by 180 $^{\circ}$

You can rotate the Camera image by $180^\circ\!.$

This setting also applies to re-measurement of logged images.

▶ [Image] – [Camera setup] – [◀] – [Rotate 180]

3-4 Adjusting the Timing of Taking Images

FQ2-S1 FQ2-S2 FQ2-S3 FQ2-S4 FQ2-CH

Delaying the Image Capture Timing from the Trigger Input

If the measurement object is moving, the position in the image of the feature that is to be measured will depend on the timing of the trigger signal.

A delay can be applied from when the trigger (i.e., the TRIG signal) is input until when the image is taken to synchronize the timing of image capture with the speed of moving objects.

If the object position varies in the image, this delay cannot be used to make the object position more stable. When you use a trigger delay with external lighting, you will also need to adjust the timing to turn ON external lighting.



- [Image] [Trigger setup] [Trigger delay]
 - **1** A TRIG signal is input.

Images are input continuously.

- 2 Select the image with the measurement object in the center using and .
- **3** Press the image.



4 Press [OK].

Setting item	Setting value	Description
Trigger delay	Range: 0 to 163ms Default: 0	Adjusts the time for opening the camera shutter after Trigger conditions are established. Only valid for external triggers. Delay time = (Setting value) + 150µs

Note

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The delay time can be set using the adjustment bar or by directly entering a value.



Adjusting External Lighting Timing

When you use a trigger delay, you must adjust the timing to turn ON external lighting so that it matches the trigger delay timing.

Using a Strobe Trigger Signal to Control External Lighting

If a Sensor Data Unit is connected, you can change the output time of the strobe trigger signal (STGOUT) to adjust the timing of the external lighting.



FQ2-S/CH Series User's Manual for Communications Settings (Cat. No. Z338) Section 2 Controlling Operation and Outputting Data with a Parallel Connection

[Image] – [Camera setup] – [] – [Lightning control]

Preventing Mutual Interference of Multiple Sensors

When the same trigger signal is input to multiple Sensors, the lighting from one Sensor may affect the measurements of the other Sensors. This is called mutual interference. This kind of interference can be prevented offsetting the image input timing of each Sensor from when the trigger signal is received.

Example:

A trigger (i.e., the TRIG signal) is input to Sensor 0 and Sensor 1 at the same time.



Sensor 0 immediately begins image input when the trigger is input. Sensor 1 begins image input after the specified time has passed.

1 Change to the setup for to Sensor 1.

3-1 Selecting a Sensor for Configuration: p. 74

2 Press [Image] – [Trigger setup] – [Trigger delay].

3 Set the trigger input delay time for Sensor 1.

Delaying the Image Capture Timing from the Trigger Input: p. 87



Important

The delay time for preventing mutual interference must be longer than the shutter time.

When the lighting built into the Sensor is used, the shutter time is 4 ms max. Therefore make the delay at least 4 ms.

3-5 Adjusting the Images That Were Taken

FQ2-S1 FQ2-S2 FQ2-S3 FQ2-S4 FQ2-CH

Image Adjustment

You can adjust the image that is taken by the Sensor to make it easy to measure. There are mainly the following two types of items that you can use to adjust the image.

- · Filtering the Images (Filter Items)
- These items filter the image by eliminating image noise with filters to make them suitable for measurement.
- Compensating for Position Offset (Position Compensation Items)
 These items compensate for offset in the position or orientation of the image.

You can combine several filter items and position compensation items to adjust the image that was taken. (You can use a total of up to eight filter and position compensation items combined.)

Flow of Image Adjustment

The image that is taken by the Camera (called the Camera image) is adjusted in the order that the filter and position compensation items are registered.

Note

You can specify the order of image adjustment by registering the items in the desired order, but you cannot change the order of the items after you register them.



Note

Specify the Camera image for the first filter item for image processing.

If you execute more than one filter item for the image, set the source image for the other filter items to the previous image. Also, you can perform image processing with filter items only to enable processing with position compensation items.

In that case, only the position information from position compensation is applied to the image to be measured. For details, refer to *Using Filter Items for Processing with Position Compensation Items* on page 106.

Filtering the Images (Filter Items)

You can filter the images that are taken by the Camera to make them easier to measure. This is used in the following cases.

- To cut unnecessary backgrounds so that they are not measured
- To remove noise

To stably find the edges of marks when other edges have been clearly extracted

Applicable Filters

Selected filter item	Description		
Color Gray Filter (only for Sensors with Color Cameras)	Converts an image that was input from a Color Camera to a monochrome image. Example: You can extract an image that contains only a specific color.		
	 Extracting an Image That Contains Only Red Note This inspection item cannot be used for monochrome images. An NG (image error) will result if you use it for a monochrome image. All inspection items after the Color Gray Filter item will be performed in the same way as when a Monochrome Camera is connected. 		
Weak Smoothing	Used when there are minor irregularities in the measurement object.		
Strong Smoothing	The image is feathered to reduce unevenness.		
Dilate	Used when there is dark noise. Dark noise is removed by dilating bright places.		
Erosion	Used when there is bright noise. Bright noise is removed by eroding bright places.		
Median	Used when there are minor irregularities in the measurement object. Unevenness is reduced while maintaining outlines.		
Extract Edges	Extracts image edges between light and dark.		
Extract Horiz. Edges (extract horizontal edges)	Extracts horizontal edges between light and dark in the image.		
Extract vertical edges	Extracts vertical edges between light and dark in the image.		
Enhance edges	Enhances image edges between light and dark.		

Selected filter item	Description		
	Extracts a specific range of brightness to increase the image contrast and suppress the unnecessary background.		
	Example: Increasing Contrast		
Background Suppres- sion			
	Any areas that are outside of the specified range of brightness are removed as the background.		
	Also, the brightness within the specified range is converted to 256 levels to enhance the contrast.		

Setting Filter Items

[Image] – [Image adjustment]

- **1** Press an unused number, and then press [Add filter].
- 2 Press the filter item to use.
- **3** Make any detailed settings as required for the filter.

Refer to the detailed settings for each of the following filter items.



- 4 Press [OK].
- 5 Press [Back].
- **6** Make any the following settings as required for each filter item.
 - Setting the Source Image for Filtering p. 95
 - Setting the Region to Filter p. 95
 - Setting the Filter Type (for Color Gray Filter Only) _____ p. 96
 - Setting the Brightness Range to Extract (for Background Suppression Item Only) p. 98

You must set the image to which the filter is to be applied.

[Image] – [Image adjustment] – [Add filter] – (Filter item to select)

- **1** Press [**4**] [Source image] on the right of the display.
- 2 Set the source image to [Camera] or [Prev.].

Parameter	Setting	Description
	Camera	
	(camera image)	The filter is applied to the image that is taken by the Camera.
Source image	Prev.	The filter is applied to the image that resulted from the previous
	(previous image)	filter items or position compensation items in the processing order.

Setting the Region to Filter

You can specify the region to which to apply the filter. This setting does not exist in the Color Gray Filter item.

[Image] – [Image adjustment] – [Add filter] – (Filter item to select)

1 Press [◀] – [Filter region] on the right of the display.

Drag to move the region. Drag a corner to size the rectangle.

2 Adjust the size and position of the region to which the filter is to be applied.

To fine-tune the region, press $[\blacktriangleleft] - [Console]$ on the right of the display to display the console. This will allow you to change the coordinates of the rectangle at the pixel level.





You can specify the ranges of colors to which the Color Gray Filter item is applied.

- [Image] [Image adjustment] [Add filter] [Color Gray Filter]
 - **1** Press $[\blacktriangleleft]$ [Filter type] on the right of the display.
 - 2 Set the filter type to either [RGB] or [HSV].

Parameter	Description
RGB (Default)	The red, green, and blue extraction ranges are specified.
HSV	The extracted color ranges are specified with the hue and chroma (saturation).



- **3** Press $[\blacktriangleleft]$ [Filter settings] on the right of the display.
- **4** Make the detailed filter settings.
 - RGB

Select the type of color filter to use.

If you select [Custom filter], set the gains for red, green, and blue.



• HSV

Set the following ranges: [Std. Hue], [Hue range], and [Chroma].

Filter settin	gs	0.Colo	r Gray	Filter
Std. Hue	Hue r	ange	Chr	oma
	0			
D R	Ø	OK	C	ancel

5 Press [OK].

6 Press [Back].

• RGB

Parameter	Setting	Description
Filter settings	 Red filter (Default) Green filter Blue filter Cyan filter Magenta filter Yellow filter Brgt.F (brightness filter) (R+G+B) Brgt.F (brightness filter) (R+2G+B) Custom filter 	These filters achieve the same effect as when using the selected optical filter.
R	Range: 0.0001 to 9.9999 Default: 0.3000	These are the RGB gain settings for a custom
G	Range: 0.0001 to 9.9999 Default: 0.5900	filter. Increase the gain to increase the density of that
В	Range: 0.0001 to 9.9999 Default: 0.1100	You can set the gains only if [Custom filter] is selected in the filter settings.

• HSV

Parameter	Setting	Description
Std. Hue (standard hue)	Range: 0 to 359 Default: 0	Sets the standard hue for the HSV filter. The density will decrease as the difference between the hue and the standard hue increases.
Hue range	Range: 10 to 180 Default: 90	Sets the hue range for the HSV filter. The hue range centered on the standard hue is divided into 255 levels to find the difference in the hue. Hues that are outside the hue range will have a density of 0.
Chroma (saturation)	Range: 0 to 255 (Default)	Set the upper and lower limit values for the chroma (saturation).

Setting the Brightness Range to Extract (for Background Suppression Item Only)

The range in which to enhance the contrast and the brightness range to extract are set for the Background Suppression item. The Background Suppression item works as described below to suppress the background for the specified brightness range.

• Enhancing Contrast

The range of the input brightness that is within the specified brightness range (0 to 255) is converted to 255 levels to enhance the contrast.

Background Suppression

Input values from 0 to the lower limit are converted to level 0 and input values between the upper limit and 255 are converted to level 255 to remove as the background any places that are not within the specified brightness range.



You can use either of the following methods to set the upper and lower limits of the brightness range to extract with the Background Suppression item.

• Enhancing the Contrast of a Specific Area

You specify the location on the image to enhance the contrast.

[Image] – [Image adjustment] – [Background Suppression] – [Modify]

- Press [◀] [Suppression level] on the right of the display.
- 2 Drag on the image to specify the location to emphasize the contrast.

The contrast in the specified range will be reset to between 0 and 255.



- 3 Press [OK].
- 4 Press [Back].

You set the upper and lower limits of the brightness range to extract with the Background Suppression item.

• Extracting Only a Specified Range of Brightness

[Image] – [Image adjustment] – [Background suppression] – [Modify]

- Press [◀] [Suppression level] on the right of the display.
- 2 Press [◀] [RGB setting] on the right of the display.
- **3** Select the method to use to specify the brightness range. (This setting applies to Sensors with Color Cameras only.)
 - Common RGB Settings
 Set the upper and lower limit values of the bright-

ness range. The same limits will be used for all RGB colors.

 Individual RGB Settings Set the upper and lower limit values of the brightness range for each RGB color. Press [R], [G], and [B] and set the upper and lower limits for each of them.

4 Set the upper and lower limit values of the brightness range. (for Sensors with Monochrome Cameras (or after a Color Gray Filter))



O.Background

G

RGB setting

Individual



- 5 Press [Back].
- 6 Press [OK].
- 7 Press [Back].



Parameter	Setting	Description
Common (common RGB setting)	Range: 0 to 255 (Default)	Set the upper and lower limit values of the background suppression level. The same limits will be used for all RGB colors. The range from the specified lower to upper limits is converted to 0 to 255.
Individual (individual RGB settings)	Range: 0 to 255 (Default)	Set the upper and lower limit values of the background suppression level for each RGB color. The range from the specified lower to upper limits is converted to 0 to 255.
Brightness range (for Sensors with Monochrome Cameras)	Range: 0 to 255 (Default)	The specified range is converted to 0 to 255.

Measurement Data That Can Be Used for External Outputs and Calculations

The following values can be used as measurement data and output to external devices via Ethernet or used in calculations. Measurement data can be specified for each filter item.

Expression t ext string	Data name	Description	Data range
JG	Judgement	This is the judgment result.	-2: No judgement (not measured)0: Judgement is OK-1: Judgement is NG

Compensating for Position Offset (Position Compensation Items)

Use position compensation items if the position or orientation of the measurement object is not consistent. When you use a position compensation item, the offset between the reference position and the position of the object is calculated and the position of the measurement region is corrected before measurements are performed.

Applicable Position Compensation Items

There are three position compensation items as indicated below. These items vary by detection method.

Туре	Description
Model	A search is made for a characteristic pattern to detect and correct the position.
(model position compensation)	 Shape Sear III.pos.comp (Shape Search Position Compensation III) Shape Sear. pos. comp. (Shape Search Position Compensation) Search position comp. (Search Position Compensation)
	The color distribution or density changes in the object are used to detect and correct the position.
Edge position comp. (edge position compensation)	 Edge position comp. (Edge Position Compensation) 2Edge position comp. (Two-edge Position Compensation) 2Edge midpoint comp. (Two-edge Midpoint Compensation)
	Edge rot. pos. comp. (Edge Rotation Position Compensation)
Numerical position compensation	Position is corrected based on entered value and image. Position comp. (Image rotation, Parameter) Linear correction

• Features of the Position Compensation Items



Applying the Results of Position Compensation

You can apply the results of position compensation either to the Camera image or to the previous image from before position compensation was applied.

If you apply the results of position compensation to the Camera image, only the position information from position compensation is applied to the image to be measured.

Using Filter Items for Processing with Position Compensation Items: p. 106

• Setting the Image for Position Compensation

You can select the image to which to apply the results of position compensation processing. You can set the image for position compensation for each position compensation item.

[Image] – [Image adjustment] – (Position compensation item name) – [Modify]

- 1 Touch [Details] [Scroll parameter]
- 2 Set the source image to [Camera] or [Prev.].

Parameter	Setting	Description
Source image	Camera (Camera Image)	The results of processing the position compensation item is applied to the image that is taken by the Camera. This setting is used when filter items or other position compensation items have been used specifically for the position compensation item. Using Filter Items for Processing with Position Compensation Items: p. 106
	Prev. (previous image) (default)	This setting is used when the processing results of the current position item are to be applied to the image that results from previous filter items or other position compensation items.

Source Image

You can select the image to which to apply the results of position compensation processing.

Applying the Results of Position Compensation: p.104

Interpolation

You can select the precision of position compensation. If you select [Bilinear], the precision of position compensation will increase.

[Image] – [Image adjustment] – [Search position comp.] – [Modify] – [Details] – [Scroll parameter] – [Interpolation]

1 Touch [Details] – [Scroll parameter] – [Shape pos. comp]

2 Select [Bilinear] or [None].

Parameter	Setting	Description
Interpolation	Bilinear	Connects the points with a line and calculates an approximate value, Although, the processing time will be longer, a smooth image can be acquired when you select [Bilinear],
	None (Default)	Image correlation is executed by a pixel.

Using Filter Items for Processing with Position Compensation Items

To more effectively perform position compensation, filter items can be used to create an image specifically for position compensation and then apply only the results of processing the position compensation to the image that will be measured.

The processing order of filter and position compensation items and the settings of the source images are set up as shown below.

Processing order	Image processing item	Source image setting	
1	0: Enhance edges (Edge Enhancement) (filter item)	Source image: Camera image Camera image (image for processing) → Processed image (results of processing)	
2	1: Search position comp. (Search Position Compensation) (position compensation item)	Source image: Camera image Previous image (image for processing) → Camera image (results of processing)	


With this position compensation item, an image pattern is registered in advance. When the registered image pattern is detected, the image is adjusted so that the image pattern is in the same position as when it was registered.

This position compensation item performs the same type of processing as the Search Position Compensation item, but it performs special processing for the shape of the image pattern.

dd pos, comp

Model

🐂 Shape III pos. comp

🖫 Shape pos. comp

🖥 Search p. comp

Use this position compensation item to correct the position of a rotated image pattern.

[Image] – [Image adjustment]

- **1** Press an unused number and then press [Add pos. comp.].
- 2 Press [Model] [Shape III. pos. comp.]
- **3** Make any detailed settings as required for the position compensation processing.

Refer to Detailed Settings for Shape Search III Position Compensation, below.

- 4 Press [OK].
- 5 Press [Back].

Detailed Settings for Shape Search Position Compensation

The settings for the Shape Search III Position Compensation item are almost the same as those for the Shape Search II inspection item. Only the [Sorting method] settings of the Search item are not included in the settings of the Shape Search Position Compensation item.

Configure the settings for teaching and the judgment conditions in the same way as for the Shape Search II item.

4-9 Inspecting with the Shape Search III Inspection Item: p. 230

Also, the following settings are included only in the Shape Search III Position Compensation Item.

Source Image

You can select the image to which to apply the results of position compensation processing.

Applying the Results of Position Compensation: p. 104

Interpolation

You can select the precision of position compensation. If you select [Bilinear], the precision of position compensation will increase.

[Image] – [Image adjustment] – [Search III pos. comp.] – [Modify]

1 Press [Details] – [Scroll parameter] – [Interpolation]

2 Set the interpolation to [Bilinear] or [None].

Parameter	Setting	Description
Interpolation	Bilinear	Connects the points with a line and calculates an approximate value, Although, the processing time will be longer, a smooth image can be acquired when you select [Bilinear],
	None (Default)	Position compensation is performed at the pixel level.

Measurement Data That Can Be Used for External Outputs and Calculations

The following values can be used as measurement data and output to external devices via Ethernet or used in calculations.

Expression text string	Data name	Description	Data range
JG	Judgement	This is the judgement result.	 -2: No judgement (not measured) 0: Judgement is OK -1: Judgement is NG -10: Image inconsistency error -15: Out of range error
DX	Scroll X	This is the amount of position compensation for the X coordinate.	-99,999.9999 to 99,999.9999
DY	Scroll Y	This is the amount of position compensation for the Y coordinate.	-99,999.9999 to 99,999.9999
DT	Scroll q	This is the amount of angular compensation, q.	-180 to 180
Х	Position X	This is the X coordinate of the position where the model was found.	-99,999.9999 to 99,999.9999
Y	Position Y	This is the Y coordinate of the position where the model was found.	-99,999.9999 to 99,999.9999
TH	Angle	This is the angle at which the model was found.	-180 to 180
SX	Reference X	This is the X coordinate of the position where the model was registered.	-99,999.9999 to 99,999.9999
SY	Reference Y	This is the Y coordinate of the position where the model was registered.	-99,999.9999 to 99,999.9999
ST	Reference angle	This is the angle when the model was registered.	-180 to 180

Expression text string	Data name	Description	Data range
CR	Correlation	This is the correlation.	0 to 100

Measurement Data That Can Be Logged

The values below can be logged as measurement data.

Parameter	Setting	Description
Judgement	-2: No judgement (not measured) 0: Judgement is OK -1: Judgement is NG	This is the judgment result.
Scroll X	-99,999.9999 to 99,999.9999	This is the amount of position compensation for the X coordinate.
Scroll Y	-99,999.9999 to 99,999.9999	This is the amount of position compensation for the Y coordinate.
Scroll q	-180 to 180	This is the amount of angular compensation, q.
Correlation	0 to 100	This is the correlation.
Position X	-99,999.9999 to 99,999.9999	This is the X coordinate of the position where the model was found.
Position Y	-99,999.9999 to 99,999.9999	This is the Y coordinate of the position where the model was found.
Angle	-180 to 180	This is the angle at which the model was found.

Detailed Settings for Search Position Compensation

The settings for the Search Position Compensation item are almost the same as those for the Search inspection item. (The [Multi-point output] and model parameter settings of the Search inspection item are not included in the Search Position Compensation settings.) Make the settings for teaching and the judgment conditions in the same way as for the Search item.

Inspecting with the Shape Search II Inspection Item: p.215

Also, the following settings are included only in the Search Position Compensation Item.

Source Image

You can select the image to which to apply the results of position compensation processing.

Applying the Results of Position Compensation: p.104

Interpolation

Select the image to reflect the results of Interpolation processing to. If you select [Bilinear], the precision of position compensation will increase.

[Image] – [Image adjustment] – [Search position comp.] – [Modify] – [Details] – [Scroll parameter] – [Interpolation]

- **1** Press [Details] [Scroll parameter] [Interpolation]
- 2 Set the interpolation to [Bilinear] or [None].

Parameter	Setting	Description
Interpolation	Bilinear	Connects the points with a line and calculates an approximate value, Although, the processing time will be longer, a smooth image can be acquired when you select [Bilinear],
	None (Default)	Position compensation is performed at the pixel level.

• Measurement Data That Can Be Used for External Outputs and Calculations

The following values can be used as measurement data and output to external devices via Ethernet or used in calculations.

Expression text string	Data name	Description	Data range
JG	Judgement	 -2: No judgement (not measured) 0: Judgement is OK -1: Judgement is NG -10: Image error -15: Out of range error 	This is the judgment result.
DX	Scroll X	-99,999.9999 to 99,999.9999	This is the amount of position compensation for the X coordinate.
DY	Scroll Y	-99,999.9999 to 99,999.9999	This is the amount of position compensation for the Y coordinate.
X	Position X	-99,999.9999 to 99,999.9999	This is the X coordinate of the position where the model was found.
Y	Position Y	-99,999.9999 to 99,999.9999	This is the Y coordinate of the position where the model was found.
SX	Reference X	-99,999.9999 to 99,999.9999	This is the X coordinate of the position where the model was registered.
SY	Reference Y	-99,999.9999 to 99,999.9999	This is the Y coordinate of the position where the model was registered.
CR	Correlation	0 to 100	This is the correlation.

Measurement Data That Can Be Logged

The values below can be logged as measurement data.

Parameter	Setting	Description
Judgement	 -2: No judgement (not measured) 0: Judgement is OK -1: Judgement is NG -15: Out of range error 	This is the judgment result.
Scroll X	-99,999.9999 to 99,999.9999	This is the amount of position compensation for the X coordinate.
Scroll Y	-99,999.9999 to 99,999.9999	This is the amount of position compensation for the Y coordinate.
Correlation	0 to 100	This is the correlation.
Position X	-99,999.9999 to 99,999.9999	This is the X coordinate of the position where the model was found.
Position Y	-99,999.9999 to 99,999.9999	This is the Y coordinate of the position where the model was found.

Edge Position Compensation

This position compensation item detects an edge in the set direction.

If the specified color is detected (or the specified density is detected for a Sensor with a Monochrome Camera), it is recognized as an edge.

When an edge is recognized, the image is adjusted so that the edge appears at the position it was in when it was registered.



Color of edge to be found



The image is adjusted so that the edge appears at the position it was in when it was registered.

[Image] – [Image adjustment]

- 1 Press an unused number and then press [Add pos. comp.].
- 2 Press [Edge] [Edge position comp.].
- 3 Make any detailed settings as required for the position compensation processing. Refer to Detailed Settings for Edge Position Compensation, below.
- 4 Press [OK].
- 5 Press [Back].

Detailed Settings for Edge Position Compensation

The settings for the Edge Position Compensation item are almost the same as those for the Edge Position inspection item.

Make the settings for teaching and the judgment conditions in the same way as for the Edge Position inspection item.



4-12 Inspecting with the Edge Position Inspection Item: p. 271

However, the following settings are included only in the Edge Position Compensation Item.

Source Image

You can select the image to which to apply the results of position compensation processing.

Applying the Results of Position Compensation: p.104

Interpolation

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You can select the precision of position compensation. If you select [Bilinear], the precision of position compensation will increase.

[Image] – [Image adjustment] – [Edge position comp.] – [Modify] – [Details] - [Scroll parameter] - [Interpolation]

The settings are the same as those for the Shape Search Position Compensation item.

Interpolation: p. 108 \square

Measurement Data That Can Be Used for External Outputs and Calculations

The following values can be used as measurement data and output to external devices via Ethernet or used in calculations.

Expression text string	Data name	Description	Data range
JG	Judgement	This is the judgement result.	-2: No judgement (not measured) 0: Judgement is OK -1: Judgement is NG
DX	Scroll X	This is the amount of position compensation for the X coordinate.	-99,999.9999 to 99,999.9999
DY	Scroll Y	This is the amount of position compensation for the Y coordinate.	-99,999.9999 to 99,999.9999
X	Position X (edge position X)	This is the X coordinate of the measured edge position.	-99,999.9999 to 99,999.9999
Y	Position Y (edge position Y)	This is the Y coordinate of the measured edge position.	-99,999.9999 to 99,999.9999
SX	Reference X	This is the X coordinate of the edge position when it was registered.	-99,999.9999 to 99,999.9999
SY	Reference Y	This is the Y coordinate of the edge position when it was registered.	-99,999.9999 to 99,999.9999

Measurement Data That Can Be Logged

The values below can be logged as measurement data.

Parameter	Setting	Description
Judgement	-2: No judgement (not measured) 0: Judgement is OK -1: Judgement is NG	This is the judgment result.
Scroll X	-99,999.9999 to 99,999.9999	This is the amount of position compensation for the X coordinate.
Scroll Y	-99,999.9999 to 99,999.9999	This is the amount of position compensation for the Y coordinate.
Position X (edge position X)	-99,999.9999 to 99,999.9999	This is the X coordinate of the measured edge position.
Position Y (edge position Y)	-99,999.9999 to 99,999.9999	This is the Y coordinate of the measured edge position.

Two-edge Position Compensation

This position compensation item detects edges in two directions.

If the specified color is detected (or the specified density is detected for a Sensor with a Monochrome Camera), it is recognized as an edge.

When an edge is recognized, the image is adjusted so that the edge appears at the position it was in when it was registered.



[Image] – [Image adjustment]

- **1** Press an unused number and then press [Add pos. comp.].
- 2 Press [Edge] [2Edge position comp.].
- **3** Make any detailed settings as required for the position compensation processing.

Refer to Detailed Settings for Two-edge Position Compensation, below.

- 4 Press [OK].
- 5 Press [Back].

Detailed Settings for Two-edge Position Compensation

The settings for the Two-edge Position Compensation item are almost the same as those for the Edge Position inspection item.

Make the settings in the same way as for the Edge Position inspection item.

4-12 Inspecting with the Edge Position Inspection Item: p. 271

However, the following settings are included only in the Edge Position Compensation Item.

Teaching

Set the measurement regions and measurement directions for both edge 0 and edge 1.

[Image] – [Image adjustment] – [2Edge position comp.] – [Modify] – [Basic]

- 1 Press [Teach].
- **2** Place the object that is to be used as the measurement reference in front of the camera.
- **3** Move the rectangle to the location to be measured, and then press [OK].

This concludes setting the measurement region and edge search direction for edge 0.

Next, go to step 4 to set the measurement region and edge search direction for edge 1.

- 4 Press [◀] [Edge1 region] on the right of the display, move the rectangle to the location to be measured, and then press [OK].
- **5** Press [TEACH] on the lower right of the display.

The basic settings will be registered when teaching has been completed.

6 Press [Back] to end teaching.





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Source Image

You can select the image to which to apply the results of position compensation processing.

Applying the Results of Position Compensation: p.104

Interpolation

You can select the precision of position compensation. If you select [Bilinear], the precision of position compensation will increase.

▶ [Image] – [Image adjustment] – [2Edge position comp.] – [Modify] – [Details] – [Interpolation]

The settings are the same as those for the Shape Search Position Compensation item.

Interpolation: p. 108

Measurement Data That Can Be Used for External Outputs and Calculations

The following values can be used as measurement data and output to external devices via Ethernet or used in calculations.

Expression text string	Data name	Description	Data range
JG	Judgement	This is the judgement result.	 -2: No judgement (not measured) 0: Judgement is OK -1: Judgement is NG -15: Out of range error
DX	Scroll X	This is the amount of position compensation for the X coordinate.	-99,999.9999 to 99,999.9999
DY	Scroll Y	This is the amount of position compensation for the Y coordinate.	-99,999.9999 to 99,999.9999
X0	Edge 0 position X	This is the X coordinate of the measured edge 0 position.	-99,999.9999 to 99,999.9999
Y0	Edge 0 position Y	This is the Y coordinate of the measured edge 0 position.	-99,999.9999 to 99,999.9999
X1	Edge 1 position X	This is the X coordinate of the measured edge 1 position.	-99,999.9999 to 99,999.9999
Y1	Edge 1 position Y	This is the Y coordinate of the measured edge 1 position.	-99,999.9999 to 99,999.9999
SX0	Edge0 ref. position X (edge 0 reference position X)	This is the X coordinate of the edge 0 position when it was registered.	-99,999.9999 to 99,999.9999
SY0	Edge0 ref. position Y (edge 0 reference position Y)	This is the Y coordinate of the edge 0 position when it was registered.	-99,999.9999 to 99,999.9999
SX1	Edge1 ref. position X (edge 1 reference position X)	This is the X coordinate of the edge 1 position when it was registered.	-99,999.9999 to 99,999.9999
SY1	Edge1 ref. position Y (edge 1 reference position Y)	This is the Y coordinate of the edge 1 position when it was registered.	-99,999.9999 to 99,999.9999

Measurement Data That Can Be Logged

The values below can be logged as measurement data.

Parameter	Setting	Description
Judgement	 -2: No judgement (not measured) 0: Judgement is OK -1: Judgement is NG -15: Out of range error 	This is the judgement result.
Scroll X	-99,999.9999 to 99,999.9999	This is the amount of position compensation for the X coordinate.
Scroll Y	-99,999.9999 to 99,999.9999	This is the amount of position compensation for the Y coordinate.
Edge 0 position X	-99,999.9999 to 99,999.9999	This is the X coordinate of the measured edge 0 position.
Edge 0 position Y	-99,999.9999 to 99,999.9999	This is the Y coordinate of the measured edge 0 position.
Edge 1 position X	-99,999.9999 to 99,999.9999	This is the X coordinate of the measured edge 1 position.
Edge 1 position Y	-99,999.9999 to 99,999.9999	This is the Y coordinate of the measured edge 1 position.

Two-edge Midpoint Compensation

This position compensation item detects edges in two directions.

If the specified color is detected (or the specified density is detected for a Sensor with a Monochrome Camera), it is recognized as an edge. Two edge positions are detected.

The image is adjusted so that the coordinates of the midpoint position of a line that connects the two detected edge positions matches the position when the edges were registered.



Color of edge to be found

[Image] – [Image adjustment]

- **1** Press an unused number and then press [Add pos. comp.].
- 2 Press [Edge] [2Edge midpoint comp.].
- **3** Make any detailed settings as required for the position compensation processing. Refer to *Detailed Settings for Two-edge Midpoint Compensation*, below.
- 4 Press [OK].
- 5 Press [Back].

Detailed Settings for Two-edge Midpoint Compensation

The settings for the Two-edge Midpoint Compensation item are almost the same as those for the Edge Position inspection item.

Make the settings in the same way as for the Edge Position inspection item.



However, the following settings are included only in the Edge Position Compensation Item.

Teaching

Set the measurement regions and measurement directions for both edge 0 and edge 1.

[Image] – [Image adjustment] – [2Edge midpoint comp.] – [Modify] – [Basic] – [Teach]

The settings are the same as those for the Two-edge Position Compensation item.

Teaching: p. 115

Source Image

You can select the image to which to apply the results of position compensation processing.

Applying the Results of Position Compensation: p.104

Interpolation

You can select the precision of position compensation. If you select [Bilinear], the precision of position compensation will increase.

[Image] – [Image adjustment] – [2ed. midp. comp.] – [Modify] – [Details] – [Scroll parameter] – [Interpolation]

The settings are the same as those for the Shape Search Position Compensation item.

Interpolation: p. 108

Measurement Data That Can Be Used for External Outputs and Calculations

The following values can be used as measurement data and output to external devices via Ethernet or used in calculations.

Expression text string	Data name	Description	Data range
JG	Judgement	This is the judgement result.	-2: No judgement (not measured) 0: Judgement is OK -1: Judgement is NG -15: Out of range error
DX	Scroll X	This is the amount of position compensation for the X coordinate.	-99,999.9999 to 99,999.9999
DY	Scroll Y	This is the amount of position compensation for the Y coordinate.	-99,999.9999 to 99,999.9999
X0	Edge 0 position X	This is the X coordinate of the measured edge 0 position.	-99,999.9999 to 99,999.9999
Y0	Edge 0 position Y	This is the Y coordinate of the measured edge 0 position.	-99,999.9999 to 99,999.9999
X1	Edge 1 position X	This is the X coordinate of the measured edge 1 position.	-99,999.9999 to 99,999.9999
Y1	Edge 1 position Y	This is the Y coordinate of the measured edge 1 position.	-99,999.9999 to 99,999.9999
MX	Midpoint X	This is the X coordinate of the measured edge midpoint position.	-99,999.9999 to 99,999.999
MY	Midpoint Y	This is the Y coordinate of the measured edge midpoint position.	-99,999.9999 to 99,999.999
SX0	Edge0 ref. position X (edge 0 reference position X)	This is the X coordinate of the edge 0 position when it was registered.	-99,999.9999 to 99,999.9999
SY0	Edge0 ref. position Y (edge 0 reference position Y)	This is the Y coordinate of the edge 0 position when it was registered.	-99,999.9999 to 99,999.9999
SX1	Edge1 ref. position X (edge 1 reference position X)	This is the X coordinate of the edge 1 position when it was registered.	-99,999.9999 to 99,999.9999
SY1	Edge1 ref. position Y (edge 1 reference position Y)	This is the Y coordinate of the edge 1 position when it was registered.	-99,999.9999 to 99,999.9999
SMX	Ref. Midpoint X (reference midpoint X)	This is the X coordinate of the midpoint of the two edges when they were registered.	-9,999.9999 to 99,999.9999
SMY	Ref. Midpoint Y (reference midpoint Y)	This is the Y coordinate of the midpoint of the two edges when they were registered.	-9,999.9999 to 99,999.9999

Measurement Data That Can Be Logged

The values below can be logged as measurement data.

Parameter	Setting	Description
Judgement	-2: No judgement (not measured) 0: Judgement is OK -1: Judgement is NG -15: Out of range error	This is the judgement result.
Scroll X	-99,999.9999 to 99,999.9999	This is the amount of position compensation for the X coordinate.
Scroll Y	-99,999.9999 to 99,999.9999	This is the amount of position compensation for the Y coordinate.
Midpoint X	-99,999.9999 to 99,999.999	This is the X coordinate of the measured edge midpoint position.
Midpoint Y	-99,999.9999 to 99,999.999	This is the Y coordinate of the measured edge midpoint position.
Edge 0 position X	-99,999.9999 to 99,999.9999	This is the X coordinate of the measured edge 0 position.
Edge 0 position Y	-99,999.9999 to 99,999.9999	This is the Y coordinate of the measured edge 0 position.
Edge 1 position X	-99,999.9999 to 99,999.9999	This is the X coordinate of the measured edge 1 position.
Edge 1 position Y	-99,999.9999 to 99,999.9999	This is the Y coordinate of the measured edge 1 position.

Edge Rotation Position Compensation

This position compensation item detects an edge in two directions.

If the specified color is detected (or the specified density is detected for a Sensor with a Monochrome Camera), it is recognized as an edge. Two edge positions are detected.

The image is adjusted so that the two edge positions match the positions when the edge positions were registered.



[Image] – [Image adjustment]

- **1** Press an unused number and then press [Add pos. comp.].
- 2 Press [Edge] [Edge rot. pos. Comp.]
- **3** Make any detailed settings as required for the position compensation processing. Refer to *Detailed Settings for Edge Rotation Position Compensation*, below.
- 4 Press [OK].
- 5 Press [Back].

Detailed Settings for Edge Rotation Position Compensation

The settings for the Edge Rotation Position Compensation item are almost the same as those for the Edge Position inspection item.

Make the settings in the same way as for the Edge Position inspection item.

4-12 Inspecting with the Edge Position Inspection Item: p. 271

However, the following settings are included only in the Edge Position Compensation Item.

Teaching

Measurement Regions and Measurement Directions

Set the measurement regions and measurement directions for both edge 0 and edge 1.

[Image] – [Image adjustment] – [Edge rot. pos. Comp.] – [Modify] – [Basic] – [Teach]

The settings are the same as those for the Two-edge Position Compensation item.

Teaching: p. 115

Reference Angle

Set the reference angle. Press [◀] – [Edit Ref. angle] on the right of the display and set the angle.

Source Image

You can select the image to which to apply the results of position compensation processing.

Applying the Results of Position Compensation: p.104

Interpolation

You can select the precision of position compensation. If you select [Bilinear], the precision of position compensation will increase.

[Image] – [Image adjustment] – [2Edge position comp.] – [Modify] – [Details] – [Interpolation]

The settings are the same as those for the Shape Search Position Compensation item.

Interpolation: p. 108

Measurement Data That Can Be Used for External Outputs and Calculations

The following values can be used as measurement data and output to external devices via Ethernet or used in calculations.

Expression text string	Data name	Description	Data range
			-2: No judgement (not measured)
JG	Judgement	This is the judgment result.	0: Judgement is OK
	0	, ,	-1: Judgement is NG
			-15: Out of range error
DT	Scroll q	This is the amount of position compensation.	-180 to 180
X0	Edge 0 position X	This is the X coordinate of the measured edge 0 position.	-99,999.9999 to 99,999.9999
Y0	Edge 0 position Y	This is the Y coordinate of the measured edge 0 position.	-99,999.9999 to 99,999.9999
X1	Edge 1 position X	This is the X coordinate of the measured edge 1 position.	-99,999.9999 to 99,999.9999
Y1	Edge 1 position Y	This is the Y coordinate of the measured edge 1 position.	-99,999.9999 to 99,999.9999
TH	Angle (edge angle)	This is the measured angle.	-180 to 180
SX0	Edg0 ref. pos. (edge 0 reference position X)	This is the X coordinate of the edge 0 position when it was regis- tered.	-99,999.9999 to 99,999.9999
	Edg0 ref. pos. Y	This is the Y coordinate of the	
SY0	(edge 0 reference position Y)	edge 0 position when it was reg- istered.	-99,999.9999 to 99,999.9999
	Edg1 ref. pos. X	This is the X coordinate of the	
SX1	(edge 1 reference position X)	edge 1 position when it was regis- tered.	-99,999.9999 to 99,999.9999
	Edg1 ref. pos. Y	This is the Y coordinate of the	
SY1	(edge 1 reference position Y)	edge 1 position when it was regis- tered.	-99,999.99999 to 99,999.9999
STH	Reference angle	This is the angle when the edge was registered.	-180 to 180

Measurement Data That Can Be Logged

The values below can be logged as measurement data.

Parameter	Setting	Description
Judgement	 -2: No judgement (not measured) 0: Judgement is OK -1: Judgement is NG -15: Out of range error 	This is the judgement result.
Scroll q	-180 to 180	This is the amount of position compensation.
Angle (edge angle)	-180 to 180	This is the measured angle.
Edge 0 position X	-99,999.9999 to 99,999.9999	This is the X coordinate of the measured edge 0position.
Edge 0 position Y	-99,999.9999 to 99,999.9999	This is the Y coordinate of the measured edge 0position.
Edge 1 position X	-99,999.9999 to 99,999.9999	This is the X coordinate of the measured edge 1position.
Edge 1 position Y	-99,999.9999 to 99,999.9999	This is the Y coordinate of the measured edge 1position.

Position Compensation

The position is corrected based on the entered numeric values.

This is used to correct the position by rotating the captured image around the center of the screen or entering numeric values.

[Image] – [Image adjustment]

- **1** Press a free number, and press [Add pos. comp.].
- 2 Press [Value] [Position comp.]

Add pos.	comp.
Model	🌤 Position comp.
Edge	
Yalue	
	🔍 🖸 Cancel

3 At the right of the screen, press **▲** – [Image rotation] or [Parameter] to open the settings screen.



Parameter	Setting	Description
Position	Image rotation	Select to correct the position by rotating the image around the center of the screen.
Compensation	Parameter	Select to specify the amount of position compensation from the reference position and the measurement position. The displacement between the measurement position and the reference position is the amount of the position compensation.

When [Image rotation] is selected



When [Parameter] is selected

Parameter	0.	Position comp.
	Reference	Position
x	640	640
¥	512	512
Θ	90	0
		K Cancel

Parameter		Setting	Description
Angle		Range: -180 to 180 Default: 90	Rotates the image clockwise around the center of the screen. To rotate 90° counterclockwise, enter -90.
Reference position [Reference]	X Y q	Range: -99,999 to 99,999 Defaults: 376 on the FQ2-S1***** FQ2-S2***** FQ2-S4***** FQ2-S4***** FQ2-CH 640 on the FQ2-S3*****08* FQ2-S3*****08* FQ2-S4***** FQ2-S4**** FQ2-S4**** FQ2-S3*-13* FQ2-S4**** FQ2-S4**** FQ2-S4**** FQ2-S4**** PQ2-S4**** FQ2-S4**** FQ2-S4**** FQ2-S4**** FQ2-S1***** FQ2-S1*****	Sets the reference position.

Parameter		Setting	Description
Measurement position [Position]	x	Range: -99,999 to 99,999 Defaults: 376 on the FQ2-S1***** FQ2-S2***** FQ2-S4***** FQ2-CH 640 on the FQ2-CH 640 on the FQ2-S3*****-08* FQ2-S3*-13* FQ2-S3*-13* FQ2-S4*-13* Range: -99,999 to 99,999 Defaults:	Sets the measurement position.
	Y	240 on the FQ2-S1***** FQ2-S2***** FQ2-S4***** FQ2-S4*****-M FQ2-CH 512 on the FQ2-S3*****08 FQ2-S3*****08 FQ2-S3*-13* FQ2-S3*-13* FQ2-S4*-13* Range: -180 to 180 Default: 0	

4 Press [OK].

5 Press [Finish].

Measurement Data That Can Be Used for External Outputs and Calculations

The following values can be used as measurement data and output to external devices via the Ethernet or used in calculations.

Expression text string	Data name	Description	Data range
JG	Judgement	This is the judgement result.	-2: No judgement (not measured) 0: Judgement is OK -1: Judgement is NG -15: Out of range error
DX	Position correction X	Amount of correction of X coordinate of position	-99,999.9999 to 99,999.9999
DY	Position correction Y	Amount of correction of Y coordinate of position	-99,999.9999 to 99,999.9999
DT	Position correction q	Amount of angle correction q	-180 to 180
Х	Measurement coordinate X	X coordinate of measurement position	-99,999.9999 to 99,999.9999
Y	Measurement coordinate Y	Y coordinate of measurement position	-99,999.9999 to 99,999.9999
TH	Measurement angle	Angle of measurement position	-180 to 180
SX	Reference coordinate X	X coordinate of reference position	-99,999.9999 to 99,999.9999
SY	Reference coordinate Y	Y coordinate of reference position	-99,999.9999 to 99,999.9999
ST	Reference angle	Angle of reference position	-180 to 180

Linear Correction

When the measurement object is distorted because it is an angle to the camera, you can correct the input image.

[Image] – [Image adjustment]

1 Press an unused number and then press [Add pos. comp.].

2 Press [Value] – [Linear Corr.].

3 Press [◀] – [Meas. position] at the right of the screen to open the settings screen.

- **4** Drag the vertices of the displayed figure to set the points to be used for correction.
- 5 Press [OK].
- 6 Press [◀] [Ref. position] at the right of the screen to open the settings screen.

Nodify O.Linear Corr Ref. position Heas. position Filter region Source image Interpolation Back









篭 Position comp.

Add pos. comp.

7 Set to the same settings as the measurement position settings, and drag the vertices of the displayed figure to bring the measurement position that you just set to the correct position.



8 Press [OK].

9 Press [Back].

Edit Region

You can set the range for position correction.

[Image] – [Filter adjustment] – [Linear Corr.] – [Modify]

- **1** Press **[◀]** [Filter region] at the right of the screen.
- Adjust the size and position of the region for position correction.
 To perform fine adjustment, press [◀] [Console] at the right of the screen to open the fine adjustment console. The coordinate values of the frame can be moved in increments of one pixel.
- 3 Press [OK].

Source Image

You can select the image to which to apply the results of position compensation processing. You can set the image for position compensation for each position compensation item.

[Image] – [Image adjustment] – [Linear Corr.] – [Modify]

1 Press [◀] – [Source image] at the right of the screen.

2 For the source image, select [Camera] or [Prev. image].

Parameter	Setting	Description
Source image	Camera	The results of processing the position compensation item is applied to the image that is taken by the Camera. This setting is used when filter items or other position compensation items have been used specifically for the position compensation item.
	Prev. (Default)	This setting is used when the processing results of the current position item are to be applied to the image that results from previous filter items or other position compensation items.

Position Interpolation

You can select the precision of position compensation. If you select [Bilinear], the precision of position compensation will increase.

[Image] – [Image adjustment] – [Linear Corr.] – [Modify]

1 Press **[◀]** – [Interpolation] at the right of the screen.

2 Select [Bilinear] or [None] for position interpolation.

Parameter	Setting	Description
Interpolation	Bilinear (Default)	Points are connected with lines to find approximations. This create smoother images. When [Bilinear] is selected, the processing time increases.
	None	Position compensation is performed at the pixel level.

Measurement Data That Can Be Used for External Outputs and Calculations

You can use the values below as measurement data for external output and calculations.

Expression text string	Data name	Description	Data range
JG	Judgement	This is the judgement result.	-2: No judgement (not measured) 0: Judgement is OK -1: Judgement is NG

Setting Up Inspections

4-1 Inspection Item Selection Guide
4-2 Setup Procedure for Inspection Items
4-3 Configuring Inspection Items
4-4 Reading with OCR 140
4-5 Reading Barcodes 179
4-6 Reading 2D-codes
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4-8 Inspecting with the Search Inspection Item 215
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4-18 Calculations and Judgments Using Inspection Item Data 323

4-1 Inspection Item Selection Guide

FQ2-S1 FQ2-S2 FQ2-S3 FQ2-S4 FQ2-CH

The FQ2 Sensor uses inspection items to judge measurement objects. There are thirteen different measurement objects. Select the best inspection items for the characteristics of the measurement object that are being judged.

Inspection	Example		Inspec- tion items used	Compati- ble mod- els	
Judging according to character recognition	Checking printed consume-by dates	OK	OCR	FQ2-S4	p. 140
2012.10.01 POD/CE6800		2012.10.01 NG 2012.11.01		F02-CH	
Judging according to bar code	Checking product information	OK NG 12345 12346	Bar code	FQ2-S4	p. 179
Judging according to 2D-code	Checking product information	OK NG 12345 12346	2D-code	FQ2-S4	p. 190
Judging according to DPM 2D- code	Reading 3D codes for direct part marking	OK NG 12345 12346	2D-code (DPM)	FQ2-S4	p. 201
Judging according to shapes	Judging if there is a mark	OK NG	Search or Shape Search III	FQ2-S1 FQ2-S2 FQ2-S3 FQ2-S4	p. 215 p. 230
Detecting positions with pat- terns	Measurement objects of the sam detected.	ne color and pattern can be	Search	FQ2-S1 FQ2-S2 FQ2-S3 FQ2-S4	p. 215



4

Inspection	Exa	mple		Inspec- tion items used	Compati- ble mod- els	
Judging according to shapes and quantities	Judging the number of labels	ОК Ф Ф	NG To to To to	Labeling	FQ2-S1 FQ2-S2 FQ2-S3 FQ2-S4	p. 310

4-2 Setup Procedure for Inspection Items

The basic steps for setting up inspection items are shown below.

FQ2-S1 FQ2-S2 FQ2-S3 FQ2-S4 FQ2-CH



If measurements are unstable



Note

Only one inspection item can be used on the FQ2-S1 Series. A combination of up to 32 inspection items can be used on the FQ2-S2/S3/S4/CH Series.

4-3 Configuring Inspection Items

FQ2-S1 FQ2-S2 FQ2-S3 FQ2-S4 FQ2-CH

Adding New Inspection Items

1 Press [Inspect] – [Inspection].

2 Press an unused inspection item number.

3 Press [Add item.] on the menu.

4 Select an inspection item, such as [Search].



When registering multiple inspection items, press the inspection item number after 1.--- and set it in the same way.



2012.08



If more than seven inspection items are set, drag the **example** icon at the bottom of the menu upward to display the next inspection item numbers.

Modifying Existing Inspection Items

1 Press the number of the inspection item to be set.



2 Press [Modify] on the menu.



Deleting Inspection Items

- **1** Press the number of the inspection item to be deleted.
- 2 Press [Delete] on the menu.

Inspect>Inspection	n FO O.SceneO
0.0CR	
1.Bar code	X Wodify
2.2D-code	Delete
3.2D-code(DPM)	Сору
4.	Rename
	-
	Back

Note

Executing Similar Measurements in Different Places.

- . Copy an inspection item that is already registered: [Copy].
- Change the name of an inspection item: [Rename].

4-4 Reading with OCR

Character String Recognition

Character recognition is used to read characters in input images as character information based on font information that is registered in the Sensor in advance. The characters that were read can be output to an external device.

You can also verify the character string that was read to see if it matches a character string that was registered in advance or the read result from a Bar Code^{*1}, 2D-code^{*1}, 2D-code (DPM)^{*1}, or OCR inspection item that was registered before the inspection item number currently being set.



*1 FQ2-S4 series only

*2 Up to 16 characters per line can be displayed in the result display.

Characters That Can Be Recognized

Item	Description
Numbers ^{*1} Letters ^{*1}	0 to 9 A to Z ^{*1}
Symbols ^{*1}	' (apostrophe) - (hyphen) . (period) : (colon) / (slash) () (parentheses)

*1 Any symbols other than those that are listed above cannot be recognized.

Note

You can also register a custom font for character recognition. Set the custom dictionary before setting character recognition.

Registering a Custom Dictionary: p. 170

The setup for character recognition is performed in the following order.



The basic settings to recognize characters are made.

- Character format (number of characters, alphanumeric characters or symbols, etc.)
- · Measurement region
- Detailed parameters to recognize characters (These are set automatically.)

Settings are made to check whether the characters that were read from the workpiece were recognized correctly. Differences between the references that were taught for character recognition and the actual result of reading the characters are detected and conditions are set to determine how accurately characters are read.

You can set conditions to verify that the character string that was read matches a specific character string. The character strings to use to verify the character strings that are read are registered in the master data.

Setup Procedure for Character Recognition

Step 1 Selecting the Inspection Item

[Inspect] – [Inspection]

- 1 Press an unused inspection item number and press [Add item.].
- 2 Press [OCR].
 - Inspection Item Selection Guide: p. 138



Note

Drag the arrow () at the bottom of the menu to display all of the inspection items.

Step 2 Teaching

In this Teaching function, specifying Measurement region, Character color, Printing type and Correct string, the measurement parameters for OCR are set automatically.

- **1** Touch [TEACH].
- 2 Capture the characters for recolonization.



3 Move the rectangle around the character string to read, and then press [OK].

The measurement region will be set.

4 Select [Character Color],

When the [Cancel] is touched, the all settings will be discarded, and then window will return to the previous setting.



Item	Setting item	Description
Character color	• Black • White	Select this item when the background is Black and character color is White. Select this item when the background is White and character color is Black.
5 Select [Printing type].

When the [Cancel] is touched, the all settings will be discarded, and then window will return to the previous setting.



Item	Setting Item	Description
Printing type	Solid characterDot character	Select Printing type for the character to inspect.

6 Select [Teach Mode].

[Correct String] is recommended normally. When you select [Simple Teach], go to Step 8.



Item	Setting Item	Description
Teach Mode	 Simple Teach Correct String 	 Simple Teach Specify the Region setting, Character color, and Printing type to execute OCR, and then the measurement parameters are defined. Then measurement parameters are adjusted automatically until the specified characters matches with read result. Simple Teach is useful when the correct strings can be recognized even though the correct strings are not specified. Correct String Specify the Region setting, Character color, and Printing type to execute OCR, and then the measurement parameters are defined.

7 Enter your attempted correct string, and then touch [OK].

Acceptable strings: 0 to 9

A to Z

- ' (apostrophe)
- (hyphen)
- . (period)
- : (colon)
- / (slash)
- () (parentheses)



8 Press [TEACH] on the lower-right window.

The Measurement parameters for OCR will be set automatically.

└── Me

Measurement Parameters That Are Automatically Set by Teaching: p. 156

9 Character string that is successfully to recognize is displayed.
 Confirm the result, and then touch [OK].

Teach		0.0CR
Teach		1
L. 1:	ABCDE	
L. 2:	12345	
L. 3:		
	OK	.CH
	Ba	ack

10 Press [Back] to end teaching.

The measurement parameters are adjusted automatically after Teaching. Character format is set automatically from the result.

• For confirming character format.

Select [Format] from the 🔣 menu button.

The following table gives detailed specifications for the character format.

Item	Description
	Numbers: 0 to 9 Letters: A to Z Symbols: ' (apostrophe), - (hyphen), . (period), : (colon), / (slash), () (parentheses) Wildcards
	You can use wildcards to specify characters. For example, you can use wildcards to prevent incorrect recognition of 0 (zero) and O (the letter O).
Characters that can be entered in the character for- mat string	?: Any character (recognized characters: any characters except for symbols) #: Any number from 0 to 9 (recognized characters: 0 to 9) \$: Any letter from A to Z (recognized characters: A to Z)
	 @: Any symbol (recognized characters:' (apostrophe),- (hyphen),. (period),: (colon), / (slash), () (parentheses)) *: any single character (Alphabetic character, Numeral, and Symbols are recognizable.) &: Skip (No judgment is made for the judgment conditions (similarity or stability). The detected character count is also not incremented.)
Limits to the character format	Each line can have a maximum of 32 characters. There can be a maximum of four lines. Characters must be input from line 1. (You cannot skip line 1 and set the character format string starting with line 2.) If you leave any line blank, the setting for the next line will be moved up to fill it.
sung 	You cannot specify a symbol by itself. You cannot specify more than symbol consecutively. You cannot specify more than 16 symbols on one line.

```
Note
```

You can use 🔣 on the right of the display to access the following menu commands to change the following settings

- [Teach mode]: You can change the Teach mode.
- [Insp. region]: You can change the measurement region for OCR.
- [Format]: You can change the setting of the character format.
- [Correct String]: You can change the correct string.
- [Camera setup]: You can adjust the Camera focus, brightness, and other factors to input a better image.
 - . Inputting Better Images: p. 76
- [Meas. Parameter]: You can change the type of code to read, the read settings, etc..
 - Detailed Parameters: p. 156
- [Continuous test]: You can start test measurements of displayed images for the settings that were taught.
 - . Test Measurements: p. 340

Step 3 Setting the Judgment Parameters

Settings are made to check whether the characters that were read from the workpiece were recognized correctly. Differences between the references that were taught for character recognition and the actual result of reading the characters are detected and conditions are set to determine how accurately characters are read.

[Inspect] – [Inspection] – [OCR] – [Settings] Tab Page

- **1** Press [Judgement].
- 2 Press each parameter and set the range that is to be judged as OK.

Set the range for each of the following parameters. Continuous measurements will be performed for the images that are displayed.



Note

· You can change measurement values that appear on the display on the Display Settings Display.

Press **[** – [Display setting] on the right of the display to switch to the Display Settings Display.

• You can automatically adjust the judgment conditions by using OK and NG workpieces. Test Measurements: p. 346

Press 【 – [Auto adjustment] on the right of the display to switch to the Auto adjustment Display.

- You can set the judgment condition depending on figure numeral, alphabet, or character type. Touch **[1]** – [Judgement mode], displays the Judgment mode window.
 - Whole setting: Set the same judgment condition to all of the character strings.
 - Individual setting: Set judgment condition to each character strings.

3 Press [OK] to enter the values.

Item	Parameter	Setting	Description	
Judgement	Similarity	0 to 1000 Default Upper limit: 100 Lower limit: 60	Sets the similarity of the read characters that is to be judged as OK. If any of the characters in the read character string has a similarity that is lower than the set value, the judgment will be NG. To judge incomplete or worn characters as NG, set a high upper limit for the similarity.	
	0 to 100 Default Stability Upper limit: 100 Lower limit: 10		Sets the stability of the read characters that is to be judged as OK. If there is more than one candidate for the same character, the differ- ence between the first and second candidates is numerically expressed by the stability. (For example, if the similarity of the first candidate is 90 and the simi- larity of the second candidate is 25, then the stability is 80 - 25 = 55.) To prevent misreading similar characters, set a high value for the sta- bility.	
	Read Ch.Str L1 to Read Ch.Str L4	-	Displays the detected character strings.	
	Verif. Str L1 to Verif. Str L4	-	Displays verification character strings. The verification strings are displayed only the verification pattern is set.	
	Num. of char.L1 to Num. of char.L4	1 to 32 Default Upper limit: 32 Lower limit: 0	Set the number of characters to judge as OK.	

Note

You can specify whether to reflect the judgment result of the judgment conditions for character recognition in the overall judgment. (The Default is to reflect them.)

[Inspect] – [Inspection] – [Add item.] – [OCR] – [Details] Tab Page – [Output parameter] – [Reflect]

Register the character string based on read character match to specific character string. Matching Mode, select Direct input, Calender Matching, or Code Matching.

Parameter	Setting	Description
Matching Mode	Direct Input	Direct Input the verification strings as a Master data, A maximum of 32 types of registered Master data can be simultaneously verified. The result is reflected to the external reference parameters. This result can be output to the external device using communication com- mand. fixed character string length is 32 characters X 4 lines.
	Calendar Matching	Verify with the sensor calender information. For the versification, the character length including calender is 32 char- acters. The number of the verification master data is one.
	Code Matching	 Verify with the following functions. 2D code 2D code (DPM) Code Reader (description as CR) For verification target is the loaded result of CR inspection item. The number of the verification master data is one.

Important

When you select Calendar Matching, the date and time information must loaded, or updated via TouchFinder, or external device connection, such as with PLC.Without date and time settings for Calendar Matching, the verification string will be zero.

4 Set or Acquire the Date and Time: p. 167

Setting Up Inspections

0.00

Back

Auto

Manual

Сору

Delete

ltem ref

[Inspect] – [Inspection] – [Add item.] – [OCR] – [Settings] Tab Page

- **1** Touch [Verification].
- 2 Touch [Matching Mode], and then select [Direct Input].
- 2.Waster data 2 3.Waster data 3 4.Waster data 4 5.Waster data 5

Master data regist

O.Waster data O

Waster data 1

3

0

- **3** Touch [Master data regist.].
- **4** Touch the master data to register.
- 5 You can use any of the following three methods to register character strings in the master data from the menu display.
 - [Auto]: A character string is read from an image and registered in the master data. The procedure is essentially the same as the procedure for teaching in step 2.
 - [Manual]: A character string is entered directly in the master data. Select this menu when making a change to the master data registered using [Auto] menu.

You can use a software keyboard to register a character string with up to 32 characters.

Note

You can set letters, numbers, symbols, and the following wildcards: * and ?.

- *: A wildcard for a character string of 0 or more characters
- ?: A wildcard for one character (alphabetic or numeric)
- [Item ref.]: Select this item to use the immediately preceding read results as the verification character string.

The following inspection items can be used as references.

- FQ2-S4 Series: Bar code, 2D-code, 2D-code (DPM), and OCR
- FQ2-CH Series: OCR

You cannot reference an inspection item that is after the current inspection item. After a character string is registered, a reference item number, such as "Ref. 00," will be displayed to the right of the character string in the master data. Note

On FQ2-S4 Series, you can set the [Item ref.] verification condition to check if characters that are printed near a barcode or 2D code match the contents of the barcode or 2D code.

Place the inspection item to read the barcode or 2D code to check before the OCR inspection item and then specify the [Item ref.] verification condition for the OCR inspection item. The verification condition will be used to verify whether the character string from the barcode or 2D code and the characters printed below it match. You can output the verification result.



- 6 Repeat the above procedure to register more than one character string in the master data.
- 7 Touch [Verif. master data] and select the character string in the master data to use for verification.

Note

You can automatically register the read result from teaching from an external device in the character string with number that is specified [External teach No.] in the master data.

8 Touch [Back].

Parameter	Setting	Description
Matching mode	Direct Input (Default)Calender MatchingCode Matching	Select your attempted Matching mode.
Verif. master data	 OFF (Default) All master data Master data 0 to 31 	Sets whether to verify the read character string against a charac- ter string that is registered in the master data. To verify the read character string against the master data, select the character string to use for verification.
Master data regist.		Registers a character string in the master data. Use [Manual] menu when making a change to the [Partial Verifi- cation] setting for master data originally registered by [Auto].
External teach No (Only the Direct Input is selected.)	OFF (Default) Master data 0 to 31	Sets the character string in which to automatically register the read result for teaching from an external device.

- **1** Touch [Verification].
- 2 Touch [Matching Mode].
- **3** Touch [Calender Matching].

4 Touch [Master data regist.].



Matching Mode	0.0CR
Sel <mark>ect</mark> Master data K ABC	latching mode. DE
Direct Input	Calendar Watching
	Cance I

Verification		0.0CR
Matching Mode	Calendar	Matching
Master data regist.		
12345	5 -	
	I	Back

5 Touch lines, a soft keyboard appears. Enter your attempt date to each lines.

Enter formats of the alphabetical characters or date to be read.

Examples of Acceptable Formats

• To recognize the text string "2014/01/01," enter "2014/01/01" in the string format area.

• To recognize four-digit numbers, enter as [####], where each "#" represents a number, in the string format area.

• To recognize 3 digits - the current year / the current month

Enter "***-mYYYY#/mMM#".



Master data regist.							0.0C <mark>r</mark>					
Num	be r	(#) A1	пу	c ha	ar(*)					BS
mY Y	n	יאא	ΥY	mН	Н	mM M	mĺ	DD				CLR
mRR	mΝ	Ν										
vYY	۷	YY	ΥY	٧H	H	VMM	٧ĺ	DD		•	►	
1	-		:	/	()					С	ode
				_		_			OK		Ca	ncel
]	0	3		Ó			Ok	(Car	ncel

Label	Description	Label	Description
0 to 9	Normal numeric value input	eY1	Coded year 1
A to Z	Normal alphabetic character input	eM1	Coded month 1
' : /()	Normal symbol input	eD1	Coded day 1
*	Uppercase alphabetic character judg- ment, Numeric character judgment and Symbol judgment	eR1	Coded hour 1
#	Numeric character judgment	eN1	Coded minute 2
mYY	Current year, 2 digits	eY2	Coded year 2
MYYYY	Current year, 4 digits	eM2	Coded month 2
mHH	Current year of the Heisei imperial era, 2 digits	eD2	Coded day 2
mMM	Current month	eR2	Coded hour 2
mDD	Current day	eN2	Coded minute 2
mRR	Current hour	iY1	Coded year after set interval 1
mNN	Current minute	iM1	Coded month after set interval 1
vYY	Year after set interval, 2 digits	iD1	Coded day after set interval 1
vYYYY	Year after set interval, 4 digits	iY2	Coded year after set interval 2
mHH	Year of the Heisei imperial era after set interval, 2 digits	iM2	Coded month after set interval 2
vMM	Month after set interval	iD2	Coded day after set interval 2
vDD	Day after set interval		

6 Touch [OK].

7 Touch [Back].

[Inspect] – [Inspection] – [Add item.] – [OCR] – [Settings] Tab Page

- **1** Touch [Verification].
- 2 Touch [Matching Mode].

3 Touch [Code Matching].

 Image: Constraint of the sector of the se

erification

Matching Mode

Verif. master data Waster data regist.

External teach No.

1234

4

0.0CR

OFF

Direct Input

4 Touch [Master data regist.].

Verification		0.0CR
Watching Wode	Code	Matching
Master data regist.		
12345		
		Back

5 Touch [Item ref.], and then select the Code Matchin items to refer.



0

2

6 Touch Line number for verification.

7 Set the Verification region as necessary.

8 Touch [Back].

Parameter	Setting	Description
Matching mode	Direct Input (Default)Calendar MatchingCode Matching	Select your attempted Matching mode.
Item ref.	The following registered func- tion before setting of item ref. • Bar code • 2D-code • 2D-code (DPM) (Default: None)	Use this parameter when you set the latest result as a verifica- tion string.Specify the Processing item for the verification string.
Line for varif.range	CheckUn-check (Default)	Select the line 1-4 for which to apply Calendar Matching.
L1. verif. range		Specify the result range of Calender Machining function that is compare with line 1.
L2. verif. range	1 to 1024 (Default Start Line: 1 Finish Line: 1024)	Specify the result range of Calender Machining function that is compare with line 2.
L3. verif. range		Specify the result range of Calender Machining function that is compare with line 3.
L4. verif. range		Specify the result range of Calender Machining function that is compare with line 4.

Setting the Measurement Parameters

When you perform teaching, the measurement parameters are set automatically. If you obtain incorrect reading results with the automatic settings, set the measurement parameters manually.

▶ [Inspect] – [Inspection] – [OCR] – [Details] Tab Page – [Meas. parameter]

Detailed Parameters

Parameter	Setting	Description
Reading Speed	Normal (Default)Fast	Set the speed to read characters. When the space is large between characters, select [Fast].
Character color	Black (Default)White	Sets the color of the characters to detect.
Printing type	Solid character (Default)Dot character	Sets the type of printing of the characters to detect. When using a custom dictionary, set this to the same setting as [Meas. parameter] – [Printing type] of the dictionary.
Dot ver. interval	0 (Default) to 30	Adjusts the vertical dot interval of the characters to detect. This parameter is enabled only when [Printing type] is set to [Dot character].
Dot hor. interval	0 (Default) to 30	Adjusts the horizontal dot interval of the characters to detect. This parameter is enabled only when [Printing type] is set to [Dot character].
Char. thick. th.	–255 to 255 (Default: 0)	Sets the thickness of the characters. Negative numbers indicate thinner characters. Positive numbers indicate thicker characters. Recognition performance will improve for positive numbers, but noise will increase, causing instability.
Boundary correction	• ON • OFF (Default)	If boundary correction is turned ON, dark areas at the edges of the measurement region will be considered to be noise and removed from the read candidates.
Rotation compensation	• ON • OFF (Default)	If rotation compensation is turned ON, the image will be compen- sated for a -15° to 15° rotational variation. (This setting compensates for rotational variations in the place- ment of the workpiece on the line, and not for rotational variations in the characters themselves that result from printing conditions.)
Slant compensation	• ON • OFF (Default)	If slant compensation is turned ON, the image will be compen- sated for a -20° to 20° slant variation. (This setting compensates for slant variations in the placement of the workpiece on the line or in the printing mechanism, and not for italic fonts.)
Hyphen height upp. th.	0 to 100 (Default: 30)	Sets the upper limit of the height of the region to treat as a hyphen or other symbol.
Hyphen height low. th.	0 to 100 (Default: 70)	Sets the lower limit of the height of the region to treat as a hyphen or other symbol.
Slender char. th.	1 to 10 (Default: 3)	Sets the ratio of the height to the width of the detection character rectangle to judge as thin characters (I, J, 1, :, and /).
Max Width Setting	ONOFF (Default)	Set the Max Width Setting to ON or OFF.
Max Width	0 to 9,999 (Default)	Specify the max width of the character to be read.
Max Height	0 to 9,999 (Default)	Specify the max height of the character to be read.
Min Height	0 to 100 (Default: 50)	Specify the min height of the character to be read.
Read Length	Variable (Default)Fixed	If character strings with a variable number of characters are to be read, specify variable. The character format should be the same as the maximum char- acter string length format.

When loading Scene data from an older version, the [Legacy Mode] Setting appears above the measurement parameters.

Meas. Parameter		0.0CR
Legacy Mode		0 N 🔨
Character color	B	lack
Printing type	Solid charac	ter:
Dot ver. interval		0
Dot hor. interval		0
Char. thick. th. 🔔		0 🗸
		Back

The [Legacy Mode] allows for Scene data, or Dictionary data created with software versions older than ver. 2.10 to be usable with ver. 2.02, or later software. The Dictionary data created with the old software version can only be used with Scene data also created from the old software version.

If you touch [Legacy Mode], which is above the measurement parameters, the following dialog appears. Touching [Yes] will update the settings to version 2.10, or later.

Legacy Mod	je	
Enable new settings w initialize	w function will be ed.	s? The
	Yes	No

Use Dictionary data with Scene data created with the same Sensor version. In [Legacy Mode] use only Dictionary data created with Sensor version older than ver. 2.02. Likewise, with Sensor version 2.10 or later, use Dictionary data created in Sensor version 2.10, or later. The following dialog will appear if there is a version mismatch.

Legacy Moo	le	
Enable new settings w initialize	v function vill be ed.	s? The
	Yes	No

Executing Teach function, parameters are set automatically

The following parameters in measurement parameters, are automatically set by executing Teach function.

Parameter	Setting	Parameter	Setting
Character color	Manual	Rotation compensation	Auto
Printing type	Manual	Slant compensation	Auto
Dot ver. interval	Auto	Max Width Setting	Auto
Dot ver. interval	Auto	Max Width	Auto
Char.thick.th.	Auto	Max Height	Auto
Boundary correction	Auto	Min Height	Auto

Limiting Readable Characters

Limiting the readable characters decreases the possibility of mis-reading similar characters.

[Inspect] – [Inspection] – [OCR] – [Details] Tab Page – [Dictionary parameter] – [Individual char.]

Changing the Output Code for Errors (Default: NG)

You can change the character string that is output for read errors. (The output code must be no more than 20 characters.)

[Inspect] – [Inspection] – [OCR] – [Details] Tab Page – [Output parameter] – [Error string]

Troubleshooting Unstable Read Results

- The read results may be unstable if the contrast is low. Adjust the brightness to improve the contrast.
- Set a custom dictionary.
- · Adjust the detailed parameters.

When reading a variable length string

Set the Read Length of measurement parameters to Variable. Then set the character format to the maximum character string format.

Setting Date Parameter

Set the date, time or update setting.

[Inspect] – [Inspection] – [Add item.] – [Details] tab – [Date parameter]

1 Touch [Period setting], and then set Year, Month and Day.

Item	Setting	Description
Year	Range : 0 to 99 Default : 0	
Month	Range : 0 to 99 Default : 0	Set the usage period from the current date.
Day	Range : -999 to 999 Default : 0	

2 Touch [Date setting], and then set the following settings.

ltem	Setting	Description
Zero suppress	• [0] • Space	Set how the tens digits of the month and day are displayed.
Calculation order	• Month→Day • Day→Month	Set whether to calculate the month first or the day first when the usage period is set. (This affects calculation of end of month.)
Month end adjust	 [Last day of current month] First day of next month Gap day of next month 	Set the adjustment method that will be used if the result of the expiration date calculation is an invalid date.

Note

Use the following examples as reference for setting of the date parameter.

E.g.1

Measurement is performed on 9/30, and the period setting is: Year: 1, Month: 1, Day: 1.

- [Month \rightarrow Day]: A month is added to 9/30, and the result will be 10/30.
 - A day is added to 10/30, and the result will be 10/31.
- [Day \rightarrow Month]: A day is added to 9/30, and the result will be 10/1.
 - A month is added to 10/1, and the result will be 11/1.

E.g.2

Measurement is performed on 1/31, and the period setting is: Year: 0, Month: 1, Day: 1.

- [Month \rightarrow Day]: A month is added to 1/31, and the result will be 2/31.
 - The month end adjustment will be applied since 2/31 does not exist. The result of the month end adjustment plus 1 will be the verification string.

Month end adjust	Result
Last day of current month	2/28
First day of next month	3/1
Gap day of next month	3/3

- [Day→Month]: A day is added to 1/31, and the result will be 2/1. The month end adjustment will not be applied since 2/31 exists. A month is added to 2/1, and the result will be 3/1.
- [Day→Month]: A day is added to 1/31, and the result will be 2/1. The month end adjustment will not be applied since 2/31 exists. A month is added to 2/1, and the result will be 3/1.

Measurement is performed on 10/30, and the period setting is: Year: 0, Month: 1, Day: 1.

- [Month→Day]: A month is added to 10/30, and the result will be 11/30. The month end adjustment will not be applied since 11/30 exists. A day is added to 11/30, and the result will be 12/1.
- [Day→Month]: A day is added to 10/30, and the result will be 10/31. A month is added to 10/31, and the result will be 11/31. The month end adjustment will be applied since 11/31 does not exist.

Month end adjust	Result
Last day of current month	11/30
First day of next month	12/1
Gap day of next month	12/1

Item	Setting	Description
		Select the condition for updating the date. The time is always updated.
		 Not update The date is not automatically updated. Update the date using the menu.
		First Update
Auto Update	Not updateFirst Update	Updates the Sensor day and time information at the first launch.
	 Always update (Default) 	Always update The date is undeted when measurement is newformed. When the
		controller is kept running more than one day, the date is updated the first time measurement is performed after the date changes.
	Range: 0 to 99	Set an appropriate count back time from the current time. Set in
Anead margin	Detault: 0	Set this when the printing time is different from the inspection time.
Back margin	Range: 0 to 99 Default: 0	Set an appropriate count forward time from the current time. Set in units of minutes.
0		Set this when the printing time is different from the inspection time.

${\bf 3}$ Touch [Common Setting], and then set Auto Update, Back margin and Ahead margin.

Touching [Date update], date and time of Verify String will be updated.

4 Touch [Back].

Code data Parameters

Set the Code data format to measure the encrypted date and time information. For changing of Code data parameters, refer to the following two method.

- · Code data edit tool
- Set using PC

Important

When you use the period setting, the encrypted data is unacceptable for OCR.

Code data edit tool

Set the Code data using Code data edit tool

Download the Code data edit tool from the OMRON website.

For registration of OMRON website, confirm the SYSMAC ID ***** that comes with Sensor. The following explanation of settings is for the example of an October date encrypted as X. Describes the setting method.

- **1** Launch the Code data edit tool.
- 2 In the code detail setting area, select the "Code month 1 flag" check box.

Note

Code month 1 and code month 2

• Set up code files for 2 patterns in order to be ready for set changes. Select a check at the one to use.

3 Place a check at "Code month 1" in the "Code detail setting" area.

Code flag setting
🗖 Code year 1 flag
🗖 Code year 2 flag
🔽 Code month 1 flag
🗖 Code month 2 flag
🗖 🗘ode day 1 flag
🗖 Code day 2 flag
🗖 Code hour 1 flag
🗖 Code hour 2 flag
🗖 Code minute 1 flag
🗖 Code minute 2 flag

Code detail setting						
	Code year 1	Code year 2	Code month 1	0.0		
	Code hour 1	Code hour 2	Code minute 1	0.0		

4 Enter "X" in the [10:].

For character string, enter with in four strings.

- 5 Select the code file (CSV format) to be loaded in the file selection screen, and click [OK].The code file is loaded and displayed on the screen.
- 6 Click [Save].

Set Code Data using PC

Since the Code data file is complicated, it is best to edit it using a PC. Once an empty CSV file is saved, edited on a PC and then re-loaded, it can most efficiently be used.

Save the Code Data

Create an empty file for editing with PC. If the Code data has already been set in Sensor, a file having the settings will be saved.

[Setup] – [Save to file] – [Setting] tab

1 Touch [Code data].



2 Touch the code data number you wish to save.



3 Enter file name, and them touch [OK]. (Default file name; code.csv)



Code File Format

- "Item" appears on the 1st line.
- "Flag" appears on the 2nd line. To use the item, set "1".
- ${\boldsymbol{\cdot}}$ On the 3rd and following lines, the code corresponding to each number appears.

The month and day start from "1".

Code	Year 1	Year 2	Month 1	Month 2	Day 1	Day 2	Hour 1	Hour 2	Minute 1	Minute 2
Flag	0	0	0	0	0	0	0	0	0	0
0										
1										
2										
3										
4										
:										
95										
96										
97										
98										
99										

[Setup] – [Load from file]

1 Touch [Code data].

2 Touch Code data number to load.

3 Select the Code data.

4 Touch [Yes].









Confirm the Code Data Name

The current Code data name can be confirmed with the following steps.

- [Inspect] [Inspection] [Add item] [OCR] [Detail] tab
 - **1** Touch [Code data].



2 The Code data file name is displayed.

Code data 1.0CR File Name code ABCDE 12345 -C

Set or Acquire the Date and Time

Since the Sensor does not have date and time information, setting or acquirement of date and time is necessary for Calendar Matching function.

Set or acquire the Date and Time by any the following methods.

• Set the Date and Time information automatically when TouchFinder is connected to the Sensor.

[Setup] - [Sensor settings] - [Current Day/Time]

1 Touch [Auto-Sync with TF]



2 Touch [ON].

Important

- When you re-connect the TouchFinder to Sensor, the day and time information is acquired,
- If one more than Sensors are connected to the TouchFinder, the day and time information of second connected TouchFinder is enabled.
- Set or Acquire the Date and Time using the external device.

Acquires the Date and Time information by sending a command from the external device. For details, refer to 5-1 Command Control, Command List, and Command to Write Data in FQ2-S/CH User's Manual for Communications Settings.

Confirm the Date and Time information

Date and Time information of Sensor is displayed.

Sensor Date and Time information will be initialized when the Sensor restarts.

[Setup] – [Sensor settings] – [Current Day/Time]

1 Touch [Current Date/Time].



2 Date and Time information is displayed.



Perform OCR with creating dictionary (Model dictionary)

Characters in special fonts cannot be read correctly with the built-in dictionary. In this case, a custom dictionary can be created to read such characters. The size of characters that can be registered is 30 pix X 30 pix.

Creating Model Dictionaries to Recognize Custom Characters

Use the dictionary customize after adding [OCR] to Inspection item and finishing TEACH. Configure model dictionary settings in the order below.



Setup Procedure for Model Dictionary

Creating a Dictionary

1 Press the Tool Button, and then [Model dictionary].



2 Press the dictionary in which to register characters.

Model dictionary	FQ
O.Dictionary dataO	^
1.Dictionary data1	
2.Dictionary data2	
3.Dictionary data3	
4.Dictionary data4	
5.Dictionary data5	×
🖾 🗔 Back	

3 Press [Modify] on the menu.





4 Press [Add].

4 Setting Up Inspections

Reading with OCR





Touch inspect item to acquire the measure-

ment range or measurement parameters.



The measurement region can contain character strings on up to four lines. Each line can contain up to 32 characters.

8

6







ABCDE

12345

0

1

ΟK

¥



9 To extract characters based on a specified character format, press **—** [Modify chara.] on the right of the display.

- 10 To edit the measurement parameters, press **K** – [Meas. Parameter] at the right of the screen.
 - Setting the Measurement Parameters: p. 156

Important

The model dictionary [Printing type] settings must match the inspection item [OCR] settings.

11 Press [Extraction].

Note

The current filter item, or position correction item will be reflected in the extracted image. To not reflect in this image. If this reflection is not necessary, touch - [Image Adjustment], and then select OFF.







Setting Up Inspections

12 The extracted characters will be displayed on the upper left of the display.

If characters are not displayed even you touch [Extraction] button, back Step 7 and retry to.

- **13** Press [OK] to register the characters.
- **14** The characters are registered for the corresponding character type.

Error Messages during Registration

• Failed to register data. Character format is wrong. The format or the number of characters did not match between the read character string and the registered character string. Correct the character string to register.

Add

12345

Modify

- Failed to register data. Character size is too small You can register characters that are 30×30 pixels or larger in the dictionary. Change the settings of the Sensor to increase the size of the characters.
- Extraction error Failed to extract the characters. Check the measurement parameter settings and the read region.
- Excess char. num An attempt was made to register more than 10 characters. Delete the data that does not need to be registered.



ABCDE

12345

0

O.Dictionary data

Extract

O.Dictionary data0

1 To display the registered characters, select the characters on the upper left of the display.



2 The registered characters will be displayed.



Deleting Registered Characters

1 Select the character that you want to delete in the customized dictionary registration display.



- 2 Press [Delete].
- **3** Press the [Yes] Button.

Setting Up Inspections

0.0CR

Back

0.0CR

Setting Dictionary Parameters

[Inspect] – [Inspection] – [Add item.] – [OCR] – [Details] Tab Page

1 Touch [Dictionary param.].

2 Touch [Dictionary ref.] and select the dictionary to use.

Reading with OCR



2.Dictionary	data1		
3.Dictionary	data2		
4.Dictionary	data3		
5.Dictionary	data <u>4</u>		\sim
	Ø	Cance	e I
Individual cl	nar.	0.	OCR
0			~

3 Touch [Individual char.] and select the figure numerical, alphabet, or symbol that you want to exclude from the reading target.

Press [Back].

Important

4

To apply the model dictionary settings, be sure to perform [Dictionary ref.] and [Individual char.].



Dictionary param.

Dictionary ref. individual char

1

Dictionary ref.

1.Dictionary dataO

12345

Note

If the measurement results still do not stabilize after you have configured model dictionary settings, check the following:

 Make s 	ure that appropriate dictionary data is selected in [Details] - [Dictionary param.] - [Dictionary ref.].
\square	Setting the Measurement Parameters: p. 156

• Make sure that [Meas. parameter] - [Printing type] in the model dictionary settings matches [Measurement] -[Printing type] in OCR inspection item.

	Ĩ		
	~		
_	Y	_	٦

Editing the Measurement Parameters: p. 172

Setting the Measurement Parameters: p. 156

Outputting Read Characters to an External Device

After a measurement, you can automatically output the character string that was read with the OCR inspection item to a PLC or other external device. The character strings are output after outputting the output data (output data settings 0 to 31), such as the inspection item parameters and calculation result. Refer to the description for the communications format for the setting procedure and output specifications to output the character string.

Sensor FQ2-S/CH Series User's Manual for Communications Settings (Cat. No. Z338)

- Section 2 Controlling Operation and Outputting Data with a Parallel Connection
- · Section 3 Controlling Operation and Outputting Data with an Ethernet Connection
- · Section 4 Controlling Operation and Outputting Data with an RS-232C Connection

Measurement Data That Can Be Used for External Outputs and Calculations

The following values can be used as measurement data and output to external devices via Ethernet or used in calculations.

Expression text string	Data name	Description	Data range
JG	Judgement	This is the judgement result.	 -2: No judgment (not measured) 0: Judgment is OK -1: Judgment is NG -11: Model does not match -13: Measurement time out -16: Measurement timeout error, -17: Format not entered error
IN	Index	This is the verification result (i.e., the master data number).	 -2: No verification pattern, or reading error -1: Verification is NG 0 to 31: Master data No.
N	Number of read characters	This is the total number of characters that were read for all four lines.	0 to 128
SIM	Similarity	This is the lowest similarity of the read characters.	0 to 100
STB	Stability	This is the lowest stability of the read characters.	0 to 100
N1	Number of read characters (line 1) N1	This is the number of read characters for line 1.	0 to 32
N2	Number of read characters (line 2) N2	This is the number of read characters for line 2.	0 to 32
N3	Number of read characters (line 3) N3	This is the number of read characters for line 3.	0 to 32
N4	Number of read characters (line 4) N4	This is the number of read characters for line 4.	0 to 32
SM	Individual similarity	This is the similarity of read character N (N = 0 to 127).	0 to 100
SB	Individual stability	This is the stability of read character N (N = 0 to 127).	0 to 100
SMC	Similarity (each character type)	Similarity level of loaded characters. (N = 0 to 39) N = 0 to 9: 0 to 9 10 to 35: A to Z 36: / (slash) 37: : (colon) 38 • 39; (,) (parenthesis)	0 to 100
SBC	Stability (each character type)	Stability level of loaded characters. (N = 0 to 39) N = 0 to 9: 0 to 9 10 to 35: A to Z 36: / (slash) 37: : (colon) 38 • 39; (,) (parenthesis)	0 to 100

Measurement Data That Can Be Logged for OCR

Parameter	Setting	Description
Judgement	 -2: No judgment (not measured) 0: Judgment is OK -1: Judgment is NG -11: Model does not match -13: Measurement time out -16: Measurement timeout error, -17: Format not entered error 	This is the judgment result.
Similarity	0 to 100	This is the lowest similarity of the read char- acters.
Stability	0 to 100	This is the lowest stability of the read char- acters.
Number of read characters on line 1	0 to 32	This is the number of characters that were read on line 1.
Number of read characters on line 2	0 to 32	This is the number of characters that were read on line 2.
Number of read characters on line 3	0 to 32	This is the number of characters that were read on line 3.
Number of read characters on line 4	0 to 32	This is the number of characters that were read on line 4.
Individual similarity	0 to 100	This is the similarity of read character N (N = 0 to 127).
Individual stability	0 to 100	This is the stability of read character N (N = 0 to 127).
Bar Codes

FQ2-S4

You can read barcodes.

You can also verify if the character string that was read from the barcode matches a registered character string.

You can output the result of reading a barcode and the verification result to an external device. The following ten code types can be read.

- 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, Expanded Stacked)

- Pharmacode
- GS1-128 Composite Code (CC-A,CC-B,CC-C)
- GS1 DataBar Composite Code (CC-A,CC-B)
- * GS1 DataBar is a code in which the name has been changed from the previous RSS.

Note

Setup

Set the measurement region, place the applicable code in front of the Camera, and then perform teaching. The code type and the detailed parameters are set automatically.



Measurement

One barcode is read in a single measurement region. When the measurement region contains multiple barcodes, the result of the first barcode to be read is output.^{*}



*: A Max.64 characters can be displayed on the result screen.

(Max.16 characters per line and Max.4 lines can be displayed.)

Important

Reading will end in error if the barcode type is incorrectly set. Set the barcode type before starting reading. When teaching is performed, the captured barcode is read, and the following items can be set:

- Code type Detailed Parameters: p. 186
- Direction (for Pharma only) Detailed Parameters: p. 186
- Reverse decode (for Pharma only) Detailed Parameters: p. 186

Setup Procedure for Bar Code

Step 1 Selecting the Inspection Item

[Inspect] – [Inspection]

1 Press an unused inspection item number and press [Add item.].

2 Press [Bar code].

4-3 Configuring Inspection Items: p. 138

Note

Drag the arrow () at the bottom of the menu to display all of the inspection items.

Add item			
Itom	abe OCR		^
rtem	Bar code		
	膣 2D-code		
	趲 2D-code(DPM)		
	💵 Search		
	🖳 Shape Search III		\sim
	a d	Cance	el –

For teaching, the region to measure and the barcode within that region are set as read conditions. You can also register the contents that was read from the barcode as a verification condition in the master data.

[Inspect] – [Inspection] – [Add item.] – [Bar code] – [Settings] Tab Page

- Step 3 Verification Conditions
 - **1** Press [Teach].
 - 2 Input an image of the barcode.
 - **3** Move the rectangle so that it surrounds the barcode.



- 4 Press the [OK] Button.
- 5 The result of reading the barcode that was displayed will be displayed along with a confirmation dialog box for registration in the master data.
- **6 Press [Yes] to register the barcode read result in the master data.** The master data contains the character strings from the barcodes that are registered to verify whether the read character strings match specific character strings.
- 7 Press the master data in which the read characters will be registered.
- 8 Press [Back] to end teaching.

4

Note
You can use the menu commands that are displayed for I at the right of the display to adjust the settings that resulted from teaching.
• [Insp. region]: You can change the measurement region.
• [Camera setup]: You can adjust the Camera focus, brightness, and other factors to input a better image.
Adjusting Image Quality: p. 76
• [Meas. Parameter]: You can change the type of code to read, the read settings, etc.
Detailed Parameters: p. 186
• [Continuous test]: You can start test measurements of displayed images for the settings that were taught.
Performing Test Measurements: p. 340

Step 3 Setting Verification Conditions

You can register a character string from a barcode to use it to verify that the character string that was read from a barcode matches the registered character string.

You can register up to 32 character strings for verification in the master data.

You can verify the character string in the inspection against up to 32 character strings that are registered in the master data.

The verification result is saved in an external reference parameter, so you can use a communications command to output it to an external device.

External Reference Parameters: p. 479

▶ [Inspect] – [Inspection] – [Add item.] – [Bar code] – [Settings] Tab Page

- **1** Press [Verification].
- 2 Press [Master data regist.].
- **3** Press the character string to register in the master data.

4 You can use any of the following three methods to register character strings in the master data from the menu display.

Waster data regist.	O.Bar code
O.Waster data O	
1.Master data 1	Auto
2.Waster data 2	Manua I
3.Master data 3	ltem ref.
4.Waster data 4	Lopy Delete
5.Waster data 5 🔔	~
	Back

- [Auto]: Registers a character string from an actual barcode in the master data. The procedure is essentially the same as the procedure for teaching in step 2.
- [Manual]: Registers a character string that is entered directly in the master data. You can use a software keyboard to register a character string with up to 32 characters.

Note

Check the table of ASCII characters to see what characters can be registered. You cannot enter two-byte characters, one-byte Kana characters, and control codes. You can use the following characters as wildcards.

*: A wildcard for a character string of 0 or more characters ?: A wildcard for one character

ASCII code table: p. 185

- [Item ref.]: Select this item to use the immediately preceding read results as the verification character string. The following inspection items can be used as references: Bar code, 2D-code, 2Dcode (DPM), and OCR. You cannot reference an inspection item at an item number that is after the item number of the inspection item that you are editing. When you register a character string from the master data, the item number of the inspection item that is being referenced, such as "Ref. 00," will be displayed. Using Item References: p. 148
- 5 Repeat the above procedure to register more than one character string in the master data.
- 6 Press [Back] to return to the verification conditions screen.
- 7 Press [Verif. master data] and select the character string in the master data to use for verification.
- 8 Set the following verification conditions as required.

Setup Item	Setting Value	Description
	OFF(Default)	Sets whether to verify the character string that was read from the
Verif. master data	All master data	data.
	Master data 0 to 31	To verify the read character string against the master data, select the character string to use for verification.
Destisless of an left	No (Default)	The number of digits in the read results to be verified with the mas-
Partial Verif. on/off	Yes	the first and last compared digit positions. Up to 32 characters can
Partial Verif. setup	1 to 1024 Default First digit: 1, last digit: 1024)	be set as the number of digits. Example: First compared digit 2, last compared digit 6 OMRON2008 1 and digit 6th digit The text string used for verification becomes "MRON2". Manually register "MRON2", the comparison character string, in master data registration.
Master data regist.		Registers a character string in the master data. When using Partial verification, after automatically registering the master data, you should then adjust the data manually.
	Off (Default)	Sets the character string in which to automatically register the read
External teach No.	Master data 0 to 31	result for leaching from an external device.

9 Press [Back].

Note ASCII code table

The following table shows the ASCII codes that can be used for manual registration of master data and also for registering characters of Limits.

Upper 4 bits

Lower 4 bits

	2	3	4	5	6	7
0	SΡ	0	@	Ρ	`	р
1	!	1	Α	Q	а	q
2	"	2	В	R	b	r
3		3	С	S	С	S
4		4	D	Т	d	t
5		5	E	U	е	u
6	&	6	F	V	f	V
7	,	7	G	W	g	R
8		8	Н	Х	h	х
9		9	I	Υ	i	У
Α	*	•••	J	Ζ	j	Ζ
В	+	;	K	[k	{
С	,	<	L	¥	I	
D	-	=	Μ]	m	}
Ε		>	Ν	۸	n	~
F	/	?	0		0	

Reflect in Total Judgment

You can specify whether to reflect the verification result of a barcode inspection item in the overall judgment. (The Default setting is [Yes].)

[Inspect] - [Inspection] - [Add item.] - [Bar code] - [Details] - [Output parameter] - [Reflect]

Detail Settings

When you execute TEACH, the measurement parameters are automatically set according to the read cords.

▶ [Inspect] – [Inspection] – [Add item.] – [Bar code] – [Details] Tab Page

Press [Meas. parameter], and set the measurement parameters.

Be sure to always specify the code type. Specify other items as necessary. If master data is automatically registered, the code type, the composite codes on/off setting, and the read direction are automatically set.

Setup Item	Setting Value	Description
	JAN/EAN/UPC (Default)	
	Code39	-
	Codebar	-
	ITF	-
Code type	Code93	Selects the type of barcode to be read.
	Code128/GS1-128	-
	GS1 DataBar	-
	Pharmacode	
	Black (Default)	
Code color	White	Sets the color of the code to be read.
	No (Default)	Sets whether or not to support composite codes.
Composite codes on/off	Yes	selected: Code128/GS1-128, GS1 DataBar
	No (Default)	Selects whether or not to insert a check digit. This item is enabled
Check digit on/off	Yes	Code39, ITF (Interleaved 2 of 5), JAN, EAN, UPC, or Code93. When the other codes are selected, this item is set to ON.
Discotion	Horizontal mode (Default)	Selects the reading direction. This item is enabled only when Phar-
Direction	Vertical mode	macode is selected as the barcode type.
	No (Default)	Sets whether or not to use the reverse mode. This item is enabled
Reverse on/off	Yes	only when Pharmacode is selected as the barcode type.
Timeout	1 to 9999 ms Default value: 9999	Sets the timeout time in read processing. A read error occurs if measurement does not end after the preset timeout time is exceeded.

Changing the Character String That Is Output for Read Errors

You can change the character string that is output for read errors.

[Inspect] – [Inspection] – [Add item.] – [Bar code] – [Details] Tab Page – [Output parameter] – [Error string]

Setup Item	Setting Value	Description
Error string	Max. 20 digits (Default value: NG)	Sets the text string to be output when a read error occurs. ASCII code table: p. 185

Changing the Items That Are Displayed on the Test Measurement and Run Display

▶ Press [Test] – [Continuous test] – and then use **I** – [Display setting] on the Test Display.

Display setting	Description
Num. of char.	Displays the number of characters that were read.
Characters	Displays the character string that was read.

Unstable Reading Results

Reading Is Unstable Due to Low Contrast

Adjust the brightness to improve the contrast of the bar code.

Adjusting the Brightness: p. 77

Outputting Read Characters to an External Device

After a measurement, you can automatically output the character string that was read with the barcode inspection item to a PLC or other external device. The character strings are output after outputting the output data (output data settings 0 to 31), such as the inspection item parameters and calculation result.

Refer to the description for the communications format for the setting procedure and output specifications to output the character string.

Vision Sensor FQ2-S/CH Series User's Manual for Communications Settings (Cat. No. Z338)

- Section 2 Controlling Operation and Outputting Data with a Parallel Connection
- · Section 3 Controlling Operation and Outputting Data with an Ethernet Connection
- · Section 4 Controlling Operation and Outputting Data with an RS-232C Connection

Note

The read character string is output after the other output data (data 0 to 31 in the output data settings) after the measurement, such as the inspection item parameters and calculation results. Refer to the following section for the location of the output area for the character string and other details.

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Vision Sensor FQ2-S/CH Series User's Manual for Communications Settings (Cat. No. Z338) Section 1 Overview of Communication Specifications

Measurement Data That Can Be Used for External Outputs and Calculations

Expression text string	Data name	Description	Data range
JG	Judgment	This is the judgment result.	 -2: No judgment (not measured) 0: Judgment is OK -1: Judgment is NG -16: Measurement timeout error
IN	Index	The verification result (master data No.) is output.	 -2: No verification pattern, or reading error -1: Verification is NG, 0 to 31: Master data No.
N	Num. of characters	The number of characters read is output.	0 to 1024

Measurement Data That Can Be Logged (Bar Code)

The following values can be logged as measurement data.

Measured item	Range of value	Description
Judgement	 -2: No judgement (not measured) 0: Judgement is OK -1: Judgement is NG -16: Measurement timeout error 	This is the judgment result from the measurements.
Num. of characters	0 to 1024	The number of characters read is output.

*When logging data is output, the data is output in the order of the above table.

7-6 Logging Measurement Data and Image Data: p. 392

Errors

Error in Teaching

If 2D-codes cannot be read during an automatic registration, a teaching error message is displayed. The reading may be unstable due to low contrast. Adjust the brightness to improve the contrast of the 2D-code.

Note Adjusting the Brightness: p.77

4-6 Reading 2D-codes

2D-codes

You can read 2D codes. You can also verify whether the character string that was read from the 2D code matches a registered character string. You can output the result of reading a 2D code and the verification result to an external device. The following five code types can be read.

Data Matrix (ECC200, GS1), QR Code, Micro QR Code, PDF417, or MicroPDF417

Note

Setup

Set the measurement region, place the applicable code in front of the Camera, and then perform teaching. The code type and the detailed parameters are set automatically.



Measurement

One 2D barcode is read in a single measurement region. When the measurement region contains multiple 2D codes, the result of the first 2D code to be read is output.^{*}



*: A Max.64 characters can be displayed on the result screen. (Max.16 characters per line and Max.4 lines can be displayed.)

Important

Reading will end in error if the 2D Code type is incorrectly set. Set the code type before starting reading. When teaching is performed, the captured 2D code is read, and the following items can be set.

- Code type Detailed Parameters: p. 196
- Mirror Detailed Parameters: p. 196
- Specifying the Code Color (Data Matrix, QR Code, or Micro QR Code only) Detailed Parameters: p. 196
- Shape (Data Matrix, QR Code, or Micro QR Code only) Detailed Parameters: p. 196

Reading 2D-codes

Setup Procedure for 2D-code

Step 1 Selecting the Inspection Item

[Inspect] – [Inspection]

1 Press an unused inspection item number and press [Add item.].

2 Press [2D-code].

4-3 Configuring Inspection Items: p. 138



Note

Drag the arrow ()) at the bottom of the menu to display all of the inspection items.

Step 2 Teaching

For teaching, the region to measure and the 2D code within that region are set as read conditions. You can also register the contents that was read from the 2D code as a verification condition in the master data.

	Step 3	Verification	Conditions:	р.	194
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▶ [Inspect] – [Inspection] – [Add item.] – [2D-code] – [Settings] Tab Page

- 1 Press [Teach].
- 2 Input an image of the 2D code.
- **3** Move the rectangle so that it surrounds the 2D code.
- 4 Press the [OK] Button.

- 5 Press [TEACH] on the lower right of the display.
- 6 The result of reading the 2D code that was displayed will be displayed along with a confirmation dialog box for registration in the master data.
- 7 Press [Yes] to register the read result in the master data.

The master data contains the character strings from the 2D codes that are registered to verify whether the read character strings match specific character strings.

8 Press the master data in which the read characters will be registered.

9 Press [Back] to end teaching.

Note

You can use the menu commands that are displayed for **I** at the right of the display to adjust the settings that resulted from teaching.

- [Insp. region]: You can change the measurement region.
- [Camera setup]: You can adjust the Camera focus, brightness, and other factors to input a better image.

Adjusting Image Quality: p. 76

• [Meas. Parameter]: You can change the type of code to read, the read settings, etc.

Detailed Parameters: p. 196

• [Continuous test]: You can start test measurements of displayed images for the settings that were taught.

Performing Test Measurements: p. 340

Step 3 Judgement condition adjustment

Settings can be made to check whether the characters that were read from the workpiece were recognized correctly.

Differences between the references that were taught for 2D code reading and the actual result of 2D code reading are detected and conditions are set to determine how accurately 2D codes are read.

[Inspect] – [Inspection] – [Add item.] – [2D-code] – [Settings] Tab Page

1 Press [Judgement].

2 Press a setting item to set the OK range.

Set a range for each of the setting items below. Continuous measurement of the displayed image is executed.



Note

The measurement values that are displayed on the screen can be changed in the display settings. Touch **[1]** – [Display settings] on the right side of the screen to display the display settings screen.

Measured item	Range of value	Description
Overall quality	Range: 0 to 4 Default value: Lower limit 0, upper limit 4	Can only be displayed and set when the code being read is Data Matrix and print quality is ON. Adjusts the upper and lower limits of the overall quality that is to be judged as OK.

3 Press [OK] to finalize.

4

Setting Verification Conditions Step 4

You can register a character string from a 2D code to use it to verify that the character string that was read from a 2D code matches the registered character string. You can register up to 32 character strings for verification in the master data. You can verify the character string in the inspection against up to 32 character strings that are registered in the master data.

The verification result is saved in an external reference parameter, so you can use a communications command to output it to an external device.



External Reference Parameters: p. 479

[Inspect] – [Inspection] – [Add item.] – [2D-code] – [Settings] Tab Page

- 1 Press [Verification].
- 2 Press [Master data regist.].
- 3 Press the character string to register in the master data.
- 4 You can use any of the following three methods to register character strings in the master data from the menu display.

Master data regist. 0.2D-c	ode
0.Waster data¥	^
1.Waster data∡uto	
2.Waster data Manual	
3.Waster data Corru	
4.Waster data Delete	
5.Waster data 5 🔔	\mathbf{v}
🛱 🔍 🖸 Back	<

- [Auto]: Registers a character string from an actual 2D code in the master data. The procedure is essentially the same as the procedure for teaching in step 2.
- [Manual]: A character string is entered directly in the master data. Select this menu when making a change to the master data registered using [Auto] menu.

You can use a software keyboard to register a character string with up to 32 characters.

Note

Check the table of ASCII characters to see what characters can be registered. You cannot enter two-byte characters, one-byte Kana characters, and control codes. You can use the following characters as wildcards.

*: A wildcard for a character string of 0 or more characters ?: A wildcard for one character

ASCII code table: p. 196

[Item ref.]: Select this item to use the immediately preceding read results as the verification character string. The following inspection items can be used as references: Bar code, 2D-code, 2D-code (DPM), and OCR. You cannot reference an inspection item at an item number that is after the item number of the inspection item that you are editing. When you register a character string from the master data, the item number of the inspection item that is being referenced, such as "Ref. 00," will be displayed.

Using Item References: p. 148

- 5 Repeat the above procedure to register more than one character string in the master data.
- 6 Press [Back] to return to the verification conditions screen.
- 7 Press [Verif. master data] and select the character string in the master data to use for verification.
- 8 Set the following verification conditions as required.

Setup Item	Setting Value	Description		
Varif maatar data	OFF (Default)	Sets whether to verify the character string that was read from the		
veni. master data	All master data	data. To verify the read character string against the master data,		
	Master data 0 to 31	select the character string to use for verification.		
Dentielesenif en leff	No (Default)	The number of digits in the read results to be verified with the mas-		
Partial Verit. on/off	Yes	the first and last compared digit positions. Up to 32 characters can		
Partial verif. setup	1 to 1024 (Default value first digit:1 last digit:1024)	be set as the number of digits. Example: First compared digit 2, last compared digit 6 OMRON2008 2nd digit 6th digit The text string used for verification becomes "MRON2". Manually register "MRON2", the comparison character string, in master data registration.		
Master data regist.		Registers a character string in the master data. When you specify the vitrification range, adjust the data manually after executing the master data automatically.		
External teach No.	OFF (Default)	Sets the character string in which to automatically register the read		
External teach NO.	Master data 0 to 31			

9 Press [Back].

4

Note ASCII code table

Lower 4 bits

The following table shows the ASCII codes that can be used for manual registration of master data and also for registering characters of Limits.

Upper 4 bits						
	2	3	4	5	6	7
0	SΡ	0	@	Ρ	`	р
1	!	1	Α	Q	а	q
2	"	2	В	R	b	r
3		3	С	S	С	s
4		4	D	Т	d	t
5		5	E	U	е	u
6	&	6	F	V	f	V
7	,	٦	(
1	·	1	G	VV	g	W
7 8	·	7 8	G H	W X	g h	W X
7 8 9		7 8 9	G H I	W X Y	g h i	w x y
7 8 9 A	*	7 8 9 :	G H J	VV X Y Z	g h i j	w x y z
7 8 9 A B	* +	7 8 9 : ;	G H J K	VV X Y Z [g h j k	w x y z {
7 8 9 A B C	* + ,	7 8 9 : ; <	G H J K L	 W X Y Z [¥ 	g h j k	W X Z {
7 8 9 A B C D	* + , -	7 8 9 : ; < =	G H J K L M	W X Y Z [¥]	g h j k I m	<pre>w x y z { { } }</pre>
7 8 9 A B C D E	* + ,	7 8 9 ∶ ; < = >	G H J K L M N	VV X Y Z [¥] ^	g h j k l m n	w x y z { I } ~

Reflect in Total Judgment

You can specify whether to reflect the verification result of a 2D code inspection item in the overall judgment. (The Default setting is [Yes].)

[Inspect] - [Inspection] - [Add item.] - [2D-code] - [Details] Tab Page - [Output parameter] - [Reflect]

Detail Settings

When you execute TEACH, the measurement parameters are automatically set corresponded read code.

[Inspect] – [Inspection] – [Add item.] – [2D-code] – [Details] Tab Page

Press [Meas. Parameter] Set the measurement parameters.

Be sure to always specify the code type. When you automatically register matrix data, the code type, code color, data matrix shape, and reverse settings are set automatically.

Setup Item	Setting Value	Description				
	Data Matrix (Default)					
	QR Code					
Code type	MicroQR Code	Selects the type of 2D Code to be read.				
	PDF417					
	MicroPDF417					
Reverse	Normal (Default)	Sets normal or reverse as the image orientation.				
	Reverse	 Inis parameter is valid only one of the following code types is selected. Data Matrix, QR Code, or Micro QR Code 				
	Black	Specifies the code color.				
Code color	White	This item is enabled only when the following barcode types are selected:				
	Auto (Default)	Data Matrix, QR Code, MicroQR Code				
	Square (Default)	Specifies the code shape.				
Snape (Data Matrix)	Square or Rectangle	 This item is enabled only when the following barcode types are selected: Data Matrix 				
Print quality	ON	Sate print quality evaluation ON/OEE				
(Data Matrix)	OFF (Default)					
	ON	Set whether grid correction is ON or OFF.				
Grid correction (MicroQR Code)	OFF (Default)	If it is set to ON, recognizing the timing pattern cell in the 2D code makes it easier to recognize the correct position of the cell. If it is set to OFF, the cell position will be the part that is evenly divided from the outer shape and the number of cells. Therefore, if the actual cell positions are not even, it is easy to detect falsely.				
Timeout	1 to 9999 ms (Default: 9999)	Sets the timeout time in read processing. A read error occurs if measurement does not end after the preset timeout time is exceeded.				

Outputting Read Characters to an External Device

After a measurement, you can automatically output the character string that was read with the 2D-code inspection item to a PLC or other external device. The character strings are output after outputting the output data (output data settings 0 to 31), such as the inspection item parameters and calculation result. Refer to the description for the communications format for the setting procedure and output specifications to output the character string.

Vision Sensor FQ2-S/CH Series User's Manual for Communications Settings (Cat. No. Z338)

- Section 2 Controlling Operation and Outputting Data with a Parallel Connection
- Section 3 Controlling Operation and Outputting Data with an Ethernet Connection
- Section 4 Controlling Operation and Outputting Data with an RS-232C Connection

Note

The read character string is output after the other output data (data 0 to 31 in the output data settings) after the measurement, such as the inspection item parameters and calculation results. Refer to the following section for the location of the output area for the character string and other details.



Vision Sensor FQ2-S/CH Series User's Manual for Communications Settings (Cat. No. Z338) Section 1 Overview of Communication Specifications

Changing the Character String That Is Output for Read Errors

You can change the character string that is output for read errors.

[Inspect] - [Inspection] - [Add item.] - [2D-code] - [Details] Tab Page - [Output parameter] -[Error string]

Setup Item	Setting Value	Description
Error string	Max. 20 digits (Default value: NG)	Sets the text string to be output when a read error occurs. ASCII code table: p. 196

Unstable Reading Results

Reading Is Unstable Due to Low Contrast

Adjust the brightness to improve the contrast of the 2D code.

Adjusting the Brightness: p. 77

Measurement Data That Can Be Used for External Outputs and Calculations

Expression text string	Data name	Description	Data range
JG	Judgment	This is the judgment result.	 -2: No judgment (not measured), 0: Judgment is OK 1: Judgment is NG -16: Measurement timeout error
IN	Index	The verification result (master data No.) is output.	 -2: No verification pattern, or reading error -1: Verification is NG 0 to 31: Master data No.
Ν	Num. of characters	The number of characters read is output.	0 to 1024
GD0	Overall quality	Overall quality of 2D code. The lowest grade of the individual indices is the over- all quality.	0 to 4
GD1	Decode	Evaluates whether decode was success- ful.	0 to 4
GD2	Cell contrast	Evaluates the difference between the average of the white cell density and the average of the black cell density.	0 to 4
GD3	Cell modulation	Evaluates the deviation of cell brightness.	0 to 4
GD4	Fixed pattern damage	Evaluates the degree of fixed pattern damage of the code.	0 to 4
GD5	Axial nonuniformity	Evaluates the degree of vertical and hori- zontal distortion of the code.	0 to 4
GD6	Grid nonuniformity	Evaluates the position deviation of each cell.	0 to 4
GD7	Unused err. Corr.	Evaluates the proportion of unused error correction during decode.	0 to 4
GD8	Print scale	Outputs the print scale.	0 to 4
GD9	Print scale X	Outputs the print scale X direction.	0 to 4
GD10	Print scale Y	Outputs the print scale Y direction.	0 to 4

Measurement Data That Can Be Logged (2D Code)

The following values can be logged as measurement data.

Measured item	Range of value	Description
Judgement	 -2: No judgement (not measured) 0: Judgement is OK -1: Judgement is NG -16: Measurement timeout error 	This is the judgment result from the measurements.
Num. of characters	0 to 1024	The number of characters read is output.
Overall quality	0 to 4	Outputs the evaluation value of overall quality.
Decode	0 to 4	Outputs the evaluation value of decode.
Cell contrast	0 to 4	Outputs the evaluation value of the contrast.
Cell modulation	0 to 4	Outputs the evaluation value of cell modulation.
Fixed pattern damage	0 to 4	Outputs the evaluation value of fixed pattern damage.
Axial nonuniformity	0 to 4	Outputs the evaluation value of axial nonuniformity.
Grid nonuniformity	0 to 4	Outputs the evaluation value of grid nonuniformity.
Unused err. Corr.	0 to 4	Outputs the evaluation value of unused error correction.
Print scale	0 to 4	Outputs the evaluation value of the print scale.
Print scale X	0 to 4	Outputs the evaluation value of print scale X.
Print scale Y	0 to 4	Outputs the evaluation value of print scale Y.

* When logging data is output, the data is output in the order of the above table.

7-6 Logging Measurement Data and Image Data: p. 392

Errors

Errors in Teaching

If 2D-codes cannot be read during an automatic registration, a teaching error message is displayed. The reading may be unstable due to low contrast.Adjust the brightness to improve the contrast of the 2D-code.

Adjusting the Brightness: p. 77

4-7 Reading 2D Codes (DPM)

2D Codes (DPM)

You can read DPM (direct part marking) 2D codes.

You can also verify whether the character string that was read from the 2D code matches a registered character string.

You can output the result of reading a 2D code and the verification result to an external device. The scan result and verification result can be externally output. Codes that can be scanned are Data Matrix (ECC200) and QR Codes. The print quality evaluation result defined in ISO/IEC TR29158 can only be calculated for Data Matrix.

Setting image

FQ2-S4

When the inspection region is set, the code image is displayed, and teaching is executed, the code type and detailed parameters are automatically set.



*: A Max.64 characters can be displayed on the result screen. (Max.16 characters per line and Max.4 lines can be displayed.) Inspection image

One 2D code is scanned in one inspection region. If there are multiple 2D codes in the inspection region, the first scanned result is output.*



Step 1 Select the Inspection Item

- [Inspect] [Modify]
- **1** Press an unused inspection item number and press [Add item.].
- 2 Press [2D-code (DPM)].
 - 4-3 Configuring Inspection Items: p. 138

Drag the arrow () at the bottom of the menu to display all of the inspection items.

Add item		
ltom	abe OCR	^
rtem	📕 Bar code	
	蹬 2D-code	
100	2D-code(DPM)	
	≱≱ Search	
	💷 Shape Search	\sim
	🔍 🙆 Cance	e I

Step 2 Teaching

For teaching, the region to measure and the 2D code within that region are set as read conditions. You can also register the contents that was read from the 2D code as a verification condition in the master data.

Step 4 Setting the Verification Conditions: p. 207

▶ [Inspect] - [Inspection] - [Add item.] - [2D-code (DPM)] - [Settings] Tab Page

1 Press [Teach].



0.2D-code(DPM

ù.

Cancel

- 2 Display the image of the 2D code.
- **3** Move the rectangle so that it surrounds the 2D code.
- **4** Press the [OK] Button.
- 5 Press [TEACH] on the lower right of the display.



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6 The result of reading the 2D code that was displayed will be displayed along with a confirmation dialog box for registration in the master data.

7 Press [Yes] to register the read result in the master data.

The master data contains the character strings from the 2D codes that are registered to verify whether the read character strings match specific character strings.



8 Press the master data in which the read characters will be registered.

9 Press [Back] to end teaching.

Note

You can use the menu commands that are displayed for at the right of the display to adjust the settings that resulted from teaching.

- [Insp. region]: You can change the measurement region.
- [Camera setup]: You can adjust the Camera focus, brightness, and other factors to input a better image.

Adjusting Image Quality: p. 76

- [Meas. Parameter]: You can change the type of code to read, the read settings, etc.
 - Detailed Parameters: p. 196
- [Continuous test]: You can start test measurements of displayed images for the settings that were taught.

Performing Test Measurements: p. 340

Settings are made to check whether the characters that were read from the workpiece were recognized correctly. Differences between the references that were taught for reading the 2D code and the actual result of reading the 2D code are detected and conditions are set to determine how accurately characters are read.

[Inspect] - [Inspection] - [2D-code (DPM)] - [Settings] Tab Page

- **1** Press [Judgement].
- **2** Press each parameter and set the range that is to be judged as OK. Set the range for each of the following parameters.

Continuous measurements will be performed for the images that are displayed.



Note

- You can change measurement values that appear on the display on the Display Settings Display. Press **[1]** – [Display setting] on the right of the display to switch to the Display Settings Display.
- You can automatically adjust the judgement conditions by using OK and NG workpieces.
 - 5-3 Adjusting the Judgment Parameters: p. 346

Press **[** – [Auto adjustment] on the right of the display to switch to the Auto adjustment Display.

Parameter	Setting	Description
Contrast	Range: 0 to 100 (Default)	Adjust the upper and lower limits of the contrast that is to be judged as OK. Cannot be displayed or set when DPM print quality is ON.
Focus	Range: 0 to 100 (Default)	Adjust the upper and lower limits of the focus that is to be judged as OK. Cannot be displayed or set when DPM print quality is ON.
Cell Recog. Rate	Range: 0 to 100 (Default)	Adjust the upper and lower limits of the cell recognition rate that is to be judged as OK. Cannot be displayed or set when DPM print quality is ON.
Overall quality	Range: 0 to 4 (Default)	Can only be displayed and set when the code being read is Data Matrix and DPM print quality is ON. Adjusts the upper and lower limits of the overall quality that is to be judged as OK.

Note

• Refer to the following information for Contrast, Focus and Cell Recog. Rate.

Measurement Data That Can Be Used for External Outputs and Calculations: p. 213

3 Press [OK] to enter the values.



You can specify whether to reflect the judgment result of the judgment conditions for character recognition in the overall judgment. (The Default is to reflect them.)

[Inspect] – [Inspection] – [Add item.] – [2D-code (DPM)] – [Details] Tab Page – [Output parameter] – [Reflect]

You can register a character string from a 2D code to use it to verify that the character string that was read from a 2D code matches the registered character string. You can register up to 32 character strings for verification in the master data.

You can verify the character string in the inspection against up to 32 character strings that are registered in the master data. The verification result is saved in an external reference parameter, so you can use a communications command to output it to an external device.

9-2 External Reference Parameters: p. 479

[Inspect] - [Inspection] - [Add item.] - [2D-code (DPM)] - [Settings] Tab Page

- **1** Press [Verification].
- 2 Press [Master data regist.].
- **3** Press the character string to register in the master data.
- 4 You can use any of the following three methods to register character strings in the master data from the menu display.

Master o	data r	egis	t.	0.2D-	-code (D	PM)
0.Master	r data	0				^
1.Waste∣	r data	1	Auto		X	
2.Waster	r data	2	Manual			
3.Master	r data	3	ltem re [.]	f		
4.Maste∣	r data	4	Copy Delete	_		
5.Master	r data	5	<u></u>			\sim
	R	Ó			Baci	k

- [Auto]: Registers a character string from an actual 2D code in the master data. The procedure is essentially the same as the procedure for teaching in step 2.
- [Manual]: A character string is entered directly in the master data. Select this menu when making a change to the master data registered using [Auto] menu.

You can use a software keyboard to register a character string with up to 32 characters.

Note

Check the table of ASCII characters to see what characters can be registered.You cannot enter two-byte characters, one-byte Kana characters, and control codes. You can use the following characters as wildcards.

*: A wildcard for a character string of 0 or more characters ?: A wildcard for one character

ASCII code table: p. 209

[Item ref.]:

Select this item to use the immediately preceding read results as the verification character string. The following inspection items can be used as references: Bar code, 2D-code, 2D-code (DPM), and OCR. You cannot reference an inspection item at an item number that is after the item number of the inspection item that you are editing.

When you register a character string from the master data, the item number of the inspection item that is being referenced, such as "Ref. 00," will be displayed.

5 Press [Back] to return to the verification conditions screen.

6 Press [Verif. master data] and select the character string in the master data to use for verification.

7 Set the following verification conditions as required.

Parameter	Setting	Description		
Verif. master data	 OFF (Default) All master data Master data 0 to 31 	Sets whether to verify the read character string against a character string that is registered in the master data. To verify the read character string against the master data, select the character string to use for verification.		
Partial verif. on/off	No (Default)	The number of digits in the read results to be verified with the mast		
	Yes	first and last compared digit positions. Up to 32 characters can be set		
Partial verif. setup	1 to 1024 Default value first digit:1 last digit:1024	as the number of digits. Example: First compared digit 2, last compared digit 6 OMRON2008 2nd digit 6th digit The text string used for verification becomes "MRON2". Manually register "MRON2", the comparison character string, in master data registration.		
Master data regist.		Registers a character string in the master data. Use [Manual] menu when making a change to the [Partial verif. on/off] setting for master data originally registered by [Auto].		
External teach No.	OFF (Default) Master data 0 to 31	Sets the character string in which to automatically register the read result for teaching from an external device.		

8 Press [Back].

Note ASCII code table

Lower 4 bits

The following table shows the ASCII codes that can be used for manual registration of master data and also for registering characters of Limits.

Upper 4 bits						
	2	3	4	5	6	7
0	SΡ	0	@	Ρ	`	р
1	!	1	Α	Q	а	q
2	"	2	В	R	b	r
3		3	С	S	С	s
4		4	D	Т	d	t
5		5	Е	U	е	u
6	&	6	F	V	f	V
7	,	7	G	W	g	W
8		8	Н	Х	h	х
9		9		Υ	i	у
Α	*	•••	J	Ζ	j	Ζ
В	+	;	K	[k	{
С	,	<	L	¥	Ι	ł
D	-	=	Μ]	m	}
E	-	>	Ν	۸	n	~
F	/	?	0	_	0	

Detailed Parameters

When you execute TEACH, the measurement parameters are automatically set corresponded read code.

[Inspect] - [Inspection] - [Add item] - [2D-code (DPM)] - [Details] Tab Page - [Meas. Parameter]

Measurement Parameters

Parameter	Setting	Description	
Code type	DataMatrix QR Code Auto (Default)	Sets the type of code to be scanned.	
Auto length	No Yes (Default)	Sets whether the code length is automatically acquired.	
Size	50 to 480 (Default)	Sets the length of the code on the display. (pixels)	
Reverse	Normal Reverse Auto (Default)	Sets normal image or reverse (mirror) image.	
Code color	Black White Auto (Default)	Sets the color of the code.	
Grid correction	ON OFF (Default)	Set whether grid correction is ON or OFF. You can set this for DataMatrix and for QR codes. If it is set to ON, recognizing the timing pattern cell in the 2D code makes it easier to recognize the correct position of the cell. If it is set to OFF, the cell position will be the part that is evenly divided from the outer shape and the number of cells. Therefore, if the actual cell positions are not even, it is easy to detect falsely.	
Fast mode	Yes No (Default)	Sets fast mode. When ON, the scanning time is shorter. For certain work, the scanning time may be longer when Fast mode is ON. Please use after performing test measurements and verifying the scanning speed.	
Shape (DataMatrix only)	Square Rectangle Auto (Default)	Sets the code shape.	
QR Code Model (QR Code only)	Model 1 Model 2 Auto (Default)	Sets the QR Code model.	
Error Correction Level (QR Code only)	L (7%) M (15%) Q (25%) H (30%) Auto (Default)	Sets the error correction level (ECC level). (The ECC level of DataMatrix is fixed at 200.)	
Cell (QR Code only)	$\begin{array}{c} 21\times21,\ 25\times25,\\ 29\times29,\ 33\times33,\\ 37\times37,\ 41\times41,\\ 45\times45,\ 49\times49,\\ 53\times53,\ 57\times57,\\ \text{Auto (Default)} \end{array}$	Sets the number of code cells.	

Parameter	Setting	Description
Cell (DataMatrix only)	Shape: Square $10 \times 10, 12 \times 12,$ $14 \times 14, 16 \times 16,$ $18 \times 18, 20 \times 20,$ $22 \times 22, 24 \times 24,$ $26 \times 26, 32 \times 32,$ $36 \times 36, 40 \times 40,$ $44 \times 44, 48 \times 48,$ $52 \times 52, 64 \times 64,$ Auto (Default) Shape: Rectangle $8 \times 18, 8 \times 32, 12 \times 26,$ $12 \times 36, 16 \times 36, 16 \times 48,$ Auto (Default)	Sets the number of code cells.
DPM print quality (Data Matrix only)	ON OFF (Default)	Sets print quality ON/OFF.
Timeout	1 to 9999 ms (Default value: 9999)	Sets the timeout time in read processing. A read error occurs if measurement does not end after the preset time- out time is exceeded.

Important

• Measurement parameters other than [Grid correction], [Fast mode] and DPM print quality are initialized as set when [Teach] is pressed.

• When the "Code type" setting is changed, some settings are initialized as shown below.

Parameter	Initialized due to "Code type" change
Code type	Initialized
Auto length	
Size	Initialized
Reverse	
Code color	
Grid correction	
Fast mode	
Shape	Initialized
QR Code Model	Initialized
Error Correction Level	Initialized
Cell	Initialized
DPM print quality	

Outputting Read Characters to an External Device

After a measurement, you can automatically output the character string that was read with the DPM 2D code inspection item to a PLC or other external device. The character strings are output after outputting the output data (output data settings 0 to 31), such as the inspection item parameters and calculation result. Refer to the description for the communications format for the setting procedure and output specifications to output the character string.

Vision Sensor FQ2-S/CH Series User's Manual for Communications Settings (Cat. No. Z338)

- Section 2 EtherNet/IP
- Section 3 PLC Link
- Section 4 TCP No-protocol Communications

Changing the Character String That Is Output for Read Errors

You can change the character string that is output for read errors.

[Inspect] – [Inspection] – [Add item.] – [2D-code (DPM)] – [Details] Tab Page – [Output parameter] - [Error string]

Setup Item	Setting Value	Description
Error string	Max. 20 digits (Default value: NG)	Sets the text string to be output when a read error occurs. ASCII code table: p. 209

Measurement Data That Can Be Used for External Outputs and Calculations

Expression text string	Data name	Data range	Description
JG	Judgment	 -2: No judgment (not measured) 0: Judgment is OK -1: Judgment is NG -16: Measurement timeout error 	This is the judgment result.
IN	Index	 -2: No verification pattern or reading error -1: Verification is NG 0 to 31: Master data No 	The verification result (master data No.) is output.
Ν	Num. of characters	0 to 1024	The number of characters read is output.
E	Cell recognition rate	0 to 100	Value that lets you check the correction rate. The recognition rate is higher when the ratio of corrected characters to the total number of characters in the code is lower. When a code cannot be read, the value is 0.
С	Contrast	0 to 100	Indicates the contrast in a code. When the difference of contrast between light and shade in a code is bigger, the value of con- trast become higher. When a code cannot be read, the value is 0.
F	Focus	0 to 100	Indicates the focus of the image using the change of density at cell edges. When out of focus, the code cannot be read. When the cell edges are sharper, the value of Focus become higher. When a code cannot be read, the value is 0.
Р	Cell size	Depends on the size of the code.	Depends on the size of the code.
GDA0	Overall quality	0 to 4	Overall quality of 2D code based on ISO/IEC TR29158(AIM-DPM-1-2006). The lowest grade of the individual indices is the overall quality.
GDA1	Decode	0 to 4	Evaluates whether decode was successful.
GDA2	Cell contrast	0 to 4	Evaluates the difference between the average of the white cell density and the average of the black cell density.
GDA3	Cell modulation	0 to 4	Evaluates the deviation of cell brightness.
GDA4	Fixed pattern damage	0 to 4	Evaluates the degree of fixed pattern damage of the code.
GDA5	Axial nonuniformity	0 to 4	Evaluates the degree of vertical and horizontal distortion of the code.
GDA6	Grid nonuniformity	0 to 4	Evaluates the position deviation of each cell.
GDA7	Unused err. Corr.	0 to 4	Evaluates the proportion of unused error correc- tion during decode.

Inspection Data that Can be Logged

Inspection item	Value range	Description
Judgement	 -2: No judgement (not measured) 0: Judgement is OK -1: Judgement is NG -16: Measurement timeout error 	This is the judgment result from the measurements.
Contrast	0 to 100	Outputs the contrast.
Focus	0 to 100	Outputs the focus.
Cell recognition rate	0 to 100	Outputs the cell recognition rate.
Num. of char.	0 to 1024	Outputs the number of characters that were detected.
Index	 -2: No verification pattern, or reading error -1: Verification is NG, 0 to 31: Master data No. 	Outputs the index.
Cell size	Depends on the size of the code.	Outputs the number of pixels per cell of the scanned code.
Overall quality	0 to 4	Outputs the evaluation value of overall quality.
Decode	0 to 4	Outputs the evaluation value of decode.
Cell contrast	0 to 4	Outputs the evaluation value of the contrast.
Cell modulation	0 to 4	Outputs the evaluation value of cell modulation.
Fixed pattern damage	0 to 4	Outputs the evaluation value of fixed pattern damage.
Axial nonuniformity	0 to 4	Outputs the evaluation value of axial nonuniformity.
Grid nonuniformity	0 to 4	Outputs the evaluation value of grid nonuniformity.
Unused err. Corr.	0 to 4	Outputs the evaluation value of unused error correc- tion.

The following values can be logged as inspection data.

When logging data is output, the data is output in the order of the above table.

 \square 7-6 Logging Measurement Data and Image Data: p. 392

If an Error Occurs

If a teaching error occurs

If scanning of the 2D code fails, a teaching error message appears. It is likely that low contrast caused unstable scanning. Adjust the brightness to increase the contrast of the 2D code.



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Adjusting the Brightness: p. 77
4-8 Inspecting with the Search Inspection Item

FQ2-S1 FQ2-S2 FQ2-S3 FQ2-S4

Search Inspection Item

This inspection item is used to perform inspections for shapes or for presence. The image pattern that is to be measured is registered in advance and measurements are performed to see if the pattern is present or if the shape is different.

The image pattern that is registered in advance is called the model.

The degree to which the image matches the model is called the correlation.



Sample Measurement

Search for sections that are similar to the model.





Step 1 Selecting the Inspection Item

[Inspect] – [Inspection]

- **1** Press an unused inspection item number and press [Add item.].
- 2 Press [Search].





Note

Drag the arrow **even** at the bottom of the menu upward to display all of the inspection items.

Step 2 Teaching

Teaching means to store the region and partial image as reference data for the measurement.

- [Inspect] [Inspection] [Add item.] [Search] [Settings] Tab Page
 - **1** Press [Teach].



- 2 Place the object that is to be used as the measurement reference in front of the camera.
- **3** Move the rectangle to the location to be measured.
- 4 Press [OK].
- **5 Press [TEACH] on the lower right of the display.** The basic settings will be registered when teaching has been completed.
- 6 Press [Back] to end teaching.

The following data is stored as the measurement reference.

Item	Parameter	Description	
	Model image	This is the partial image that is stored as the reference.	
Reference data	Reference position X	-	
	Reference position Y	These are coordinates of the model image that are stored as reference	
	Reference Angle	The angle of the registered model.	

[Inspect] – [Inspection] – [Add item.] – [Search] – [Settings] Tab Page

1 Press [Judgement].

2 Press each parameter and set the range that is to be judged as OK. Set the range for each of the following parameters.

Continuous measurements will be performed for the images that are taken.

Note

You can change the parameters for judgement conditions on the Display Settings Display.

Press $[\blacktriangleleft]$ – [Display setting] on the right of the display to switch to the Display Settings Display.

3 Press [OK] to accept the value.

4 Press [Back] to end making the setting.

Parameter	Setting	Description	
Correlation	Range: 0 to 100 Defaults: Lower: 60 Upper: 100	Adjust the upper and lower limits of the correlation for an OK judgment.	
Position X	Range: -99,999.9999 to 99,999.9999 Defaults: Lower: -99,999.9999 Upper: 99,999.9999	Adjust the upper and lower limits of measurement position X for an OK judgment.	
Position Y	Range: -99,999.9999 to 99,999.9999 Defaults: Lower: -99,999.9999 Upper: 99,999.9999	Adjust the upper and lower limits of measurement position Y for an OK judgment.	
Angle	Range: –180 to 180 (Default) Defaults: Lower: –180 Upper: 180	Adjust the upper and lower limits of angle for an OK judgment.	
Count	Range: 0 to 32 Defaults: Lower: 0 Upper: 32	Adjust the upper and lower limits of the detection count for an OK judgment.	

If more than one result was detected, you can switch to a display for each result. (Multi-point output must be enabled.)



Upper limit

Blue for OK. Red for NG.

Lower limit

Note

• You can change the output form for each measurement value to one of the following settings.

- Press $[\blacktriangleleft]$ [Result type] on the right of the display.
 - Absolute value (Default): The measured coordinates are output.
 - Relative value : The difference from the reference position is output as coordinates.
- Note the following when [Multi-point output] is enabled.
 - If [Candidate level] is higher than the lower value of the Judgment condition, [Candidate level] has higher priority.
 - If Correlating value is lower than [Candidate level], measurement result will be zero.

Increasing Measurement Position Accuracy

You can increase the accuracy of measurement positioning. You can calculate down to four decimal places.



1 Press [Sub-pixel] and select [Yes].

Sub-pixel	O.Search
Measure position by sub-pixel. longer processing time.	Needs
Yes No	
	Cancel

Obtaining Multiple Results Simultaneously

You can detect all items that satisfy the extraction conditions. Judgment is performed for all detected results.



[Inspect] - [Inspection] - [Search] - [Modify] - [Details] Tab Page - [Meas. Parameter]

- 1 Press [Multi-point output] and select [Yes].
- 2 Press [Sorting method] and select the conditions by which to sort the detected results.

You can output the results in the sort order that you selected.

Sorting method	0.Sear	rch
Select the sorting method.		
Corr. ascending order		
lorr. descending order		
os.X ascending order		
os.X descending order		~
	Cance	I

Note

You can specify the actual output conditions and count for outputting multiple results.

 \square

Selecting the results to output: p. 221

Selection item	Setting	Description
	Corr. ascending order (ascending order of correlation value)	Sorts the results in order from the smallest correlation to the largest. Candidate level has priority when Candidate level is lower than lower value of Judgment condition. Measurement value will be zero if the correlating value is lower than Candidate level.
Sorting method	Corr. descending order (Default) (descending order of correlation value)	Sorts the results in order from the largest correlation to the smallest.
	Pos.X ascending order (ascending order of position X)	Sorts the results in order from the smallest measurement X position to the largest.
	Pos.X descending order (descending order of position X)	Sorts the results in order from the largest measurement X position to the smallest.
	Pos.Y ascending order (ascending order of position Y)	Sorts the results in order from the smallest measurement Y position to the largest.
	Pos.Y descending order (descending order of position Y)	Sorts the results in order from the largest measurement Y position to the smallest.

4

Select the Results to Output

You can use multiple conditions to determine which results to output from all the objects detected with a correlation at the candidate level or higher.

Only the results that meet all the specified conditions are output.

[Inspect] – [Inspection] – [Search] – [Modify] – [Details] Tab Page – [Meas. Parameter]

- **1** Press [Extraction condition] and adjust the candidate level so that only objects higher than a certain correlation are detected.
- If [Multi-point output] is set to [Yes], you can specify the output conditions for more than one result.
 (Extraction X/Y and Detection count)



Extraction condition	Range	Description
Candidate level	Range: 0 to 100 Defaults: Lower: 70 Upper: 100	Set the threshold to find Candidate. Output the correlat- ing value that is higher than [Candidate level] value. Decrease the value when Model search is unstable.
Extraction X	Range :-99999.9999 to 99999.9999 Defaults: Lower: -99999.9999 Upper: 99999.9999	Results are output only for objects with a measured X coordinate that is within this range.
Extraction Y	Range :-99999.9999 to 99999.9999 Defaults: Lower: -99999.9999 Upper: 99999.9999	Results are output only for objects with a measured Y coordinate that is within this range.
Detection count	Range: 1 to 32 Default: 32	Sets the maximum number of detection results to output.

Note

The processing time changes if you change the candidate level.

Reflect in Total Judgment

You can specify whether to reflect the judgment results of an inspection item in the overall judgment. (The Default is to reflect them.)

[Inspect] – [Inspection] – [Add item.] – [Search] – [Details] Tab Page – [Output parameter]

Unstable Search Results

Inclined Measurement Objects

Adjust the [Angle range] parameter to increase the range in which a search is made for the model.

The Search inspection item judges whether an image is OK or NG according to the correlation with a previously registered image pattern.

For this reason, if the object is at an angle, the correlation is reduced and the image may be judged as NG. To achieve an OK judgment for the same image pattern even when the object is at an angle, the rotation range must be widened.

[Inspect] – [Inspection] – [Search] – [Modify] – [Details] Tab Page – [Model parameter]

- **1** Set [Rotation] to [Yes].
- **2** Press [Angle range] and set the following range.

Parameter	Setting	Description
Angle range	Range: –180 to 180 Default: Lower: –180 Upper: 180	A search is performed within the set angle range. The larger the angle range, the longer the processing time. Important If you change the angle range, perform teaching again.

Adjust the brightness to improve the contrast of the mark.

Adjusting the Brightness: p. 77

Correlation Is Inconsistent Due to Variations in the Measurement Object

Inconsistent portions can be masked so that they are omitted from matching.



Correlation coefficient is zero

If the correlation coefficient is zero, reduce the Candidate level.

Select the Results to Output p. 221.

Search a Different Place

If the measurement result does not stabilize, change the stability and precision as needed. For better detection accuracy, the following two methods can be used.

- Set [Model mode] to [stable].
- Increase [Candidate level] value.

[Inspect] – [Inspection] – [Search] – [Modify] – [Details] Tab Page – [Model parameter]

Parameter	Setting	Description
Stability	Range: 1 to 15 Default: 12	Sets whether priority is given to measurement stability or speed. If the speed is slow even when the stability is lowered, it is possible that many candidates are found. Raise the candidate level or increase the stability.
Precision	Range: 1 to 3 Default: 2	Sets whether priority is given to measurement position precision or speed. Increasing the precision gives priority to measurement position accuracy.

Increasing Processing Speed

The following two methods can be used to reduce processing time.

• Reduce the range in which a search is performed for the model.



Changing the measurement region: p. 227

• Reduce the angle range setting.

Adjust the [Angle range] parameter to reduce the range in which a search for the model is performed.



• Increase the [Candidate level] value and limit the models.

Select the Results to Output: p. 221

Editing the Model and Measurement Regions

This section describes how to edit the following regions.



Measurement region (region that is searched for the model)

Important

224

If the model region is changed, perform teaching again.

📺 p. 217

Changing the Model Registration Region to a Shape Other Than a Rectangle

One rectangular region is registered as the Default model registration region. Other than rectangles, circles and polygons can be set as the model registration regions.

[Inspect] – [Inspection] – [Search] – [Modify] – [Settings] Tab Page – [Teach] – [] – [Model region]

- **1** Press [**◀**] [Model region].
- 2 Press [◀] [Delete] in the model registration editing display. The rectangle will be deleted.



3 Press [Yes].

Model re	gion	0.Search
Cottingo	Rectangle	
Settings	Ellipse	
	Wide circle	
	Polygon	
	☑ 🖸	Cance I

- 4 Press [Add] in [◀].
- 5 Press the shape of the region that you want to use.
- 6 Draw the region.
- 7 Press [OK].

Note

Up to 8 shapes can be combined to create a region for one model.

Masking Parts of the Model

The model registration region can be formed freely by combining enabled and disabled regions.



[Inspect] – [Inspection] – [Search] – [Modify] – [Settings] Tab Page – [Teach] – [] – [Model region]

1 Draw the figure according to the section that you want to mask.

____ p. 225

2 While the figure to be masked is selected, press [◀] on the right of the display and then press [OR/NOT]

The selected area will be removed from the model. Every time you press [OR/NOT], the area will switch between being enabled and disabled.

- OR : Enabled range
- NOT: Disabled range



This section describes the console which is useful to fine-tune the position of the measurement region or the model registration region in 1-pixel increments.



1 Press [◀] – [Console] on the right side of the display where you draw the region.

The console will appear.

- 2 To adjust the position of the figure, press within the frame. To adjust the size of the figure, press a corner of the figure.
- **3** Use the cross-key to align the figure with the search object.

The position of the figure can be adjusted by pressing the cross-key. Pressing it once will change the coordinate values by one pixel.

lodel region	0. <mark>e</mark> arch
-	(306, 192)-(578, 332) ×
Ī	2012.08
	DK Cancel

Coordinates

Changing the Measurement Region

The region within which the model is searched can be changed.

[Inspect] – [Inspection] – [Search] – [Modify] – [Settings] Tab Page – [Teach]

Press [◀] – [Insp. region] on the right of the display.

The [Insp. region] Display will appear.



2 Adjust the size and position of the measurement region.

Change the size.

Press the frame at one corner.

The processing time can be shortened by making the region smaller.

Change the position.

Drag the figure to move it.

You can specify which part of the model to detect as coordinates during inspections. Normally, the center position of the registered model is used as the detection point.

[Inspect] – [Inspection] – [Search] – [Modify] – [Settings] Tab Page – [Teach] – [] – [Detection point]

1 Use one of the following methods to move the cross cursor to the desired position.

Drag the cross cursor.

The position of the cross cursor will be the coordinate position that is output. This position is registered relative to the model region.

- · Drag the cross cursor to move it.
- Press [4] [Console] on the right of the display to display the console. You can use the cross cursor on the console to change the coordinate values one pixel at a time.

Detection point	0.Search (442.0,262.0)
201	₹.08
T R O	OK Cancel

Note

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The detection coordinates will automatically return to the center coordinates of the model if you change the model region.

Measurement Data That Can Be Used for External Outputs and Calculations

The following values can be used as measurement data and output to external devices via the Ethernet or used in calculations.

Expression text string	Data name	Description	Data range
JG	Judgement	 -2: No judgment (not measured) 0: Judgment is OK -1: Judgment is NG -13: Teaching not performed error -14: Figure not registered error -15: Out of range error 	This is the judgment result.
CR[0] to CR[31]	Correlation	0 to 100	This is the correlation of the Nth model that was found.
X[0] to X[31]	Position X	-99,999.9999 to 99,999.9999	This is the X coordinate where the Nth model was found.
Y[0] to Y[31]	Position Y	-99,999.9999 to 99,999.9999	This is the Y coordinate where the Nth model was found.
TH[0] to TH[31]	Angle	-180 to 180	This is the angle in which the Nth model was found.

Expression text string	Data name	Description	Data range
SX	Reference X	-99,999.9999 to 99,999.9999	This is the X coordinate of the position where the model was registered.
SY	Reference Y	-99,999.9999 to 99,999.9999	This is the Y coordinate of the position where the model was registered.
ST	Reference angle	-180 to 180	This is the angle when the model was registered.
RX	Detection coordinate X	-99,999.9999 to 99,999.9999	-99,999.9999 to 99,999.9999 This is the X coordinate of the detection point when the model was registered.
RY	Detection coordinate Y	-99,999.9999 to 99,999.9999	This is the Y coordinate of the detection point when the model was registered.
С	Count	0 to 32	This is the number of models found.

4-18 Calculations and Judgments Using Inspection Item Data: p. 323

Measurement Data That Can Be Logged

The following values can be logged as measurement data.

Parameter	Range of value	Description
Judgement	0: Judgement is OK -1: Judgement is NG -13: Teaching not performed error -14: Figure not registered error -15: Out of range error	This is the measurement judgment results.
Correlation	0 to 100	This is the measured correlation.
Position X	-99999.9999 to 99999.9999	This is the measurement position X.
Position Y	-99999.9999 to 99999.9999	This is the measurement position Y.
Angle	-180 to 180	This is the measurement angle.
Count	0 to 32	This is the number of models found.

*When logging data is output, the data is output in the order of the above table. If more than one item is stored, results are output for each model.

7-6 Logging Measurement Data and Image Data: p. 392

Errors

Errors in Teaching

A teaching error message will appear if the contrast of the image within the model registration region is too low. Select a region with a larger contrast between light and dark areas compared to the region that was registered as the model and re-register it as the model.

4-9 Inspecting with the Shape Search III Inspection Item

FQ2-S1 FQ2-S2 FQ2-S3 FQ2-S4

Shape Search II Inspection Item

This function is for detecting user-defined target to estimate target position and pose precisely. The correlation value indicating the degree of similarity, measurement target position, and orientation can be output. In shape search III, edge information is used as features, whereas in a normal search mode, color and texture information are used.

It enables highly robust and fast detection robust to environmental variations including shadings, reflections, lightings, shape deformations, pose and noises.

Since state-of-the-art object detection algorithm is exploited in shape search III, it can provides much more reliable position and pose estimation with higher speed compared to shape search II. Furthermore, it has much more parameter to tune to support a wider variety of applications.



Sample Measurement

Search for sections that are similar to the model.





Setup Procedure for the Shape Search III Inspection Item

Step 1 Selecting the Inspection Item

[Inspect] – [Inspection]

- 1 Press an unused inspection item number and press [Add item.].
- 2 Press [Shape Search III].



Registering inspection items: p. 138

Add item			
ltom	abe OCR		^
rtem	📲 Bar code		
	膣 2D-code		
	膣 2D-code(DPM)		
	💵 Search		
	🖳 Shape Search III		\mathbf{v}
	D	Cance	

Note

Drag the arrow **I** at the bottom of the menu upward to display all of the inspection items.

Step 2 Teaching

Teaching means to store the region and partial image as reference data for the measurement.

[Inspect] – [Inspection] – [Add item.] – [Shape Search III] – [Settings] Tab Page

1 Press [Teach].



- 2 Place the object that is to be used as the measurement reference in front of the camera.
- **3** Move the rectangle to the location to be measured.
- 4 Press [OK].

5 Press [TEACH] on the lower right of the display.

The basic settings will be registered when teaching has been completed.

6 Press [Back] to end teaching.

The following data is stored as the measurement reference.

Item	Parameter	Description
	Model image	This is the partial image that is stored as the reference.
Reference data	Reference position X	These are coordinates of the model image that are stored as refer-
	Reference position Y	ence.
	Reference angle	An angle when the model is registered.

Note

The following settings can be changed from the menus in the lower-right of the screen.

- [Model region]: Editing the Model and Measurement Regions p.224.
- [Insp. region] : Changing the Measurement Region p. 227
- [Detection point]: Changing Output Coordinate Positions p.228
- [Edge extraction]: When Edge cannot be detected at model region p.241
- [Display setting]: the following images can be selected.
- Measurement image: displays the Measurement image.
- Measurement image + Model image (Default): displays the detected Model on the Edge image.
- Edge image: displays the Edge image.
- Edge image + Model image: displays the detected Model on the Edge image.
- Green: Model points matching with Edge image.
- Yellow: Model points match with Edge image except for direction.
- Red: Model points not matching with Edge image.

[Inspect] – [Inspection] – [Add item.] – [Shape Search] – [Settings] Tab Page

- **1** Press [Judgement].
- **2** Press each parameter and set the range that is to be judged as OK. Set the range for each of the following parameters.

Continuous measurements will be performed for the images that are taken.

If more than one result was detected, you can switch to a display for each result. (Multi-point output must be enabled.)



per limit Lowe

Blue for OK. Red for NG.

Note

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You can change the parameters for judgement conditions on the Display Settings Display. Press $[\blacktriangleleft]$ – [Display setting] on the right of the display to switch to the Display Settings Display.

3 Press [OK] to accept the value.

4 Press [Back] to end making the setting.

Parameter	Setting	Description
Correlation	Range: 0 to 100 Defaults: Lower: 60 Upper: 100	Adjust the upper and lower limits of the correlation for an OK judgment. When the candidate level is higher than the judgment lower-limit value of correlation, the candidate level has priority. If the correlation value is lower than the candidate level, the measurement result is 0.
Position X	Range: –99,999.9999 to 99,999.9999 Defaults: Lower: –99,999.9999 Upper: 99,999.9999	Adjust the upper and lower limits of measurement posi- tion X for an OK judgment.
Position Y	Range: –99,999.9999 to 99,999.9999 Defaults: Lower: –99,999.9999 Upper: 99,999.9999	Adjust the upper and lower limits of measurement posi- tion Y for an OK judgment.
Angle	Range: –180 to 180 Defaults: Lower: –180 Upper: 180	Adjust the upper and lower limits of angle for an OK judgment.
Count	Range: 0 to 32 Defaults: Lower: 0 Upper: 32	Adjust the upper and lower limits of the detection count for an OK judgment.

Note

- You can change the output form for each measurement value to one of the following settings.
 - Press $[\blacktriangleleft]$ [Result type] on the right of the display.
 - Absolute value (Default): The measured coordinates are output.
 - Relative value: The difference from the reference position is output as coordinates.
- [Display setting]: the following images can be selected.
 - · Measurement image: displays the Measurement image.
 - Measurement image + Model image (Default): displays the detected Model on the Edge image.
 - Edge image: displays the Edge image.
 - Edge image + Model image: displays the detected Model on the Edge image.
 - Green: Model points matching with Edge image.
 - Yellow: Model points match with Edge image except for direction.
 - Red: Model points not matching with Edge image.

Obtaining Multiple Results Simultaneously

You can detect all items that satisfy the extraction conditions. Judgment is performed for all detected results.

 [Inspect] – [Inspection] – [Shape Search III] – [Modify] – [Details] Tab Page – [Meas. Parameter]

1 Press [Sorting method] and select the conditions by which to sort the detected results.

You can output the results in the sort order that you selected.

Note

You can specify the actual output conditions and count for outputting multiple results.

Selecting the results to output: p. 237



Selection item	Setting	Description
Sorting method	Corr. ascending order (ascending order of correlation value)	Sorts the results in order from the smallest correlation to the largest.Candidate level has priority when Candi- date level is lower than lower value of Judgment condi- tion. Measurement value will be zero if the correlating value is lower than Candidate level.
	Corr. descending order (Default) (descending order of correlation value)	Sorts the results in order from the largest correlation to the smallest.
	Pos.X ascending order (ascending order of position X)	Sorts the results in order from the smallest measure- ment X position to the largest.
	Pos.X descending order (descending order of position X)	Sorts the results in order from the largest measurement X position to the smallest.
	Pos.Y ascending order (ascending order of position Y)	Sorts the results in order from the smallest measure- ment Y position to the largest.
	Pos.Y descending order (descending order of position Y)	Sorts the results in order from the largest measurement Y position to the smallest.

Exclude the Overlapping Detected Result

- [Inspect] [Inspection] [Shape Search III] [Modify] [Details] Tab Page [Meas. Parameter]
 - 1 Touch [Overlay judgment], and then select [Yes].
- 2 Set Overlay rejection.

Weas. Parameter	0.Shape Search)
Extration condition		^
Sorting methodCorr. (descending order	
High-Prec.	OFF	
Overlay Judgement Yes		
Overlay Rejection		
Edge Level Auto 🔔	O N	\sim
	Back	(

Extraction condition	Setting	Description
Overlay Judgement	Yes No (Default)	When you find the overlapped result, set the Overlay judg- ment to Yes.
Overlay Rejection	0 to 100 (Default: 100)	This parameter is acceptable when the Overlay judgment is Yes. Set the overlay level to remove, If you want to remove small overlay, increase this parameter.

4

Select the Results to Output

You can use multiple conditions to determine which results to output from all the objects detected with a correlation at the candidate level or higher.

Only the results that meet all the specified conditions are output.

[Inspect] – [Inspection] – [Shape Search III] – [Modify] – [Details] Tab Page – [Meas. Parameter]

- **1** Press [Extraction condition] and adjust the candidate level so that only objects higher than a certain correlation are detected.
- 2 Set the conditions for outputting the detected objects. (Extraction X/Y and Detection Count)



Extraction condition	Range	Description
Candidate level	0 to 100 Default: 50	Set the threshold to find Candidate. Output only a value that is higher than [Candidate level]. Increase the value if Model search is unstable.
Extraction X	-99999.9999 to 99999.9999 Defaults: Lower: -99,999.9999 Upper: 99,999.9999	Results are output only for objects with a measured X coordinate that is within this range.
Extraction Y	-99999.9999 to 99999.9999 Defaults: Lower: -99,999.9999 Upper: 99,999.9999	Results are output only for objects with a measured Y coordinate that is within this range.
Detection count	1 to 32 Default: 1	Sets the maximum number of detection results to output.

Note

The processing time changes if you change the candidate level.

Reflect in Total Judgment

You can specify whether to reflect the judgment results of an inspection item in the overall judgment. The Default is to reflect them.

[Inspect] – [Inspection] – [Add item.] – [Shape Search III] – [Details] Tab Page – [Output parameter]

Unstable Shape Search III Results

Inclined Measurement Objects

The search area for the model can be expanded by adjusting [Angle range].

The OK or NG Judgment is determined by the correlation to the registered image pattern for the search. Therefore, there may be an NG judgment result for good workpiece if the correlation is low due to the angle being slanted.

In this case, to get an OK judgment, increase the Angle range.

▶ [Inspect] – [Inspection] – [Shape Search III] – [Modify] – [Details] Tab Page – [Model parameter]

- **1** Set [Rotation] to [Yes].
- 2 Press [Angle range] and set the following range.

Parameter	Setting	Description
Angle range	Range: –180 to 180 Default: Lower: –180 Upper: 180	A shape search II is performed within the set angle range. The larger the angle range, the longer the processing time. Important If you change the angle range, perform teaching again p. 232

If you cannot detect the Edge correctly, adjust the Edge parameters.

- [Inspect] [Inspection] [Shape Search III] [Modify] [Details] Tab Page [Measure parameter]
- 1 Touch [Edge level auto], and then select [OFF].
- 2 Set [Edge level].



Parameter	Setting	Description
Edge level auto	ON (Default) OFF	This setting will be enabled to set automatically by selecting ON. If edge recognition results are not good with this setting, set to OFF.
Edge level	0 to 1024 (Default: 30)	This setting will be enabled if [Edge level auto] is OFF. Set the lower limit to recognize the [Edge level]. Edges higher than set value are recognized. Decrease the setting value when it is difficult to find edges. Increase the setting value when the effect of noise is high.

When the variability of good work pieces is large.

· Increase the Candidate level

If the mis-detection occurs, i.e. detects same shape with workpiece, the targets can be detected too much. Adjust the correlating value of target or increase the Candidate level.

Select the Results to Output: p. 221

If the correlation value is significantly lower when the variation of target shapes may be large, increase the Acceptable distortion level.

[Inspect] - [Inspection] - [Add item.] - [Shape Search III] - [Details] tab page -[Meas. Parameter]

- **1** Touch [Acceptable Dist. level].
- **2** Set the [Acceptable Dist. level].

Parameter	Setting	Description
Acceptable distortion level	0: Low 1: Medium 2: High	Selects the degree of influence of correlation values when Model edge has small uneven patterns. To avoid reduction of correlation value, set [High] in this item.

Search other place

If the model image consists of detailed graphic images, similar models may be detected. For more accurate detection, consider the followings.

[Inspect] – [Inspection] – [Shape Search III] – [Modify] – [Details] Tab Page – [Model parameter] – [Model mode]

Parameter	Setting	Description
Model mode	Stable (Default) Fast	This function is enabled for color images only. Stable: Creates the model image using RGB colors, Fast: Creates the model image using one color of RGB. When the shape is same, but the color differs, the detection can be unstable.

Increase the Candidate level

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If the mis-detection occurs, i.e. detects same shape with workpiece, the targets can be detected too much. Adjust the correlating value of target or increase the Candidate level.

Select the Results to Output: p. 221

Change the Edge setting when the Edge cannot be detected at Model registration or the detected Edge is broken. After changing the Edge setting, retry to register the Model.

[Inspect] - [Inspection] - [Add item.] - [Shape Search III] - [Settings] tab page - [Teach]

1 Touch **[**Edge setting] on the upper-right window.



Edge	Setting	O.Shape	Sea	rch	
Mask	Size			3	XЗ
Edge	Level Auto			0	FF
Edge	Level				
Noise	e Removal Level	-			
		and the second sec			
			B	ack	

2 Set each item.

Parameter	Setting	Description
Mask size	3×3 (Default) 5×5 7×7	Select the range of pixels which are used to extract the edge. With a larger mask size, search is less affected by variation in pixels.
Edge level: Auto	ON (Default) OFF	Select this check box to adjust [Edge level] automatically. If edges are not detected under the auto settings, clear this check box and adjust value of [Edge level].
Edge level	0 to 1024 Default: 20	This setting is enabled when the [Auto] check box is cleared in the [Edge setting] area. Set the lower limit of edge level to recognize as edge. Edges are recognized when their edge level is above this value. The smaller the value, the easier it is to find edges. The larger the value, the less noise will affect finding edges.
Noise removal level	0 to 100 Default: 0	Specify the upper limit of noise level to eliminate. Noise whose noise level is below this value will be eliminated. In the noise removal process, edges are connected and divided into a set of groups of line segments, and then these line seg- ments are removed one by one from shorter segments. Setting a larger value removes larger noise.

Adjust the brightness to improve the contrast of the mark.

Adjusting the Brightness: p. 77

Correlation Is Inconsistent Due to Variations in the Measurement Object

Inconsistent portions can be masked so that they are omitted from matching.

Model masking: p. 226

Correlation coefficient is zero

If the correlation coefficient is zero, reduce the Candidate level.

Select the Results to Output: p. 221

Increasing Processing Speed

The following two methods can be used to reduce processing time.

• Reduce the range in which a shape search III is performed for the model.

Changing the Measurement Region: p. 227

• Reduce the Angle range setting.

Adjust the [Angle range] parameter to reduce the range in which a shape search II for the model is performed.

Select the Results to Output: p. 237

• Raise [Candidate level].

Raise [Candidate level], then processing time will be shortened.

Select the Results to Output p. 221

• Set the Model region as small as possible.

Raise [Candidate level], then processing time will be shortened.

Step 2 Teaching: p.142

Judgment is NG (Insufficient memory)

The measurement region is possible to use large memory. Set the measurement region as smaller as possible.

• Set the measurement region to be small.

Changing the Measurement Region: p. 227

• Set the model region to be small.

The model size is possible to use large memory. Set the model region as smaller as possible.

Editing the Model Regions and Measurement Region

Changing the Model Regions

This section describes how to edit the model regions.

You can edit the model region in the same way as for a search region.

Changing the Model Registration Region to a Shape Other Than a Rectangle: p. 225



Measurement region (region that is searched for the model)

Important

If the model region is changed, perform teaching again.
p. 232

Measurement Data That Can Be Used for External Outputs and Calculations

The following values can be used as measurement data and output to external devices via the Ethernet or used in calculations.

Expression	Data name	Data range	Description
text string			
JG	Judgment	 -2: No judgement (not measured) 0: Judgement is OK -1: Judgement is NG -10: Image error -13: Teaching not performed error -14: Figure not registered error -15: Out of range error 	This is the judgment result.
CR[0] to CR[31]	Correlation	0 to 100	This is the correlation of the Nth model that was found.
X[0] to X[31]	Position X	-99999.9999 to 99999.9999	This is the X coordinate where the Nth model was found.
Y[0] to Y[31]	Position Y	-99999.9999 to 99999.9999	This is the Y coordinate where the Nth model was found.
TH[0] to TH[31]	Angle	-180 to 180	This is the angle in which the Nth model was found.
SX	Reference X	-99,999.9999 to 99,999.9999	This is the X coordinate of the position where the model was registered.
SY	Reference Y	-99,999.9999 to 99,999.9999	This is the X coordinate of the position where the model was registered.
ST	Reference angle	-180 to 180	This is the angle when the model was registered.
RX	Detection coordinate X	-99,999.9999 to 99,999.9999	This is the X coordinate of the detection point when the model was registered.
RY	Detection coordinate Y	-99,999.9999 to 99,999.9999	This is the Y coordinate of the detection point when the model was registered.
С	Count	This is the number of models found.	0 to 32

4-18 Calculations and Judgments Using Inspection Item Data: p. 323

Measurement Data That Can Be Logged

Parameter	Range of value	Description	
Judgement	0: Judgement is OK -1: Judgement is NG -10: Image error -13: Teaching not performed error -14: Figure not registered error -15: Out of range error	This is the measurement judgment results.	
Correlation	0 to 100	This is the measured correlation.	
Position X	-99999.9999 to 99999.9999	This is the measurement position X.	
Position Y	-99999.9999 to 99999.9999	This is the measurement position Y.	
Angle	-180 to 180	This is the measurement angle.	
Count	0 to 32	This is the number of models found.	

The following values can be logged as measurement data.

* When logging data is output, the data is output in the order of the above table. If more than one item is stored, results are output for each model.

7-6 Logging Measurement Data and Image Data: p. 392

Errors

Errors in Teaching

A teaching error message will appear if the contrast of the image within the model registration region is too low. Select a region with a larger contrast between light and dark areas compared to the region that was registered as the model and re-register it as the model.

4-10 Inspecting with the Shape Search II Inspection Item

FQ2-S1 FQ2-S2 FQ2-S3 FQ2-S4

Shape Search II Inspection Item

This inspection item is used to search for the portion of the input image that most closely resembles an image pattern that is called a model. The model is registered in advance based on a characteristic feature of the measurement object.

You can output the correlation, which tells how closely the portion of the image matches the model. You can also output the position of the measurement object and the angle of the measurement object. For the normal Search inspection item, a model that concentrates on the color and brightness of the image pattern is used, but in the Shape Search II, a model that concentrates on the outline information is used.

This inspection item enables robust, high-speed, high-precision detection of models even when lighting is reflected from the workpieces, when the shapes of the workpieces are inconsistent, when the orientation of the workpieces change, when noise is superimposed, when part of the image is blocked, or when there are other fluctuations in the environment.



Search region (region to search for the model)

Sample Measurement

Search for sections that are similar to the model.





Setup Procedure for the Shape Search II Inspection Item

Step 1 Selecting the Inspection Item



- **1** Press an unused inspection item number and press [Add item.].
- 2 Press [Shape Search II].



Registering inspection items: p. 138



Note

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Drag the arrow _____ at the bottom of the menu upward to display all of the inspection items.

Step 2 Teaching

Teaching means to store the region and partial image as reference data for the measurement.

[Inspect] – [Inspection] – [Add item.] – [Shape Search II] – [Settings] Tab Page

1 Press [Teach].



- 2 Place the object that is to be used as the measurement reference in front of the camera.
- **3** Move the rectangle to the location to be measured.
- 4 Press [OK].
- **5** Press [TEACH] on the lower right of the display.

The basic settings will be registered when teaching has been completed.

6 Press [Back] to end teaching.

The following data is stored as the measurement reference.

Item	Parameter	Description	
	Model image	This is the partial image that is stored as the reference.	
Reference data	Reference position X	These are coordinates of the model image that are stored as reference.	
	Reference position Y		
	Reference Angle	The angle of the registered model.	

Step 3 Adjusting Judgment Parameters

[Inspect] – [Inspection] – [Add item.] – [Shape Search] – [Settings] Tab Page

- **1** Press [Judgement].
- **2** Press each parameter and set the range that is to be judged as OK. Set the range for each of the following parameters.

Continuous measurements will be performed for the images that are taken.

If more than one result was detected, you can switch to a display for each result. (Multi-point output must be enabled.)



Blue for OK. Red for NG.

Note

You can change the parameters for judgement conditions on the Display Settings Display. Press $[\blacktriangleleft]$ – [Display setting] on the right of the display to switch to the Display Settings Display.

3 Press [OK] to accept the value.

4 Press [Back] to end making the setting.

Parameter	Setting	Description
Correlation	Range : 0 to 100 Defaults: Lower: 60 Upper: 100	Adjust the upper and lower limits of the correlation for an OK judgment.
Position X	Range : –99,999.9999 to 99,999.9999 Defaults : Lower: –99,999.9999 Upper: 99,999.9999	Adjust the upper and lower limits of measurement position X for an OK judgment.
Position Y	Range : –99,999.9999 to 99,999.9999 Defaults : Lower: –99,999.9999 Upper: 99,999.9999	Adjust the upper and lower limits of measurement position Y for an OK judgment.
Angle	Range: –180 to 180 Defaults: Lower: –180 Upper: 180	Adjust the upper and lower limits of angle for an OK judgment.
Count	Range : 0 to 32 Defaults: Lower: 0 Upper: 32	Adjust the upper and lower limits of the detection count for an OK judgment.

Note

• You can change the output form for each measurement value to one of the following settings.

Press $[\blacktriangleleft]$ – [Result type] on the right of the display.

- Absolute value (Default): The measured coordinates are output.
- Relative value: The difference from the reference position is output as coordinates.
Obtaining Multiple Results Simultaneously

You can detect all items that satisfy the extraction conditions. Judgment is performed for all detected results.

[Inspect] – [Inspection] – [Shape Search II] – [Modify] – [Details] Tab Page – [Meas. Parameter]

1 Press [Sorting method] and select the conditions by which to sort the detected results.

You can output the results in the sort order that you selected.

Note

You can specify the actual output conditions and count for outputting multiple results.

Selecting the results to output: p. 237



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Selection item	Setting	Description
Sorting method	Corr. ascending order (ascending order of correlation value)	Sorts the results in order from the smallest cor- relation to the largest. Candidate level has priority when Candidate level is lower than lower value of Judgment con- dition. Measurement value will be zero if the correlating value is lower than Candidate level.
	Corr. descending order (Default) (descending order of correlation value)	Sorts the results in order from the largest cor- relation to the smallest.
	Pos.X ascending order (ascending order of position X)	Sorts the results in order from the smallest mea- surement X position to the largest.
	Pos.X descending order (descending order of position X)	Sorts the results in order from the largest mea- surement X position to the smallest.
	Pos.Y ascending order (ascending order of position Y)	Sorts the results in order from the smallest mea- surement Y position to the largest.
	Pos.Y descending order (descending order of position Y)	Sorts the results in order from the largest mea- surement Y position to the smallest.

Select the Results to Output

You can use multiple conditions to determine which results to output from all the objects detected with a correlation at the candidate level or higher.

Only the results that meet all the specified conditions are output.

[Inspect] – [Inspection] – [Shape Search II] – [Modify] – [Details] Tab Page – [Meas. Parameter]

- **1** Press [Extraction condition] and adjust the candidate level so that only objects higher than a certain correlation are detected.
- Set the conditions for outputting the detected objects.
 (Extraction X/Y and Detection Count)



Extraction condition	Range	Description
Candidate level	0 to 100 Default: 80	Set the threshold to find Candidate point. Output only a value that is higher than [Candidate level]. Increase the value if Model search is unstable.
Extraction X	–99999.9999 to 99999.9999 Defaults: Lower: –99,999.9999 Upper: 99,999.9999	Results are output only for objects with a measured X coordinate that is within this range.
Extraction Y	–99999.9999 to 99999.9999 Defaults: Lower: –99,999.9999 Upper: 99,999.9999	Results are output only for objects with a measured Y coordinate that is within this range.
Detection count	1 to 32 Default: 1	Sets the maximum number of detection results to out- put.

Note

The processing time changes if you change the candidate level.

4

Reflect in Total Judgment

You can specify whether to reflect the judgment results of an inspection item in the overall judgment. The Default is to reflect them.

[Inspect] – [Inspection] – [Add item.] – [Shape Search II] – [Details] Tab Page – [Output parameter]

Unstable Shape Search II Results

Inclined Measurement Objects

Adjust the [Angle range] parameter to increase the range in which a search is made for the model.

The Shape Search II inspection item judges whether an image is OK or NG according to the correlation with a previously registered image pattern.

For this reason, if the object is at an angle, the correlation is reduced and the image may be judged as NG. To achieve an OK judgment for the same image pattern even when the object is at an angle, the rotation range must be widened.

[Inspect] – [Inspection] – [Shape Search II] – [Modify] – [Details] Tab Page – [Model parameter]

- **1** Set [Rotation] to [Yes].
- **2** Press [Angle range] and set the following range.

Parameter	Setting	Description
Angle range	Range: –180 to 180 Default: Lower: –180 Upper: 180	A shape search II is performed within the set angle range. The larger the angle range, the longer the processing time. Important If you change the angle range, perform teaching again.

Searching for Other Locations

If the model image consists of detailed graphic images, similar models may be detected. For more accurate detection, consider the followings.

- Set [Model mode] to [Stable]
- · Raise [Candidate level].
- Increase the Candidate level
 Increasing the [Candidate level], limit the detected model.

For [Candidate level], refer to _____ Select the Results to Output: p. 221

[Inspect] – [Inspection] – [Shape Search II] – [Modify] – [Details] Tab Page – [Model parameter] – [Model mode]

Parameter	Setting	Description
Model mode	Stable (Default) Fast	This function is only valid for color images. Stable: Creates a model using the three RGB colors. Fast : Creates a model using only one of the RGB colors. Detection is occasionally unstable for workpieces with the same shape but a different color.

Correlation Is Inconsistent Due to Low Contrast

Adjust the brightness to improve the contrast of the mark.

Adjusting the Brightness: p. 77

Correlation Is Inconsistent Due to Variations in the Measurement Object

Inconsistent portions can be masked so that they are omitted from matching.

Masking Parts of the Model: p. 226

Correlation coefficient is zero

If the correlation coefficient is zero, reduce the Candidate level.



Inspecting with the Shape Search II Inspection Item

Increasing Processing Speed

The following two methods can be used to reduce processing time.

• Reduce the range in which a shape search II is performed for the model.

Changing the Model Regions: p. 227

• Reduce the angle range setting.

Adjust the [Angle range] parameter to reduce the range in which a shape search II for the model is performed.

Select the Results to Output: p. 237

• Raise [Candidate level].

Raise [Candidate level], then processing time will be shortened.

Select the Results to Output: p. 221

Editing the Model Regions and Measurement Region

Changing the Model Regions

This section describes how to edit the model regions. You can edit the model region in the same way as for a search region.

Changing the Model Registration Region to a Shape Other Than a Rectangle:		p. 225
	I	P



Measurement region (region that is searched for the model)

Important

256

If the model region is changed, perform teaching again.

🛄 р. 232

Changing the Measurement Region

The region within which the model is searched can be changed. You can edit the measurement region in the same way as for a search region.

Changing the Measurement Region: D p. 227

Measurement Data That Can Be Used for External Outputs and Calculations

The following values can be used as measurement data and output to external devices via the Ethernet or used in calculations.

Expression text string	Data name	Description	Data range
JG	Judgment	 -2: No judgement (not measured) 0: Judgement is OK -1: Judgement is NG -13: Teaching not performed error -14: Figure not registered error -15: Out of range error 	This is the judgment result.
CR[0] to CR[31]	Correlation	0 to 100	This is the correlation of the Nth model that was found.
X[0] to X[31]	Position X	-99999.9999 to 99999.9999	This is the X coordinate where the Nth model was found.
Y[0] to Y[31]	Position Y	-99999.9999 to 99999.9999	This is the Y coordinate where the Nth model was found.
TH[0] to TH[31]	Angle	-180 to 180	This is the angle in which the Nth model was found.
SX	Reference X	-99,999.9999 to 99,999.9999	This is the X coordinate of the position where the model was registered.
SY	Reference Y	-99,999.9999 to 99,999.9999	This is the Y coordinate of the position where the model was registered.
ST	Reference angle	-180 to 180	This is the angle when the model was regis- tered.
RX	Detection coordinate X	-99,999.9999 to 99,999.9999	This is the X coordinate of the detection point when the model was registered.
RY	Detection coordinate Y	-99,999.9999 to 99,999.9999	This is the Y coordinate of the detection point when the model was registered.
С	Count	0 to 32	This is the number of models found.

4-18 Calculations and Judgments Using Inspection Item Data: p. 323

Measurement Data That Can Be Logged

The following values can be logged as measurement data.

Parameter	Range of value	Description
Judgement	0: Judgement is OK -1: Judgement is NG -13: Teaching not performed error -14: Figure not registered error -15: Out of range error	This is the measurement judgment results.
Correlation	0 to 100	This is the measured correlation.
Position X	-99999.9999 to 99999.9999	This is the measurement position X.
Position Y	-99999.9999 to 99999.99999	This is the measurement position Y.
Angle	-180 to 180	This is the measurement angle.
Count	0 to 32	This is the number of models found.

* When logging data is output, the data is output in the order of the above table. If more than one item is stored, results are output for each model.

7-6 Logging Measurement Data and Image Data: p. 392

Errors

Errors in Teaching

A teaching error message will appear if the contrast of the image within the model registration region is too low. Select a region with a larger contrast between light and dark areas compared to the region that was registered as the model and re-register it as the model.

4-11 Inspecting with the Sensitive Search Inspection Item

FQ2-S1 FQ2-S2 FQ2-S3 FQ2-S4

Sensitive Search Inspection Item

This inspection item automatically divides the registered model into smaller areas and performs matching for details. The lowest correlation for all of the divisions is output.

A sensitive search is suitable when the differences between the model image and measurement image are too small to produce differences in correlations with a normal search.



Model (desired image pattern)

Sample Measurement

A search is made for sections that are similar to the model and then a finely divided model is used to check the correlations in detailed divisions. If there is no pattern in the divided model, then you can inspect the degree by which there is no pattern.



Setup Procedure for the Sensitive Search Inspection Item

Step 1 Selecting the Inspection Item

[Inspect] – [Inspection]

- 1 Press an unused inspection item number and press [Add item.].
- 2 Press [Sensitive Search].



Registering inspection items: p. 138



Note

Drag the arrow at the bottom of the menu upward to display all of the inspection items.

Step 2 Teaching

Teaching means to store the region and partial image as reference data for the measurement.

[Inspect] – [Inspection] – [Add item.] – [Sensitive Search] – [Settings] Tab Page

1 Press [Teach].



- 2 Place the object that is to be used as the measurement reference in front of the camera.
- **3** Move the rectangle to the location to be measured.
- 4 Press [OK].
- 5 Press [TEACH] on the lower right of the display. The basic settings will be registered when teaching has been completed.
- 6 Press [Back] to end teaching.

The following data is stored as the measurement reference.

Item	Parameter	Description
	Model image	This is the partial image that is stored as the reference.
Reference data	Reference position X	These are coordinates of the model image that are stored as refer-
	Reference position Y	ence.

[Inspect] – [Inspection] – [Add item.] – [Sensitive Search] – [Settings] Tab Page

- **1** Press [Judgement].
- **2** Press each parameter and set the range that is to be judged as OK. Set the range for each of the following parameters.

Continuous measurements will be performed for the images that are taken.



Blue for OK. Red for NG.



You can change the parameters for judgment conditions on the Display Settings Display. Press $[\blacktriangleleft]$ – [Display setting] on the right of the display to switch to the Display Settings Display.

- **3** Press [OK] to accept the value.
- 4 Press [Back] to end making the setting.

Parameter	Setting	Description
Correlation	Range: 0 to 100 Default: Lower: 60, Upper: 100	Set the correlation range that is to be judged as OK. If the correlation in the measurement results is 0, the judgment will be NG regardless of the setting of the lower limit.
Position X	Range: -99,999.9999 to 99,999.9999 Default: Lower: -99,999.9999 Upper: 99,999.9999	Set the range of movement in the X direction that is to be judged as OK.
Position Y	Range: -99,999.9999 to 99,999.9999 Default: Lower: -99,999.9999 Upper: 99,999.9999	Set the range of movement in the Y direction that is to be judged as OK.
Angle	Range: –180 to 180 Default: Lower: –180 Upper: 180	Set the angle range that is to be judged as OK.
Density deviation	Color image Range: 0 to 221 Default: Lower: 0 Upper: 221 Monochrome image Range: 0 to 127 Default: Lower: 0 Upper: 127	Set the density difference range that is to be judged as OK. The value will increase for larger percentages of areas with no pattern. This parameter is valid when setting a plain inspection area for a divided model.

Note

• You can change the output form for each measurement value to one of the following settings.

- Press [] [Result type] on the right of the display.
 - Absolute value (Default): The measured coordinates are output as absolute values.
 - Relative value: The difference from the reference value is output.

Reflect in Total Judgment

You can specify whether to reflect the judgment results of an inspection item in the overall judgment. The Default is to reflect them.

[Inspect] – [Inspection] – [Add item.] – [Sensitive Search] – [Details] Tab Page – [Output parameter]

Increasing Measurement Position Accuracy

You can increase the accuracy of measurement positioning. You can calculate down to four decimal places.

[Inspect] – [Inspection] – [Sensitive Search] – [Modify] – [Details] Tab Page – [Meas. Parameter]

1 Press [Sub-pixel] and select [Yes].



Select the Results to Output

Only objects with a correlation that is higher than the specified candidate level are output.

- [Inspect] [Inspection] [Sensitive Search] [Modify] [Details] Tab Page [Meas. Parameter]
- **1** Press [Candidate level] and adjust the candidate level so that only objects higher than a certain correlation are detected.



Extraction condition	Range	Description
Candidate level	0 to 100 (Default: 70)	Set the threshold to find Candidate. Output the correlating value that is higher than [Candidate level] value. Decrease the value when Model search is unstable.

Note

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The processing time changes if you change the candidate level.

Changing the Number Region Divisions

You can change the number of divisions of the registered model.

[Inspect] - [Inspection] - [Sensitive Search] - [Modify] - [Details] Tab Page -[Model parameter] - [Sub-model number]

Parameter	Setting	Description
Sub-model number	• 3 × 3 • 5 × 5 (Default) • 9 × 9	Sets the number of divisions of the registered model.

Inspecting Plain Regions

Density deviations are used to inspect sections that are set as plain regions during teaching.

[Inspect] – [Inspection] – [Sensitive Search] – [Modify] – [Details] Tab Page – [Model parameter] – [Plain inspection]

Parameter	Setting	Description
Plain inspection	• Yes • No (Default)	Enables or disables inspecting plain sections.

Unstable Search Results

Inclined Measurement Objects

Adjust the [Angle range] parameter to increase the range in which a search is made for the model. The Search inspection item judges whether an image is OK or NG according to the correlation with a previously registered image pattern.

For this reason, if the object is at an angle, the correlation is reduced and the image may be judged as NG. To achieve an OK judgment for the same image pattern even when the object is at an angle, the rotation range must be widened.

▶ [Inspect] – [Inspection] – [Sensitive Search] – [Modify] – [Details] Tab Page – [Model parameter]

1 Set [Rotation] to [Yes].

2 Press [Angle range] and set the following range.

Parameter	Setting	Description
Angle range	Range: –180 to 180 Default: Lower: –180 Upper: 180	A search is performed within the set angle range. The larger the angle range, the longer the processing time. Important If you change the angle range, perform teaching again.

Correlation Is Inconsistent Due to Low Contrast

Adjust the brightness to improve the contrast of the mark.

Adjusting the Brightness: p. 77

Correlation Is Inconsistent Due to Variations in the Measurement Object

Inconsistent portions can be masked so that they are omitted from matching.

Model masking: p. 226

Increasing Processing Speed

The following two methods can be used to reduce processing time.

• Reduce the range in which a search is performed for the model.



Changing the measurement region: p. 227

• Reduce the angle range setting.

Adjust the [Angle range] parameter to reduce the range in which a search for the model is performed.

Setting the angle range: p. 266

For more accurate detection, consider the followings:

- Set [Model mode] to [Stable]
- Raise [Candidate level].

For [Candidate level], refer to _____ Select the Results to Output: p. 221

Editing the Model Regions and Measurement Region

Changing the Model Regions

This section describes how to edit the model regions. You can edit the model region in the same way as for a search region.

Changing the Model Registration Region to a Shape Other Than a Rectangle: p. 225



Measurement region (region that is searched for the model)

Important

If the model region is changed, perform teaching again.
____ p. 261

Changing the Measurement Region

The region within which the model is searched can be changed. You can edit the measurement region in the same way as for a search region.

Changing the Measurement Region: _____ p. 227

The following values can be used as measurement data and output to external devices via the Ethernet or used in calculations.

Expression	Data name	Description	Data range
text string			
JG	Judgement	This is the judgment result of the sensi- tive search.	 -2: No judgment (not measured) 0: Judgment is OK -1: Judgment is NG -13: Teaching not performed error -14: Figure not registered error -15: Out of range error
CR	Correlation	Correlation	0 to 100
DV	Deviation	Density deviation	Color image: 0 to 221 Monochrome image: 0 to 127
Х	Position X	This is the X coordinate of the position where the model was found.	-999,999,999.9999 to 999,999,999.9999
Y	Position Y	This is the Y coordinate of the position where the model was found.	-999,999,999.9999 to 999,999,999.9999
TH	Angle	This is the angle of the position where the model was found.	-180 to 180
RX	Detection X	This is the X coordinate of the detection point when the model was registered.	-999,999,999.9999 to 999,999,999.9999
RY	Detection Y	This is the Y coordinate of the detection point when the model was registered.	-999,999,999.9999 to 999,999,999.9999
SX	Reference position X	This is the X coordinate of the position where the model was registered. (This is the center of the model region.)	-999,999,999.9999 to 999,999,999.9999
SY	Reference position Y	This is the Y coordinate of the position where the model was registered. (This is the center of the model region.)	-999,999,999.9999 to 999,999,999.9999
ST	Reference angle	This is the angle when the model was registered.	-180 to 180
СТ	NG sub-region	This is the number of NG sub-regions.	0 to 100
AN	Sub-region number	This is the number of the regions with the lowest correlation.	0 to 99
ANX	Sub-region number (X)	This is the column number in the X direction of the output region.	0
ANY	Sub-region number (Y)	This is the row number in the Y direc- tion of the output region.	0
DX	Sub-region pos. X	This is the X coordinate of the sub- region that was found.	-999,999,999.9999 to 999,999,999.9999
DY	Sub-region pos. Y	This is the Y coordinate of the sub- region that was found.	-999,999,999.9999 to 999,999,999.9999
CRN[0] to CRN[99]	Correlation (sub-region)	This is the correlation of the sub-region that was found.	0 to 100
DVN[0] to DVN[99]	Deviation (sub-region)	This is the density deviation of the region that was found.	Color image: 0 to 221 Monochrome image: 0 to 127

4-18 Calculations and Judgments Using Inspection Item Data: p. 323

The following values can be logged as measurement data.

Parameter Range of value		Description
Judgement –2: No judgment (not measured) 0: Judgment is OK –1: Judgment is NG		This is the judgment result of the sensitive search.
Correlation	0 to 100	Correlation
D deviation	Color image: 0 to 221 Monochrome image: 0 to 127	Density deviation
Position X	-99,999.9999 to 99,999.9999	This is the X coordinate of the position where the model was found.
Position Y	-99,999.9999 to 99,999.9999	This is the Y coordinate of the position where the model was found.
Angle	-180 to 180	This is the angle of the position where the model was found.
NG sub-region	0 to 100	This is the number of NG sub-regions.
Sub-region number	0 to 99	This is the number of the regions with the lowest cor- relation.
Sub-region pos. X (sub-region number (X))	0 to 9	This is the column number in the X direction of the output region.
Sub-region pos. Y (sub-region number (Y))	0 to 9	This is the row number in the Y direction of the output region.
Sub-region position X	-999,999,999.9999 to 999,999,999.9999	This is the X coordinate of the sub-region that was found.
Sub-region position Y	-999,999,999.9999 to 999,999,999.9999	This is the Y coordinate of the sub-region that was found.
Correlation (sub-region)	0 to 100	Correlation
Deviation Color image: 0 to 221 (sub-region) Monochrome image: 0 to 127		Density deviation

When logging data is output, the data is output in the order of the above table.

☐ 7-6 Logging Measurement Data and Image Data: p. 392

Errors

Errors in Teaching

A teaching error message will appear if the contrast of the image within the model registration region is too low. Select a region with a larger contrast between light and dark areas compared to the region that was registered as the model and re-register it as the model.

4-12 Inspecting with the Edge Position Inspection Item

FQ2-S1 FQ2-S2 FQ2-S3 FQ2-S4

Edge Position

This inspection item is used to inspect positions. For example, it can be used to see if a label is attached at the correct position or if a product is set in the correct position.

Places where the color changes greatly are called edges. The positions of these edges are measured.



Sample Measurement An edge is detected within the region according to set direction and color.



Step 1 Selecting the Inspection Item



1 Press an unused inspection item number and press [Add item.].

 2 Press [Edge position].
 Add item.

 □ Registering inspection items: p. 138
 Item Im Search

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 Im Edge Position
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Note

Drag the arrow _____ at the bottom of the menu upward to display all of the inspection items.

 $\overline{}$

Teaching means to store the region and the edge position in the region as reference data for the measurement.

[Inspect] – [Inspection] – [Add item.] – [Edge Position] – [Settings] Tab Page

1 Press [Teach].

The arrow in the middle shows the direction for detecting an edge.



Drag to move the region. of the measurement region.

of the measurement region. Changes the width

- 2 Place the object that is to be used as the measurement reference in front of the camera.
- 3 Move the rectangle to the location to be measured.
- 4 Press [OK].
- 5 Press [TEACH] on the lower right of the display. The basic settings will be registered when teaching has been completed.
- 6 Press [Back] to end teaching.

Changing the measurement region: p. 227 \square

The following data is stored as basic measurement data.

Item	Parameter	Description
	Reference position X	The reference coordinates (X, Y) of the position are set auto-
Reference data	Reference position Y	matically.

[Inspect] – [Inspection] – [Add item.] – [Edge Position] – [Settings] Tab Page

- **1** Press [Judgement].
- **2** Press the parameters and set the range that is to be judged as OK.

The measurement value is displayed next to the parameter name. Continuous measurements will be performed for the images that are displayed.



Blue for OK. Red for NG.

Note

You can change the parameters for judgement conditions on the Display Settings Display. Press $[\blacktriangleleft]$ – [Display setting] on the right of the display to switch to the Display Settings Display.

3 Press [OK] to enter the value.

Parameter	Setting	Description
Offset amount	Range: -99,999.9999 to 99,999.9999 Defaults: Lower: -1,640 Upper: 1,640	Sets the upper/lower limit range for the amount of posi- tion deviation considered to be OK.
Position X	Range: -99,999.9999 to 99,999.9999 Defaults: Lower: -99,999.9999 Upper: 99,999.9999	Sets the upper/lower limit range for the amount of edge position X considered to be OK.
Position Y	Range: -99,999.9999 to 99,999.9999 Defaults: Lower: -99,999.9999 Upper: 99,999.9999	Sets the upper/lower limit range for the amount of edge position Y considered to be OK.

Note

• You can change the output form for each measurement value to one of the following settings.

Press [] – [Result type] on the right of the display.

- Absolute value (Default): The measured coordinates are output as absolute values.
- Relative value: The difference from the reference value is output.

Reflect in Total Judgment

You can specify whether to reflect the judgment results of an inspection item in the overall judgment. The Default is to reflect them.



Changing Edge Detection Conditions (Sensors with Monochrome Cameras Only)

You can change the following measurement conditions for Sensors with Monochrome Cameras.

▶ [Inspect] – [Inspection] – [Edge Position] – [Modify] – [Details] Tab Page – [Meas. Parameter]

Item	Parameter	Description
	Projection	A projection is formed based on the gray level, and any position of inter- section between the gray level value and the threshold (edge level) is detected as an edge. This detection method is used when you must process an image with excessive noise or when the edges are blurry.
Measurement methods	Differentiation	A differentiated waveform is created that represents the amount of change in gray level between neighboring pixels. The edge position is detected from the differentiated waveform that exceeds the threshold (edge level). This detection method is used for low-contrast images.
Density change	Light to Dark	Detects as an edge any position within the specified region that changes from white to black.
(when Measurement methods is set to Projection only)	Dark to Light	Detects as an edge any position within the specified region that changes from black to white.

Unstable Edge Position Results

There Is an Edge But It Cannot Be Detected

[Inspect] – [Inspection] – [Edge Position] – [Modify] – [Details] Tab Page – [Meas. Parameter] – [Edge Level]

Parameter	Setting	Description
Edge level	Color diff. / density diff. (%) Range: 0 to 100 Default: 50 When specified by absolute value • Color Range: 0 to 442 Default: 20 • Monochrome Range: 0 to 255 Default: 20	Set the color change level to detect as an edge. The edge point is found based on a threshold that is set for a color change. Important If you change the edge level, perform teaching again.

Note

Edge Level

- When measuring by relative value (%) of color difference width An edge is detected in the following way.
 - 1. The color change distribution of the entire measurement region is determined.
 - 2. The minimum color change is 0%. The maximum color change is 100%.
 - 3. The location where the color change intersects with the edge level is detected as the edge.



• When measuring by color difference value

The edge threshold is set using the absolute value of the color difference.



4

Setting Up Inspections

[Inspect] – [Inspection] – [Edge Position] – [Modify] – [Details] Tab Page – [Meas. Parameter] – [Noise Level]

Parameter	Setting	Description
Noise level	Sensors with Color Cameras Only Range: 0 to 442 Default: 5 (Sensors with Monochrome Cam- eras only) Range: 0 to 255 Default: 5	Sets the density level to be considered as noise. If the difference between the maximum and minimum color changes in the region is below the noise level, it will be assumed that there is no edge. Increase this value if noise is incorrectly detected as an edge. Important If you change the noise level, perform teaching again.

Note

Noise threshold

The maximum and minimum color deviations and densities within the edge detection region are determined. If the difference is less than the noise threshold, it is assumed that there are no edges. Normally there is no problem with the Default value of 10, but if noise is mistakenly detected as an edge, make this value higher.

• Sensors with Color Camera

```
Within the Region
Max. color change – Min. color change < Noise threshold \rightarrow No edge found \rightarrow Measurement result: NG
Max. color change – Min. color change \geq Noise threshold \rightarrow Edge found \rightarrow Perform measurement
```

Sensors with Monochrome Cameras

```
Max. density change – Min. density change < Noise threshold \rightarrow No edge found \rightarrow Measurement result: NG
```

Max. density change – Min. density change – Noise threshold \rightarrow Edge found \rightarrow Perform measurement



Screen Display When the Edge Level and Noise Level Are Changing

A bar showing the threshold level moves up and down on the graphic as the edge level/noise level value changes. A cross-key cursor will also appear at the detected edge position.



Screen display when the edge level are changing.

Undesired Edge Position Is Automatically Detected When Teaching (Sensors with Color Cameras Only)

Manually set the color of the edge that you want to detect.

[Inspect] – [Inspection] – [Edge Position] – [Modify] – [Settings] Tab Page – [Teach]

- **1** Press **[4]** − [Color ON/OFF] on the right side of the display.
- 2 Press [ON].
- **3** Press [**4**] [Set color.] on the right of the display.
- 4 Press [◀] [Detection mode] on the right of the display and select one of the following detection modes.
- **5** Draw a rectangle around the color that you want to use to extract an edge.

The specified color will be extracted.

6 Press [OK] to enter the edge color.



(Only a rectangle can be used to specify the region.)

- 7 Press [TEACH] again.
- 8 Press [Back].



Note

It is also possible to check the extraction colors or specify them using the color palette. The RGB values of the extraction color can be checked and adjusted using the color palette.

If you press [] – [Color palette], a color palette will appear.



When a color is pressed on the color palette, its RGB values will be displayed.

Increasing Processing Speed for Edge Position

Make the measurement region smaller to reduce the processing time.

Changing the measurement region: p. 227

Measurement Data That Can Be Used for External Outputs and Calculations

The following values can be used as measurement data and output to external devices via the Ethernet or used in calculations.

Expression text string	Data name	Description	Data range
JG	Judgement	 -2: No judgement (not measured) 0: Judgement is OK -1: Judgement is NG -13: Teaching not performed error -14: Figure not registered error -15: Out of range error 	This is the judgment result.
Х	Position X	-99999.9999to 99999.9999	This is the X coordinate of the measured edge position.
Y	Position Y	–99999.9999 to 99999.9999	This is the Y coordinate of the measured edge position.
SX	Ref. position X (reference position X)	-99999.9999 to 99999.9999	This is the X coordinate of the edge position when a range is set.
SY	Ref. position Y (reference position Y)	-99999.9999 to 99999.9999	This is the Y coordinate of the edge position when a range is set.
DF	D. position (difference in position)	-99999.9999 to 99999.9999	This is the offset from the measured refer- ence position.

4-18 Calculations and Judgments Using Inspection Item Data: p. 323

Measurement Data That Can Be Logged for Edge Position

The following values can be logged as measurement data.

Measured item	Range of value	Description
Judgement	0: Judgement is OK -1: Judgement is NG -13: Teaching not performed error -14: Figure not registered error -15: Out of range error	This is the measurement judgment results.
D. position (difference in position)	-99999.9999 to 99999.9999	This is the offset from the measured reference position.
Position X	-99999.9999 to 99999.9999	This is the X coordinate of the measured edge position.
Position Y	-99999.9999 to 99999.9999	This is the Y coordinate of the measured edge position.

When logging data is output, the data is output in the order of the above table. If more than one item is stored, results are output for each model.

7-6 Logging Measurement Data and Image Data: p. 392

Errors

Errors in Teaching

A teaching error message will appear if the edge position cannot be detected when teaching. Perform the following.

- If the color of the measurement object has changed from the specified color, set the color again and try teaching again.
- If there is an edge and it cannot be detected, adjust the [Noise level] on the [Details] Tab Page and try teaching again.

Edge Not Found

If an edge is not found, the measurement result will be NG. Perform the following.

- If a color was specified, make sure the color of the measurement object has not changed from the specified color.
- Set the color again if necessary.
- If there is an edge and it cannot be detected, make sure the [Edge level] parameter on the [Details] Tab Page is correct.



Edge level: p. 276

4-13 Inspecting with the Edge Width Inspection Item

FQ2-S1 FQ2-S2 FQ2-S3 FQ2-S4

Edge Width Inspection Item

This inspection item is used to measure dimensions. Places where the color changes greatly are called edges. The distance between two edges is called the edge width.



Color of edge to be found



Setup Procedure for Edge Width Inspection Item

Step 1 Selecting the Inspection Item

[Inspect] – [Inspection]

- **1** Press an unused inspection item number and press [Add item.].
- 2 Press [Edge Width].



Registering inspection items: p. 138

Add item		
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	📧 Sensitive Search	
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	蒜 Edge Width	
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Note

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Drag the arrow **e** at the bottom of the menu upward to display all of the inspection items.

Teaching means to store the region and the edge width in the region as reference data for the measurement.

[Inspect] – [Inspection] – [Add item.] – [Edge Width] – [Settings] Tab Page

1 Press [Teach].



The middle arrow is the

- 2 Place the object that is to be used as the measurement reference in front of the camera.
- **3** Move the rectangle to the location to be measured.
- 4 Press [OK].
- 5 Press [TEACH] on the lower right of the display.

The basic settings will be registered when teaching has been completed.

6 Press [Back] to end teaching.

Changing the measurement region: p. 227

The following data is stored as the measurement reference.

Item	Parameter	Description
Reference data	Reference width	The reference edge width is set automatically.

Step 3 Adjusting the Judgement Parameters

[Inspect] – [Inspection] – [Add item.] – [Edge Width] – [Settings] Tab Page

1 Press [Judgement].

2 Set the D. Width range for an OK judgement.

Continuous measurements will be performed for the images that are displayed. The measured value is displayed beside the parameter name.



Blue for OK. Red for NG.

Note

You can change the parameters for judgement conditions on the Display Settings Display. Press $[\blacktriangleleft]$ – [Display setting] on the right of the display to switch to the Display Settings Display.

3 Press [OK] to enter the value.

Parameter	Setting	Description
Edge width (edge in width)	When the result type is set to absolute value Range: 0.0000 to 99,999.999 Defaults: Upper: 99,999.999 Lower: 0.0000 When the result type is set to relative values: Range: -99,999.9999 or 99,999.999 Defaults: Upper: 99,999.9999 Lower: -99,999.9999 When the result type is set to ratios: Range: 0.000 to 999.9999(%) Defaults: Upper: 999.9999 Lower: 0.000	Set the upper and lower limits of the refer- ence width for an OK judgment.

Note

• You can change the output form for each measurement value to one of the following settings.

Press [] – [Result type] on the right of the display.

- Absolute value (Default): The measured edge width is output.
- Relative value: The difference from the reference value is output.
- Ratio: The percentage of the reference value is output.

Changing Edge Detection Conditions (Sensors with Monochrome Cameras Only)

You can change the measurement conditions for Sensors with Monochrome Cameras. Change the [Density change] and [Measurement method] parameters.

____ p. 275

Reflect in Total Judgment

You can specify whether to reflect the judgment results of an inspection item in the overall judgment. The Default is to reflect them.

[Inspect] – [Inspection] – [Add item.] – [Edge Width] – [Details] Tab Page – [Output parameter]

Unstable Edge Width Results (Sensors with Color Cameras)

If the measurement result is not stable, adjust the [Edge level], [Noise level], and [Set color.] parameters.

🛄 p. 276

Increasing Edge Width Processing Speed

Make the measurement region smaller to reduce the processing time.



Changing the measurement region: p. 227

Measurement Data That Can Be Used for External Outputs and Calculations

The following values can be output to external devices or used in calculations as measurement data.

Expression text string	Data name	Description	Data range
JG	Judgement	 -2: No judgement (not measured) 0: Judgement is OK -1: Judgement is NG -13: Teaching not performed error -14: Figure not registered error -15: Out of range error 	This is the judgment result.
W	Edge width	0 to 99999.9999	Edge width
SW	Ref. edge width (reference edge width)	0 to 99999.9999	This is the reference edge width from when the model was registered.
DF	D. edge width (difference in edge width)	0 to 99999.9999	This is the difference between the reference edge width and the mea- sured edge width.

4-18 Calculations and Judgments Using Inspection Item Data: p. 323

Measurement Data That Can Be Logged for Edge Width

The following values can be logged as measurement data.

Measured item	Range of value	Description
Judgement	0: Judgement is OK, -1: Judgement is NG, -13: Teaching not performed error -14: Figure not registered error -15: Out of range error	This is the measurement judgment results.
Edge Width (edge in width)	-99999.9999 to 99999.9999	This is the difference between the reference width and the measured edge width.

*1 When logging data is output, the data is output in the order of the above table. If more than one item is stored, results are output for each model.

7-6 Logging Measurement Data and Image Data: p. 392
Errors

Errors in Teaching

A teaching error message will appear if the edge position cannot be detected when teaching. Perform the following.

- If the color of the measurement object has changed from the specified color, set the color again and try teaching again.
- If there is an edge and it cannot be detected, adjust the [Noise level] on the [Details] Tab Page and try teaching again.

Edge Not Found

The measured edge width will be 0. Perform the following:

- If a color was specified, make sure the color of the measurement object has not changed from the specified color.
- Set the color again if necessary.
- If there is an edge and it cannot be detected, make sure the [Edge level] parameter on the [Details] Tab Page is correct.

Edge level: p. 276

4-14 Inspecting with the Edge Pitch Inspection Item

FQ2-S1 FQ2-S2 FQ2-S3 FQ2-S4

Edge Pitch Inspection Item

This inspection item is used to detect edges through changes in brightness within a region. Edges of the specified color in one measurement area are found and the number objects, object width, and pitch are output.



Setup Procedure for Edge Width Inspection Item

Step 1 Selecting the Inspection Item

- ▶ [Inspect] [Inspection]
 - **1** Press an unused inspection item number and press [Add item.].
 - 2 Press [Edge Pitch].
 - - Registering inspection items: p. 138

Add item.		
ltom	🕂 Edge Position	^
rtem	T⇔T Edge Width	
	🗰 Edge Pitch	
	💑 Color Data	
	⊾ Area	
	🛥 Labeling	\sim
	🔍 🗖 Cance	:

Note

Drag the arrow **I** at the bottom of the menu upward to display all of the inspection items.

Teaching means to store the region as reference data for the measurement.

[Inspect] – [Inspection] – [Add item.] – [Edge Pitch] – [Settings] Tab Page

- 1 Press [Teach].
- 2 Place the object that is to be used as the measurement reference in front of the camera.
- 3 Move the rectangle to the location to be measured.
- Δ Press [OK].
 - Changing the Measurement Region: p. \square 227



point of the measurement region. Drag to move



the region.

Changes the width of the measurement region.

Adjusting the Judgment Parameters Step 3

[Inspect] – [Inspection] – [Add item.] – [Edge Pitch] – [Settings] Tab Page

- 1 Press [Judgement].
- **2** Press the parameters and set the range that is to be judged as OK.

Continuous measurements will be performed for the images that are displayed. The measured value is displayed beside the parameter name.



Blue for OK. Red for NG.

Note

You can change the parameters for judgment conditions on the **Display Settings Display.**

Press [] – [Display setting] on the right of the display to switch to the Display Settings Display.

3 Press [OK] to enter the value.

Item	Parameter	Setting	Description
	Edge pitch	Range : 0 to 1000 Defaults: Lower: 0 Upper: 1000	
	Average pitch	Range : 0.0000 to 99,999.9999 Defaults: Lower: 0.0000 Upper: 99,999.9999	Set the range that is to be judged OK for each parameter.
	Max. pitch (maximum pitch)	Range : 0.0000 to 99,999.9999 Defaults: Lower: 0.0000 Upper: 99,999.9999	
Judgment Parameter	Min. pitch (minimum pitch)	Range : 0.0000 to 99,999.9999 Defaults: Lower: 0.0000 Upper: 99,999.9999	
	Average width	Range : 0.0000 to 99,999.9999 Defaults: Lower: 0.0000 Upper: 99,999.9999	Pitch Width (distance between center points)
	Max. width (maximum pitch)	Range : 0.0000 to 99,999.9999 Defaults: Lower: 0.0000 Upper: 99,999.9999	Edge pitch (number of objects)
	Min. width (minimum pitch)	Range : 0.0000 to 99,999.9999 Defaults: Lower: 0.0000 Upper: 99,999.9999	

Changing Edge Detection Conditions (Sensors with Monochrome Cameras Only)

You can change the following measurement conditions for Sensors with Monochrome Cameras.

[Inspect] – [Inspection] – [Edge Pitch] – [Modify] – [Details] Tab Page – [Meas.parameter]

Parameter	Setting	Description
Color to count	White (Default) Black	Sets the color of edges to measure.
Mode	Standard (Default) Precise	Select the Precise Mode if the pin width or pitch is less than 2 pixels.

Reflect in Total Judgment

You can specify whether to reflect the judgment results of an inspection item in the overall judgment. The Default is to reflect them.

▶ [Inspect] – [Inspection] – [Add item.] – [Edge Pitch] – [Details] Tab Page – [Output parameter]

Unstable Edge Pitch Results (Sensors with Color Cameras Only)

If the measurement result is not stable, adjust the [Edge level], [Noise level], and [Set color.] parameters.

D. 276

Increasing Edge Pitch Processing Speed

Make the measurement region smaller to reduce the processing time.

Changing the measurement region: p. 227

Measurement Data That Can Be Used for External Outputs and Calculations

The following values can be output to external devices or used in calculations as measurement data.

Expression text string	Data name	Description	Data range
JG	Judgement	 -2: No judgement (not measured) 0: Judgement is OK -1: Judgement is NG -13: Teaching not performed error -14: Figure not registered error -15: Out of range error 	This is the judgement result.
Ν	Edge pitch	0 to 999	This is the number of objects.
Р	Average pitch	0 to 99999.9999	This is the average pitch.
PH	Max. pitch	0 to 99999.9999	This is the maximum pitch.
PL	Min. pitch	0 to 99999.9999	This is the minimum pitch.
W	Average width	0 to 99999.9999	This is the average width between edges.
WH	Max. width	0 to 99999.9999	This is the maximum width between edges.
WL	Min. width	0 to 99999.9999	This is the minimum width between edges.

4-18 Calculations and Judgments Using Inspection Item Data: p. 323

Measurement Data That Can Be Logged for Edge Pitch

Measured item	Range of value	Description
Judgement	 -2: No judgement (not measured) 0: Judgement is OK -1: Judgement is NG -13: Teaching not performed error -14: Figure not registered error -15: Out of range error 	This is the judgement result from the measurements.
Edge pitch	0 to 999	This is the number of objects that were detected.
Average pitch	0 to 99999.9999	This is the average pitch that was detected.
Max. pitch	0 to 99999.9999	This is the maximum pitch that was detected.
Min. pitch	0 to 99999.9999	This is the minimum pitch that was detected.
Average width	0 to 99999.9999	This is the average width that was detected between edges.
Max. width	0 to 99999.9999	This is the maximum width that was detected between edges.
Min. width	0 to 99999.9999	This is the minimum width that was detected between edges.

The following values can be logged as measurement data.

When logging data is output, the data is output in the order of the above table.

7-6 Logging Measurement Data and Image Data: p. 392

Errors

*

Edge Not Found

The measured edge pitch will be 0. Perform the following.

• If a color was specified, make sure the color of the measurement object has not changed from the specified color.

• Set the color again if necessary.

• If there is an edge and it cannot be detected, make sure the [Edge level] parameter on the [Details] Tab Page is correct.

Edge level: p. 276

4-15 Inspecting with Color Data Inspection Item

FQ2-S1 FQ2-S2 FQ2-S3 FQ2-S4

Color Data Inspection Item

This inspection item is used to perform inspections for foreign matter with a different color or for presence. The region is set for a portion of the image with the color that is to be measured. This region is called the measurement region. The average color within the measurement region is measured.

If a Sensor with a Monochrome Camera is connected, the average density in the measurement region is found and inspections are performed for the difference from the registered reference value (density average) and the variation within the measurement region (density deviation).



If a Sensor with a Monochrome Camera is connected, the average density in the measurement region is measured and the density deviation is used for judgments.

Setup Procedure for Color Data Inspection Item

Step 1 Selecting the Inspection Item

- [Inspect] [Inspection]
 - **1** Press an unused inspection item number and press [Add item.].
 - 2 Press [Color Data].



Registering inspection items: p. 138

Add item		
ltom	🕂 Edge Position	^
rtem	T⇔T Edge Width	
	🗰 Edge Pitch	
	💑 Color Data	
🗖 Area		
	🛥 Labeling	\sim
Cancel		

Note

Drag the arrow **e** at the bottom of the menu upward to display all of the inspection items.

Teaching means to store the region and the average color in the region as reference data for the measurement.

[Inspect] – [Inspection] – [Add item.] – [Color Data] – [Settings] Tab Page

1 Press [Teach].

Drag the rectangle to move it.



- 2 Place the object that is to be used as the measurement reference in front of the camera.
- **3** Move the rectangle to the location to be measured.
- 4 Press [OK].
- **5** Press [TEACH] on the lower right of the display.

The basic settings will be registered when teaching has been completed.

6 Press [Back] to end teaching.

Changing the measurement region: p. 227

The following data is stored as the measurement reference.

Item	Parameter	Description
Reference data	Reference color R	The R average to use as a reference is set automatically.
	Reference color G	The G average to use as a reference is set automatically.
	Reference color B	The B average to use as a reference is set automatically.

[Inspect] – [Inspection] – [Add item.] – [Color Data] – [Settings] Tab Page

1 Press [Judgement].

2 Press the parameters and set the range that is to be judged as OK.

The measured value is displayed beside the parameter name. Continuous measurements will be performed for the images that are displayed.



Blue for OK. Red for NG.

Note

You can change the parameters for judgment conditions on the Display Settings Display. Press [◀] – [Display setting] on the right of the display to switch to the Display Settings Display.

3 Press [OK] to enter the value.

Sensors with Color Cameras Only

Item	Parameter	Setting	Description
	Color difference	0 to 442	Sets the upper and lower limits of the difference between the average color and reference color that is to be judged as OK.
	Color deviation	0 to 221	Set the upper and lower limits of the range of the deviation in the region that is to be judged as OK.
Judgement Parameter	R average	0.0000 to 255.0000	Set the difference in the average value of the R (red) compo- nent that is to be judged as OK.
	G average	0.0000 to 255.0000	Set the difference in the average value of the G (green) component that is to be judged as OK.
	B average	0.0000 to 255.0000	Set the difference in the average value of the B (blue) compo- nent that is to be judged as OK.

Sensors with Monochrome Cameras only

Item	Parameter	Setting	Description
Judgement	Density average	0 to 255	Set the judgment upper and lower limits for the average den- sity in the measurement region.
Farameter	Density deviat. (density devia- tion)	0 to 127	Set the upper and lower limits for the deviation in the average density in the measurement region.

Reflect in Total Judgment

You can specify whether to reflect the judgment results of an inspection item in the overall judgment.

▶ [Inspect] – [Inspection] – [Add item.] – [Color Data] – [Details] Tab Page – [Output parameter]

Measurement Data That Can Be Used for External Outputs and Calculations

The following values can be used as measurement data and output to external devices via the Ethernet or used in calculations.

Expression text string	Data name Description		Data range
JG	Judgement	 -2: No judgement (not measured) 0: Judgement is OK -1: Judgement is NG -10: Image error -13: Teaching not performed error -14: Figure not registered error -15: Out of range error -20: Other error 	This is the judgment result.
AR	R average	0 to 255	This is the average value of the R (red) compo- nent.
AG	G average	0 to 255	This is the average value of the G (green) component.
AB	B average	0 to 255	This is the average value of the B (blue) compo- nent.
AD Color diff./dens. AV.		0 to 442	(For Sensors with Color Cameras) This is the dif- ference between the average color in the region and the standard color.
	Color difference	0 to 255	(For Sensors with Monochrome Cameras) This is the difference between the average density in the region and the standard density.
DV	Clr. deviat. Color deviation	0 to 221	(For Sensors with Color Cameras) This is the deviation within the region.
		0 to 217	(For Sensors with Monochrome Cameras) This is the deviation within the region

4-18 Calculations and Judgments Using Inspection Item Data: p. 323

Measurement Data That Can Be Logged (Color Data)

The following values can be logged as measurement data.

Measured item	Range of value	Description
Judgement	0: Judgement is OK, -1: Judgement is NG -10: Image error -13: Teaching not performed error -14: Figure not registered error -15: Out of range error -20: Other error	This is the measurement judgment results.
R average	0 to 255	This is the average value for the R (red) component.
G average	0 to 255	This is the average value for the G (green) component.
B average	0 to 255	This is the average value for the B (blue) component.
Color diff./dens. AV. Color (for Sensors with Color Cameras)	0 to 442	This is the difference between the color that was registered as the reference and the measured color. The average color within the measurement area is used in both cases.
Color diff./dens. AV. Color (for Sensors with Mono- chrome Cameras)	0 to 255	This is the difference between the average density in the region and the currently measured density.
Clr. deviat. (for Sensors with Color Cameras)	0 to 221	This is the deviation within the measurement region.
Clr. deviat. (for Sensors with Mono- chrome Cameras)	0 to 127	This is the deviation in the average density in the measurement region.

When logging data is output, the data is output in the order of the above table.

7-6 Logging Measurement Data and Image Data: p. 392

Increasing Processing Speed for Color Data

Make the measurement region smaller to reduce the processing time.

Changing the measurement region: p. 227

4-16 Inspecting with the Area Inspection Item

FQ2-S1 FQ2-S2 FQ2-S3 FQ2-S4

Area Inspection Item

This inspection item is used to measure sizes. It measures the amount of a color within the measurement region. The size is calculated as a number of pixels and it is called the area.



Sample Measurement Judges according to the number of pixels (area) of the specified color.



Inspecting with the Area Inspection Item

Setup Procedure for Area

Step 1 Selecting the Inspection Item

[Inspect] – [Inspection]

1 Press an unused inspection item number and press [Add item.].

2 Press [Area].



Registering inspection items: p. 138



Note

Drag the arrow **u** at the bottom of the menu upward to display all of the inspection items.

Step 2 Teaching

Teaching means to store the region and the color area in the region as reference data for the measurement.

[Inspect] – [Inspection] – [Add item.] – [Area] – [Settings] Tab Page

1 Press [Teach].



- 2 Place the object that is to be used as the measurement reference in front of the camera.
- **3** Move the rectangle to the location to be measured.
- 4 Press [OK].

5 Press [TEACH] on the lower right of the display.

The basic settings will be registered when teaching has been completed. Areas with the extracted color will be automatically detected.

Note

Information on the color that has the largest area in the measurement region is extracted and registered. (The color information is extracted only the first time.)

The extracted color information will not change from the second time on.

To specify a desired color, refer to *Extraction Is Automatically Performed for an Undesired Color When Teaching* p. 305.

6 Press [Back] to end teaching.

Changing the measurement region: p. 227

The following data is stored as the measurement reference.

Item	Parameter	Description
Reference data	Extract color	This is the color for which to measure the area. The color occupying the largest area will be automatically registered. Setting Colors Manually: p. 305
	Reference area	The area to use as a reference is set automatically.

[Inspect] – [Inspection] – [Add item.] – [Area] – [Settings] Tab Page

- **1** Press [Judgement].
- **2** Press the parameters and set the range that is to be judged as OK.

The measured value is displayed beside the parameter name. Continuous measurements will be performed for the images that are displayed.



Blue for OK. Red for NG.

Note

You can change the parameters for judgment conditions on the Display Settings Display. Press $[\blacktriangleleft]$ – [Display setting] on the right of the display to switch to the Display Settings Display.

3 Press [OK] to enter the value.

Item	Parameter	Setting	Description
Judgement Parameter	Area	When the result type is set to absolute value Range: 0.0000 to 999,999,999.9999 Defaults: Upper: 999,999,999.9999 Lower: 0.0000 When the result type is set to relative value Range: -999,999,999,999 to 999,999,999,999,9999 Defaults: Upper: 999,999,999,9999 Lower: -999,999,999,999,9999 When the result type is set to ratio Range: 0.00000 to 999.9999 Defaults: Upper: 999.9999 Lower: 0.0000 Lower: 0.0000	Set the upper and lower limits for an OK judgment. The set range is the difference between the reference area and the measured areas.
	Gravity X	Range: –99,999.9999 to 99,999.9999 Defaults: Upper: 99,999.9999 Lower: –99,999.9999	Set the upper and lower limits of the range of gravity X that is to be judged as OK.
	Gravity Y	Range: –99,999.9999 to 99,999.9999 Defaults: Upper: 99,999.9999 Lower: –99,999.9999	Set the upper and lower limits of the range of the gravity Y that is to be judged as OK.

• You can change the output form for each measurement value to one of the following settings.

- Press $[\blacktriangleleft]$ [Result type] on the right of the display.
 - Absolute value (Default): The measured coordinates are output.
 - Relative value: The difference from the reference position is output as coordinates.
 - Ratio: The percentage of the reference value is output. (This applies to the area only.)

Reflect in Total Judgment

You can specify whether to reflect the judgment results of an inspection item in the overall judgment. (The Default is to reflect them.)

[Inspect] – [Inspection] – [Add item.] – [Area] – [Details] Tab Page – [Output parameter]

Unstable Area Results

The Desired Color Cannot Be Detected

Add a specific color or enlarge the color range.

Extraction Is Automatically Performed for an Undesired Color When Teaching

Manually set the color for which to measure the area.

[Inspect] – [Inspection] – [Area] – [Modify] – [Settings] Tab Page – [Teach]

Sensors with Color Cameras Only

- **1** Press [◀] [Set color] on the right of the display.
- 2 Drag around the color for which you want to measure the area.

Areas with that color will be automatically detected. Continuous measurements will be performed for the images that are displayed.

Only the extracted color will appear on the display.



- 3 Press [OK].
- 4 Press [TEACH].
- 5 Press [Back] to end teaching.

4

Measuring More Than One Color

Set the colors using the color palette.

Press $[\blacktriangleleft]$ – [Color palette] on the Set Color Display to display the color palette.

Up to four colors can be specified.

If the Color inv. Option is selected, the color outside the region will become the selected color.

If the Inv. Check Box is selected, the color outside the region will become the selected color.

The [Inv.] Check Box applies to all colors. Select the [Exclusion] Check Box to exclude the selected color from extraction. The order of exclusion is from the largest color palette number.



Making the Extract Color Easier to Check

- The display for the extracted color can be switched by using [◀] [Display setting].
 (The following display patterns can be selected for the extracted color: [Measurement image], [All color image]
 (Default), [Selected color image], or [Binary image].)
- Press [◀] [Background color] to change the display for colors other than the extraction color. (The color can be chosen from [Black] (Default), [White], [Red], [Green], or [Blue].)

• Sensors with Monochrome Cameras (or for a Color Gray Filter)

- **1** Press $[\blacktriangleleft]$ [Set color] on the right of the display.
- 2 Press [] [Binary level].
- **3** Specify the range of brightness to detect, and then press [OK].

Specify the range of brightness to convert to a binary image. Measurement is performed after the image taken by the camera in 256-color grayscale is converted to a binary image. Then, white pixels are measured.



4 Press [OK].

- 5 Press [TEACH].
- 6 Press [Back] to end teaching.

Note

Making the Extraction Results Easier to Check

- You can invert the black/white extraction results. Press [◀] – [Reverse] and select [Yes].
- You can select whether to display a binary image.
 Press [◀] [Binary image display] and select [OFF] or [ON].

Changing the Area Detection Conditions

You can fill in the area detected through color extraction or binary conversion to perform a stable extraction of the areas and their characteristics or to mark only areas inside the measurement region for inspection.

[Inspect] – [Inspection] – [Aria] – [Modify] – [Details] Tab Page – [Meas. Parameter]

1 Press [Fill profile] and select [Filling up holes] or [Fill Outline].



Parameter	Setting	Description
		None: Holes are not filled. Filling up holes: Processes areas that are surrounded by the specified color, like in the shape of a donut, as the specified color.
Fill profile	 None (Default) Fill Outline Filling up holes 	Input Image Filled Image
		Fill Outline: Measures the image between the first extracted point and the last extracted point in the X axis direction in the measurement area as the extracted color. Because filling is performed only in the X axis direction, this method is faster than filling up holes.
		Input Image Image Following Fill Outline

Increasing Processing Speed for Area

Make the measurement region smaller to reduce the processing time.

Changing the measurement region: p. 227

Measurement Data That Can Be Used for External Outputs and Calculations

The following values can be used as measurement data and output to external devices via the Ethernet or used in calculations.

Expression text string	Data name	Description	Data range
JG	Judgement	 -2: No judgement (not measured) 0: Judgement is OK -1: Judgement is NG -13: Teaching not performed error -14: Figure not registered error -15: Out of range error 	This is the judgement result.
AR	Area	0 to 9999999999999999	This is the area in the measurement region with the specified color.
Х	Gravity X	-99999.9999 to 99999.9999	This is the X coordinate of the center of the measurement area with the specified color.
Y	Gravity Y	-99999.9999 to 99999.9999	This is the Y coordinate of the center of the measurement area with the specified color.
SA	Reference area	0 to 999999999.9999	This is the area with the specific color to be measured when a range is set.
SX	Ref. point X (reference point X)	-99999.9999 to 99999.9999	This is the X coordinate of the center of gravity when a range is set.
SY	Ref. point Y (reference point Y)	-99999.9999 to 99999.9999	This is the Y coordinate of the center of gravity when a range is set.

4-18 Calculations and Judgments Using Inspection Item Data: p. 323

Measurement Data That Can Be Logged for Area

The following values can be logged as measurement data.

Measured item	Range of value	Description
Judgement	0: Judgement is OK -1: Judgement is NG -13: Teaching not performed error -14: Figure not registered error -15: Out of range error	This is the measurement judgement results.
Area	0 to 99999.9999	This is the measured color area.
Gravity X	-99999.9999 to 99999.9999	This is the detected center of gravity X coordinate.
Gravity Y	-99999.9999 to 99999.9999	This is the detected center of gravity Y coordinate.

* When logging data is output, the data is output in the order of the above table.

 \Box

7-6 Logging Measurement Data and Image Data: p. 392

4-17 Inspecting with the Labeling Inspection Item

FQ2-S1 FQ2-S2 FQ2-S3 FQ2-S4

Labeling

One region of the color you want to measure is counted as a Label. You can sort these labels by position or size, and assign numbers to them. You can then output the total number of labels, and size and position of a desired label.



Note

If a Sensor with Color Camera is connected, you can specify up to four colors to measure. If a Sensor with Monochrome Camera is connected, the image is converted to a black and white binary image. Then, white pixels are measured.

Step 1 Selecting the Inspection Item

▶ [Inspect] – [Inspection]

- **1** Press an unused inspection item number and press [Add item.].
- 2 Press [Labeling].



Registering Inspection Items: p. 138

Add item		
ltom	🕂 Edge Position	^
rtem	⊤ ⊷ Edge Width	
	📖 Edge Pitch	
	💑 Color Data	
	🍢 Area	
	🛥 Labeling	\mathbf{v}
	Cance	:

Note

Drag the arrow **v** at the bottom of the menu upward to display all of the inspection items.

Teaching means to register the region and label characteristics in that region as reference data for measurements.

· Sensors with Color Cameras Only

[Inspect] – [Inspection] – [Add item.] – [Labeling] – [Settings] Tab Page

1 Press [Teach].

Drag the rectangle to move it. Drag a corner to size the rectangle. (32, 160)-(650, 400) CI 🔍 🗖 OK

- 2 Place the object that is to be used as the measurement reference in front of the camera.
- 3 Move the rectangle to the location to be measured.
- 4 Press [OK].
- 5 Press [TEACH] on the lower right of the display.

The basic settings will be registered when teaching has been completed.

Note

Information on the color that has the largest area in the measurement region is extracted and registered. (The color information is extracted only the first time.)

The extracted color information will not change from the second time on.

To specify a desired color, refer to Extraction Is Automatically Performed for an Undesired Color When Teaching: p. 314.

6 Press [Back] to end teaching.

Changing the measurement region: p. 227

Note

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If you press the [TEACH] Button without specifying a color, the color with the largest area in the measurement region will be extracted and the resulting color information will be registered.

The following data is stored as the measurement reference.

Item	Parameter	Description
	Reference area	The area for label 0 to use as a reference is set automatically.
Reference data	Reference position X	The gravity position X for label 0 to use as a reference is set automati- cally.
	Reference position Y	The gravity position Y for label 0 to use as a reference is set automati- cally.

Step 3 Adjusting Judgment Parameters

[Inspect] – [Inspection] – [Add item.] – [Labeling] – [Settings] Tab Page

1 Press [Judgement].

2 Press the parameters and set the OK ranges.

Set the range for each of the following parameters. Continuous measurements will be performed for the images that are taken. If more than one result was detected, you can switch to a display for each result.



Setting Up Inspections

4

Upper limit Lower limit Blue for OK. Red for NG.

Item	Parameter	Setting	Description
	Number of labels	Range: 0 to 100 (Default)	Set the upper and lower limits of the number of labels for an OK judgment.
Judgment parameters	Total label area	Range: 0 to 999,999,999.9999 (Default)	Set the upper and lower limits of the total label area for an OK judgment.
	Area	Range: 0 to 999,999,999.9999 (Default)	Sets the upper and lower limits of the area for an OK judgment.
	Gravity center X	Range: –99,999.999 to 99,999.999 (Default)	Set the upper and lower limits of the gravity X for an OK judgment.
	Gravity center Y	Range: –99,999.999 to 99,999.999 (Default)	Set the upper and lower limits of the gravity Y for an OK judgment.
	Master angle	Range: –180 to 180 (Default)	Sets the upper and lower limits of the master angle for an OK judgment.

Note

You can change the parameters for judgment conditions on the Display Settings Display. Press [◀] – [Display setting] on the right of the display to switch to the Display Settings Display.

3 Press [OK] to accept the value.

Unstable Labeling Results

The Desired Color Cannot Be Detected

Add a specific color or enlarge the color range.

Extraction Is Automatically Performed for an Undesired Color When Teaching

Manually set the color for which to measure the labeling.

[Inspect] – [Inspection] – [Area] – [Modify] – [Settings] Tab Page – [Teach]

Sensors with Color Cameras Only

- **1** Press **[◀]** [Set color] on the right of the display.
- **2** Drag around the color for which you want to measure the labeling.

Labeling with that color will be automatically detected.

Continuous measurements will be performed for the images that are displayed.

Only the extracted color will appear on the display.



- 3 Press [OK].
- 4 Press [TEACH].
- 5 Press [Back] to end teaching.

Note

Measuring More Than One Color

Set the colors using the color palette.

Press $[\blacktriangleleft]$ – [Color palette] on the Set Color Display to display the color palette. Up to four colors can be specified. If the *Color inv*. Option is selected, the color outside the region will become the selected color.

The [Inv.] Check Box applies to all colors. Select the [Exclusion] Check Box to exclude the selected color from extraction.

The order of exclusion is from the largest color palette number.



Making the Extract Color Easier to Check

- The display for the extracted color can be switched by using [◀] [Display setting].
 (The following display patterns can be selected for the extracted color: [Measurement image], [All color image]
 (Default), [Selected color image], or [Binary image].)
- Press [◀] [Background color] to change the display for colors other than the extraction color. (The color can be chosen from [Black] (Default), [White], [Red], [Green], or [Blue].)

- Sensors with Monochrome Cameras (or for a Color Gray Filter)
 - **1** Press [◀] [Binary level] on the right of the display.

2 Specify the range of brightness to detect, and then press [OK].

Specify the range of brightness to convert to a binary image. Measurement is performed after the image taken by the camera in 256-color grayscale is converted to a binary image. Then, white pixels are measured.



3 Press [OK].

4 Press [TEACH].

5 Press [Back] to end teaching.

Note

Making the Extraction Results Easier to Check

- You can invert the black/white extraction results. Press [◀] – [Reverse] and select [Yes].
- You can select whether to display a binary image.
 Press [◀] [Binary image display] and select [OFF] or [ON].

Changing the Label Detection Conditions

You can fill in the labels detected through color extraction or binary conversion to perform a stable extraction of the labels and their characteristics or to mark only labels inside the measurement region for inspection.

- ▶ [Inspect] [Inspection] [Labeling] [Modify] [Details] Tab Page [Meas. Parameter]
 - **1** To enable filling up holes, press [Filling up holes] and select [Yes].



2 To extract an image, press [Extract image] and select [Yes].

Parameter	rameter Setting Description		
		Sets how to process areas surrounded by the specified color. If [Yes] is set, those areas are processed as the specified color.	
Filling up holes	Yes No (Default)	Input Image Filled Image	
Extract image	Yes No (Default)	Select this option if there are areas of the specified color inside the mea- surement region that you do not want to measure. If [Yes] is set, all areas outside the measurement region are cut out as the specified color. Measurement region Yes You need to know the position and area of this label. You can find the position and area of the center label if you set the sort condition to sort by descending order of area. Areas outside the measurement region are set to the color for measure- ment.	

Changing the Label Extraction Conditions

Set the label extraction conditions. You can select to extract only labels that satisfy all four of the following: Number of labels, specified area, gravity X, and gravity Y conditions.

▶ [Inspect] – [Inspection] – [Labeling] – [Modify] – [Settings] Details – [Details] Tab Page – [Meas. Parameter] – [Extraction condition]

1 Press and set each of the parameters for the extraction conditions.

Extraction condition	6.Labeling
Number of labels	
Area	
Gravity X	
Gravity Y	
ER 0	Back

Parameter	Setting	Description
Number of labels	Range: 1 to 100 Default: 100	Set the maximum number of labels to detect.
Area	Range: 0 to 999,999,999.9999 Defaults: Upper limit: 999,999,999.9999 Lower limit: 0	Specify the area range to judge as a label.
Gravity X	Range: -99,999,999.999 to 999,999,999.999 Defaults: Upper limit: 999,999,999.999, Lower limit: -999,999,999.9999	Specify the gravity X position to judge as a label.
Gravity Y	Range: -999,999,999,999 to 999,999,999.999 Defaults: Upper limit: 999,999,999.999, Lower limit: -999,999,999.9999	Specify the gravity Y position to judge as a label.

Sorting Extracted Labels

Set the sort condition and count for extracted labels. You can set the sort condition and the maximum number of detections for detection results.

▶ [Inspect] – [Inspection] – [Labeling] – [Modify] – [Details] Tab Page – [Meas. Parameter]

- 1 Press [Sorting method].
- 2 Select the sorting method.



Parameter	Setting	Description
Sorting method	Area ascending order Area descending order (Default) Pos. X ascending order (ascending order of X coordinate) Pos. X descending order (descending order of X coordinate) Pos. Y ascending order (ascending order of Y coordinate) Pos. Y descending order (descending order of Y coordinate)	Set the condition to use for label number reassignment. When sorting by X or Y coor- dinates, the upperleft corner is the origin.

Reflect in Total Judgement

You can specify whether to reflect the judgment results of an inspection item in the overall judgment. The Default is to reflect them.

▶ [Inspect] – [Inspection] – [Add item.] – [Labeling] – [Details] Tab Page – [Output parameter]

Editing the Measurement Region

This section describes how to edit the measurement regions. You can edit the measurement region in the same way as for a search region.



Increasing the Processing Speed

Make the measurement region smaller to reduce the processing time.



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Changing the Measurement Region p. 227

Measurement Data That Can Be Used for External Outputs and Calculations

The following values can be used as measurement data and output to external devices via the Ethernet or used in calculations.

Expression text string	Data name	Description	Data range
JG	Judgement	 -2: No judgement (not measured) 0: Judgement is OK -1: Judgement is NG -13: Teaching not performed error -14: Figure not registered error -15: Out of range error 	This is the Labeling judgement results.
L	Number of labels	0 to 100	This is the number of labels found.
TAR	Total label area	0 to 999,999,999.9999	This is the total area of all labels found.
AR[0] to AR[99]	Area	0 to 999,999,999.9999	These are the areas of each individual label.
X[0] to X[99]	Gravity X	-99,999.9999 to 99,999.9999	-99,999.9999 to 99,999.9999 These are the X coordinates of the center of each label.
Y[0] to Y[99]	Gravity Y	-99,999.9999 to 99,999.9999	These are the Y coordinates of the center of each label.
ATH[0] to ATH[99]	Master angle	–180 to 180	These are the master angle of the center of each label.
SA	Reference area	0 to 999,999,999.9999	This is the reference area.
SX	Ref. position X (reference position X)	-99,999.9999 to 99,999.9999	This is the X coordinate of the reference position.
SY	Ref. position Y (reference position Y)	-99,999.9999 to 99,999.9999	This is the Y coordinate of the reference position.

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Measurement Data That Can Be Logged for Labeling

You can select to log any of the following values.

Measurement item	Range of value	Description
Judgement	0: Judgement is OK -1: Judgement is NG -13: Teaching not performed error -14: Figure not registered error -15: Out of range error	This is the measurement judgement results.
Number of labels	0 to 100	This is the number of labels.
Total label area	0 to 999,999,999.9999	This is the total area of all extracted labels.
Area	0 to 999,999,999.9999	This is the area of the detected label (100 max.).
Gravity center X	-99999.9999 to 99999.9999	This is the gravity coordinate X of the detected label (100 max.).
Gravity center Y	-99999.9999 to 99999.9999	This is the gravity coordinate Y of the detected label (100 max.).
Master angle	-180 to 180	This is the master angle of the detected label (100 max.).

When logging data is output, the data is output in the order of the above table. If more than one item is stored, results are output in order for each label.

Example:

[# of label] [Total label area] [Area 0.X] [Area 0.Y] [Gravity center 0.X] [Gravity center 0.Y] [Mater angle 0.ATH] ... [Area N.X] [Area N.Y] [Gravity center N.X] [Gravity center N.Y] [Master angle N.ATH] ... [Number of Label (Count-1).X] [Number of Label (Count-1).TH]

7-6 Logging Measurement Data and Image Data p. 392
4-18 Calculations and Judgments Using Inspection Item Data

FQ2-S1 FQ2-S2 FQ2-S3 FQ2-S4 FQ2-CH

You can set inspection item judgment results and measurement data with the Calculation menu command to use them in basic arithmetic operations and functions. The judgment results of the calculations are reflected in the overall judgment.

Calculation

Use the Calculation menu command to set the calculation expressions and the judgment parameters for the calculation results.

Expression

You can get up to 32 expressions. You can also combine expressions. You can use the following values in calculations.

- Filter item and position compensation item data (measurement data, reference values, and judgment results)
- Inspection item data (measurement data, reference values, and judgment results)
- Constants
- Other calculation results

Judgment

Upper and lower limit values are used for the judgment of calculation results (D00 to D31). If within the upper and lower limits, each calculation judgment result (J00 to J31) is OK. If all registered calculation results are judged OK, the judgment result (JG) is OK.

If there is at least one NG, the judgment result (JG) is NG. The judgment result (JG) of calculation can be reflected in the overall judgment.

(It is also possible to not reflect the judgment result in the output parameter(s) settings.)

Outputting the Calculation Results

The overall judgment (JG) of the calculations are reflected in the overall judgment of the inspection item. The calculation result of each expression (J00 to J31) and calculation data (D00 to D31) can be output via Ethernet or recorded as logging data.



Examples for Calculation

Example 1: Finding the distance between two measured points

This example finds edge position 2 by detecting the two edge positions of inspection item 0 and inspection item 1, and calculates the distance between the two points.





- Region 0 (edge position coordinates of inspection item 0): (I0.X,I0.Y)
- Region 1 (edge position coordinates of inspection item 1): (I1.X,I1.Y)
- Distance between two points = DIST (I0.X,I0.Y,I1X,I1.Y)

Example 2: Finding the lowest similarity of characters read with OCR inspection items

OCR items in inspection items 0 and 1 are used to find the lowest similarity of characters read.

Region 0	Region 1
ABC	DEF
	<u></u>

- Region 0 (similarity from OCR item in inspection item 0): (I0.SIM)
- Region 1 (similarity from OCR item in inspection item 1): (I1.SIM)
- Lowest similarity from OCR items in inspection items 0 and 1: min(I0.SIM,I1.SIM)

Procedure (Calculation)

1 Press [Inspect] – [Calculation].



Setting Expressions

1 Press [Expression] on the [Settings] Tab Page.



2 Press the expression number that you want to use.

Expression		
O.ExpressionO		へ
1.Expression1		
2.Expression2		
3.Expression3		
4.Expression4		
5.Expression5 🔔		\sim
	Back	(

3 Press [Modify] on the menu.

Expression settings O.Expression(
Const.			\rightarrow	BS	CLR
Data	4		6		*
			3		
Math.					T JG
		٥	OK	Ca	ancel

Note

Performing Similar Calculations At Different Locations

- [Rename] The name of the calculation can be changed. (16 characters max.)
- [Copy] Previously registered calculation expressions can be copied.

4 Set the expression by selecting items from the [Data], [Const.], and [Math.] Tab Pages.

The expression will be displayed in the space under [Expression settings].

Do not exceed 255 characters in the expression.

Item	Description
Const.	Press this to input constants or a mathematical operator. The following operators can be used: + (addition), – (subtraction), × (multiplication), and / (division).
Data	Press this to use measurement data, reference values, and judgment results of other items.
Math.	Press this to use functions.

Expression Notation

Expressions must have the following notation.

 IO.X Text string corresponding to the item: position correction data, inspection item, or calculation settings. For an item that has multiple measurement results such as search, shape search III, and labelling, you can use the array symbol and enter in the format X[0] to acquire individual data values. Enter the data number to be referenced in []. Filter item or position compensation item: Enter "P" and the item number. Inspection item: Enter "I" and the inspection item number. Calculation settings data: Enter "Z0". (Enter "Z1" for the FQ2-S4/CH.)
Example: Finding the distance between the centers of gravity of inspection item 1 and inspection item
DIST(1.X,1.T,1/2,X,1/2,T)
Function
Example: Subtracting 120 from the calculation result of expression 0.
D00 - 120.00 Constant Mathematical operator Result of expression 0
Example: Adding the judgement result of inspection items 0 and 1.
IO.JG + I1.JG Judgement result for inspection item 1 Mathematical operator Judgement result for inspection item 0
Example: Using an array to add the area of label 0 and the area of label 1 for inspection item 0 (labeling).
IO.AR[0] + IO.AR[1] Area of label 1 for inspection item 0
Mathematical operator
Area of label 0 for inspection item 0

Function List

The following functions can be used in calculations.

Function	Description
SIN	Finds the sine. The result is a value between –1 and 1. The angle in the expression is in degrees. SIN(<i>angle</i>)
COS	Finds the cosine. The result is a value between –1 and 1. The angle in the expression is in degrees. COS(<i>angle</i>)
ATAN	 Finds the arctangent of the value (Y component, X component). The result is a radian value between -π and π. ANGL(Y_component, X_component) Example: Finding the angle between the straight line joining the centers of region 0 and region 1 and horizontal. ATAN(<i>R</i>1. Y-<i>R</i>0. Y,<i>R</i>1. X-<i>R</i>0. X) If the two arguments are both 0, the result is 0 and the judgement is NG.
AND	Finds the logical AND. If one of the arguments is 0, the calculation result is 0. Otherwise it is –1. AND(argument_1,argument_2)
OR	Finds the logical OR. If both of the arguments are 0, the calculation result is 0. Otherwise it is –1. OR(argument_1,argument_2)
NOT	Applies a logical NOT operation. If the argument is 0, the calculation result is –1. Otherwise it is 0. NOT(<i>argument</i>)
ABS	Finds the absolute value. ABS(argument)
MAX	Returns the larger of the two arguments. MAX(argument_1, argument_2)
MIN	Returns the smaller of the two arguments. MAX(argument_1, argument_2)
	 Finds the angle of the straight line joining two points (the center of gravity and center of the model). The angle against the horizontal is found. The result is a value between –180 and 180. ANGL(Y_component,X_component) Example: Finding the angle of the straight line joining the centers of region 0 and region 1 ANGL(R1.Y-R0.Y,R1.X-R0.X)
ANGL	
	First point (Horizontal)
	Second point
	If the two arguments are both 0, the result is 0 and the judgement is NG.
MOD	 Finds the remainder after dividing a non-ordinal number with an ordinal number. MOD(<i>non-ordinal</i>, <i>ordinal</i>) If any of the arguments are real numbers, the decimals are rounded off before calculating the remainder. The remainder is the result of dividing integers. Example: MOD(13,4) Result: 1 (remainder when 13 is divided by 4) MOD(25.68,6.99) Result: 5 (remainder when 26 is divided by 7)

Function	Description
SQRT	Finds the square root. If the argument is negative, the result is 0. The judgement will be NG. SQRT(<i>argument</i>)
	• Finds the distance between two points (the center of gravity and the center of the model). DIST(first_position_X, first_position_Y, second_position_X, second_position_Y)
	Example: Finding the distance between the centers of gravity of region 0 and region 1 DIST(<i>R0.X,R0.Y,R1.X,R1.Y</i>)
DIST	The following calculation is performed internally.
	$\sqrt{(R1.X-R0.X)^2+(R1.Y-R0.Y)^2}$
	• Finds the length of a perpendicular line from point (x,y) to line ax + by + c = 0. DIST (X_coordinate_of_point, Y_coordinate_of_point, coefficient_a_of_line, coefficient_b_of_line, coefficient_c_of_line)
TJG	Returns a Overall Judgment Results of the inspection items and position compensation items. Returns -1 if NG somewhere in the inspection items or position compensation items. Returns 0 if all of those items are OK. Calculation judgment is not included.

Setting Judgment Parameters for Expressions

1 Press [Judgement] on the [Settings] Tab Page.



2 Press an expression between 0 to 31 and set the corresponding judgement parameters using the slider.



3 Press the [OK] Button.

Reflecting the Judgment Results for Expressions to the Overall Judgment Results

You can specify whether to reflect the judgment results of a calculation in the overall judgment. (The Default is to reflect them.)

[Inspect] – [Calculation] – [Details] Tab Page – [Output parameter] – [Reflect]

Inspection Item Data That Can Be Used in Expressions

Inspection item	Data name	Expression text string	Data range	Default
Filter (FQ2-S1/S2/S3/S4/CH)	Judgement	JG	 -2: No judgement (not measured) 0: Judgement is OK -1: Judgement is NG 	-2
	Judgement	JG	 -2: No judgement (not measured) 0: Judgement is OK -1: Judgement is NG 	-2
	Scroll X	DX	-99999.9999 to 99999.9999	0
	Scroll Y	DY	-99999.9999 to 99999.9999	0
	Scroll θ	DT	-180 to 180	0
Shape Sear. pos. comp.	Position X	Х	-99999.9999 to 99999.9999	0
(FQ2-S1/S2/S3/S4/CH)	Position Y	Y	-99999.9999 to 99999.9999	0
	Angle	TH	-180 to 180	0
	Reference X	SX	-99999.9999 to 99999.9999	0
	Reference Y	SY	-99999.9999 to 99999.9999	0
	Reference angle	ST	-180 to 180	0
	Correlation	CR	0 to 100	0
	Judgement	JG	 -2: No judgement (not measured) 0: Judgement is OK -1: Judgement is NG 	-2
	Scroll X	DX	-99999.9999 to 99999.9999	0
Search position comp.	Scroll Y	DY	-99999.9999 to 99999.9999	0
(FQ2-S1/S2/S3/S4/CH)	Position X	Х	-99999.9999 to 99999.9999	0
	Position Y	Y	-99999.9999 to 99999.9999	0
	Reference X	SX	-99999.9999 to 99999.9999	0
	Reference Y	SY	-99999.9999 to 99999.9999	0
	Correlation	CR	0 to 100	0
	Judgement	JG	 -2: No judgement (not measured) 0: Judgement is OK -1: Judgement is NG 	-2
Edge position comp	Scroll X	DX	-99999.9999 to 99999.9999	0
(FQ2-S1/S2/S3/S4/CH)	Scroll Y	DY	-99999.9999 to 99999.9999	0
	Ref. position X	Х	-99999.9999 to 99999.9999	0
	Ref. position Y	Y	-99999.9999 to 99999.9999	0
	Reference X	SX	-99999.9999 to 99999.9999	0
	Reference Y	SY	-99999.9999 to 99999.9999	0

Inspection item	Data name	Expression text string	Data range	Default
	Judgement	JG	 -2: No judgement (not measured) 0: Judgement is OK -1: Judgement is NG 	-2
	Scroll X	DX	-99999.9999 to 99999.9999	0
	Scroll Y	DY	-99999.9999 to 99999.9999	0
	Edge0 position X	X0	-99999.9999 to 99999.9999	0
	Edge0 position Y	Y0	-99999.9999 to 99999.9999	0
	Edge1 position X	X1	-99999.9999 to 99999.9999	0
2Edge position comp.	Edge1 position Y	Y1	-99999.9999 to 99999.9999	0
(FQ2-S1/S2/S3/S4/CH)	Edge0 ref. position X (edge 0 reference position X)	SX0	-99999.9999 to 99999.9999	0
	Edge0 ref. position Y (edge 0 reference position Y)	SY0	-99999.9999 to 99999.9999	0
	Edge1 ref. position X (edge 1 reference position X)	SX1	-99999.9999 to 99999.9999	0
	Edge1 ref. position Y (edge 1 reference position Y)	SY1	-99999.9999 to 99999.9999	0
	Judgement	JG	 -2: No judgement (not measured) 0: Judgement is OK -1: Judgement is NG 	-2
	Scroll X	DX	-99999.9999 to 99999.9999	0
	Scroll Y	DY	-99999.9999 to 99999.9999	0
	Edge0 position X	X0	-99999.9999 to 99999.9999	0
	Edge0 position Y	Y0	-99999.9999 to 99999.9999	0
	Edge1 position X	X1	-99999.9999 to 99999.9999	0
	Edge1 position Y	Y1	-99999.9999 to 99999.9999	0
	Midpoint X	MX	-99999.9999 to 99999.9999	0
2Edge midpoint comp. (FQ2-S1/S2/S3/S4/CH)	Midpoint Y	MY	-99999.9999 to 99999.9999	0
	Edge0 ref. position X (edge 0 reference position X)	SX0	-99999.9999 to 99999.9999	0
	Edge0 ref. position Y (edge 0 reference position Y)	SY0	-99999.9999 to 99999.9999	0
	Edge1 ref. position X (edge 1 reference position X)	SX1	-99999.9999 to 99999.9999	0
	Edge1 ref. position Y (edge 1 reference position Y)	SY1	-99999.9999 to 99999.9999	0
	Ref. midpoint X (reference midpoint X)	SMX	-99999.9999 to 99999.9999	0
	Ref. midpoint Y (reference midpoint Y)	SMY	-99999.9999 to 99999.9999	0

Inspection item	Data name	Expression text string	Data range	Default
	Judgement	JG	 -2: No judgement (not measured) 0: Judgement is OK -1: Judgement is NG 	-2
	Scroll θ	DT	–180 to 180	0
	Edge0 position X	X0	-99999.9999 to 99999.9999	0
	Edge0 position Y	Y0	-99999.9999 to 99999.9999	0
	Edge1 position X	X1	-99999.9999 to 99999.9999	0
Edge rot. pos. Comp.	Edge1 position Y	Y1	-99999.9999 to 99999.9999	0
(FQ2-S1/S2/S3/S4/CH)	Angle	TH	-180 to 180	0
	Edge0 ref. position X (edge 0 reference. position X)	SX0	-99999.9999 to 99999.9999	0
	Edge0 ref. position Y (edge 0 reference. position Y)	SY0	-99999.9999 to 99999.9999	0
	Edge1 ref. position X (edge 1 reference. position X)	SX1	-99999.9999 to 99999.9999	0
	Edge1 ref. position Y (edge 1 reference. position Y)	SY1	-99999.9999 to 99999.9999	0
	Reference angle	STH	–180 to 180	0
	Judgement	JG	 -2: No judgment (not measured) 0: Judgement is OK -1: Judgement is NG -15: Out of range error 	-2
	Position correction X	DX	-99999.9999 to 99999.9999	0
	Position correction Y	DY	-99999.9999 to 99999.9999	0
Numerical Position	Position correction θ	DT	–180 to 180	0
(FQ2-S1/S2/S3/S4/CH)	Measurement coordinate X	Х	-99999.9999 to 99999.9999	*1
	Measurement coordinate Y	Y	-99999.9999 to 99999.9999	*1
	Measurement angle	TH	–180 to 180	0
	Reference coordinate X	SX	-99999.9999 to 99999.9999	*1
	Reference coordinate Y	SY	-99999.9999 to 99999.9999	*1
	Reference angle	ST	-180 to 180	90
	Judgement	JG	 -2: No judgment (not measured) 0: Judgement is OK -1: Judgement is NG -16: Measurement timeout error -17: Format not entered error 	-2
	Index	IN	 -2: No verification pastern, or reading error -1: Verification is NG 0 to 31: Master data No. 	-2
	Number of read characters	Ν	0 to 128	0
OCR (FQ2-S4/CH only)	Similarity	SIM	0 to 100	0
(Stability	STB	0 to 100	0
	Number of read characters (line 1) N1	N1	32 characters max.	0
	Number of read characters (line 2) N2	N2	32 characters max.	0
	Number of read characters (line 3) N3	N3	32 characters max.	0
	Number of read characters (line 4) N4	N4	32 characters max.	0

Inspection item	Data name	Expression text string	Data range	Default
	Individual similarity	SMC	0 to 100	0
OCR (FQ2-S4/CH only)	Individual stability	SBC	0 to 100	0
	Judgement	JG	 -2: No judgement (not measured) 0: Judgement is OK -1: Judgement is NG -16: Measurement timeout error 	-2
Bar code (FQ2-S4 only)	Index No.	IN	 -2:No verification pastern or reading error -1: Verification is NG, 0 to 31: Master data No. 	-2
	Num. of char.	Ν	0 to 1024	0
	Judgement	JG	 -2: No judgement (not measured), 0: Judgement is OK -1: Judgement is NG -16: Measurement timeout error 	-2
	Index No.	IN	 -2: Verification OFF or reading error -1: Verification is NG 0 to 31: Master data No. 	-2
	Num. of char.	Ν	0 to 1024	0
	Overall quality	GD0	0 to 4	0
2D-code	Decode	GD1	0 to 4	0
(FQ2-S4 only)	Cell contrast	GD2	0 to 4	0
	Cell modulation	GD3	0 to 4	0
	Fixed pattern damage	GD4	0 to 4	0
	Axial nonuniformity	GD5	0 to 4	0
	Grid nonuniformity	GD6	0 to 4	0
	Unused err. Corr.	GD7	0 to 4	0
	Print scale	GD8	0 to 4	0
	Print scale X	GD9	0 to 4	0
	Print scale Y	GD10	0 to 4	0

*1:Depends on the model. Refer to Compensating for Position Offset (Position Compensation Items): p. 102.

Inspection item	Data name	Expression text string	Data range	Default
	Judgement	JG	 -2: No judgement (not measured) 0: Judgement is OK -1: Judgement is NG -16: Measurement timeout error 	-2
	Index No.	IN	 -2: Verification OFF or reading error, -1: Verification is NG, 0 to 31: Master data No. 	-2
	Num. of char.	N	0 to 1024	0
	Cell Recog. Rate	E	0 to 100	0
	Contrast	С	0 to 100	0
2D-code (DPM)	Focus	F	0 to 100	0
(FQ2-S4 only)	Cell size	Р	Depends on the size of the code being read	0
	Overall quality	GDA0	0 to 4	0
	Decode	GDA1	0 to 4	0
	Cell contrast	GDA2	0 to 4	0
	Cell modulation	GDA3	0 to 4	0
	Fixed pattern damage	GDA4	0 to 4	0
	Axial nonuniformity	GDA5	0 to 4	0
	Grid nonuniformity	GDA6	0 to 4	0
	Unused err. Corr.	GDA7	0 to 4	0
	Judgement	JG	 -2: No judgement (not measured) 0: Judgement is OK -1: Judgement is NG -13: Teaching not performed error -14: Figure not registered error -15: Out of range error 	-2
	Correlation	CR[0] to CR[31]	0 to 100	0
	Position X	X[0] to X[31]	-99999.9999 to 99999.9999	0
	Position Y	Y[0] to Y[31]	-99999.9999 to 99999.9999	0
Search	Angle	TH[0] to TH[31]	–180 to 180	0
(FQ2-S1/S2/S3/S4 only)	Reference X	SX	-99999.9999 to 99999.9999	0
	Reference Y	SY	-99999.9999 to 99999.9999	0
	Reference angle	ST	–180 to 180	0
	Detection X	RX	-99999.9999 to 99999.9999	0
	Detection Y	RY	-99999.9999 to 99999.9999	0
	Count	С	0 to 32	0

Inspection item	Data name	Expression text string	Data range	Default
	Judgement	JG	 -2: No judgement (not measured) 0: Judgement is OK -1: Judgement is NG -13: Teaching not performed error -14: Figure not registered error -15: Out of range error 	-2
Shape Search II	Correlation	CR	0 to 100	0
Shape Search III	Position X	Х	-99999.9999 to 99999.9999	0
(FQ2-S1/S2/S3/S4 only)	Position Y	Y	-99999.9999 to 99999.9999	0
	Angle	TH	-180 to 180	0
	Reference X	SX	-99999.9999 to 99999.9999	0
	Reference Y	SY	-99999.9999 to 99999.9999	0
	Reference angle	ST	-180 to 180	0
	Detection X	RX	-99999.9999 to 99999.9999	0
	Detection Y	RY	-99999.9999 to 99999.9999	0
	Count	С	0 to 32	0
	Judgement	JG	 -2: No judgement (not measured) 0: Judgement is OK -1: Judgement is NG -13: Teaching not performed error -14: Figure not registered error -15: Out of range error 	-2
	Correlation	CR	0 to 100	0
	Density	DV	Color image: 0 to 221	0
			Monochrome image: 0 to 127	0
	Position X	Х	-99999.9999 to 99999.9999	0
	Position Y	Y	-99999.9999 to 99999.9999	0
	Angle	TH	-180 to 180	0
	Detection X	RX	-99999.9999 to 99999.9999	0
Sensitive Search	Detection Y	RY	-99999.9999 to 99999.9999	0
(FQ2-S1/S2/S3/S4 only)	Ref. position X (reference position X)	SX	-99999.9999 to 99999.9999	0
	Ref. position Y (reference position Y)	SY	-99999.9999 to 99999.9999	0
	Reference angle	ST	-180 to 180	0
	NG sub-region	СТ	0 to 100	0
	Sub-region number	AN	1 to 99	0
	Sub-region number(X)	ANX	0 to 9	0
	Sub-region number(Y)	ANY	0 to 9	0
	Sub-region pos.X (sub-region position X)	DX	-99999.9999 to 99999.9999	0
	Sub-region pos.Y (sub-region position Y)	DY	-99999.9999 to 99999.9999	0
	Correlation (sub-region)	CRN[0] to CRN[80]	0 to 100	0
	Deviation (sub-region)	DVN[0] to DVN[80]	Color image: 0 to 221	0
			Monochrome image: 0 to 127	0

Inspection item	Data name	Expression text string	Data range	Default
	Judgement	JG	 -2: No judgement (not measured) 0: Judgement is OK -1: Judgement is NG -13: Teaching not performed error -14: Figure not registered error -15: Out of range error 	-2
Edge Position	Position X	Х	-99999.9999 to 99999.9999	0
(FQ2-31/32/33/34 0111y)	Position Y	Y	-99999.9999 to 99999.9999	0
	Ref. position X (reference position X)	SX	-99999.9999 to 99999.9999	0
	Ref. position Y (reference position Y)	SY	-99999.9999 to 99999.9999	0
	Offset amount	DF	-99999.9999 to 99999.9999	0
Edge Width (FQ2-S1/S2/S3/S4 only)	Judgement	JG	 -2: No judgement (not measured) 0: Judgement is OK -1: Judgement is NG -13: Teaching not performed error -14: Figure not registered error -15: Out of range error 	-2
	D. edge width	DF	0 to 99999.9999	0
	Ref. edge width	SW	0 to 99999.9999	0
	Edge width	W	0 to 99999.9999	0
	Judgement	JG	 -2: No judgement (not measured) 0: Judgement is OK -1: Judgement is NG -13: Teaching not performed error -14: Figure not registered error -15: Out of range error 	-2
	Edge pitch	N	0 to 999	0
	Average pitch	Р	0 to 99999.9999	0
Edge Pitch	Max. pitch (maximum pitch)	PH	0 to 99999.9999	0
(1 Q2-0 1/02/03/04 011y)	Min. pitch (minimum pitch)	PL	0 to 99999.9999	0
	Average width	W	0 to 99999.9999	0
	Max width (maximum width)	WH	0 to 99999.9999	0
	Min width (minimum width)	WL	0 to 99999.9999	0
	Judgement	JG	 -2: No judgement (not measured) 0: Judgement is OK -1: Judgement is NG -10: Image error -20: Other error 	-2
	R average	AR	0 to 255	0
Color Data	G average	AG	0 to 255	0
(FQ2-S1/S2/S3/S4 only)	B average	AB	0 to 255	0
	Color diff./dens. Av. (color difference/density aver- age)	AD	Color difference: 0 to 442 Density average: 0 to 255	0
	Clr deviat. (color deviation/density devia- tion)	DV	Color difference: 0 to 221 Density deviation: 0 to 217	0

Inspection item	Data name	Expression text string	Data range	Default
	Judgement	JG	 -2: No judgement (not measured) 0: Judgement is OK -1: Judgement is NG -13: Teaching not performed error -14: Figure not registered error -15: Out of range error 	-2
Area	Area	AR	0 to 9999999999999	0
(FQ2-S1/S2/S3/S4 only)	Gravity X	Х	-99999.9999 to 99999.9999	0
	Gravity Y	Y	-99999.9999 to 99999.9999	0
	Reference area	SA	0 to 999999999	0
	Ref. position X (reference position X)	SX	-99999.9999 to 99999.9999	0
	Ref. position Y (reference position Y)	SY	-99999.9999 to 99999.9999	0
	Judgement	JG	 -2: No judgement (not measured) 0: Judgement is OK -1: Judgement is NG -13: Teaching not performed error -14: Figure not registered error -15: Out of range error 	-2
	Number of labels	L	0 to 100	0
	Area	AR[0] to AR[99]	0 to 999999999.9999	0
Labeling	Gravity X	X[0] to X[99]	-99999.9999 to 99999.9999	0
(FQ2-31/32/33/34 0111y)	Gravity Y	Y[0] to Y[99]	-99999.9999 to 99999.9999	0
	Reference area	SA	0 to 999999999.9999	0
	Ref. position X (reference position X)	SX	-99999.9999 to 99999.9999	0
	Ref. position Y (reference position Y)	SY	-99999.9999 to 99999.9999	0
	Total label area	TAR	0 to 99999999999999	0
	Master angle	ATH[0] to ATH[99]	-180 to 180	0

Testing and Saving Settings

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5-1 Performing Test Measurements

FQ2-S1 FQ2-S2 FQ2-S3 FQ2-S4 FQ2-CH

After completing the settings in the [Image], [Inspect], and [In/Out] Tab Pages, move to the [Test] Tab Page. The displayed image is measured automatically. This is called a test measurement.

A test measurement is used to verify that the settings that have been made will produce stable results and, if necessary, to fine-tune the settings. An overall judgment of all inspection items can be performed. Test measurements can be performed for through images (Default) or saved images.

Performing Test Measurements with Samples

▶ [Test] – [Continuous test]

- **1** Press [Graphics+Details].
- 2 Input an image of a previously prepared object. Check the judgement results.
- **3** When you finish checking the results, press [Back].

AV Test				FQ
UN 214ms			0.Scen	еO
	0.Search			
Judgement		OK	0 🔽	
¢orrelation	99.	3000		4
Position X	935.	0000		
Position Y	387.	0000		
Angle	Ó.	0000		
Çount		1		
	Ó		Back	

Note

340

The same five types of displays are available for the [Continuous test] on the [Test] Tab Page, i.e., [Graphics], [Graphics + Details], [All results/region], [Trend monitor], and [Histogram]. Press the [Back] Button to access the menu to change the display.

Changing the Run Mode display: p. 354

[Trend monitor] and [Histogram] are shown when the File Logging function is enabled.



Performing Test Measurements with Saved Images (Re-measuring)

This Sensor can save measured images in the Sensor's built-in memory or on an SD card. Test measurements can be performed using these saved images.

This function is useful for adjusting the judgment parameters when objects are not available.

[Test] – [Continuous test] – (Any display)

1 Press 🔍 – 📑 .



2 Select one of the following.

- [Log]: Images that are logged in the Sensor's internal memory.
- · [Logging image file]: Images that are logged in the SD card.
- · [Camera image file]: Images that were saved as logged images with the 📲 (Log Image) Button.

3 The display switches to the saved image and measurements are taken again.



Saving images: p. 420





5-2 Shortening the Measurement Takt Time

FQ2-S1 FQ2-S2 FQ2-S3 FQ2-S4 FQ2-CH

Checking the Measurement Takt Time

The measurement time of this Sensor can be checked from the Setup or Run Mode display.



The measurement time is the time taken from when a trigger is input until when all measurement processes are executed.

During the measurement time, this Sensor will not accept the next trigger. This means that the measurement time is the basic measurement takt time.



Increasing Image Input Speed

With the partial input function, it is possible to input only images that are in the region that is necessary for measurements.

The image measurement region becomes smaller and therefore the image input time is shortened.

Consider the offset in the measurement object when you set the range.

The image in the input range will be displayed in the inspection item setting displays and measurement displays.

• FQ2-S3/S4

[Image] – [Camera setup]

- Press [◀] [Partial input] on the right side of the display.
- **2** Press [Y] and set the input range along the Y axis by setting the Y coordinate of the partial input start point and the Y coordinate of the partial input end point.

Partial input Y start line



Y coordinate of the partial input start point

Y coordinate of the partial input end point

3 Press [X] and set the input range along the X axis by setting the X coordinate of the partial input start point and the X coordinate of the partial input end point.

4 Press [OK].



X coordinate of the partial input start point

X coordinate of the partial input end point

S

Parameter	Setting	Description
X coordinate of the partial input start point	FQ2-S=====-08= Range: 176 to 1,088, Default: 176	
	FQ2-S□□-□□□ Range: 0 to 1,264, Default: 0	Specify the partial input range
X coordinate of the partial input end point	FQ2-S=====-08== Range: 191 to 1,103, Default: 1,103	along the X axis.
	FQ2-S□□-□□□ Range: 15 to 1,279, Default: 1,279	
	FQ2-S=====/FQ2-S=====-M Range: 0 to 472, Default: 0	
Y coordinate of the partial input start point	FQ2-S======-08= Range: 98 to 918, Default: 98	
	FQ2-S□□-□□□ Range: 0 to 1,016, Default: 0	Specify the partial input range along the Y axis.
	FQ2-S=====/FQ2-S=====-M Range: 7 to 479, Default: 479	
Y coordinate of the partial input end point	FQ2-S□□□□□-08□ Range: 105 to 925, Default: 925	
	FQ2-S===== Range: 7 to 1,023, Default: 1,023	

Note

• The minimum input widths are 16 for the X axis and 8 for the Y axis.

• The values of the monitor display positions are displayed for the coordinates in the measurement results.

• The coordinate values will not change as a result of the partial input settings.

Important

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- [Image] [Camera setup]
 - **1** Press $[\blacktriangleleft]$ [Partial input] on the right side of the display.
 - 2 Change the input size.
 - 3 Press [OK].
 - 4 Press [Back].



Changing the Image Input Mode

Pixel sampling can be applied to the input image to reduce image input time.

▶ [Image] – [Camera setup] – ◀ – [Image input mode]

Parameter	Setting	Description
Image Input Mode	High-speed Standard (Default)	Pixel sampling can be applied to the input image to reduce image input time.

Important

If you change the image input mode, perform teaching again.

5-3 Adjusting the Judgment Parameters

FQ2-S1 FQ2-S2 FQ2-S3 FQ2-S4 FQ2-CH

Adjusting Judgment Parameters While Looking at Measurement Results

If correct judgments are not possible, you can move directly from the Setup Mode display to the judgment parameters display to make adjustments.

- ▶ [Test] [Continuous test] (Either display)
 - **1** Press **[◀]** [Adjust judgement] on the right of the display.
 - **2** Press the parameters and adjust the values of the judgment conditions for them.



Setting Up the Best Judgement Parameters Automatically

The judgment parameters of the selected inspection items can be automatically adjusted by using actual workpieces which are considered as good and faulty products.

[Test] – [Continuous test]

- 1 Move to the inspection item for which you want to automatically adjust the judgement parameters and press [◀] [Adjust judgement] on the right side of the display.
- 2 Press [] [Auto adjustment].
- **3** Display a sample image of a good object and press [OK Teach]. Display a sample image of a bad object and press [NG Teach].
- **4** Repeat these steps for at least three samples each.

5 Press [Back].

The best judgement parameters will be set automatically.

6 Press [OK].



Important

There are no judgment condition settings for the following inspection items.

- Bar code and 2D-code (FQ2-S4 series only)
- Labelling and Edge pitch (FQ2-S1/S2/S3/S4 series only)

Note

You can select one of the following three patterns as the judgment method.

▶ [◀] – [Select the method.] on the right side of the display

- 1) Threshold (minimum): The lower limit of the variations between OK object is used as the judgment condition.
- 2) Threshold (average): The median value between the OK object variations and NG object variations is used as the judgement condition.
- 3) Threshold (maximum): The upper limit of the variations between NG object is used as the judgment condition.



5-4 Checking a List of All Inspection Item Results

FQ2-S1 FQ2-S2 FQ2-S3 FQ2-S4 FQ2-CH

Individual judgment results for all inspection items can be checked in a list. The individual inspection items can be selected to change the judgment parameters.

▶ [Test] – [Continuous test]

1 Press [All results/region] to display the list.



Note

Judgement parameters can also be changed from this display. Select an inspection item and press $[\blacktriangleleft] - [Adjust judgement]$.



5-5 Saving Data to the Sensor

FQ2-S1 FQ2-S2 FQ2-S3 FQ2-S4 FQ2-CH

Until you have saved your settings explicitly to the memory in the FQ2 Sensor, the settings are only stored temporarily. They will be lost if the power is turned OFF. Execute [Save data] after you have finished making your settings.

The FQ2 Sensor will remind you to do so with a message if you switch from Setup Mode to Run Mode. You can use this feature to keep the previous settings and discard the new settings if desired, but keep in mind that all settings that are not saved explicitly are replaced by the settings that are stored in the memory of the FQ2 Sensor the next time you turn ON the FQ2 Sensor.

Important

Do not turn the power supply OFF while data is being saved. The data that is being saved may become corrupted.

Figure [Test]

- **1** Press [Save data].
- 2 Press [Yes].



Note

• The data that are saved by this operation are scene data, system data, calibration data, touch finder data, and dictionary data*¹.

*1: Only supported on the FQ2-S4/CH Series.

Scene data and system data details: p. 407

• Measurement data and image data cannot be saved in this way.



350

Logging measurement data: p. 392

- · Settings data can also be backed up to an external memory.
 - Saving settings: p. 406

Operation

6-1 Starting Operation 352
6-2 Configuring the Run Mode Display 354
6-3 Checking the Trend of Measurement Results with Graphs 358
6-4 Adjusting Judgement Parameters during Operation
6-5 Editing the Model Region / Measurement Region from Run Mode

6-1 Starting Operation

FQ2-S1 FQ2-S2 FQ2-S3 FQ2-S4 FQ2-CH

When test measurements and adjustments in Setup Mode have been finished, change to Run Mode and begin actual measurements. In Run Mode, the Sensor operates stand-alone and outputs the measurement judgment results on the I/O lines accordingly to the settings. If the Touch Finder or the PC Tool is connected via network to the Sensor, the operation of the Sensor can be monitored in the following ways.

Run Mode Display



Moving to Run Mode

You can move from Setup Mode to Run Mode by using the following procedure.

- 1 Press [Run].
- 2 Press [Switch to Run mode.].



3 Press [Yes].

If you press [No], the setting will not be saved and you will move to Run Mode.



Note

Returning to Setup Mode

Press 📥 and press [Sensor settings].

Signal Status When Moving to Run Mode
 When moving to Run Mode, the signal will change as shown below and data can be input from and output to an external device.



6-2 Configuring the Run Mode Display

FQ2-S1 FQ2-S2 FQ2-S3 FQ2-S4 FQ2-CH

There are six types of displays that can be used, as shown below. Select the display as desired.

Checking the Judgement Results of Inspection Items

Graphics



The image and region currently being measured will appear.

Graphics + Details



In addition to [Graphics] display, individual judgement results and measurement values of selected inspection items will appear.

Displaying Measurement Result Histories

Checking the Overall Judgement Result History

Statistical data



The currently measured image and history of the overall judgement results (measurement count, NG count, and NG rate) will appear.

Checking the Judgements of All Inspection Items in a List

Trend monitor



The statistical data for the currently selected inspection item can be checked against time.





The distribution of measurement results of the currently selected inspection item can be checked.



Image: Arrow (Run Mode) – [Select display]



The two conditions below are required in order to display the trend monitor / histograms in Run Mode.

Enabling File Logging: p. 399 \square



Setting Logging Conditions: p. 395

All results/region 100ms 0 OK 8 24 25 26 28 2114

The judgement results of all inspection items can be checked in a list.



The following displays are convenient if more than one Sensor is connected.



Displays the measurement results of all connected Sensors. Green display: OK, Red display: NG



Automatically changes to the display for any Sensor with an NG result.

(Run Mode) – [Sensor monitor]

When multiple sensors are connected, switching from [Sensor monitor] to [Single Sensor], [Multi sensor], or [NG sensor] is possible.



Specifying the Startup Run Mode Display

The display that appears when power supply is turned ON can be set. The Default setting is [Graphics + Details]. This only appears when [Start screen type] under [Startup display] is set to [Single sensor].

▶ 🚘 (Setup Mode or Run Mode) – [TF settings] – [Startup display] – [Display pattern]
Note
You can set the scene to be displayed when the power supply is turned ON.
Setting the Startup Scene: p. 368
The Default display setting for startup can be changed.
Selecting the Display When More Than One Sensor Is Connected: p. 389

Displaying the Inspection Item Results

You can scroll though the measurement results of all the configured inspection items by using the following operations.



Note

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The following are also displayed in addition to the measurement results for each inspection item.

- Filter item: The results of a filter item is displayed.
- Camera input: The image that is being measured is displayed.
- Position comp.: The result of position compensation is displayed.
- All Region: The measurement regions for all inspection items are displayed.
- Calculation: The calculation result of each expression registered in the inspection settings is displayed.

Image: A state of the state

You can clear the measurement results of all the configured inspection items by using the following operations.



Selecting the Displayed Image

You can select the displayed image when you use the Area or Labeling Inspection items,





1



You can select from Measurement image, All color image and Binary image. (Default : Measurement image) Monochrome type

0.Scene(

÷

Clear results

FQ Series

0



You can select from Measurement image and Binary image. (Default : Measurement image)

6-3 Checking the Trend of Measurement Results with Graphs

FQ2-S1 FQ2-S2 FQ2-S3 FQ2-S4 FQ2-CH

Measurement result histories can be checked using the trend monitor and histograms. To display trend monitors or histograms in Run Mode, you must make the following setting in advance in Setup Mode.

▶ 🚘 (Setup Mode) – [TF settings] – [Logging setting] – [ON]

Trend Monitor

Changes in the measurement values of the selected inspection item against time can be observed from the graph. It becomes possible to predict when malfunctions may occur or to analyze the cause of the malfunction by checking the trends in the measurement values. The most recent 1,000 measurement values are displayed on the graph.

• [Trend monitor] Display



Changes in the measured value of the selected inspection item are displayed against time in a graph.

Image: Provide the second state of the seco
Arranging the Trend Monitor Display

The display range for the vertical axis and display conditions for the horizontal axis can be changed. To change the display range of the vertical axis, [Auto display] must be set to OFF.

Note

You can display only one parameter in the Trend Monitor. You cannot display multiple parameters at the same time.

- Disabling Automatic Adjustment of the Display Range (Default: ON)
 - **1** Press [◀] [Auto display] on the right of the trend monitor.
 - 2 Press [OFF].
- Changing the Display Range of the Vertical Axis
 - **1** Press [**4**] [Display range] on the right of the trend monitor.
 - 2 Set the minimum and maximum values of the measurement values.
- Changing the Number of Values That Are Displayed
 - **1** Press [**4**] [Number of data] on the right of the trend monitor.
 - 2 Select the number of values from 200, 400, and 1,000.

• You can select whether to display all data on the trend monitor or only data for which the overall judgement is NG. Logging settings are applied to the trend monitor as well.

However, they are not applied to trend monitor when it is displayed in Setup Mode.

Check recent measurement trends (recent results logging): p. 401

Note

[•] Trend monitor data is held until the power supply is turned OFF.

Histograms

The distribution of each measurement value can be checked on a histogram. The most recent 1,000 measurement values are displayed on a graph.



[Run Mode] – [Select display] – [Histogram]

Arranging Histogram Display

The display range on the horizontal axis and the number of data on the vertical axis of the histogram can be changed. To change the display range of the vertical axis, [Auto display] must be set to OFF.

• Disabling Automatic Adjustment of the Display Range (Default: ON)

- **1** Press [**4**] [Auto display] on the right of the histogram.
- 2 Press [OFF].

Changing the Display Range of the Horizontal Axis

- **1** Press [**4**] [Display range] on the right of the histogram.
- 2 Select the maximum measurement value, the minimum measurement value, and the class.

· Changing the Number of Data on the Vertical Axis

- **1** Press [◀] [Number of data] on the right of the histogram.
- **2** Select the maximum number of data to display.

Note

However, they are not applied to histograms displayed in Setup Mode.

Check recent measurement trends (recent results logging): p. 401

[·] Histogram data is held until the power supply is turned OFF.

[•] You can select whether to display all data in the histogram or only data for which the overall judgment is NG. Logging settings are applied to the histogram as well.

6-4 Adjusting Judgement Parameters during Operation

FQ2-S1 FQ2-S2 FQ2-S3 FQ2-S4 FQ2-CH

This Sensor enables judgment parameters to be adjusted while measurements are being performed. Downtime can be eliminated with this feature because the production line does not have to be stopped while making adjustments.

Preparations

This function is switched OFF as a Default to prevent it from inadvertently working during operation. Turn ON the function if you want to use it.

Setup Mode) – [Sensor settings] – [Adjustment mode in Run]

1 Press [ON].

Changing the Judgment Parameters in Run Mode

This section describes how to change the judgment parameters without stopping measurement in Run Mode.

Run Mode

- 1 Select the inspection item or position compensation item for which you want to adjust the judgment parameters using the **and Buttons**.
- 2 Press [◀] [Adjust judgement].



Run

- **3** Press the parameters and change the values of the judgment conditions for them with the slider.
- Press [OK].
 The judgement results with the changed judgment parameters will appear.



Important

The changed judgment parameters will not be reflected in the measurement result until [OK] is pressed.

6-5 Editing the Model Region / Measurement Region from Run Mode

FQ2-S1 FQ2-S2 FQ2-S3 FQ2-S4 FQ2-CH

With this Sensor, you can move from Run Mode to the model edit / measurement region edit display. This eliminates the need to move to Setup Mode, making it easier to edit the model region / measurement region. The procedure for editing the model region are explained below. The measurement region can be edited in the same way.

Preparations

In the Default state, this function is turned OFF to prevent accidental operation in Run Mode. To use the function, first turn it ON.

- Setup Mode) [Sensor settings] [Adjustment mode in Run]
 - 1 Press [ON].

Editing the Model Region from Run Mode

The procedure for editing the model region from Run Mode is explained below.

- 1 Use the and Buttons to select the inspection item whose model region you want to adjust.
- 2 Press [◀] [Model region].



- **3** Change the model region.
- 4 Press [OK].



Important

The BUSY signal is ON during model region editing. Take care that this does not affect the line.

MEMO

Convenient Functions

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7-1 Changing the Scene to Change the Line Process

FQ2-S1 FQ2-S2 FQ2-S3 FQ2-S4 FQ2-CH

What Are Scenes?

With an FQ2 Sensor, the inspection items that can be processed at the same time are registered as scenes. A command input from an external device or a touch panel operation can be used to select a certain scene. If a scene is registered for each type of measurement object or inspection, the line process can be changed simply by changing the scene when the measurement object or inspection changes.



Maximum Number of Scenes

Item	FQ2-S2/S3/S4/CH Series	FQ2-S1 Series
Number of scenes	32	8

• Settings Included with Scenes

The settings that are changed by switching scenes are the Camera image ([Image] Tab Page) and Inspection Items ([Inspect] Tab Page) output data settings. Settings related to external I/O specifications and the system settings for the Sensor are used in common for all scenes.

Refer to the following information for the data that is included in the scene data.

🦳 9-1 Menu Tables: p. 440

Creating New Scenes

The Default scene number is 0. To create another scene, use the following procedure to switch the scene and then make the settings.



Setup Mode) – [Select scene]

- 1 Press the number of the scene to change to and then press [Select].
- 2 The scene will change. Make the settings for the scene.

Select scene data			
0.SceneO			^
1.Scene1			
2.Scene2		X	
3.Scene3	Select		
4.Scene4	Rename		
5.Scene5	Clear		\mathbf{v}
		Bacl	<

Changing Scene Names, Copying Scenes, and Deleting Scenes

▶ 垚 (Setup Mode) – [Select scene]

- 1 Press the number of the scene and then press [Rename], [Copy], or [Clear].
- 2 To change the name, enter a new scene name in 15 alphanumeric characters or less. To copy a scene, press the number of the scene to copy.

Select scene 📃		FQ
	0.Scen	e O
O.SceneO	4	^
1.Scene1		
2.Scene2	X	
3.Scene3	Select	
4.Scene4	Rename	
5.Scene5	Clear	\sim
	Back	

1

Switching Scenes from an External Device

Changing Scenes by Parallel Input Command



Vision Sensor FQ2-S/CH Series User's Manual for Communications Settings (Cat. No. Z338) Section 2 Controlling Operation and Outputting Data with a Parallel Connection

· Changing Scenes by PLC Link Command

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Vision Sensor FQ2-S/CH Series User's Manual for Communications Settings (Cat. No. Z338) 3-2 Controlling Operation and Outputting Data with PLC Link Communications

Changing Scenes by EtherNet/IP Command

 \square

Vision Sensor FQ2-S/CH Series User's Manual for Communications Settings (Cat. No. Z338) 3-1 Controlling Operation and Outputting Data with EtherNet/IP Communications

Changing Scenes by TCP No-protocol Command or a UDP No-protocol Command

Vision Sensor FQ2-S/CH Series User's Manual for Communications Settings (Cat. No. Z338) 3-4 Control and Output in No-protocol (TCP) / No-protocol (UDP)

Changing Scenes by FINS/TCP No-protocol Command

Vision Sensor FQ2-S/CH Series User's Manual for Communications Settings (Cat. No. Z338) 3-5 Controlling Operation and Outputting Data with FINS/TCP No-protocol Commands

· Changing scenes by PROFINET command

Vision Sensor FQ2-S/CH Series User's Manual for Communications Settings (Cat. No. Z338) 3-3 Outputting Data and Controlling Operation through PROFINET

Setting the Startup Scene

▶ 🚘 (Setup Mode) – [Sensor settings] – [Startup settings]

The following items can be set.

Item	Purpose	Setting range
Startup mode	Select whether the startup scene number is set manually.	ON OFF (The scene number when the settings were saved will be the startup scene number. The startup mode is set to OFF in the Default settings.)
Startup scene	Set the scene number to use at startup.	Standard models: 0 to 31 Single-function models: 0 to 8, Default: 0



Calibration

Calibration is used to convert Camera coordinates into actual coordinates. You can set calibration to output the detected position in the actual coordinates.

You can convert pixels to actual dimensions and then output them.



You can also compensate for offsets in the origin and coordinate system.



Camera coordinates



Calibration Conversion Methods

There are the following three conversion methods for calibration.

Point specification: You can enter the actual pixel coordinates of any position.

Reference: You can measure a registered model and then enter the actual coordinates of the model.

Parameter: You can enter the calibration values directly.

Setting Calibration

Use the following procedure to set calibration.

1 Set the conversion method to use for calibration.

Select the calibration method (point specification, reference, or parameter) and enter the actual coordinates or other values that are suitable for the selected method.

You can register up to 32 calibration patterns.

Calibration type	Description	
Specify point (point specification)	Specify from three to nine points and enter their actual coordinates.	p. 371
Reference sampling (reference)	Search for a registered model and enter the actual coordinates of the position where the model is detected.	p. 374
Parameter	Enter the numeric values of the parameters directly to calculate the calibration data.	p. 377

2 Select the calibration pattern to use.

Select the calibration pattern to use from the calibration settings.

Selecting the Calibration Pattern to Use: p. 379

Note

You can set the calibration setting for each scene. You can use the same calibration setting for different scenes or use a different calibration setting for each scene.

Setting the Calibration Pattern

Point Specification

Set the pixel coordinates of positions to set the calibration pattern.

When you enter the actual coordinates of the specified positions, the calibration parameters are automatically calculated.

You can register the coordinates of up to nine positions.

• Different Magnifications in X and Y Directions

Specify three positions.

X : Y = 5 : 3



Note

Calibration cannot be performed using two places. Specify at least three places.

▶ 📥 (Setup Mode) – [Calibration]

- **1** Select the data region to set from [Calibration data 0] to [Calibration data 31].
- 2 Press [Modify].
- **3** Press [◀] [Specify point] on the right of the display.



4 Press [No. 1] and then press [Modify].

Specify point	O.Calibration dat	taO
No.1	Unconfigured	<u>_</u>
No .2	Modify	X
No . 3	Clear	
No.4	Unconfigured	
No.5	Unconfigured	\mathbf{v}
	Generate parameters	
	D Back	

5 Press the Camera coordinates to register on the display to select them.

A cross mark will be displayed on the selected position.

Cross mark



Note

· You can enlarge the display.

Image Zoom: p. 380

You can fine-tune the coordinates that are set.
 Press [◀] – [Console] on the right of the display to display the console.
 Press the Cross Key on the console to change the coordinates one pixel at a time.

6 Press [OK].

7 Enter the actual coordinates of the specified position.

Press $[\blacktriangleleft]$ – [Actual coord.] on the right of the display.



8

9

- Repeat the above steps 4 to 8 to set the coordinates of the remaining positions.
- **10** When you have finished setting the coordinates for all of the positions, press [Generate parameters].

11 The calibration parameters will be displayed.

The items in the calibration parameters are listed in the following table.

Item	Setting	Description
A	Calculated value	-
В	Calculated value	These are the calibration conversion values. These values are used to convert the Camera coordinates to the actual coordi-
С	Calculated value	nates. The following formulas are used to convert to actual coordinates.
D	Calculated value	(X,Y): Camera coordinates of measurement position, Unit: pixels
E	Calculated value	(X, Y): Converted coordinates (actual coordinates) X' = A × X + B × Y + C
F	Calculated value	$Y' = D \times X + E \times Y + F$

Convenient Functions
· · · ·



O.Calibration dataO

1.000000

0.00000

0.000000

0.000000

1.000000

∈ō.000000

Modify

Coefficient A

Coefficient B Coefficient C

Coefficient D

Coefficient E

Coefficient F

0



Calibration

Reference

With this method, the calibration settings are based on measurement results.

When you enter the actual coordinates of the position that results from searching for a registered model, the calibration parameters are calculated automatically.

(The position resulting from the search is found at the subpixel level.)



Measure three positions and enter the actual coordinates of them.

- ▶ 📥 (Setup Mode) [Calibration]
 - **1** Select the data region to set from [Calibration data 0] to [Calibration data 31].
 - 2 Press [Modify].
 - 3 Press [◀] [Reference] on the right of the display.
 - 4 Press [No. 1] and then press [Modify].

Modify	O.Calibration dat	:a0
Coefficient A Coefficient B Coefficient C Coefficient D Coefficient E Coefficient F	X Specify point Reference Parameter 1,000000 0,000000	•
	Back	

Reference samp	ling O.Calibration da	taO
No .1	X ^a d	^
No.2	Modify ed	
No . 3	Clear ed	
No.4	Unconfigured	
No.5	Unconfigured	\sim
	Generate parameters	
	D Back	<

5 Move the rectangular frame to specify the model region.



Note

You can edit the model region.

The procedure is the same as that for the search function.

Editing the Model and Measurement Regions: p. 224

6 Press [OK].

7 Press a reference sample to get the Camera coordinates.

8 Enter the actual coordinates of the specified position.

Press $[\blacktriangleleft]$ – [Actual coord.] on the right of the display.



ノ

12 The calibration parameters will be displayed. The items in the calibration parameters are the same as those for point specification.

110.2
No . 3
No . 4
No .5

O.Calibration da	tal
Configured	^
Configured	
Configured	
Unconfigured	
Unconfigured	\sim
Generate parameters	
	O.Calibration da Configured Configured Configured Unconfigured Unconfigured Generate parameters

0

-

Coefficient A

Coefficient B Coefficient C

Coefficient D Coefficient E Coefficient F

0

Modify

10 Repeat the above steps 4 to 8 to set the coordinates of the remaining positions.

11 When you have finished setting the coordinates for all of the positions, press [Generate parame-

ters].

9 Enter the actual X and Y coordinates and press [OK].



Back

O.Calibration dataO

1.000000 0.000000

0.000000 0.000000

1.000000

Parameter

With this method, you directly enter values to set calibration.

The calibration parameters will be automatically calculated when you enter the following three parameters.

Parameter	Setting	Description	
Coordinate (coordinate system)	• Righthand • Lefthand (Default)	 Lefthand: The positive direction is clockwise when coordinates are specified. Righthand: The positive direction is counterclockwise when coordinates are specified. Lefthand Coordinate System Y Positive direction Righthand Coordinate System Y Positive direction 	
Origin	 Upperleft (Default) Lowerleft Center 	Select the location of the origin of the coordinate system. Upper left Center Lower left	
Magnification	0.0001 to 9.9999 Default: 1.0000	Set the actual dimension that corresponds to one pixel.	

Setup Mode) – [Calibration]

- **1** Select the data region to set from [Calibration data 0] to [Calibration data 31].
- 2 Press [Modify].
- **3** Press [◀] [Parameter] on the right of the display.



- **4** Set the following parameters: [Coordinate], [Origin], and [Magnification].
- 5 Press [OK].
- **6** The calibration parameters will be displayed. The items in the calibration parameters are the same as those for point specification.





In the Camera setup, select the calibration pattern to use.



You can select the calibration pattern for each scene.

[Image] – [Camera setup]

- **1** Press **[◀]** [Calibration] on the right of the display.
- **2** Select the calibration pattern from [Calibration data 0] to [Calibration data 31].



3 Press [Back].

Note

If the selected calibration data has not been set yet, a message will be displayed asking if you want to go to the calibration setting display.

7-3 Display Functions

FQ2-S1 FQ2-S2 FQ2-S3 FQ2-S4 FQ2-CH

The procedures given in this section can be used to make the Sensor easier to use and the display easier to see.

Image Zoom

The display can be zoomed in or out to make the image easier to see.

Image: Setup Mode or Run Mode)



Enlarges the display. Reduces the display. Fits the image to the display size. Switches between live display and freeze display. (Only in Setup Mode)

Press [Back] to end setting the display.

Displaying a Live Image

You can display a live image to check the image that is input by the Sensor in realtime.





This can also be set with the [Live] button (

Displaying a Frozen Image

You can display a frozen image to stop image refreshing and display the last image that was input.



This can also be set with the [Freeze] button (

FQ Series

Ó

Cancel

Displaying a Saved Image

You can display an image that was saved in internal memory in the Sensor or in an SD card. This can be done to configure inspection items or to check measurements using saved images.





2 You can select one of the following types of images to display.



- [Log]: Images that are logged in the Sensor's internal memory
- [Logging image file]: Images that are logged in the SD card
- [Camera image file]: Images that were logged with _____ (Logging Button)
 - Saving the Currently Displayed Camera Image: p. 416
- **3** Press the [Back] Button to return to the [Display] Display.

Note

Refer to the following information for the procedures to save images.

Logging Measurement Data: p. 392

Updating the Display and Measurement Results Only for NG Measurement

Results

In Run Mode, you can specify updating the display of the image and measurement results only when the measurement result is NG.





Change the following setting to display the last NG image after restarting.

▶ 📥 (Setup Mode or Run Mode) – [TF Settings] – [Startup display] – [Display update mode]

1 Press [Last NG image].



Note

If an operation to change the display is performed (e.g., if the display pattern is changed or the inspection item is changed) when displaying images for NG results is set, the display will change to refreshing the most recent measurement results and the most recent NG display will disappear.

To ensure that you can check the NG results, log the NG results.



Checking Recent Measurement Trends (Recent Results Logging): p. 401

Automatically Changing to the Display for Any Sensor with an NG Result

You can change the settings to automatically display the Sensor for which the measurement result is NG if more than one Sensor is connected.



Hiding the Menu

To view an image that is hidden behind the menu, or to set a shape to full screen display, you can display only the image in the touch finder or on your computer.

If you press the icon again, the menu will be displayed.



Turning ON/OFF the Touch Finder Backlight

You can use Eco Mode to turn OFF the LCD backlight and reduce the power consumed by the Touch Finder whenever there is no operation on the Touch Finder for 30 seconds or longer. The LCD backlight will turn ON whenever any part of the touch panel is pressed.



Changing the Brightness of the Touch Finder

The brightness of the LCD backlight can be changed to any of five levels.

🕨 🚘 (Setup Mode or Run Mode) – [TF settings] – [LCD Backlight] – [Brightness]

7-4 Monitoring the Signal I/O Status

FQ2-S1 FQ2-S2 FQ2-S3 FQ2-S4 FQ2-CH

You can check if the I/O connections are working normally.

- [In/Out] [I/O monitor] [I/O monitor]
 - 1 The I/O status of the external devices will be displayed.
 - **2** Press the [OK] Button to return to the [Communication check] Display.

Input Signals (TRIG and IN0 to IN5) Signals that are displayed in red are currently being input from the external devices to the Sensor.



Output Signals (OUT0, OUT1, and OUT2) Signals that are displayed in red are currently being output from the Sensor to the external devices. You can turn the signals ON and OFF by pressing them to test the outputs.

Note

When the Sensor Data Unit is connected, the I/O status of the following signals are displayed. FQ-SDU1: TRIG, DSA, RST, IN0 to IN7, RUN, OR, BUSY, ERR, STG, SHT, ACK, GATE, and D0 to D15 FQ-SDU2: TRIG, RST, IN0 to IN5, RUN, OR, BUSY, ERR, STG, SHT, and ACK

7-5 Connecting to More Than One Sensor

FQ2-S1 FQ2-S2 FQ2-S3 FQ2-S4 FQ2-CH

Up to eight sensors can be connected to one Touch Finder or a computer used for PC Tool. This sections describes how to connect more than one Sensor to a Touch Finder or computer.

Setting the Sensors to Connect

Use the following setting to connect more than one Sensor to a Touch Finder.

Automatically Connecting Sensors

The Touch Finder can detect Sensors and automatically connect to them in the order that it detects them. The Touch Finder can detect up to 32 Sensors and it can connect to up to eight Sensors at the same time. Set this parameter to [OFF] to connect to only a specific Sensor.



Setup Mode or Run Mode) – [TF settings]

1 Set [Auto sensor detection] to [ON].

Note

If there are more than eight Sensors available for connection, use [Sensor List] to select the Sensors to connect.

Selecting the Sensors to Connect: p. 388 \square

You can set any of the Sensors for connection to the Touch Finder and register them.



1 Press any line and then press [Add].



- 2 Enter the IP address.
- **3** Press the IP address that you entered, and then press [Comm. test] to confirm that connection is possible.

Check whether the com cation with sensor is available.	muni- 1	P Address 0.5.5.101
✔ *(FQ)		×
🔽 II:No response	Network	
······ ·······························	Switch s	sensor
	Comm. te	est
	Add	
	Update L	_ist
	OK	Cancel

Selecting the Sensors to Connect

You can select the Sensors to connect to the Touch Finder from a list.



1 Press the check boxes of the Sensors to connect to select them.

Sensor List	IP Address
	10.5.5.100
🗸 (FQ)	10.5.5.10
!!:No response	10.5.5.136
ОК	Ē

Note

- Sensors that are logged are indicated by "*" in before the sensor name.
- The names of Sensors that are on the same network as the Touch Finder are given in parentheses.
- If a sensor's IP address is abnormal, "!" will appear in front of the sensor name.
- "!!:No response" will appear in the sensor name of a sensor that is not responding.
- "!!: Unknown device" will appear if the device is not an FQ2 sensor.
- Automatically assigned IP addresses appear in gray.
- · Manually set IP addresses appear in white.
- The IP address of the touch finder appears at the upper right.

Selecting the Display When More Than One Sensor Is Connected

Selecting the Display When More Than One Sensor Is Connected

You can select the display to appear on the Touch Finder when more than one Sensor is connected.

Setup Mode or Run Mode) – [TF Settings] – [Startup display] – [Startup screen type]

1 Select one of the following display types.

Display type	Description
	Simultaneously displays the images from up to eight detected Sensors. The display positions for Sensors that are not connected will remain blank. The Sensors are connected in the order that they are detected.
	You can change the display positions of the Sensors.
Multi Sensor	[Auto] Only): p. 390 If there are more than eight Sensors that can be connected, select the Sensors to con- nect from the list of Sensors
	Selecting the Sensors to Connect: p. 388 Register the Sensor to connect to display a specific Sensor. Registering the Sensors to Connect: p. 387
NG sensor	Of the connected Sensors, displays the image from the Sensor that most recently had an NG result.
Single sensor	Displays the image from only one Sensor. Of the Sensors, the image from only the Sensor that is specified in [Sensor selection] is displayed. If a Sensor is not specified in [Sensor selection], the image from the first Sensor that is detected will be displayed.
	Specifying the Sensors to Connect Continuously: p. 417
Auto (Default)	Automatically adjusts the display according to the number of Sensors that are detected. If more than one Sensor is detected, the images from up to eight Sensors are displayed at the same time. If eight Sensors are connected, the display is the same as that for [Multi sensor].

Specifying Sensor Display Positions for Multiple Sensors ([Multi Sensor] or [Auto] Only)

If [Startup screen type] is set to [Multi sensor] or [Auto],*1 you can specify the position of the image on a split display for each Sensor that is displayed.

*1 This can only be specified when at least two Sensors have been connected.

- Image: Run Mode) [Sensor monitor] [Multi sensor]
 (Run Mode) [Switch sensor]
 - Press [◀] [Display position] on the right of the display.
 - 2 Press the display of the Sensor for which to specify the display position. A list of numbers for the display positions will be displayed.



3 Select a number from the list of display positions. The display for the Sensor will be displayed in the position that corresponds to the specified number.

Note

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The display positions that are set with [Display position] are cleared when the power supply to the Touch Finder is turned OFF.

However, if the Sensor status is changed (by changing from Setup Mode to Run Mode), the current settings for [Display position] are saved in the Touch Finder. Therefore, the next time the same Sensors are connected, they will be displayed in the same positions.

If a previously connected Sensor is not detected, either the display position will be blank, or if [Auto sensor detection] is set to [ON], the Touch Finder will display another Sensor that it has detected.

If a previously connected Sensor is then detected by the Touch Finder, it will display the image from it in the previous display position.

Displaying information of individual sensors when multiple sensors are connected

The information of individual sensors can be displayed in the "Multi sensor" display and the "Switch sensor" display.

"OFF", "IP address", or "Sensor name" can be selected for the information that is displayed. The Default is "IP address".

- ▶ 🚘 (Run Mode) [Sensor monitor] [Multi sensor] or 🚦 (Run Mode) [Switch sensor]
 - Press [◀] [Setting disp. info.] at the right of the display.
- Hulti sensor Display position Setting disp. Info. 10.55.55.254
- **2** Press the connected sensor information you want to display.

Setting disp. Info.			
Show the information of sensors which TCP communication are established.			
	OFF	IP Address	
	Sensor Name		
		Cancel	

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7-6 Logging Measurement Data and Image Data

FQ2-S1 FQ2-S2 FQ2-S3 FQ2-S4 FQ2-CH

There are two ways to log data.

Recent results logging:	Data is temporarily saved in memory inside the Sensor.
File logging:	Large amounts of data are saved in SD cards or other external media.

The amounts and types of data that can be logged depend on the logging method that is used, as shown in the following table.

	Logged quantity		
Logged data	Recent results logging ^{*1}	File logging	
Statistical data	One value (The average value of the mea- surement results in the collected measure- ment data is continuously updated.)	Not possible.	
Measurement data	1,000 measurement values max. ^{*2}	Up to the capacity of the external memory	
Image data	20 images max.		

*1: For recent results logging, the oldest data is overwritten when the maximum number of saved data items is exceeded. *2: This limit is for one data item.

If more than one data item is logged at the same time, logging can be performed as long as the total number of data items in all logged data is 32,000 or less.

Logging Procedure

Use the following procedure to log data.



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Logging All Data (File Logging)

Large amounts of measurement and image data can be saved in files in external memory (SD cards or computer).



*1: Image data and measurement data can be logged in the same way as for the Touch Finder by installing the PC Tool for FQ.

System Configuration: p. 32

Note

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Only the data for the Sensor that is currently being displayed will be logged even if more than one Sensor is connected.

If multiple sensors are displayed, or if the most recent NG sensor is displayed, only the results of the sensor that was displayed before changing to the other sensor monitor screen will continue to be logged. Simultaneous logging of the results of multiple sensors is not possible.
Setting Logging Conditions

Use the following procedures to set the conditions to log data.

[In/Out] – [Log setting]

- Image Data
 - **1** Press [Image logging].
 - 2 Change the logging conditions, and then press [Back].



Measurement Data

- **1** Press [Data logging] [Condition].
- 2 Change the logging conditions, and then press [Back].

Data logging	
Select the kind of data)	data. (max 1000
AII	Only NG
None	ines in the second seco
	Cancel

Item	Description
Image logging	All: All images will be logged regardless of the measurement results. Only NG: Only images for which the overall judgment was NG will be logged.
(image data)	None: No images will be logged (Default).
Data logging	All: All measurement data (Measured values and calculation results) will be logged regardless of the measurement results. Only NG: Only measurement data (Measured values and calculation results) for which the overall judgment was NG will be logged.
(modouromont data)	None: No measurement data (Measured values and calculation results) will be logged (Default).

Note

The logging parameter settings are the same for recent results logging.

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Selecting the Measurement Data To Log

Use the following procedure to select the measurement data to log.

[In/Out] – [Log setting] – [Measurement data] – [Select data]

1 Press the measurement pre-processing, inspection item, or calculation that has the parameter to be logged.

Select data	_	_		
	Logging	upper	limit	879
10.Search				
l1.Edge Positio	on			
12.Edge Width				
3.Color Data				
l4.Area				
ZO.Calculation				
	Ø		Bac	:k

2 Press the parameter for which to log data to select it.

Select data				
O.Search Logging upper limit (379			
Measurement values to log	32			
🗹 Processing item				
🗹 Judgment	^			
🗹 Correlation				
✓ Position X				
🗹 Position Y 🔔				
🛱 🔍 🖸 OK Cance				

Note

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The procedure to select the measurement data to log is the same for recent results logging.

Storage Locations and File Names for Logged File Data

	Storage	location		
Data	TouchFinder	TouchFinder for PC	File name	
Image logging (image data)	\sensor_name\ LOGIMAGE\number *1, *2	\My Documents\ OMRON FQ\SDCard/ Sensorname\ LOGIMAGE\	img_Scnxxx_YYYY_MM_DD-HH_MM_SS(n)_Mea- surementID_OverallJudgementResult.IFZ*3,*4,*5 Example: The following name would be used for mea- surements performed at 10:10:21 pm on May 10, 2012 when Scene1 is set, and it's measurement result is OK. Then Image logging (image data) is as below.	
			22_10_21(0)_0000_OK.IFZ.IFZ	
Data logging (measurement data)	\sensor_name\ LOGDATA\number *1, *2	\My Documents\ OMRONFQ\SDCard\ Sensor name\ LOGDATA\	YYYY_MM_DD-HH_MM_SS.CSV ^{*6} Example: The following name would be used for mea- surements performed at 10:10:21 pm on May 10 2012: 2012_05_10-22_10_21.CSV	

*1: A five-digit number is assigned as a name to the image data storage folder in the order of folder creation as shown below. Up to 100 images are stored in each folder. 00000

- 00001
- *2: Files are stored in the following folder when the PC Tool is used.
- \My Documents\OMRON FQ\SDCard
- *3: *4: *5: *6: "n" is a serial number that is added when images are logged at the same time.
- You can change the "img" at the beginning of the file name
- You can add a character string to the beginning of the file name.
- Measurement ID is a value equal to the measurement count minus 1. When launching the FQ2, the count starts from zero.
- Note
- TouchFinder file save capacity is limited by capacity of SD card.
- TouchFinder for PC's file save capacity is limited by the specifications of the PC.
- · Setting the File Name for Logged Data

You can set a character string to add to the beginning of the file name for logged data.

Image data: You can change the "img " at the beginning of the file name for logged data to another text string. Measurement data: You can add a character string to the beginning of the file name for logged data.

🕨 📥 (Setup Mode or Run Mode) – [TF settings] – [File format]

- 1 Select the item for which to add to or change the file name and then press [Logging image file] or [Logging data file].
- 2

Press [File name prefix].

- 3 Enter the file name (up to 15 alphanumeric characters) and press [OK].
- 4 Press [OK].

File Format

Image data: Image data is saved in a special format for OMRON Sensors.

(The file name extension is IFZ.)

Measurement data: Measurement data is saved in the following CSV format.

Data	Time		Measurer	nent ID	Scene	No.	Judg	е	ID.CRO	10.X0		10.CR1	 II.Diff	Zn.D00	
yyyy_mm_	ldhh_mm_	SS		100		0		0	85	152		79	578	58	
yyyy_mm_	ld hh_mm_	ss		150		0		-1	88	155		82	581	61	
L_t_	_ I +					•									
												<hr/>		\subseteq	
1)	2)		3	5)	4	·)	5	i)			6	5)		7)	

	Item	Format	Description
1)	Date ^{*1}	YYYY/MM/DD	This is the date that the measurement data was obtained from the Sensor. ^{*1}
2)	Time ^{*1}	hh:mm:ss	This is the time that the measurement data was obtained from the Sensor.
3)	Measurement ID		This is the measurement ID information. ^{*2}
4)	Scene No.		Scene number
5)	Judge		Overall judgment 0: OK, –1: NG, –2: NC (not measured)
6)	Inspection item region	I(inspection_item_number).(measure- ment_item)(detection_point) Example 1: The correlation of the second detec- tion point in a search for inspection item number 0 would be given as fol- lows: I0.CR2 Example 2: The judgement result of OCR of inspection item No. 0 would be given as follows: I0.JG	The data selected for logging in the [Measurement data] under [Log setting] is output. If multiple results are detected, only the maximum number of data items that is set in the [Measurement data] are out- put.
7)	Expression region	Zn.J**,Zn.D** Example: The fourth registered expression would be: Z0.J04,Z0.D04 (FQ2-S1)	The judgement result and calculation result of each expres- sion are output. ** indicates 00 to 31. Zn (expression variable): Z0 for FQ2-S1/S2/S3, Z1 for FQ2-S4/CH.

*1: The data and time are not recorded with the measurement data. Therefore, this is not the date that the measurement was executed. This is the date that the PC Tool or the Touch Finder obtained the data from the Sensor.

*2: Measurement ID is a value equal to the measurement count minus 1. When launching the FQ2, the count starts from zero.

The output CSV file format can be changed according to the external device.

▶ 垚 (Setup Mode or Run Mode) – [TF settings] – [File format] – [Logging data file]

- **1** Press [Output format].
- **2** Change the required items in the CSV format.
- 3 Press [Back].

Item	Symbol
Field separator	None, comma (Default), tabs, space, colon, semicolon, CR, or CR+LF
Decimal symbol	None, point (Default), or comma
Record separator	None, comma, tabs, space, colon, semicolon, CR, or CR+LF (Default)

Enabling File Logging

You must enable file logging before you can execute it.

```
▶ 📥 (Setup Mode) – [TF settings] – [Logging setting]
```

1 Press [ON].

Starting and Stopping Logging

After logging is started (i.e., set to ON), the specified image data and measurement data will be saved in the SD card or computer hard disk each time measurements are performed.



- 1 Press [Logging].
- 2 Press [Image logging] or [Data logging].
- **3** Press [ON] to start logging. Press [OFF] to stop logging.
- 4 Press [Back].

Note

To save logged data, you must first select either [All] (all data is saved) or [Only NG] (only NG data is saved) in the logging parameters.

Setting Logging Conditions: p. 395

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Ensuring That All Measurement Results Are Logged in External Memory

To ensure that all measurement results are actually saved, change the settings so that the BUSY signal remains ON until logging has been completed. During operation, do not input the next trigger until the BUSY signal turns OFF.

[In/Out] – [I/O setting] – [I/O terminals] – [Output] Tab Page – [BUSY output]

Change the BUSY output parameter to [Data logging].



Note

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- File logging cannot be used when performing continuous measurements.
- If you use the PC Tool, the logging time may vary by up to 100 ms depending on the application conditions of your computer.
- If logging data to an SD card, the write time varies depending on the amount of the available space on the SD card.

Reference value: For SDHC class 4, the time required to write image data is approx. 200 to 800 ms.

Checking Recent Measurement Trends (Recent Results Logging)

The most recent measurement results can be logged inside the Sensor.

Even if data is not logged in external memory, such as an SD card, trends in measurement results can be easily checked on the Touch Finder.

However, if the power supply is turned OFF, this data will be lost.



~

Setting Logging Conditions

Use the following procedure to set the conditions for the measurement data, image data, and statistical data that will be logged.

Some of these operations and settings are the same as for file logging.



Setting Logging Conditions: p. 395

Item	Description
Statistical data	Statistical data, such as the number of measurements, the number of NG overall judgments, and the NG rate, since the power supply was turned ON will be logged. ON : Statistical data will be displayed (Default). OFF: Statistical data will not be displayed.
Logging image (image data)	
Logging data (measurement data)	These are the same as for the logging.

Note

The logging parameters for image data and measurement data are the same as those for file logging.

Selecting the Measurement Data To Log

With recent results logging, you can select the measurement pre-processing, measurement data, or calculation items to be logged. These settings also apply to file logging.

Selecting the Measurement Data To Log: p. 396

Starting Logging

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Logging will be started as soon as the conditions for logging have been set. If the settings are saved, logging will start automatically the next time the power supply is turned ON.

Checking the Results of Logging

The results of logging can be checked using the trend monitors, histograms, or statistical data.

6-2 Configuring the Run Mode Display: p. 354

Use the following menu command to check the image data.

▶ 🔜 (Setup Mode) – 📑 🛛 – [Log]

Deleting Logged Data

The logged data will be deleted when the power supply to the Sensor is turned OFF. The logged data can also be deleted without turning OFF the power supply.

Setup Mode

- [In/Out] [Log setting]
 - **1** Press [Delete Log].

Saving Logged Recent Results Data in a File

Although the logged recent results data will be deleted when the power supply is turned OFF, it can be saved in a file in external memory.

The most recent 1,000 measurement values and the most recent 20 images at the time save is executed will be saved in the file. (When the logging data number is one. When more than one, logging can be performed until the total number of values of all logging data is 32,000.)

Setup Mode) – [Save to file] – [Logging] Tab Page

1 Press the data to save.



~

2 The following display will appear if [Logging image] is pressed.

Select whether to save the most recently logged image or to save all of the image data that is logged in the Sensor.



The file storage locations and file format are given in the following table.

Item	Storage location	File name
Statistical data		YYYY_MM_DD-HH_MM_SS_record.CSV ^{*2}
Logging data (measurement data)	\sensor_name\LOGDATA ^{*1}	Example: The following name would be used for measurements performed at 10:10:21 pm on May 10, 2012: 2012_05_10-22_10_21_record.CSV
		img_Scn0**_YYYY_MM_DD-HH_MM_SS(n)_ MeasurementID_OverallJudgementResult.IFZ*3*4*5
Logging image (image data)	\sensor_name\LOGIMAGE ^{*1}	Example: The following name would be used for measurements performed at 10:10:21 pm on May 10, 2012: img_2012_05_10-22_10_21(0)_0000_OK.IFZ

*1: Files are stored in the following folder when the PC Tool is used. \My Documents\OMRON FQ\SDCard

*2: You can add a character string to the beginning of the file name.

*3: "n" is a serial number that is added when images are logged at the same time.

*4: You can change the "img" at the beginning of the file name. *5: You can add a character string to the beginning of the file name,

*6: Measurement ID is a value equal to the measurement count minus 1. When launching the FQ2, the count starts from zero.

File format

1)

Statistical data :	The data is saved in the following CSV format.
Image data :	Number of measurements, number of OKs, number of NGs, OK rate, NG rate (delimiter) Image data is saved in a special format for OMRON Sensors. (The file name extension is IFZ.)
Measurement data :	Measurement data is saved in CSV format.

I1.JG Zn.J00 Zn.D00 10.CR1 Index Measurement Scene No. Judge 10.X0 1 0 0 0 85 152 0 0 58 0 2 1 0 -1 88 155 0 61 0 0 3 2 0 -1 88 155 61

4)

6)

5)

Logging Measurement Data and Image Data

3)

2)

	Item	Format	Content
1)	Index	-	Index
2)	Measurement ID	-	Measurement ID Information ^{*1}
3)	Scene No.	-	Scene Number
4)	Judge	-	Overall judgment result 0: OK -1: NG -2: NC (means unmeasured)
5)	Inspection item region	Inspection item No., Measurement item, Inspection point Example 1 When Search is executed with inspection item No,0, the second correlation value is I0, CR1. Example 2 Judgment result in OCR of inspec- tion item No,1 is I1, JG	Outputs a data selected as a logging item in [Measurement data] of [Logging setting]. When multiple results in Search are detected, outputs the maximum data that set in [Measurement data].
6)	Arithmetic expression region	Example Arithmetic expression judgment registered the fist: Z0.J00,Z0.D00?FQ2-S1?	Zn.J**, Zn.D** Example The fourth registered arithmetic expression is Z0.J04.Z0.D04 when you use FQ2-S1.

*1 Measurement ID is calculated -1 from measurement counts. This ID is counted from zero at launch of FQ2.

Note

• The saved recent measurement data cannot be loaded back into the Sensor and displayed on a trend monitor or histogram.

• The data and time are not recorded with the measurement data. The file name is created from the time when the file is saved. It does not indicate when the measurement was made.

Important

The recent log data will be cleared if the scene is changed.

Changing the Format for Saving Measurement Data

The output CSV file format can be changed according to the external device.

Changing the Format for Saving Measurement Data: p. 399

Displaying Image Data

• Images Saved in Internal Sensor Memory

▶ 🔜 (Setup Mode) – 📑 – [Log]

• Image Files in an SD Card

🕨 🔜 (Setup Mode) – 📑 – [Logging image file] or [Camera image file]

Displaying a Saved Image: p. 382

7-7 Saving Sensor Settings

FQ2-S1 FQ2-S2 FQ2-S3 FQ2-S4 FQ2-CH

The Sensor settings are saved in flash memory inside the Sensor.

This section describes how to back up the settings in and restore them from an SD card or other external memory.

Backing Up Settings in External Memory

🕨 📥 (Setup Mode) – [Save to file] – [Setting] Tab Page

1 Press the data to save.



2 Enter the file name in 15 characters or less.

After entering the file name, press [OK]. The data will be saved and the display will return to [Save to file].

Applicable Data

Data	Storage location ^{*1}	Description
Scene data (The file name extension is SCN.)	\sensor_name\SCN	The following data are backed up for each scene. Settings for all inspection items Order of inspection items
Scene group data* ² (The file name extension is SGP.)	\sensor_name\SGP	All scene data are backed up.
Calibration data (file name extension: CLB)	\sensor_name\CLB	The calibration data are backed up.
Calibration group data (file name extension: CGP)	\sensor_name\CGP	All calibration data are backed up.
Dictionary data ^{*2} (The file name extension is DIC.)	\sensor_name\DIC	Dictionary data are backed up.
All dictionary data (The file name extension is DGP.)	\sensor_name\DGP	All dictionary data are backed up.
Code data*2 (file name extension: .csv)	\sensor_name\CODE	Code data will be backed up.
Sensor system data (The file name extension is SYD.)	\sensor_name\SYD	All system data in the Sensor are backed up. The system data are the same for all scenes.
All Sensor data (The file name extension is BKD.)	\sensor_name\BKD	All settings in the Sensor (scene group data, Sensor system data, calibration group data, and all dictionary data ^{*2}) are backed up.
Touch Finder data (The file name extension is MSD.)	\MSD	All settings in the Touch Finder are backed up.

For the PC Tool, data will be saved in the following folder: $\. My Documents OMRON FQ SDC ard Only supported on the FQ2-S4/CH Series.$ *1: *2:

Restoring Data to the Sensor from External Memory

- (Setup Mode) [Load from file]
 - **1** Press the data to be restored.

2 The selected data will be read from external memory and displayed. Press the file to load.

Load from file.	
Scene data	^
Scene group data	
Calibration data	
Calibration group data	
Dictionary data	
All dictionary data	\sim
🖾 🗔 Back	
Load from file	

7-8 SD Card Operations

FQ2-S1 FQ2-S2 FQ2-S3 FQ2-S4 FQ2-CH

With an FQ2 Sensor, the following folders are automatically created in the SD card according to the data that is saved. The specified data is saved in files in these folders.

Storage folder ^{*1}	Data
\sensor_name\SCN	Scene data (The file name extension is SCN.)
\sensor_name\SGP	Scene group data (The file name extension is SGP.)
\sensor_name\DIC ^{*2}	Dictionary data (The file name extension is DIC.)
\sensor_name\DGP ^{*2}	All dictionary data (The file name extension is DGP.)
\sensor_name\CODE ^{*2}	All dictionary data (The file name extension is CSV.)
\sensor_name\SYD	Sensor system data (The file name extension is SYD.)
\sensor_name\BKD	All sensor data (The file name extension is BKD.)
\sensor_name\CLB	Calibration data (The file name extension is CLB.)
\sensor_name\CGP	Calibration data (The file name extension is CGP.)
\MSD	Touch Finder data (The file name extension is MSD.)
\sensor_name\LOGIMAGE	Image data (The file name extension is IFZ.)
\sensor_name\LOGDATA	Statistical data and measurement data (The file name extension is CSV.)
\CAPTURE	Captured images (The file name extension is BMP.) Camera image data (The file name extension is IFZ.)

*1 : For the PC Tool, data will be saved in the following folder: \\..\My Documents\OMRON FQ\SDCard\

*2 : Only supported on the FQ2-S4/CH Series.

Note

- The PC Tool does not support SD card operations.
- To display an image file saved in an SD card, refer to the following.
- Use SD card formatted as FAT or FAT32. Touch Finder will not recognize other formats.

[] [Logging image file] or [Camera image file]

Display Functions - Displaying a Saved Image: p. 382

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Inserting and Removing SD Cards

Inserting an SD Card in the Touch Finder

1 Open the cover to the SD card slot on the top of the Touch Finder.



- 2 Insert the SD card with the back of the SD card facing the front of the Touch Finder and press it in until it clicks into place.
- **3** Close the cover to the SD card slot.



- 1 Open the cover to the SD card slot on the top of the Touch Finder.
- 2 Press in on the SD card until you hear a click.
- 3 Pull out the SD card.
- 4 Close the cover to the SD card slot.
- Never remove the SD card while data is being saved or read. The data on the SD card may be corrupted.

Important

Do not restart or turn OFF the power supply to the Sensor or Touch Finder while a message is being displayed saying that data is being saved to or read from the SD card. The settings or system data may be corrupted.

Checking the Available Space on the SD Card

Before saving data to the SD card, use the following display to make sure that there is sufficient space available on the SD card.



Setup Mode or Run Mode) – [TF settings] – [SD card] – [SD card information]

1 The following information in the SD card inserted in the Touch Finder can be checked.



Formatting an SD Card

Setup Mode or Run Mode) – [TF settings] – [SD card] – [Format]

1 Press [Yes] to start formatting.



7-9 Convenient Functions for Operation

FQ2-S1 FQ2-S2 FQ2-S3 FQ2-S4 FQ2-CH

This section describes the functions that can be used during Sensor operation.

Setting a Password to Prevent Unwanted Changes

A password can be set to prevent unwanted changes to settings. If a password is set, you cannot change from Run Mode to Setup Mode without entering the password.

Setting a Password

🕨 🚘 (Setup Mode) – [Sensor settings] – [Password settings]

- **1** Press [Password on/off] and press [ON].
- 2 Press [Enter password].
- 3 Enter a password containing up to 15 characters and press [OK].

Clearing the Password

🕨 🚘 (Setup Mode) – [Sensor settings] – [Password settings]

Press [Password on/off] and press [OFF].

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Entering the password when switching from [Run] Mode to [Setup] Mode.

- 1 If a password is set and you try to change from Run Mode to Setup Mode, the following password entry display will appear.
- 2 🕨 📥 (Setup Mode) [Sensor settings]
- 3 Press the text box. A keyboard display will appear. Enter the password and press [OK]. If the password is correct, the Setup Mode will be displayed.



Important

- This password restricts only the operation to switch from Run Mode to Setup Mode. It does not restrict other operations.
- If you forget the password, contact your OMRON representative for the procedure to clear the password.
- The password is deleted when the Sensor is initialized.

Capturing the Displayed Image

The current display on the Touch Finder or PC Tool can be captured and used in text files and other files on the computer.

The captured images are saved in external memory^{*1} as bit maps.

*1: Images captured on the Touch Finder are saved in the SD card. Images captured with the PC Tool are saved in the computer's hard disk drive.

Setup Mode or Run Mode)

The image that is being displayed when the button is pressed is saved in external memory.

Storage Location and File Names

Storage location	File name
\CAPTURE	YYYY_MM_DD-HH_MM_SS.BMP Example: The following name would be used for an image that was captured at 10:10:21.350 pm on March 10, 2010. 2010_03_10-22_10_21_350.BMP

Important

Make sure an SD card is inserted in the Touch Finder before capturing display images.

Note

For the PC Tool, data will be saved in the following folder:\\..\My Documents\OMRON FQ\SDCard\

Saving the Currently Displayed Camera Image

You can save the Camera image that is displayed on the Touch Finder or computer.



The Camera image that is being displayed when the The Button is pressed is saved in external memory.

Storage Location and File Names

Storage location	File name		
\CAPTURE	YYYY_MM_DD-HH_MM_SS.IFZ Example: The following name would be used for an image that was captured		
	at 10:10:21.350 pm on March 10, 2010: 2010_03_10-22_10_21_350.IFZ		

Important

Make sure an SD card is inserted in the Touch Finder before capturing display images.

Note

For the PC Tool, data will be saved in the following folder: \\..\My Documents\OMRON FQ\SDCard\

Setting the Startup Run Display Pattern

You can select the startup run display pattern. This only appears when [Start screen type] under [Startup display] is set to [Single sensor].



▶ 击 (Setup Mode or Run Mode) – [TF settings] – [Startup display] – [Display pattern]

- 1 Select from the following: [Graphics], [Graphics + Details], [Statistical data], [All results/region], [Trend monitor], or [Histogram].
- Note

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The Default display setting for startup can be changed.

Selecting the Display When More Than One Sensor Is Connected: p. 389

Specifying the Sensors to Connect Continuously

You can specify one Sensor to connect to the Touch Finder. The Touch Finder will connect to that Sensor each time the Touch Finder is started.

▶ 🚘 (Setup Mode or Run Mode) – [TF settings] – [Startup display]

- **1** Set [Specify sensor] to [ON].
- 2 Set [Sensor selection] to the IP address of the Sensor.

Note

If the Touch Finder cannot connect to the specified Sensor when the Touch Finder is started, it will continue to retry until a connection is made.

If connection to the specified Sensor is not possible, press the [Sensor List] Button to cancel connecting to the specified Sensor.

Monitoring and Setting Up a Sensor from Two Touch Finders

You can monitor and set up the same Sensor from two Touch Finders.

You can simultaneously monitor the Sensor from both Touch Finders.

You can set up the Sensor only from one of the two Touch Finders at any one time.



You can monitor the same Sensor at the same time from a locally installed Touch Finder and a remotely installed Touch Finder.

Operations during Simultaneous Connection of Two Touch Finders

The following restrictions apply to operations when two Touch Finders are simultaneously connected to the same Sensor.

Operation	Sensor status	Changes
Editing model regions in Run Mode	Monitor	Operation is possible with only one of the Touch Finders. Operation will be possible from the Touch Finder where [Model region] was pressed first.
Run Mode operations	Setup	 When either of the Touch Finders changes to Setup Mode, operation will no longer be possible from the other Touch Finder. When that occurs, a message will be displayed on the other Touch Finder saying that another Touch Finder is currently setting up the Sensor. A (Switch sensor) icon will be displayed on the lower right of the display. When Run Mode operations are possible again, Run Mode will be displayed in the initial status.
Logging	Monitoring or setup	Logging (including file logging and recent results logging) can be per- formed by only one of the Touch Finders. If logging is enabled on both of the Touch Finders, logging will be per- formed only on the Touch Finder that was connected to the Sensor first. An error will be displayed on the other Touch Finder when it connects to the Sensor and logging will automatically be disabled. If logging is disabled on both of the Touch Finders when they are con- nected, logging will be performed only on the Touch Finder for which log- ging is enabled first. You can use the following parameter to enable and disable logging. Enabling File Logging: p. 399
Trend monitors and histogramsMonitoring or setupTrend monitors and histograms can be displayed only if logging Therefore, they can be displayed only on the Touch Finder for w ging is enabled as described above.		Trend monitors and histograms can be displayed only if logging is enabled. Therefore, they can be displayed only on the Touch Finder for which log- ging is enabled as described above.

Checking the cause of a sensor NG from the multisensor display

It is easy to check the cause of a sensor NG when multiple sensors are connected.

You can immediately move between the detailed result display of a sensor, the multi-sensor display, and the result list display.

Setup Mode) – [TF settings]

1 Press the [Multi sensor button] in [Display setting in Run mode].



(1) Press [Multi sensor] in the detailed results display to move to the Switch sensor display.

(2) In the switch sensor display, press the sensor whose results you want to check. The result list display of that sensor appears.
 (3) In the result list display, press the inspection item for which the NG occurred. The detailed results display of the selected

(3) In the result list display, press the inspection item for which the NG occurred. The detailed results display of the selected inspection item appears.

7-10 Convenient Functions for Setup

FQ2-S1 FQ2-S2 FQ2-S3 FQ2-S4 FQ2-CH

This section describes the functions that can be used when setting inspection items.

Making Settings with Stored Images

With an FQ2 Sensor, judgment parameters can be set by using the following images.

- Images saved in internal Sensor memory.
- · Image files in an SD card

Note

You can also use images that were captured on the display.

Capturing the Displayed Image: p. 415

Saving Image Data

• Temporarily Saving Images in the Sensor

The measured images can be temporarily saved inside the Sensor. These images are held until the Sensor power supply is turned OFF.

[In/Out] – [Log setting] – [Image logging]

Setting Logging Parameters for Image Data: p. 401

Saving Images in the Sensor to an SD Card

The images that are temporarily saved inside the Sensor can be saved to an SD card.

Setup Mode) – [Save to file] – [Logging] Tab Page

1 Press [Logging image].

2 Select whether to save the most recently logged image or to save all of the data that is logged in the Sensor.

Storage location	File name
	Img_Scn0**_YYYY_MM_DD-HH_MM_SS(n)_ <i>MeasurementID_OveralIJudge-</i> mentResult.IFZ*
\sensor_name\LOGIMAGE	Example: The following name would be used for files saved at 10:10:21 pm on March 10, 2010. Img_Scn000_2010_03_10-22_10_21(0)_0000_OK.IFZ

* Measurement ID is a value equal to the measurement count minus 1. When launching the FQ2, the count starts from zero.

Saving Images in an SD Card

The image data can be saved in the SD card each time measurements are performed.



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Retry Function

FQ2-S4 FQ2-CH

This function repeats the Scan (with a single measurement trigger) until the overall judgment is OK. (*1) The retry function has four modes: normal retry, exposure retry (*2), scene retry, and trigger retry.

- *1: The retry function does not work for the judgment result of the calculation.
- *2: The brightness (exposure) depends on the shutter speed and gain. When HDR is ON, the shutter speed and gain are automatically adjusted for the optimum exposure. When HDR is OFF, the gain is fixed.
- Setup Mode) [Sensor settings] [Retry details] [Retry mode]
 - **1** Select the retry mode.

Retry mode
Normal retry
Exposure retry
Scene retry
Trigger retry
None
Cancel

Retry mode	Description		
Normal retry	This function repeats the Scan at the specified interval and count until the overall judg- ment is OK. Sets the repeat count and imaging interval. These settings are set from Retry settings of each Scenes.		
Exposure retry	Scanning is repeated the specified number of times while varying the exposure (when HDR is OFF, the shutter speed is varied) until the entire code is successfully scanned. The brightness step (shutter speed step when HDR is OFF), increment count, and decrement count are specified. The settings are configured in the retry settings of each scene.		
Scene retry	This function repeats the scan at the specified count while switching the Scenes until the overall judgment is OK. [Auto] or [Fixed] is selected for the switch order. [Auto]: Switches through the scenes in the order of highest frequency of use. [Fixed]: Switches scenes in the set order.		
Trigger retry	This function repeats the reading procedure until the overall judgment is OK when IN5 signal of parallel is ON. To use trigger retry, the I/O input mode must be set to expanded mode. Image: FQ2-S/CH Series User's Manual for Communications Settings (Cat. No. Z338)		
None (Default)	Retry is not performed.		

Combining retry modes

Normal retry, exposure (shutter speed) retry, scene retry, and trigger retry cannot be used at the same time. When scene retry is ON, the normal retry and exposure retry modes in the same scene are OFF. When normal retry, exposure retry, or scene retry is ON, trigger retry is OFF.

Setting normal retry

• Set the retry mode to [Normal retry] in "Retry details".

Setup Mode) – [Sensor settings] – [Retry details]

- **1** Press [Normal retry] for the retry mode.
- 2 Press OK.

• Specify the maximum count and interval.

- ▶ [Inspect] [Retry details]
 - **1** Set the maximum count and interval.



Parameter	Settings	Description
Max count	0 to 20, (Default: 4)	Sets the maximum number of retries.
Interval	32 to 999 (Default: 100)	Sets the capture interval (msec).

Setting exposure retry

• Set the retry mode to [Exposure retry] in "Retry details".

Setup Mode) – [Sensor settings] – [Retry details]

- **1** Press [Exposure retry] for the retry mode.
- Set the brightness (shutter speed) step, increment count, and decrement count.

▶ [Inspect] – [Retry details]

1 Set the brightness (shutter speed) step, increment count, and decrement count.



Parameter	Settings	Description
Brightness (shutter speed) step	Brightness: 1 to 20 (Default: 5) Shutter speed: 0.01 to 1.00 (Default: 0.30)	Sets the brightness or shutter speed step (msec).
Increment count	0 to 10 (Default: 2)	Sets the brightness (shutter speed) increment count.
Decrement count	0 to 10 (Default: 2)	Sets the brightness (shutter speed) decrement count.

• Set the retry mode to [Scene retry] in "Retry details".

Setup Mode) – [Sensor settings] – [Retry details]

- **1** Press [Scene retry] for the retry mode.
- 2 Set the switch order.
- **3** Set the scenes that are switched through.



Parameter	Settings	Description
Switch Order	Auto (Default) Fixed	Sets the scene switching order. Auto: Switches through the scenes in the order of highest frequency of use. Fixed: Switches through the scenes in the order that the scenes were registered for scene switching.
Retry scene	1st to 32nd	Register the scenes for scene switching. Register the scenes to switch in order from "1st" If there are any scenes for scene switching that are not registered, the remaining scenes are ignored.

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Reading order of the Sort order

The scanning procedure when the sort order is set to auto is shown below.

1st: The last Scene which was scanned successfully.2nd and following: Scene order by most successful scans



• In the Default state, the order is the order of the scene numbers.

• If the power is interrupted or the sensor is restarted, the success counts are initialized when adjust mode is entered.

Note

For the timing chart, refer to the following manual:

FQ2-S/CH Series User's Manual for Communications Settings (Cat. No. Z338)

7-12Functions Related to the System

FQ2-S1 FQ2-S2 FQ2-S3 FQ2-S4 FQ2-CH

This section describes system settings.

Turning OFF the Integrated Sensor Lighting (Only Sensors with Built-in Lighting)

The internal light can be turned OFF to use external illumination.

▶ [Image] – [Camera setup] – [◀] – [Lighting control] Press [OFF].

Switching the Display Language

Any of the following languages can be selected for display on the Touch Panel or PC Tool. Japanese, English, German, French, Italian, Spanish, Traditional Chinese, Simplified Chinese, or Korean

Setup Mode or Run Mode) – [TF settings] – [Language]

Press the language to be displayed.

Setting the Time on the TouchFinder

You can set the date and time.

🛛 🚘 (Setup Mode or Run Mode) – [TF settings] – [Time settings]

Setting the Day and Time Information

Sensor does not have day and time information. When you want to use Calender Matching in OCR, day and time setting is required.

▶ 🚘 (Setup Mode) – [Sensor settings] – [Sensor Day/Time]

Set or Acquire the Date and Time: p. 167

Initializing the Sensor and Touch Finder

Initializing the Sensor

Setup Mode) – [Sensor settings] – [Initialize]

- Initializing the Touch Finder
- 🕨 🚘 (Setup Mode or Run Mode) [TF settings] [Initialize]

Restarting the Sensor and Touch Finder

Restarting the Sensor

Setup Mode) – [Sensor settings] – [Restart]

• Restarting the Touch Finder

🕨 🚘 (Setup Mode or Run Mode) – [TF settings] – [Restart]

Checking Versions

Checking the Sensor Version

Information]

Checking the Touch Finder Version

Setup Mode or Run Mode) – [TF settings] – [Information]

Checking the Touch Finder Battery Level

Checking the Sensor Version

Setup Mode or Run Mode) – [TF settings] – [Battery level]

Important

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• The battery level is displayed only for a Touch Finder with a DC/AC/battery power supply (FQ2-D31).

• The settings will be lost if the battery runs out while you are making the settings. If the battery level is low, save the settings and charge the battery immediately.

Changing the Sensor Name

An alphanumeric name can be assigned to a Sensor to make it easier to recognize. This is convenient when more than one Sensor is connected.

Setup Mode) – [Sensor settings] – [Information] – [] – [Rename]

Checking Available Memory in the Sensor

If a setting cannot be made, check the amount of memory that is available in the Sensor.

🕨 🚘 (Setup Mode) – [Sensor settings] – [Information] – [┥] – [Memory state]

Correcting the Touch Screen Positions of the Touch Finder

Use this function to correct the touch screen positions if they are offset from the opposite position.

Setup Mode) – [TF settings] – [Touch screen calib]

Setting the Resolution of Measurement Objects Displayed on the PC Tool

Use this function to set the resolution of measurement object that are displayed on the Touch Finder on the computer.

🕨 🚘 (Run Mode) – [TF settings] – [Resolution]

Changing the Sensor's BUSY Indicator

You can change the BUSY indicator to a RUN indicator.

[In/Out] – [In/Out setting] – [In/Out setting] – [Output] – [BUSY LERD]

Setting the Inspection Timeout Time (FQ2-S4 series or FQ2-CH series only)

The time after which inspection times out can be set (msec).

Setup Mode) – [Sensor settings] – [Timeout]

MEMO
Troubleshooting

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8-1 Error Histories F02-S1 F02-S2 F02-S3 F02-S4 F02-CH

Error histories are stored with the PC Tool and in the Sensor and in the Touch Finder. Up to 100 errors will be stored in the error history in the Sensor or Touch Finder.

Errors Stored in the Error History

Error code	Cause	Points to check	Measures to perform
TRIG input error <i>merr</i> (Error code (hex): 01040302)	A TRIG signal was input when the BUSY signal for Sensor measurement was ON.	• Check the program in the PLC or other host to see if an inter- lock or similar measure has been implemented.	• Program interlocks to control the TRIG so that they do not turn ON while the BUSY signal is ON.
		 If a relay or other device with contacts is being used as the input device, see if chattering has occurred. 	• Switch from a device with con- tacts (e.g., relay) to a device without contacts (e.g., SSR or PLC transistor output).
IN input error Area (Error code (hex): 11020900)	A parallel command was input while the BUSY signal was ON.	 Is an interlock or other counter- measure provided, e.g., in a ladder program in the PLC? Is the wiring appropriate? 	 Interlock so that a parallel command is not input when the BUSY signal is ON in a ladder or otherwise. Malfunctioning will occur if the
			power ground level of the FQ- S is different from the power ground level of the connected IO device. Short the two power GNDs together.
Scene data error MERR (Error code (hex): 01030800)	The scene data to switch to is corrupted.		The scene data to be switched to is corrupted. Reset the scene data from the beginning.
Model error (Error code (hex): 01050405 or 01050500)	A model was re-registered with an image with low contrast.	Check the image to see if the contrast is too low to register the model.	Increase the image contrast and try again to register the model.
Logging error (Error code (hex): 02160702 or 02160703)	Some data was not saved when logging data to files on an SD card.	Check to see if the BUSY output parameter is set to <i>Measurement</i> .	Set a sufficiently long measure- ment interval or set the BUSY output condition to [Data logging] or [Image logging].
Comm. error (Error code (hex): 01010100)	After EtherNet/IP communica- tion or PROFINET communica- tion was established, normal communication could not be performed.	Check to see if communications were cut off with the data link partner device and to see if a cable is broken.	Check the cable connection to the data link partner device.
Communication error (Error code (hex): 01010101, 11090101)	A timeout occurred in process- ing to output the measurement results via EtherNet/IP, PROF- INET, or PLC Link.	Make sure that handshake pro- cessing is being performed by the master. Also, make sure that the measurement interval is long enough.	Check the measurement interval and handshake processing. Change the timeout time so that it is suitable for the ladder program processing time.
Data out buffer overflow (Error code (hex): 01010701, 11090801)	An output data buffer overflow occurred during output process- ing of measurement results for EtherNet/IP, PROFINET, or PLC Link.	 Make sure that handshake processing is being performed by the master. Check the measurement inter- val to see if it is long enough. 	Check the measurement interval and handshake processing.

Error code	Cause	Points to check	Measures to perform
SD card error (Error code (hex): 02130900, 02130901, 02130902, 02130903)	SD card is not inserted. A write to the SD card failed. An attempt was made to save more data than the available space on the SD card.	 Is the SD card inserted correctly? Check to see if the SD card is locked. Check to see if there is sufficient space available on the SD card. Verify that the SD card's format is FAT/ FAT32. 	 Insert the SD card correctly. Unlock the SD card. Delete unnecessary files on the SD card. Make the SD card's format FAT or FAT32 using a PC.
Item addition error (Error code (hex): 01030701, 01030702)	The unit registration has exceeded the limit. Failed to copy the unit.		Take corrective action for the cause.
Item deletion error (Error code (hex): 01030703)	Failed to delete the unit.		Take corrective action for the cause.
Auto adjust error (Error code (hex): 01040300, 01040301)	The result of camera auto- adjustment is too bright. The result of camera auto- adjustment is too dark.		Take corrective action for the cause.
Image input error (Error code (hex): 01040800)	It is an error of camera image input.		Take corrective action for the cause.
Teaching error (Error code (hex): 01050300, 01050301, 01050302, 01050303, 01050304, 01050305, 01050402)	Low contrast Color area 0 Reference value setting failure 2D code teaching failure Barcode teaching failure OCR teaching failure Other failures		Take corrective action for the cause.
Region setting error (Error code (hex): 01050502, 01050503, 01050504, 01050505, 01050706)	The model registration figure is only in the NOT area. The start angle and end angle of the arc of the model registration figure are the same. The start point and end point of the wide straight line of the model registration figure are the same. The same coordinates exist at the vertices of the polygon of the model registration figure. Model registration process failed. The figure is out of the area.		Take corrective action for the cause.
Password error (Error code (hex): 01080604)	Password mismatch.		Take corrective action for the cause.
Setting error (Error code (hex): 01080700)	Failed to allocate memory.		Take corrective action for the cause.
Scene copy error (Error code (hex): 01080701)	Scene copy failed.		Take corrective action for the cause.
Obsolete message (Error code (hex): 02140605)	The file path is too long.		Take corrective action for the cause.
System error (Error code (hex): 12160901, 12160902)	System error		Please contact us.

Note: MERR If an error that is indicated by this icon occurs, the ERROR operation indicator will light and the ERROR signal will turn ON.

Note

You cannot check the error codes from the Touch Finder. Use the command to acquire the most recent error information for the connection method.

FQ2-S/CH Series User's Manual for Communications Settings (Cat. No. Z338)

Checking the Error Histories

• Checking the History of Errors That Have Occurred in the Sensor

Setup Mode) – [Sensor settings] – [Error history] – [View history]

Errors will be displayed in order with the most recent ones on top.

View	history
0.IN	input error
1.IN	input error
2.IN	input error
3.IN	input error
4.IN	input error
5.IN	input error
	Back

• Checking the Log of Errors That Have Occurred in the Touch Finder

Setup Mode or Run Mode) – [TF settings] – [Error history] – [View history]

Clearing the Error Histories

• Deleting the History of Errors That Were Detected in the Sensor

Setup Mode) – [Sensor settings] – [Error history] – [Delete history]

• Deleting the History of Errors That Were Detected in the Touch Finder

Setup Mode or Run Mode) – [TF settings] – [Error history] – [Delete history]



If an error occurs while making settings on the PC Tool or the Touch Finder, an error message will appear on the display.

For these errors, the ERR indicator on the Sensor will not light, the ERROR signal will not be output, and the error will not be recorded in the error history.

Follow the instructions that are given in the error message.

If the following messages appear, the hardware may be faulty.

Contact your OMRON representative.

- System error.
- Application system error. Please reboot.
- · Failed to startup.

8-3 Basic Troubleshooting

FQ2-S1 FQ2-S2 FQ2-S3 FQ2-S4 FQ2-CH

Problem	Measures to perform	
The Sensor or Touch Finder will not start.	Check the power supply capacity to see if it is sufficient.	
	Check the Ethernet cable to see if it is connected correctly.	
	Check the Ethernet settings to see if they are correct between the devices.	p. 67
	If you do not know the IP address of the sensor, execute [TF settings] - [Re-assign IP forcibly]. The sensor IP address will be assigned based on the network settings of the computer.	p. 437
The Sensor cannot be detected.	Check the communications cable to see if it is disconnected.	
	Check the switching hubs to see if any of them are faulty. (If switching hubs are used.)	
	No more than a combined total of two PC Tool / Touch Finder units can be connected at once. If the PC Tool or Touch Finder is already con- nected to the Sensor, disconnect it.	
The Setup Mode display opens.	Check if an inspection item is set in the scene of the connected FQ. If an inspection item is set in the scene of the connected FQ, the Run Mode display will open at startup. If the Touch Finder is started when the scene of the connected FQ does not have an inspection item set, the Setup Mode display will open.	p. 29
The judgement result JG is -15 (out of range error) during measurement.	An area where the image does not exist is included in the measurement area due to position compensation or partial input. Change the settings so that the area where the image exists is the measurement area.	
"Touch Finder setting version error" appears when switching Sensors or switching between the Run Mode and Setup Mode dis- plays at startup (Sensor software version 1.91 or later).	This appears when the Touch Finder software version is older than the Sensor software version. Functions not supported by the Touch Finder are shown as "XXX". Update the Touch Finder software to the latest version.	p. 576
	Check to see if the TRIG signal is being correctly input to the Sensor.	p. 385
The results display is not updated.	Check to see if the most recent NG result is being displayed.	p. 383
	If other devices are connected to the same network as the Sensor, dis- connect the other devices from the network and check the update speed. If the update speed returns to normal, check the specifications of the dis- connected devices and take suitable measures.	
opdating the results display is slow.	If there are power lines running in parallel with the Ethernet cable or if there are inverters or other sources of noise near the communications cable, separate the communications cable from them and check the update speed. Noise may be adversely affecting the communications response.	
Data is not been descended.	Check to see if the logging setting in the Sensor are correct.	p. 392
Data is not logged properly.	If logging to an SD card is not possible, check the available space on the SD card and check to see if the SD card is write-protected.	p. 409
The ERROR indicator lights.	Check the error history to see what error has occurred and take suitable measures.	p. 432
The measurement trigger is not input.	Check to see it the measurement trigger is set correctly.	
The image brightness does not stabilize. (FQ2-S1 S3 /FQ2-S3 S4 /FQ2-S4 S4	Turn ON the brightness correction mode. When the Brightness Correction Mode is ON, the timing when images are taken changes. Check that the images of the measured objects taken when the Brightness Correction Mode is ON are appropriate.	p. 78

Restoring a Sensor Connection

If you cannot connect to a sensor because the sensor is not detected in the [Sensor List] and the IP address set in the sensor is unknown, you can execute [Re-assign IP forcibly] to forcibly change the IP address of the sensor and connect.

The sensor' IP address will be re-assigned as shown below based on the IP address settings of the Touch Finder (PC Tool) that is connected to the sensor.



Important

- Execute this function with the Touch Finder (PC Tool) in a one-to-one connection with the sensor. If connected to
 multiple sensors, IP address assignment will be performed for all sensors and reconnection will not take place normally.
- The reassign IP address function is valid for Version 1.84 and later sensors.
 - **1** Configure the network settings (IP address, subnet mask, and Default gateway) of the Touch Finder (PC Tool).
 - 2 Connect the sensor and the Touch Finder (PC Tool) in a one-to-one connection. (If the sensor is connected via a network, disconnect the sensor from the network.)
 - 3 Press (Run Mode) [TF settings] [Re-assign IP forcibly].

Capturing the TF display.				
Time settings 🔶		^		
Touch screen calib				
Initialize				
Restart				
Update				
Re-assign IP forcibly				
🖾 🗖 Back				

4 Make sure that the sensor and Touch Finder are connected in a one-to-one connection, and press [Yes].

Captu	iring the Ti	F display.			
Time	Re-assign	IP forcib	ly		^
Toucl	Make sure	that only	one	_	
Init	sensor is Initializa	connected ition of n	to IF etwork	· _	
Resta	settings w	viii be ex	ecutea	·	
Upda [.]		Yes	No		
Re-as	sign IP fo	rcibly			\sim
		o i		Bacl	<

Appendices

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9-1 Menu Tables F02-51 F02-52 F02-53 F02-54 F02-CH

Image Tab Page

	Menu command	Description	Setting range	Data	
era setup	Focus	The value shown here is used as a refer- ence when adjusting the focus with the focus adjustment screw.			p. 76
Came	Image mode	Pixel sampling can be applied to the input image to reduce image input time.	Normal (Default)Fast	Scene	p. 345
	Shutter speed (Normal mode)	Sets the shutter speed for Normal Mode.	 FQ2-S4	Scene	p. 80
	Gain (Normal mode)	If the gain is high, the image will be bright. If the gain is low, the image will be dark.	 FQ2-S3, FQ2-S4=====-08=, FQ2-S4===== Range: 0 to 10 (Default: 10) FQ2-S1, FQ2-S2, FQ2-S4=====, FQ2-S4=====-M, FQ2-CH Range: 16 to 64 (Default: 16) 	Scene	p. 80
	Brightness correc- tion (When HDR mode is OFF.)	Use to stabilize the brightness.	• ON • OFF (Default)	System	p. 78
	Brightness (HDR mode)	Sets the brightness level of the image for HDR Mode.	1 to 100	Scene	p. 81
	Brightness correc- tion (HDR mode)	Use to stabilize the brightness.	• ON • OFF (Default)	System	p. 78
	HDR	Suppresses reflections and differences in brightness.	OFF (Default)Level 1 to Level4	Scene	p. 83
	White balance	Corrects differences in coloring between the image and the actual object.	 AUTO R: 0.001 to 7.999 G: 0.001 to 7.999 B: 0.001 to 7.999 	Scene	p. 85

	Menu command			nand	Description	Setting range	Data	
Camera setur		Pa	rtial input		Used to make the image input range smaller.	 752×8 to 752×480 FQ2-S1 FQ2-S2 FQ2-S4 FQ2-S4 FQ2-CH 928×8 to 928×828 FQ2-S1 FQ2-S4 -08 FQ2-S4 -08 1280×8 to 1280×1024 FQ2-S3 8 FQ2-S4 	Scene	p. 343
		Ro	tate 180		You can rotate the Camera image by 180°.	ON OFF (Default)	Scene	p. 86
		Ca	libration s	setting	Sets a registered calibration pattern.	Off (Default) Calibration Data 0 to 31	Scene	p. 379
		Lig	hting con	itrol	Turns off built-in lighting when external lighting is used.	ON (Default)OFF	Scene	p. 427
		ing control	Strobe o	output delay	Sets the delay time for the strobe output signal (STGOUT) in response to the trig- ger signal.	0 to 65,535 µs (Default: 0 µs)	Scene	*1
		Lightr	Strobe o	output time	Sets the output time of the strobe output signal (STGOUT).	0 to 65,535 μs (Default: 1,000 μs)	Scene	<u></u> *1
Trigger setup	Tri	rigger delay			Adjusts the time until the Camera shutter opens after the trigger signal is received. Only valid for external triggers.	0 to 163 ms (Default: 0)	System	p. 87
Image adjustment		d fill	ler		These commands are used to add mod-	Color Gray Filter Weak Smoothing Strong Smoothing Dilate Erosion Median Extract Edges Extract Horiz Edges Extract vertical edges Enhance edges Background Suppression	Scene	p. 94
		Model			ify, delete, copy, or change the name of filter items and position compensation items.	 Shape Sear III. pos. comp Shape Sear. pos. comp Search position comp 	Scene	p. 102
Ac co	Ad cor	id pos. mp.		Edge		 Edge position comp 2Edge position comp 2ed. midp. comp Edge rot. pos. Comp 		p. 102
				Value		Position compensation (Image rotation,Parameter)	Scene	p. 102
	Mo	odify						p. 94
	De	lete						p. 94
	Co	ру						p. 94
Re		nan	ne			15 alphanumeric characters	Scene	p. 94

		Me	enu com	mand	Description	Setting range	Data			
ijustment	•	ay Filter)	Filter type		You can specify the ranges of colors to which the Color Gray Filter item is applied.	 RGB (Default) HSV	Scene	p. 96		
Image		(Color Gr	Filter settings		Select the type of color filter to use.	 Red filter (Default) Green filter Blue filter Cyan filter Magenta filter Yellow filter Brgt.F. (R+G+B) Brgt.F. (R+2G+B) Custom filter 	Scene	p. 96		
			Source	e image	You must set the image to which the filter is to be applied.	Camera Prev. (Default)	Scene	p. 95		
		er than Color Gray Filter)	Filter region		You can specify the region to which to apply the filter.		Scene	p. 95		
			Source image		You must set the image to which the filter is to be applied.	• Camera • Prev. (Default)	Scene	p. 95		
		(Items oth	Suppre (for Ba Suppre Only)	ession level ckground ession Item	The range in which to enhance the con- trast and the brightness range to extract are set for the Background Suppression item.		Scene	p. 98		
	asic	ach	nape nape ation	Model region			Scene			
	B	Te	compensation, S compensation, and S tion III Compens	ompensation, S ensation, and S tion III Compens	ompensation, S ensation, and S tion III Compens	Add		RectangleEllipseWide circlePolygon	Scene	
			tition (Comp	Delete	Used to specify the region of the image to register as the model with a combina-		Scene			
			th Pos sition Searc	Сору	tion of figures.		Scene			
			Searc ch Po	Console	_		Scene			
			for	OR/NOT		OR (Default)NOT	Scene			
				One/All		• One (Default) • All	Scene			
				Insp. region	Adjusts the size and position of the mea- surement region.		Scene			
					Detection point	You can specify which part of the model to detect as coordinates during inspections.		Scene		

	Menu command			and	Description	Setting range	Data	
Insation items) Basic	Teach	Compensation	Ins	sp. region	Adjusts the size and position of the mea- surement region, changes the measure- ment direction, etc.		Scene	
osition compe		dge Position	Co OF	blor ON/ ⁼F	Sets whether to specify an edge color.	• ON • OFF (Default)	Scene	
ge adjustment (Po		for E	Se	t color.	Specifies the color of the image for edge detection (i.e., the border between the measurement object and background).	 R: 0 to 255 B: 0 to 255 G: 0 to 255 	Scene	
Ima			C e	Color pal- ette	Displays a palette for color specification.			
			C r	Detection node OUT	Specifies whether to detect a change in color as an edge.	• Color IN (Default) • Color	Scene	
		sation, Two-edge Midpoint ion Position	Ed reç Ed reç	lge 0 gion, lge 1 gion	Adjusts the size and position of the mea- surement region, changes the measure- ment direction, etc.		Scene	
			Ed ON Ed ON	lge 0 clr N/OFF lge 1 clr N/OFF	Sets whether to specify an edge color.	• ON • OFF (Default)	Scene	
		osition Comper and Edge Rotat	Ed col Ed col	lge 0 set lor. lge 1 set lor.	Specifies the color of the image for edge detection (i.e., the border between the measurement object and background).	 • R: 0 to 255 • B: 0 to 255 • G: 0 to 255 		
		Two-edge F npensation,	(Color pal- ette	Displays a palette for color specification.		Scene	
		for Cor	C r	Detection node	Specifies whether to detect a change in color as an edge.	Color IN (Default)Color OUT		
			Ed an (Ed tion Co tion	lit Ref. gle dge Rota- n Position ompensa- n only)	Set the reference angle.	–180 to 180° (Default:0)	Scene	
		Juc		nent	 Shape Search III Position Compensation pensation Item, and Search Position C Almost the same as for the Shape Sea inspection item. Edge Position Compensation, Two-edg Midpoint Compensation, and Edge Rot Almost the same as for the Edge Positi 	on Item, Shape Search Position Com- ompensation Item rch III, Shape Search II, and Search ge Position Compensation, Two-edge ation Position Compensation ion inspection item.	Scene	

	M	enu coi	mmand	Description	Setting range	Data				
ompensation items) Details	Mc (SI Sh tio	odel pa hape S nape Se n Comp ms only	rameters earch and earch III Posi- oensation y)	Shape Search Position Compensation tion Item Almost the same as for the Shape Sea inspection item. However, the [Sub-pixel] and [Multi-po inspection item do not exist	Item and Search Position Compensa- arch III, Shape Search II, and Search int output] settings of the Search	Scene				
ion c	Me	eas. Pa	rameter			Scene				
djustment (Positi	Οι	utput pa	ırameter	The settings for the Edge Position Compensation, the Edge Mide those for the Edge Position Compensation item are almost the same as those for the Edge Position inspection item.						
Image ac	croll parameter	Sourc	e image	You can select the image to which to apply the results of position compensation processing.	• Camera • Prev. (Default)	Scene	p. 107			
	ŭ	Interp	olation	You can select the precision of position compensation.	BilinearNone (Default)	Scene	p. 108			
arameter)	`	Imag	e rotation	Select to correct the position by rotating the image around the center of the screen.	–180° to 180° (Default: 90°)	Scene	p. 126			
rotation P.	arameter	e position	Reference position X coordinate	Sets the X coordinate of the reference position.	–99999 to 99999 (Default: p. 127)	Scene	_			
n (Image		Referenc	Reference position Y coordinate	Sets the Y coordinate of the reference position.	–99999 to 99999 (Default: p. 127)	Scene	_			
nsatic			Reference angle	Sets the reference angle θ .	–180 to 180 (Default: 90)	Scene				
sition Compe		lent position	Measure- ment posi- tion X coordinate	Sets the X coordinate of the measure- ment position.	–99999 to 99999 (Default: p. 127)	Scene	p. 126			
for Pc		Measurement po	Measurement pc	Measurement po	Measurement po	Measure- ment posi- tion Y coordinate	Sets the Y coordinate of the measure- ment position.	–99999 to 99999 (Default: p. 127)	Scene	
			Measure- ment angle	Sets the measurement angle θ .	-180 to 180 (Default: 0)	Scene	-			
orrection	Re	ef. posit	ion	Sets the reference position.		Scene	p. 129			
r Linear C	Me	eas. po	sition	Sets the measurement position.		Scene	p. 129			
fo	Fil	ter regi	on	You can specify the range over which position correction is performed.		Scene	p. 131			
	So	ource in	nage	You must set the image to which the filter is to be applied.	CameraPrev. (Default)	Scene	p. 132			
	Int	terpolat	ion	You can select the precision of position compensation.	NoneBilinear (Default)	Scene	p. 132			

*1 Refer to FQ2-S/CH Series User's Manual for Communications Settings (Cat. No. Z338).

Inspect Tab Page

		Me	enu	com	mand	Description	Setting range	Data	
Inspection	Item selected			Ado	l item	Used to add, modify, delete, copy, or change the name of an inspection item.	 OCR*⁴ Bar code*³ 2D-code*³ 2D-code (DPM)*³ Search*² ShapeSearch III *² Shape Search II*² Sensitive Search*² Edge Position*² Edge Width*² Edge Width*² Color Data*² Area Labeling*² 		p. 138
				Mo	odify				p. 139
				De	elete				
				С	ору				p. 139
				Rer	name		15 alphanumeric characters	Scene	
		ettings	Teach	Te	each Mode	Set the Teach Mode.	Simple Teach (Default)Correct String	Scene	p. 142
		S		Ir	nsp. region	Moves the measurement region or adjusts the size of the measurement region.		Scene	p. 141
				String Format	L.1 to L.4	Sets the character format for recogni- tion.	32 alphanumeric characters	Scene	p. 141
				Correct String	L.1 to L.4	Sets the character format for recognition.	32 alphanumeric characters	Scene	p. 141
				Can	nera setup	Same as Camera adjustments on the I	mage Tab Page.	Scene	p. 76
				Parameter C	Reading Speed	Set the Reading Speed.	Normal (Default)Fast	Scene	p. 156
				Meas.	Character color	Sets the color of the characters to detect.	Black (Default)White	Scene	
					Printing type	Sets the type of printing of the charac- ters to detect.	Solid characterDot character (Default)	Scene	
					Dot ver. interval	Adjusts the vertical dot interval of the characters to detect. This parameter is enabled only when [Printing type] is set to [Dot character].	0 (Default) to 30	Scene	
					Dot hor. interval	Adjusts the horizontal dot interval of the characters to detect. This parame- ter is enabled only when [Printing type] is set to [Dot character].	0 (Default) to 30	Scene	p. 156
					Char. thick. th.	Sets the thickness of the characters. Negative numbers indicate thinner characters. Positive numbers indicate thicker characters.	-128 to 128 (Default: 0)	Scene	
					Boundary correction	Treats dark areas at the edges of the measurement region as noise and removes them from the read candidates.	• ON (Default) • OFF	Scene	

		Me	enu	comi	mand	Description	Setting range	Data				
Inspection	Settings	Teach	for OCR*4	Parameter	Rotation compensa- tion	Turned ON when characters on the workpiece are rotated because the workpiece itself is rotated. Correction is possible in a rotation range of $\pm 15^{\circ}$.	• ON • OFF (Default)	Scene	p. 156			
			4	Meas.	Slant com- pensation	Used when the characters are at a slant. Correction is possible in a rotation range of $\pm 15^{\circ}$.	• ON • OFF (Default)	Scene				
					Hyphen height upp. th.	Sets the upper limit of the height of the region to treat as a hyphen or other symbol.	0 to 100 (Default: 30)	Scene				
					Hyphen height low. th.	Sets the lower limit of the height of the region to treat as a hyphen or other symbol.	0 to 100 (Default: 70)	Scene				
					Slender char. th.	Sets the ratio of the height to the width of the detection rectangle to judge as thin characters (I, J, 1, :, and /).	1 to 10 (Default: 3)	Scene	p. 156			
					Max Width Setting	Set the Max Width Setting.	ONOFF (Default)	Scene				
					Max Width	specify the max width for attempted character string.	0 to 9,999 (Default: 0)	Scene				
					Max Height	Specify the max height of the charac- ter to be read.	0 to 9,999 (Default: 0)	Scene	-			
					Min Height	Specify the min height of the character to be read.	0 to 100 (Default: 50)	Scene				
					Reading Length	If character strings with a variable number of characters are to be read, specify variable.	Variable (Default)Fixed	Scene				
				Con	tinuous test	Same as [Continuous test] on the [Test] Tab Page.		p. 340			
			for Bar code*3	Ir	isp. region	Moves the measurement region or adjusts the size of the measurement region.		Scene				
			<u>ب</u>	Can	nera setup	Same as Camera adjustments on the I	mage Tab Page.	Scene	p. 76			
			•	Meas. Parameter	Meas. Parameter	Meas. Parameter	Meas. Parameter	Code type	Sets the type of code to read.	JAN/EAN/UPC (Default) Code39 Codebar ITF Code93 Code128 / GS 1-128 GS1 DataBar Pharmacode	Scene	p. 186
					Code color	Sets the color of the code to be read.	Black (Default)White	Scene	p. 186			
					Composite codes on/ off	Sets whether or not composite codes are supported. (Only valid for Code128/GS1-128, GS1 Databar)	• Yes • No (Default)	Scene				
					Check digit on/off (Except for Pharmac- ode)	Sets whether there is a check digit.	Yes (Default)No	Scene				
					Direction (For Phar- macode only)	Sets the direction in which to read.	 Horizontal mode (Default) Vertical mode 	Scene				
					Reverse on/off (For Pharmac- ode only)	Sets whether to use Reverse Mode.	YesNo (Default)	Scene				

		Me	enu	comr	mand	Description	Setting range	Data	
Inspection	Settings	Teach	for Bar code*3	Meas. Parameter	Timeout	Sets the timeout time for read pro- cessing.	1 to 9999 ms (Default: 9999)	Scene	
			•	Con	tinuous test	Same as [Continuous test] on the [Test] Tab Page.		p. 340
				In	sp. region	Moves the measurement region or adjusts the size of the measurement region.		Scene	
				Ca	mera setup	Same as Camera adjustments on the I	mage Tab Page.	Scene	p. 76
				deas. Parameter	Code type	Sets the type of code to read.	 JAN/EAN/UPC (Default) Code39 Codebar GS1 DataBar ITF Code128/GS 1-128 Pharmacode 	Scene	
					Reverse (Other than PDF417, Micro- PDF417)	Sets a normal or reverse image.	Normal (Default)Reverse	Scene	
					Code color (Other than PDF417, Micro- PDF417)	Sets the code color.	 Black (Default) White 	Scene	p. 196
					Grid correc- tion (Micro QR Codes only)	Set whether grid correction is ON or OFF.	• ON • OFF (Default)	Scene	
					Shape (for DataMatrix Only)	Sets the code shape.	Square (Default)SquareRect.	Scene	
					Print quality (Data Matrix only)	Sets print quality evaluation ON/OFF.	• ON • OFF (Default)	Scene	
					Timeout	Sets the timeout time for read pro- cessing.	1 to 9999 ms (Default: 9999)	Scene	
				Con	tinuous test	Same as [Continuous test] on the [Test] Tab Page.		p. 340
			(DPM)* ³	Insp	. region	Moves the measurement region or adjusts the size of the measurement region.		Scene	
			code	Can	nera setup	Same as Camera adjustments on the I	mage Tab Page.	Scene	p. 76
			▲ for 2D-	as. Parameter	Code type	Sets the type of code to read.	 DataMatrix (Default) QR MicroQRCode PDF417 MicroPDF417 	Scene	
				Me	Shape (for DataMatrix only)	Sets the code shape.	Square (Default)Rectangle	Scene	-
					QR Code Model (for QR Code only)	Sets the QR code model.	 Model 1 Model 2 Auto (Default) 	Scene	p. 210
					ECC Level (for QR Code only)	Sets the error correction level (i.e., the ECC level).	 L (7%) M (15%) Q (25%) H (30%) Auto (Default) 	Scene	

		Me	nu	comr	mand	Description	Setting range	Data	
Inspection		Teach	for 2D-code (DPM)* ³	Meas. Parameter	Cell (for DataMatrix and QR Code only)	Sets the number of cells in the code.	For QR codes 21×21 , 25×25 , 29×29 , 33×33 , 37×37 , 41×41 , 45×45 , 49×49 , 53×53 , 57×57 , or Auto (defalut) For square data matrices 10×10 , 12×12 , 14×14 , 16×16 , 18×18 , 20×20 , 22×22 , 24×24 , 26×26 , 32×32 , 36×36 , 40×40 , 44×44 , 48×48 , 52×52 , 64 64 , or Auto (Default) For rectangular data matrices 8×18 , 8×32 , 12×26 , 12×36 , 16×36 , 16×48 , or Auto	Scene	
					Auto length (Except for when the number of cells is set to automatic for data matrices or QR codes.)	Sets whether the code size is detected automatically.	 Yes (Default) No 	Scene	
					Reverse	Sets a normal or reverse image.	 Normal Reverse Auto (Default) 	Scene	-
					Code color	Sets the code color.	BlackWhiteAuto (Default)	Scene	p. 210
					Grid correction	Set whether grid correction is ON or OFF.	ON OFF (Default)	Scene	
					Fast mode	Sets whether to use the Fast Mode. Reading time is reduced if Fast Mode is used.	YesNo (Default)	Scene	
					DPM print quality (Data Matrix only)	Sets print quality evaluation ON/OFF.	ONOFF (Default)	Scene	
					Timeout	Sets the timeout time for read pro- cessing.	0 to 9999 ms (Default: 9999)	Scene	
				Con	tinuous test	Same as [Continuous test] on the [Test] Tab Page.		p. 340

		Me	enu	command	Description	Setting range Data		
nspection	Settings	Teach	search* ²)	Model region			Scene	p. 224 p. 244 p. 225
_			h III*2, Sensitive	Add	Used to specify the region of the image to register as the model with a	• Rectangle • Ellipse • Wide circle • Polygon	Scene	p. 225
			searc	Delete	combination of figures.		Scene	
			ape s	Сору			Scene	
			, Sh	Console			Scene	p. 227
			rch II*2	OR/NOT		OR (Default)NOT	Scene	p. 226
			ape sea	One/All	-	One (Default)All	Scene	
			Search* ² , Sh	Insp. region	Adjusts the size and position of the measurement region.		Scene	p. 227
			•	Detection point	You can specify which part of the model to detect as coordinates during inspections.		Scene	p. 228
			ge Pitch* ²	Insp. region	Adjusts the size and position of the measurement region, changes the measurement direction, etc.		Scene	p. 279 p. 285 p. 291
			* ² , and Ed	Edge Setting		• 3 x 3/Default)		
			e Width	Mask size	Select the pixel size to be used at	• 5 × 5 • 7 × 7		
			sition* ² , Edg	Edge level auto	The [Edge level] can be set automati- cally by selecting ON. If edge recogni- tion results are not good with this setting, set to OFF.	ON (Default)OFF		p. 239
			for Edge Po:	Edge level	This function will be enabled if you un- check [Auto] check box. Set the lower limit to recognize the [Edge level]. Edges higher than set value are recognized. Decrease the setting value when it is difficult to find edges. Increase the setting value when the effect of noise is high.	0 to 1024 (Default: 20)	Scene	
				Noise Removal Level	Spesify the upper value to remove noise.	0 to 100 (Default: 0)		
				Disp. Image Selection	Select the displayed image.	 Meas. Img. Meas. Img.+Model Img (Default) Edge Image Edge Img.+ Model Img. 		
				Insp. region	Adjusts the size and position of the measurement region, changes the measurement direction, etc.		Scene	
				Color ON/OFF (for Edge width and Edge position Only)	Sets whether to specify an edge color.	• ON • OFF(Default)		p. 278

		Me	enu	command	Description	Setting range	Data	
Inspection	Settings	Teach	Edge Pitch*2	Set color	Specifies the color of the image for edge detection (i.e., the border between the measurement object and background).			
			Edge Width* ² , and	Color palette	Displays a palette for color specifica- tion.	R: 0 to 255 B: 0 to 255 G: 0 to 255		
			for Edge Position* ² , I	Detection mode	Select the situation when the Edge is detected.	 Color IN (Default) Color OUT 		
			eling*2	Insp. region	Adjusts the size and position of the measurement region.		Scene	p. 308 p. 320
			, Labe	Set color	The color for which to find the area is specified.		Scene	
			for Area*2	Color palette	Displays a palette for color specifica- tion.	 Hue: 0 to 359 Saturation: 0 to 255 Brightness: 0 to 255 Exclusion: ON or OFF Color inv.: Yes or No (Default) 	Scene	p. 305
				Display Setting	Specifies the type of image to display on the color specification display to check on the image the color that was set for the reference color.	Measurement Image, All Color Image (Default) Selected Color Image Binary Image	Scene	p. 314
				Background color	Specifies the background color of the extracted image.	 Black (Default) White Red Green Blue 	Scene	-
			for Color Data*2	Insp. region	Moves the measurement region or adjusts the size of the measurement region.		Scene	p. 299
	ł	Juo	dger	nent			Scene	
			(OCR*4)	Similarity	Sets the similarity of the read charac- ters that is to be judged as OK.	0 to 100 (Defaults: lower limit: 60 upper limit: 100)	Scene	
				Stability	Sets the stability of the read characters that is to be judged as OK. If there is more than one candidate for the same character, the difference between the first and second candidates is numeri- cally expressed by the stability.	0 to 100 (Defaults: lower limit: 10 upper limit: 100)	Scene	p. 146
				Read Char. Str L1 to Read Char. Str L4	Display the read character string.		Scene	
				Verif. Str L1 to Verif. Str L4	Display the verification string.		Scene	İ
				Character Count	Set the number of character that judg- ment is OK.	0 to 32 (Defaults: lower limit: 0 upper limit: 32)	Scene	1

		Me	enu	command	Description	Setting range	Data	
ection	ettings	ement	-code	Num. of char.	Displays the number of characters that were read.			
lnsp	ő	Judg	2D	Characters	Displays the character string that was read.			
				Overall quality	Displays the evaluation value of over- all quality.	0 to 4		
				Decode	Displays the evaluation value of decode.			
				Cell Contrast	Displays the evaluation value of cell contrast.			
				Cell Modulation	Displays the evaluation value of cell modulation.			
				Fixed pattern damage	Displays the evaluation value of fixed pattern damage.			p. 193
				Axial nonunifor- mity	Displays the evaluation value of axial nonuniformity.			
				Grid nonunifor- mity	Displays the evaluation value of grid nonuniformity.			
				Unused err. Corr.	Displays the evaluation value of unused error correction.			
				Print scale	Displays the evaluation value of the print scale.			
				Print scale X	Displays the evaluation value of print scale X.			
				Print scale Y	Displays the evaluation value of print scale Y.			
			(DPM)*3	Contrast	Sets the upper and lower limits of the contrast that is to be judged as OK.	0 to 100 (Defaults: lower limit: 0 upper limit: 100)	Scene	
			2D-code	Focus	Sets the upper and lower limits of the focus that is to be judged as OK.	0 to 100 (Defaults: lower limit: 0 upper limit: 100)	Scene	
				Cell Recog. Rate	Sets the upper and lower limits of the cell recognition rate that is to be judged as OK.	0 to 100 (Defaults: lower limit: 0 upper limit: 100)	Scene	
				Num. of char.	Displays the number of characters that were read.			
				Characters	Displays the character string that was read.			
				Cell size	Outputs the number of pixels per cell of the scanned code.			
				Overall quality	Displays the evaluation value of over- all quality.	0 to 4		p. 205
				Decode	Displays the evaluation value of decode.			
				Cell Contrast	Displays the evaluation value of cell contrast.			
				Cell Modulation	Displays the evaluation value of cell modulation.			
				Fixed pattern damage	Displays the evaluation value of fixed pattern damage.			
				Axial nonunifor- mity	Displays the evaluation value of axial nonuniformity.			
				Grid nonunifor- mity	Displays the evaluation value of grid nonuniformity.			
				Unused err. Corr.	Displays the evaluation value of unused error correction.			1

	M	enu	command	Description	Setting range	Data	
spection Settings	dgement	earch* ²)	Correlation	Sets the correlation OK range.	0 to 100 (Defaults: Lower limit: 60 Upper limit: 100)	Scene	
드	'n٢	sitive s	Position X	Sate the position OK range	(Defaults: Lower limit: –99,999.9999 Upper limit: 99,999.9999)	Scene	-
		l* ² , Ser	Position Y	Sets the position OK range.	(Defaults: Lower limit: -99,999.9999 Upper limit: 99,999.9999)	Scene	-
		ape search II* ² , Shape search I	Density deviat. (Sensitive search only)	Set the density deviation OK range.	 Color image Range: 0 to 221 Defaults: Upper limit: 221 Lower limit: 0 Monochrome image Range: 0 to 127 Defaults: Upper limit: 127 Lower limit: 0 	Scene	p. 218 p. 234 p. 262
		(Search ^{*2} , Sha	Angle	Sets the angle OK range.	–180 to 180 (Defaults: Lower limit: –180 Upper limit: 180)	Scene	
			Count	Sets the count OK range.	0 to 32 (Default: 0)	Scene	-
		position* ²)	Offset amount (Edge position only)	Sets the upper/lower limit range for the amount of position deviation considered to be OK.	-99,999.9999 to 99,999.9999 (Defaults: Lower limit: -1,640 Upper limit: 1,640)	Scene	
		(Edge	Position X	Sets the position OK range.	-99,999.9999 to 99,999.9999 (Defaults: Lower limit: -99,999.9999 Upper limit: 99,999.9999)	Scene	p. 274
			Position Y		-99,999.9999 to 99,999.9999 (Defaults: Lower limit: -99,999.9999 Upper limit: 99,999.9999)	Scene	-
		(Edge width* ²)	Edge width	Sets the Edge width OK range.	 When the result type is set to absolute value: Range: 0.0000 to 99,999.9999 Defaults: Upper limit: 99,999.9999, Lower limit: 0.0000 When the result type is set to relative values: Range: -99,999.9999 to 99,999.9999 Defaults: Upper limit: 99,999.9999 Lower limit: -99,999.9999 When the result type is set to ratios: Range: 0.000 to 999.9999(%) Defaults: Upper limit: 99.9999 Lower limit: 0.000 	Scene	p. 284

		Me	enu	command	Description	Setting range	Data	
Ispection	Settings	Idgement	e pitch* ²)	Edge pitch		Range: 0 to 1000 Defaults: Lower limit: 0 Upper limit: 1000	Scene	
-		٦L	(Edg	Average pitch			Scene	
				Max. pitch (maximum pitch)			Scene	+
				Min. pitch (minimum pitch)	Sets the Edge pitch OK range.	Range: 0.0000 to 99,999.9999 Defaults: Lower limit: 0.0000 Upper limit: 99.999.9999	Scene	p. 289
				Average width			Scene	ł
				Max. width (maximum pitch)			Scene	
				Min. width (minimum pitch)	-		Scene	
			olor Data* ²)	Color difference (Color images only)	Sets the upper and lower limits of the difference between the average color and reference color that is to be judged as OK.	0.0000 to 442.0000 (Defaults: Lower limit: 0 Upper limit: 442)	Scene	
			0	Color deviation (Color images only)	Set the upper and lower limits of the range of the deviation in the region that is to be judged as OK.	0.0000 to 221.0000 (Defaults: Lower limit: 0 Upper limit: 221)	Scene	
				R average (Color images only)	Set the difference in the average value of the R (red) component that is to be judged as OK.	0.0000 to 255.0000 (Defaults: Lower limit: 0 Upper limit: 255)	Scene	
				G average (Color images only)	Set the difference in the average value of the G (green) component that is to be judged as OK.	0.0000 to 255.0000 (Defaults: Lower limit: 0 Upper limit: 255)	Scene	p. 296
				B average (Color images only)	Set the difference in the average value of the B (blue) component that is to be judged as OK.	0.0000 to 255.0000 (Defaults: Lower limit: 0 Upper limit: 255)	Scene	
				Density average (monochrome images only)	Sets the upper/lower limit range for the density average in the measurement region.	0 to 255 (Defaults: Lower limit: 0 Upper limit: 255)	Scene	
				Density deviat. (monochrome images only)	Sets the upper/lower limit range for the density deviation in the measurement region.	0 to 127 (Defaults: Lower limit: 0 Upper limit: 127)	Scene	
			(Area* ²)			When the result type is set to abso- lute value: Range: 0.0000 to 999,999,999,9999 Defaults: Upper limit: 999,999,999,9999 Lower limit: 0.0000 When the result type is set to relative values:		
				Area	Set the upper and lower limits for an OK judgement.	Range: -999,999,999.9999 to 999,999,999.9999 Defaults: Upper limit: 999,999,999.9999, Lower limit: -999,999,999,999.9999	Scene	p. 303
						When the result type is set to ratios: Range: 0.0000 to 999.9999(%) Defaults: Upper limit: 999.9999 Lower limit: 0.0000		
				Gravity X	Set the upper and lower limits of the range of gravity X that is to be judged as OK.	Range: -99,999.9999 to 99,999.9999 Defaults: Upper limit: 99,999.9999 Lower limit: -99,999.9999	Scene	
				Gravity Y	Set the upper and lower limits of the range of the gravity Y that is to be judged as OK.	Range: -99,999.9999 to 99,999.9999 Defaults: Upper limit: 99,999.9999 Lower limit: -99,999.9999	Scene	

		Me	enu	command	Description	Setting range	Data	
spection	Settings	dgement	beling* ²)	Number of labels	Set the upper and lower limits of the number of labels for an OK judgement.	0 to 100 (Defaults: Upper limit: 100 Lower limit: 0)	Scene	
Ē		ηſ	(La	Total label area	Set the upper and lower limits of the total label area for an OK judgement.	0 to 999,999,999,999 (Defaults: upper limit: 999,999,999.999 lower limit: 0)	Scene	-
				Area	Sets the upper and lower limits of the area for an OK judgement.	0 to 999,999,999,999 (Defaults: upper limit: 999,999,999,999 lower limit: 0)	Scene	-
				Gravity X	Set the upper and lower limits of the gravity X for an OK judgement.	–99,999.9999 to 99,999.9999 (Defaults: upper limit: 99,999.9999 lower limit: –99,999.9999)	Scene	p. 313
				Gravity Y	Set the upper and lower limits of the gravity Y for an OK judgement.	–99,999.9999 to 99,999.9999 (Defaults: upper limit: 99,999.9999 lower limit: –99,999.9999)	Scene	-
			•	Master angle	Sets the upper and lower limits of the master angle for an OK judgement.	–180 to 180 (Defaults: upper limit: 180 lower limit: –180)	Scene	
				Result type (Except for OCR, 2D-code (DPM), Edge Pitch, and Label- ing)	You can change the output form of the measurement values.	 Absolute value (Default) Relative value Ratio (Edge Position or Area only) 	Scene	p. 218 p. 234 p. 262 p. 274 p. 284 p. 303
				Display setting	You can change the parameters of the judgment conditions.	The names of the judgment conditions are displayed.	Scene	p. 218 p. 234 p. 262 p. 274 p. 284 p. 303
				Auto adjustment (Except for Labeling and Edge Pitch)	Automatically adjusts the judgment parameters by using actual work- pieces which are considered as good or faulty products.	OK TeachNG Teach	Scene	p. 346
				Judgment Mode (Only for OCR)	Select the Judgment mode.	 All (Default) Individual	Scene	p. 146
				Verif. master data	Sets whether to verify the read charac- ter string against a character string that is registered in the master data. Sets the character string to use to ver- ify the read character string against the master data.	OFF (Default) Master data 0 to 31	Scene	p. 148

		Me	enu	comr	man	ıd	Description	Setting range	Data	
Ispection	Settings	fication*4	(OCR*4)	Mate	chin	g Mode	Register the loaded strings to verify with the specified string.	 Direct Input (Default) Calender Matching Code Matching 	Scene	p. 148
-	:	Veri		Mas regis (only Inpu	ter o st. / Di t)	data rect	Registers a character string in the master data.	Master data 0 to 31 • OFF	Scene	
				[MENU]	•	Auto Insp. region	Reads a character string from an input image and registers it in the master data.		Scene	
					Manual	L.1 to L.4	A character string is entered directly in the master data.	32 alphanumeric characters	Scene	p. 148
					Item ref.	Ref. data	Registers the immediately preceding read results as a verification character string.		Scene	
						L.1 verif. range to L.4 verif. range	Sets the beginning and end characters to verify.	1 to 1024 (Defaults: beginning: 1, end: 1024)	Scene	
						Copy Delete	Copies or clears registered master data.			
				Aut	o te	each No.	Sets the character string in the master data in which to automatically register the read result for teaching from an external device.	OFF Master data 0 to 31	Scene	
				Mas ist. (dar l	ter o only Mat	data reg- / Calen- ching)	Registers the Master data.		Scene	
				L1	to L	_4	Enter the Master data.			
				Mas ist. (Mate	ter only chin	data reg- / Code g)	Registers the Master data.			
				Ma reç	aste gist.	r data	Registers the latest result as a verifi- cation string.		Scene	
				Ve Se	rif. I lect	_ine	Select the Line to verify.	Check Unchecked (Default)	Scene	
				Pa L1	rtial to L	verif _4	Set the beginning and end lines to ver- ify.	1 to 1024 (Defaults: beginning: 1, end: 1024)	Scene	

		Me	enu	cor	nm	nano	d	Description	Setting range	Data	
Inspection	Settings	Verification*4	* ³ , 2D-code (DPM)* ³)	Ve da	rif. ta	ma	aster	Sets whether to verify the read charac- ter string against a character string that is registered in the master data. Sets the character string to use to ver- ify the read character string against the master data.	 OFF All master data (Default) Master data 0 to 31 	Scene	
			* ³ , 2D-code	Ma ist.	st	er d	lata reg-	Registers a character string in the master data.	Master data 0 to 31	Scene	
			code		Ĺ.		Auto				-
			(Bar			•	Insp. region	Reads a character string from an input image and registers it in the master data.		Scene	
						Manual	L.1 to L.4	Registers a character string directly in the master data.	32 alphanumeric characters	Scene	p. 182 p. 194 p. 207
						ef.	Ref. data	Registers the immediately preceding read results as a verification character string.		Scene	
						Item re	Line 1 verif. range to Line 4 verif. range	Sets the beginning and end characters to verify for each line.	1 to 1024 (Defaults: beginning: 1 end: 1024)	Scene	-
					-	[Copy Delete	Copies or clears registered master data.			
	etails	CR*4)	Me	eas.	Pa	arar	meter	Same as [Teach] – [Meas. Parameter] under [Modify] or [Inspection].		Scene	p. 156
		Ō	Dio	ctior	nar	y pa	aram.	Sets the model dictionary to register custom characters.		Scene	
				Die	ctic	onai	ry ref.	Sets the dictionary data to use for character recognition.	• None (Default) Dictionary data 0 to 31	Scene	
				Inc	livi	idua	al char.				Ť
				Ν	lur	nbe	er	When you have number, alphabet, or symbol that want to exclude touch	0 to 9	Scene	
				A	lpl	hab	et	Individual char, and then unchecked	A to Z		-
				s	yn	nbo	I		: (colon) / (slash) () (parentheses)		p. 169
			Da	te F	Par	am	eters				4
				tting			Year		0 to 99 (Default: 0)	Scene	-
				od Se		ľ	Month	Set the period setting of the current	0 to 99 (Default: 0)		-
				Peric			Day	date and time.	-999 to 999 (Default: 0)		

		M	enu	com	mand	Description	Setting range	Data		
tion	ails	۲*4)	Da	te Pa	arameters					
Inspect	Det	(OCF			Zero Sup- press	Select the method for Zero Suppress.	0 (Default)Blank			
				Setting	Date Calc. Order	Select the calculate method when the Period Setting is set,	 Month → Day (Default) Day → Month 			
				Date S	Month end adjust	Select the adjust method when not exist day is calculated.	 Last day of current month (Default) First day of next month Gap day of next month 			
				Setting	Auto Update	Set the Update method.	 Don't Update Fist Update Always Update (Default) 	Scene	p. 159	
				mmon 3	Back Margin	Set the Time Margin that is before the current time.	0 to 99 (Default: 0)		-	
				ŏ	Ahead Margin	Set the Time Margin that is after the current time.	0 to 99 (Default: 0)		_	
			Co	de da	ata					
				File	name	Displays the file name of code data.		Scene		
			put parameter	Refl	ect	Specifies whether to reflect the judg- ment results of an inspection item in the overall judgment.	Yes (Default)No	Scene	p. 146	
			Out	Errc	or string	Sets the character string that is output for read errors.	20 alphanumeric characters (Default: NG)	Scene	p. 158	
			N	leas.	Parameter	Same as [Teach] – [Meas. Parameter] under [Modify] or [Inspection].		Scene	p. 186	
		ar code ^{*3})	oarameter	Reflect		Specifies whether to reflect the judg- ment results of an inspection item in the overall judgment.	• Yes (Default) • No	Scene	p. 185	
		(E	Output p	Errc	or string	Sets the character string that is output for read errors.	20 alphanumeric characters (Default: NG)	Scene	p. 187	
			N	leas.	Parameter	Same as [Teach] – [Meas. Parameter] under [Modify] or [Inspection].		Scene	p. 196	
		2D-code ^{*3})	barameter	Refl	ect	Specifies whether to reflect the judg- ment results of an inspection item in the overall judgment.	Yes (Default)No	Scene	p. 196	
		(7)	Output p	Errc	or string	Sets the character string that is output for read errors.	20 alphanumeric characters (Default: NG)	Scene	p. 198	
			N	leas.	Parameter	Same as [Teach] – [Meas. Parameter]	under [Modify] or [Inspection].	Scene	p. 210	
		code (DPM)* ³)	t parameter	Reflect		Specifies whether to reflect the judg- ment results of an inspection item in the overall judgment.	Yes (Default)No	Scene		
		(2D-cod	Output para	Output parar	Errc	or string	Sets the character string that is output for read errors.	20 alphanumeric characters (Default: NG)	Scene	p. 212

		Me	enu	command	Description	Setting range	Data	
ection	Details	arch* ²)	ameter	Rotation	Sets the angle range for the registered	No (Default)Yes	Scene	p. 222
lnsp		(Sea	lodel para	Angle range	model.	–180 to 180 (Defaults: Lower limit: –180 Upper limit: 180)	Scene	p. 222
			2	Stability	Sets whether priority is given to mea- surement stability or speed.	1 to 15 (Default: 12)	Scene	p. 223
				Accuracy	Sets whether priority is given to mea- surement position accuracy or speed.	1 to 3 (Default: 2)	Scene	p. 223
			Meas. Parameter	Sub-pixel	You can increase the accuracy of measurement positioning.	No (Default)Yes	Scene	p. 219
			meter	Extraction condi- tion			Scene	
			leas. Para	Candidate level	Sets the detection target to only objects with a correlation above the specified candidate level.	0 to 100 Default: 80	Scene	
			2	Extraction X	Results are output only for objects with a measured X coordinate that is within this range.	-999,999,999,999 to 999,999,999,999 (Defaults: Lower limit: -999,999,999,999,999 Upper limit: 999,999,999,999)	Scene	p. 221
				Extraction Y	Results are output only for objects with a measured Y coordinate that is within this range.	-999,999,999.9999 to 999,999,999.9999 (Defaults: Lower limit: -999,999,999.9999 Upper limit: 999,999,999.9999)	Scene	
				Detection count	Sets the maximum number of detec- tion results to output.	1 to 32 Default: 32	Scene	-
				Multi-point out- put	Sets whether to output only the result with the highest correlation, or to out- put all results that meet the specified extraction conditions.	ON (Default)OFF	Scene	p. 221
				Sorting method	Sets the sort condition to use when multiple measurement results meet the extraction conditions.	 Corr. ascending order Corr. descending order (Default) Pos.X ascending order Pos.X descending order Pos.Y ascending order Pos.Y descending order 	Scene	p. 220
			Output parameter	Reflect	You can specify whether to reflect the ment results of an inspection item in the overall judgement.	• None • Yes (Default)	Scene	p. 222

		Me	enu	command	Description	Setting range	Data	
nspection	Details	arch III* ²)	barameter	Rotation (Only for Shape Search III)	Sets the angle range for the registered	NoYes (Default)	Scene	p. 238
		Shape se	Model p	Angle range		–180 to 180 (Defaults: Lower limit: –180 Upper limit: 180)	Scene	p. 238
		arch II* ² (Model mode	You can change to a mode that makes it easier to search for images similar to a model.	FastStable (Default)	Scene	p. 223
		abe se	neter	Extraction condi- tion			Scene	
		(Sh	Meas. Parar	Candidate level	Sets the detection target to only objects with a correlation above the specified candidate level.	0 to 100 Default Shape Search II: 80 Shape Search III: 50	Scene	
				Extraction X	Results are output only for objects with a measured X coordinate that is within this range.	-999,999,999.9999 to 999,999,999.9999 (Defaults: Lower limit: -999,999,999.9999, Upper limit: 999,999,999.9999)	Scene	p. 237
				Extraction Y	Results are output only for objects with a measured Y coordinate that is within this range.	-999,999,999,999,999 to 999,999,999,999 (Defaults: Lower limit: -999,999,999,999, Upper limit: 999,999,999,9999)	Scene	
				Detection count	Sets the maximum number of detec- tion results to output.	1 to 32 Default : 1	Scene	
				Sorting method	Sets the sort condition to use when multiple measurement results meet the extraction conditions	 Corr. ascending order Corr. descending order (Default) Pos.X ascending order Pos.X descending order Pos.Y ascending order Pos.Y descending order Pos.Y descending order 	Scene	p. 235
				Overlay Judgment (only for Shape Search III)	When you want to find the detected result when the detected result is over- lapped, set this parameter to ON.	• ON • OFF (Default)	Scene	
				Overlay Rejection (only for Shape Search III)	Set the range to remove overlapped target.	0 to 100 (Default: 100)	Scene	- p. 236
				Edger level auto (only for Shape Search III)	The [Edge level] can be set automati- cally by selecting ON. If edge recognition results are not good with this setting, set to OFF.	ON (Default)OFF	Scene	
				Edge level (only for Shape Search III)	This function will be enabled if you un- check [Auto] check box. Set the lower limit to recognize the [Edge level]. Edges higher than set value are recognized. Decrease the setting value when it is difficult to find edges. Increase the setting value when the effect of noise is high.	0 to 1024 (Default: 70)	Scene	p. 239
				Acceptable Dist. Level (only for Shape Search III)	Set the acceptable level of distortion.	• Low • Medium • High	Scene	p. 240
			Dutput parameter	Reflect	You can specify whether to reflect the judgement results of an inspection item in the overall judgement.	NoYes (Default)	Scene	p. 238

	l	Mer	u command	Description	Setting range	Data	
Inspection	Details	arcn ^{~-})	Rotation		No (Default)Yes	Scene	p. 266
			Angle range	Sets the angle range for the registered model.	-180 to 180 (Defaults: Lower limit: -180 Upper limit: 180)	Scene	p. 266
	ç	(Ser	Sub-model num- ber	You can change the number of divi- sions of the registered model.	3 × 3 5 × 5 (Default) 9 × 9	Scene	p. 265
			Plain inspection	Enables or disables inspecting plain sections.	YesNo (Default)	Scene	p. 214
			Sub-pixel	You can increase the accuracy of measurement positioning.	No (Default)Yes	Scene	p. 264
		:	Candidate level	Sets the detection target to only objects with a correlation above the specified candidate level.	0 to 100 (Default: 70)	Scene	p. 264
			Reflect	You can specify whether to reflect the judgement results of an inspection item in the overall judgement.	• No • Yes (Default)	Scene	p. 263
	1-1-1-	pitch"")	Edge level (Color image only)	Sets the color density level of the edge.	Color difference (%): 0 to 100 (Default: 50) Color difference: 0 to 442 (Default: 20)	Scene	p. 275 p. 266 p. 276
	- 1	on"", Eage	Noise level (Color image only)	Sets the color density level to treat as noise.	0 to 442 (Default: 5)	Scene	p. 275 p. 266 p. 276
		Edge positio	Measurement method (mono- chrome image only)	Specifies the edge detection method.	 Projection (Default) Differentiation 	Scene	p. 275 p. 266 p. 276
	C+ III :	e wiath" ⁻ ,	Density change (monochrome image only)	Specifies the density direction that is detected.	 Light to Dark (Default) Dark to Light 	Scene	p. 275 p. 266 p. 276
	ŕ	(Eag	Edge level (monochrome image only)	Specifies the density level that is regarded as an edge.	Density diff. (%): 0 to 100 (Default: 50) Density diff.: 0 to 255 (Default: 20)	Scene	p. 275 p. 266 p. 276
			Noise level (monochrome image only)	Specifies the density change level that is regarded as an edge.	0 to 255 (Default: 5)	Scene	p. 275 p. 266 p. 276
			Reflect	You can specify whether to reflect the judgment results of an inspection item in the overall judgment.	• No • Yes (Default)	Scene	p. 275 p. 266 p. 276
	() 		Reflect	You can specify whether to reflect the judgement results of an inspection item in the overall judgement.	• No • Yes (Default)	Scene	

		Me	nu	command	Description	Setting range	Data	
Inspection		(Area* [∠])	Meas. Parameter	Fill profile	You can set how to process holes for an Area inspection item.	 None (Default) Filling up holes Fill Outline 	Scene	p. 308
			Output parameter	Reflect	You can specify whether to reflect the judgement results of an inspection item in the overall judgement.	• No • Yes (Default)	Scene	p. 319
	Ċ	ing*<)	meter	Filling up holes	Sets how to process areas surrounded by the specified color.	YesNo (Default)	Scene	p. 308
	:	(Labeli	Meas. Para	Extract image	Select this option if there are areas of the specified color inside the measure- ment region that you do not want to measure.	YesNo (Default)	Scene	p. 317
				Extraction condi- tion			Scene	
				Number of labels	Set the maximum number of labels to detect.	Range: 1 to 100 Default: 100	Scene	-
				Area	Specify the area range to judge as a label.	Range: 0 to 999,999,999.9999 (Defaults: Lower limit: 0 Upper limit: 999,999,999.9999)	Scene	p. 317
				Gravity X	Specify the gravity X position to judge as a label.	Range: -99,999,999,9999 to 999,999,999,999 (Defaults: Lower limit: 0 Upper limit: 999,999,999,9999)		p. 218
				Gravity Y	Specify the gravity Y position to judge as a label.	Range: -999,999,999.9999 to 999,999,999.999 (Defaults: Lower limit: 0 Upper limit: 999,999,999.9999)		p. 218
				Sorting method	Set the condition to use for label num- ber reassignment.	Area ascending order Area descending order (Default) Pos. X ascending order Pos. X descending order Pos. Y ascending order Pos. Y descending order	Scene	p. 319
			Output parameter	Reflect	You can specify whether to reflect the judgement results of an inspection item in the overall judgement.	• No • Yes (Default)	Scene	p. 319

		Me	enu	command	Description	Setting range	Data	
lation	ettings	ssion	ENU	Expression 0 to expression 31	Sets the number of the expression for which to set a calculation.		Scene	
Calcu	s	Expre	[N	Expression set- tings	Sets the expressions.		Scene	p. 323
				Data	Uses the measurement result of other items.	Inspection item calculation symbols (() / * . , + TJG)	Scene	p. 330
				Const.	Inputs constants or mathematical operators.	0 to 9, ., calculation symbol (() / * ? , + TJG)	Scene	p. 330
				Math.	Uses functions in expressions.	SIN, COS, ATAN, AND, OR, NOT ABS, MAX, MIN, MOD, SQRT, ANGL (angle of straight line joining two points (center of gravity and model center)), DIST (distance between two points), calculation symbols (() / * . , + TJG)	Scene	p. 330
				Rename	Deletes/copies the expression or		Scene	
				Сору	changes the expression name.			p. 330
				Delete				
		Juo	lger	nent	Specifies the parameters for judg- ment of results.		Scene	p. 323
	Details	Output parameter	Reflect		You can specify whether to reflect the judgment results of a calculation in the overall judgment.	• No • Yes (Default)	Scene	p. 323
details	Ma (No	ix C orma	oun al re	t try)	Sets the number of retries.	0 to 20 Default: 4	Scene	
Retry o	Inte (No	erva orma	l al re	try)	Sets the retry interval (msec).	32 to 999 Default: 100	Scene	
	Brig spe (Ex	ghtr eed (pos	ness step sure	step or Shutter retry)	Sets the exposure time step (msec).	Brightness step: 1 to 20, Default 5 shutter speed step: 0.01 to 1.00 (Default: 0.30)	Scene	*1
	Inc (Ex	rem	ement count osure retry) Sets the increment count for the brightness (shutter speed) step.			0 to 10 (Default: 2)	Scene	
	De (Ex	crer (pos	nen sure	t count retry)	Sets the decrement count for the brightness (shutter speed) step.	0 to 10 (Default: 2)	Scene	

Refer to FQ2-S/CH Series User's Manual for Communications Settings (Cat. No. Z338). Not supported on the FQ2-CH Series. Not supported on the FQ2-S1/S2/S3 Series or FQ2-CH Series. Not supported on the FQ2-S1/S2/S3 Series. *1 *2 *3 *4

In/Out Tab Page

	N	Men	u comm	and	Description	Setting range	Data	
Log setting	Sta	atist	ical data	1	Sets whether to record the number of measurements and the number of NG overall judgments.	ON (Default)OFF	System	p. 402
	Ima	age	logging		Sets the parameter to log measurement image data.	All Only NG None (Default)	System	p. 395 p. 402
	Da gin	ta lo g	og- Co	ndition	Sets the parameter to log measurement data from inspection items.	All Only NG None (Default)	System	p. 395
			Se	ect data	You can select the parameters to log from the parameters in the filter items, position compensation items, inspection items and expression that are set.	Parameter names for the filter items position compensation items, inspection items and expression that are set	System	p. 396
	De	lete	Log		Resets the log data without turning OFF the power supply.			p. 403
I/O setting	I/O setting	Output	OUT0 to OUT2	Control signal Item judge- ment Expres- sion judge-	Specify the output signal to OUT0 to OUT2. When model FQ-SDU is connected, OUT0 to OUT2 are not displayed.	OR (Total judgement (Default assignment: OUT0)) BUSY ERROR (Default assignment: OUT2) READY (Default assignment: OUT1) RUN STG OR0 (Item0 judgement) to OR31 (Item31 judgement) Exp.0 judgement to EXP. 31 judgement	System	*1
			OR ou	put	OK: ON NG: ON (Default)		System	* ¹
			Output	mode	You can set the output mode for the OR signal and for output signals to which judgements are assigned.	 One-shot output Level output (Default) 	System	* ¹
			Output	delay	When one-shot output mode is selected, this parameter sets the delay from when measurement processing is completed until when the OR signal turns ON.	0 to 1,000 ms (Default: 0 ms)	System	*1
			Output	time	When one-shot output mode is selected, this parameter sets the time that the OR signal is ON.	1 to 1,000 ms (Default: 5 ms)	System	
			BUSY	output	Specifies when to turn OFF the BUSY signal after starting measurement processing.	 Measurement (Default) Data logging Image logging Result display 	System	*1

	Ν	Men	u co	ommand	Description	Setting range	Data	
setting	setting	Output	OL	IT0 Polarity	You can change the polarity of the output signals that are assigned to OUT0 to	Positive (Default)Negative	System	* ¹
I/O	I/O		OL	IT1 Polarity	assigned to the output). When FQ-SDU is connected, OUT0 to 2	Positive (Default)Negative	System	
			OL	IT2 Polarity	will not appear.	Positive (Default)Negative	System	
			BU	SY LED	You can change the BUSY indicator to a RUN indicator.	BUSY (Default)RUN	System	* ¹
			Ou	tput control	You can select the data output method. (Only when the FQ-SDU1□ is con- nected.)	None (Default)HandshakingSync. Output	System	* ¹
			Ou	tput period	Sets the period for outputting measure- ment results. (Only when the FQ-SDU1 is connected.)	2.0 to 5,000.0 ms 10.0 ms (Default)	System	* ¹
			GA	TE ON delay	Sets the time from when the result is out- put to the parallel interface until the GATE signal turns ON. (Only when the FQ-SDU1□ is con- nected.)	1.0 to 1,000.0 ms 1.0 ms (Default)	System	*1
			Ou	tput time	Sets the time to turn ON the GATE sig- nal. (Only when the FQ-SDU1□ is con- nected.)	1.0 to 1,000.0 ms 5.0 ms (Default)	System	* ¹
			Tin	imeout Sets the timeout time for output control. (Only when the FQ-SDU1□ is con- nected.)		0.5 to 120.0 s 10.0 s (Default)	System	* ¹
			Nu	mber of delay	Set the number of times to ignore the TRIG signal turning ON between when the TRIG signal turns ON and the mea- surement results are output. (Only when the FQ-SDU1□ is con- nected.)	1 (Default) to 15	System	<u></u> *1
			AC pei	K signal ON riod	Sets the output time of the normal exe- cution completion signal for parallel com- mands. (Only when the FQ-SDU is connected.)	1.0 to 1,000.0 ms 5.0 ms (Default)	System	* ¹
			Ou	tput polarity	Sets the ON/OFF polarity for all of the output signals (Only when the FQ-SDU is connected.)	Positive (Default)Negative	System	* ¹
		Input	Inp	ut mode	Specifies whether to use functions other than scene switching for external parallel commands.	Standard mode (Default)Expanded mode	System	<u></u> *1
	ing	put	Ou	tput data set		Data 0 to data 31	Scene	
	a set	a out	[IJ	Data settings			Scene	
	Dutput dat	otocol dat	[MEI	Multi-data setting	Sets data to output to selected data number.	rext strings for the filter items, position compensation items, inspection items and expression that are set	Scene	
	0	Nopr		Rename	Changes the name of the selected data number.	The name can be changed to a name with up to 15 alphanumeric characters.	Scene	* ¹
				Сору	Copies the contents registered in the selected data number to another data number.		Scene	
				Delete	Clears the content of the selected data number.		Scene	

	Ν	Men	u co	omma	and	Description	Setting range	Data	
D setting	a setting	Ou	itpu	t char	acter set	Specifies the output settings for charac- ters read by OCR, Bar code, 2D-code, and 2D-code (DPM).			
ž	utput dat		Str off	ing o	utput on/	Selects whether the string that was read is output.	ONOFF (Default)	Scene	
	õ		Pa off	rtial o	utput on/	Selects whether part of the string is to be specified for output.	ONOFF (Default)	Scene	* ¹
			Ou set	tput s up	string	Species the part of the string that is output.	1 to 1024 (Defaults: beginning: 1, end: 1024)	Scene	
			NG pu	6 Strir t on/o	ng out- ff	Specifies whether NG strings are output.	ONOFF (Default)	Scene	
		Ou	itpu	t form					* ¹
			Ou Pro and (UI	tput f otocol d No- DP) o	orm (No- (TCP) Protocol nly)	Selects the format of the data to be output.	ASCII (Default)Binary	Scene	
			nat is ASCII	Digit ger	s of inte-	Sets the digits of the integer part, including the sign. However, + is not out- put for positive numbers.	1 to 10 (Default: 6)	Scene	
			t forn			output as -999.			
			hen outpui	Digit imal	s of dec-	Sets the output digits for the decimal part. If it is set to 0, the decimal part is rounded off before the data is output.	0 to 4 (Default: 4)	Scene	
			8	Nega	ative	Selects what to display as the sign when the number is negative.	 – (Default) 8 	Scene	<u></u> *1
						Selects the method to adjust unused dig- its on the left in output data.			
				0 suppress		Example: The following examples are for when five integer digits and three decimal digits are set and the data is 100.000. ON: 00100.000 OFF: _100.000 (The underscore indi- cates a space.)	• ON • OFF (Default)	Scene	
		tocol data output	Output form	Format Is ASCII	Field separa- tor	Selects the separator to use between output data.	 None (Default) comma tab, space CR LF CR+LF 	Scene	*1
		Nopro		When Output	Record separa- tor	Selects the separator to use between sets of output data.	 None (Default) comma tab space CR LF CR+LF 	Scene	
				When output format is Binary	Deci- mal output form	Selects the numerical expression for binary output. Fixed-decimal-point data is multiplies by 1,000 and the result is output.	Floating-point decimal or fixed decimal (Default)	Scene	
				Outp (No- (TCF No-F (UDF	out form Protocol P) and Protocol P) only)	Sets whether to output the data.	 Floating-point decimal Fixed decimal (Default) 	Scene	*1

	N	/len	u co	ommand	Description	Setting range	Data	
ting	ut data setting	itput	Ou	tput data set			Scene	
I/O sett	Output data set	s data ou	Ou ter	tput charac- set			Scene	-
	Output	Link data / Fieldbu	Ou	tput format	The same as for no-protocol data output,	above.	Scene	* ¹
-	ed.)	asic	Se	ttings		Data0 to Data15	Scene	
	connecte	ä	4	Settings	Sets the data from the inspection item to judge.	Inspection item text strings	Scene	-
	D is 0			Rename			Scene	
	DU1			Сору	Changes, copies, or clears the data.		Scene	
	S-Q-			Delete			Scene	
	Output(Only when the		Judgement condition	Data 0 to Data 15	Sets the range of the output data to judge OK.	Range: –999,999,999.9999 to 999,999,999.999 Defaults: Upper limit: 999,999,999.999 Lower limit: –999,999,999.9999	9 Scene	·*1
	Par. Jdg (Details	arameter	Reflect	You can specify whether to reflect the judgment results of an inspection item in the overall judgment.	NoYes (Default)	Scene	*1
			Output p	Data output	Sets whether to output the judgment results.	• No • Yes (Default)	Scene	* ¹
	ted.)	asic	Da	ta settings		Data0 to Data31	Scene	
	nnec	ш		Data settings	Sets the output data.	Inspection item text strings	Scene	
	lis co		1	Rename			Scene	* ¹
	DU1			Сору	Changes, copies, or clears the data.		Scene	
	FQ-S			Delete			Scene	
	(Only when the		Output format	Output for- mat	Sets the output form.	Binary(Default) or BCD	Scene	* ¹
	Par. Data Output	Output parameter	Data output	Output form	Sets whether to output the data.	NoYes (Default)	Scene	* ¹
	I/O	mo	nito	r	Used to check I/O connections.			p. 385

*1 Refer to FQ2-S/CH Series User's Manual for Communications Settings (Cat. No. Z338).
Test Tab Page

	ſ	Menu command	Description	Setting range	Data	
Co	ntin	uous test	Used to check the individual judgment results for the inspection items and to adjust the judgment parameters.			
	Gra	aphic	Displays the input image.			p. 340
	Gra	aphics + Details	Displays the inspection item individual judgment results and measurement val- ues.			
	All	results/Region	Displays the inspection item individual judgment results for all inspection items.			p. 349
	Tre	end Monitor	Displays the individual judgment results saved in the Sensor in a trend monitor.			p. 340
	His	stogram	Displays the individual judgment results saved in the Sensor in a histogram.			p. 336
		Model region	Same as for the Search item settings.		Scene	
	4	Insp. region			Scene	
		Adjust judgement	Adjusts judgment parameters without stopping measurements.		Soono	p. 346
		Result type	Specifies the measurement result type.	Absolute value (Default)Relative valueRatio	Scene	p. 346
Continuous tes	•	Display setting	Specifies whether to display individual inspection results.	 Area, Labeling Measurement image All color image (Default) Selected color image Binary image When the Shape Search III Meas. Img. Meas. Img.+Model Img. Edge Image Edge Image. Edge Img.+ Model Img. 	Scene	p. 346
		Auto judgement con- dition setting	Automatically adjusts the judgment parameters by using actual workpieces which are considered as good or faulty products.	OK TeachNG Teach		
		Method	Selects the expression to use to auto- matically adjust the judgment parame- ters.	 Threshold (minimum) Threshold (average) (Default) Threshold (maximum) 		
		Auto display (trend monitor and histo- gram only)			<u>.</u>	n 359
		Display range (trend monitor and histo- gram only)	Same as the trend monitor and histogram	for [Run] Mode.		p. 360
		Number of data (trend monitor only)				p. 358
		Number of data (histogram only)				p. 360
		Erase display				
		Save data	Saves scene data, Calibration data, and system data.			p. 350

Run Tab Page (from Setup Display)

Menu command	Description	Setting range	Data	
Switch to Run mode	Switches to Run Mode.			p. 353



Setup Mode

	ľ	Men	u com	mand		Description	Setting range	Data		
Se	lect	sce	ne							
	Se	lect				Switches to a registered scene.		Scene		
	Re	nam	ne			light to delete serve as shanned the name	15 alphanumeric characters		p. 366	
	Co	ру				of a scene.				
	Cle	Clear								
alibration*2	Se	lect				Sets a registered calibration pattern.	Calibration data 0 to 31			
	Мо	Aodify				Used to edit calibration data.	Calibration data 0 to 31	Calibra- tion data		
0		Sp	ecify p	oint					p. 371	
	•	Reference Sets the type of calibration data to set.		Sets the type of calibration data to set.	Specify point (No. 1 to No. 9)		p. 374			
		Parameter					p. 377			
		•	Modif	ý		Sets the parameters for the calibration data.				
			(Specify point)	•	Specify point coord.	Sets the Camera coordinates.		Calibra- tion data		
			÷			Actual coord.	Sets the Camera coordinates and the actual coordinates.	Point coordinate: 0 to 9999 Actual coordinate: 0 to 99999.9999	Calibra- tion data	p. 371
					Generate parameters	Used to create calibration parameters.		Calibra- tion data		

	ľ	Men	u com	mand		Description	Setting range	Data	
Calibration*2	•	•	nce sampling)	•	Model region	Used to edit the model regions. The procedure is the same as for setting the model region for a Search inspection item.		Calibra- tion data	
			(Refere		Insp. region	Changes the size and position of the mea- surement region.		Calibra- tion data	p. 374
					Actual coord.	Sets the Camera coordinates and the actual coordinates.	Point coordinate: 0 to 9999 Actual coordinate: 0 to 99999.9999	Calibra- tion data	
			(Reference sampling)		Generate parameters	Used to create calibration parameters.		Calibra- tion data	p. 374
			eter)	Coord nate	di-	Sets the positive direction when specifying coordinates.	 Righthand Lefthand (Default) 	Calibra- tion data	
			(Param	Origir	1	Select the location of the origin of the coordinate system.	 Lowerleft Upperleft (Default) Center 	Calibra- tion data	p. 377
				Magn tion	ifica-	Set the actual dimension that corresponds to one pixel.	0.0001 to 9.9999 (Default:1.0000)	Calibra- tion data	
	Cle	ear				Clears the parameter settings for the cali- bration data.			
	Co	opy Copies the calibration data.							
	Re	ename Changes the name of the calibration data.					15 alphanumeric characters max.	Calibra- tion data	
tionary*2	a 0 to 31	[MENU]		Modify		Used to edit the dictionary data in the model dictionary for character recognition using custom characters.		Dictionary data	
odel dic	ary dat		Rename		Э	Changes the name of dictionary data.	15 characters max.	Dictionary data	p. 175
M	iction			Сору		Copies dictionary data.			-
				Clear		Clears the settings of dictionary data.			
e to file	Setting	Sce	ene da	ata		Saves scene data with an SCN file name extension.			
Save	••	Sce	ene gr	oup da	ita	Saves all scene data with an SGP file name extension.			
		Ca	libratio	on data		Saves calibration data with an CLB file name extension.			
		Ca dat	libratio a	on grou	ıp	Saves calibration group data with an CGP file name extension.			
		Dic	tionar	y data*	2	Saves dictionary data with a DIC file name extension.			p. 406
		All	dictio	nary da	ıta* ²	Saves all dictionary data with a DGP file name extension.			
		Co	de da	ta* ²		Saves all dictionary data with a DGP file name extension.			
		Sei	nsor s	ystem	data	Saves system data with csv file name extension.			

	I	Menu com	mand	Description	Setting range	Data	
to file	Setting	All Senso	or data	Saves all Sensor data with a BKD file name extension.			n 406
Save	0,	Touch Fir	nder data	Saves Touch Finder data with an MSD file name extension.			p. 400
	ogging	Statistica	l data	Saves statistical data with a CSV file name extension.			
		Logging i	mage	Saves image data with an IFZ file name extension.			p. 403
		Logging	data	Saves measurement data with a CSV file name extension.			
n file	Sc	ene data		Loads scene data.			
from	Sc	ene group	data	Loads scene group data.			
Load	Ca	libration d	ata	Loads calibration data.			
	Ca	libration g	roup data	Loads calibration group data.			
	Dio	ctionary da	ıta* ²	Loads dictionary data.			
	All	dictionary	data* ²	Loads all dictionary data.			p. 408
	Со	de data* ²		Loads all dictionary data with .csv file name extension.			
	Se	nsor syste	m data	Loads system data.			
	All	Sensor da	ata	Loads all Sensor data.			
	То	uch Finder	data	Loads Touch Finder data.			
sbu	Information			Used to check the Sensor information.			
sor setti		Model		Used to check the model and software version of the connected Sensor.			
Sen		Name		Displays the name of the connected Sen-		System	* ¹
		Numo		sor.			
		MAC add	ress	Used to check the MAC address of the connected Sensor.			-
		•	Rename	Used to change the name of a connected Sensor.	15 alphanumeric characters max.		p. 367
			Memory state	Used to check the status of Sensor mem- ory.			p. 367
	En	ror history	View his- tory	Displays a history of errors that have occurred in the Sensor.			p. 434
			Delete his- tory	Deletes the error history.			p. 434
	Sta tin	artup set- gs	Startup mode	Sets whether the startup scene number is set manually.	ON OFF (Scene number when settings were saved is startup scene number.)	System	n 368
			Startup scene	Set the scene number to use at startup.	Standard models: 0 to 31 Single-function models: 0 to 7 Default: 0	Jystem	p. 500
	Se Tir	nsor Day/ ne	Current Day/Time	Confirms the current day and time infor- mation of Sensor.		System	p. 168
			Auto-Sync with TF	Synchronizes automatically the day and time setting of TouchFinder when the TouchFinder is connected.	ON OFF (Default)	Jystem	p. 167

	N	/len	u com	mand	Description	Setting range	Data	
ettings	Pas sett	ssw ting	ord s	Password ON/OFF	Enables (ON) or disables (OFF) the pass- word.	OFF (Default)ON	Systom	n 413
ensor s				Enter password	Sets a password.	15 characters max.	Oystem	p. 410
S	Tim	ieol	ut* ²		Sets the timeout time during measure- ments.	100 to 30,000 ms (Default: 30,000 ms)	System	p. 367
	rement retry*2	Re	try mo	de	Sets the type of retry for measurements.	 Normal retry Expose retry Scene retry Trigger retry None (Default) 	System	p. 422
	Measu	Sw Sce	itch O ene re	rder (for try only)	Sets the method for changing scenes.	Auto (Default)Fixed	System	
		Re Sce	try sce ene re	ene (for try only)	Changes the order in which to change the scenes. Scenes are registered in order from the first scene.	1st to 32nd	System	p. 425
	Adj Rur	djustment mode in un			Sets whether to adjust measurement con- tents in Run Mode.	OFF (Default)ON	System	p. 362
	ngs	Eth	nernet					
	twork setti		IP add ting	dress set-	Sets the method to use to set IP addresses.	Auto (Default)FixedDHCP	System	p. 67
	Ne		IP add	dress	Enter the IP address of the Sensor. (Valid only when the [IP address setting] is set to [Fixed].)	a.b.c.d a: 1 to 223 b: 0 to 255 c: 0 to 255 d: 2 to 254 (Default: 10.5.5.100)	System	p. 67
			Subne	et mask	Inputs the subnet mask. (Valid only when the [IP address setting] is set to [Fixed].)	0.0.0.0 to 255.255.255.255 (Default: 255.255.255.0)	System	n 67
			Gatev	vay	Sets the Default gateway address. (When the [IP address setting] is set to [Fixed].)	1.0.0.1 to 223.255.255.254 (Default: 10.5.5.1)	System	μ. 07
-	Data output	No-protocol data	Comr type	nunication	Sets the communications type to use to output no-protocol data.	No protocol (TCP) (Default) No protocol (FINS/TCP) No protocol (RS-232C)* No-protocol (UDP) * Displays by connecting FQ-SDU□□ Sensor Data Unit.	System	* ¹
			When the tions type protocol protocol tocol	e communica- be is TCP no- , FINS/TCP no- or UDP No-pro-				
				Connec- tion mode	Sets whether to communicate with the communications devices as a server device or a client device. * Cannot be specified when the communi- cation type is no-protocol (UDP).	 TCP server (Default) TCP client 	System	* ¹
				IP address	Sets the IP address to which to output no- protocol data. *Setting is not possible if the connection mode is set to a TCP server.	a.b.c.d a: 1 to 223 b: 0 to 255 c: 0 to 255 d: 1 to 254 (Default:10.5.5.111)	System	<u>*</u> 1
				Output port No.	Sets the output port number. * Setting is not possible if the connection mode is set to a TCP server.	0 to 65535 (Default: 9876 (FINS/TCP) 9600 No-protocol (UDP))	System	*1
				Input port No.	Sets the input port number.	0 to 65535 (Default: 9876 (FINS/TCP) 9600 No-protocol (UDP))	System	*1

	Ν	Men	u command			Description	Setting range	Data	
sor settings	Data output	rotocol data	When munic is RS protoc	the co cations -232C col	om- type no-				
Sen		d-oN		Baud	rate	Set the baud rate to use for RS-232C communications.	2400, 4800, 9600, 19200, 38400, 57600, or 115200 (Default: 38400)	System	* ¹
				Data lengtł	ı	Sets the data length.	 7bit 8bit (Default: 8bit)	System	* ¹
				Parity	1	Sets the parity.	None Odd Even (Default: None)	System	* ¹
				Stop	bit	Sets the number of stop bits.	1bit 2bit (Default: 1bit)	System	* ¹
				Flow trol	con-	Sets the controls for the flow of communi- cations with the software.	None Xon/Xoff (Default: None)	System	*1
				Delim	niter	Set the delimiter to add to the end of com- mands and responses.	CR LF CR+LF (Default:CR)	System	* ¹
			tions type o-protocol	Interv timeo (text)	al ut	Timeout [s] Set the time in seconds to generate a timeout error.	1 to 120 s, 0: Not monitored. (Default: 0 s)	System	* ¹
			When the communica is RS-232C n	Interv time- out(at Xoff recep	ral fter otion)	Timeout [s] Set the time in seconds to generate a timeout error.	1 to 120 s, 0: Not monitored. (Default: 0 s)	System	*1
		Link data output	Comr type	nunica	ition	Sets the communications type to use for EtherNet/IP outputs.	Invalid (Default) PLC link (SYSMAC) PLC link (MELSEC)	System	* ¹
			Area tings(comm type is	set- Only w nunicat s PLC	/hen tions Link)				
				Command	Area type	Sets the area to write command data to the Sensor. Control inputs, command codes, and com- mand parameters are written to this area.	PLC Link (SYSMAC CS/CJ/CP/One) CIO Area (CIO) (Default) Work Area (WR) Holding Bit Area (HR) Auxiliary Bit Area (AR) DM Area (DM) EM Area (EM0 to EMC) PLC Link (MELSEC QnU/Q/QnAS) Data Register (Default)	System	*1
					vddress	Set the first address of the command area.	0 to 99,999 (Default: 0)	System	
				Response	Area type A	Sets the area to write execution results from the Sensor. Control outputs, command codes, response codes, and response data	PLC Link (SYSMAC CS/CJ/CP/One) CIO Area (CIO) (Default), Work Area (WR), Holding Bit Area (HR), Auxil- iary Bit Area (AR), DM Area (DM), EM Area (EM0 to EMC) PLC Link (MELSEC QnU/Q/QnAS) Data Register (Default) File Register Link Register	System	*1
					Address	Set the first address of the response area.	0 to 99999 (Default: 100)	System	

S	ľ	Men	u com	mand	Description	Setting range	Data	
Sensor settings	Data output	Link data output	Area settings	Output Area type	Sets the area to write output data from measurements. Output data 0 to 31	PLC Link (SYSMAC CS/CJ/CP/One) CIO Area (CIO) (Default) Work Area (WR) Holding Bit Area (HR) Auxiliary Bit Area (AR) DM Area (DM) EM Area (EM0) EM Area (EM1) : EM Area (EMC) PLC Link (MELSEC QnU/Q/QnAS) Data Register (Default) File Register Link Register	System	*1
				Set the first	Address t address of the output area .	0 to 99999 (Default: 200)	System	
			Outpu shake	ut hand- e	Sets whether to establish an interlock with the PLC when data is output.	No (Default)Yes	System	* ¹
			Retry	details	Enables or disables retrying communica- tions.	ON (Default)OFF	System	* ¹
			Retry	interval	Sets the interval for retrying communica- tions. This setting is enabled only when [Retry details] is set to [ON].	0 to 2,147,483,647 ms (Default:10,000 ms)	System	* ¹
			Max o	output data	Sets the upper limit of the number of out- put data to use for PLC Link outputs. Any output data that is beyond this value is discarded.	32 to 1024 (Default: 256)	System	 *1
			Conn mode	ection	Sets the TCP connection mode.	TCP server (Default)TCP client	System	* ¹
			Data period	output d	Set the period for outputting measurement results. This parameter is displayed and can be set only when [Handshake setting] is set to [No].	2 to 5,000 ms (Default: 40 ms)	System	<u></u> *1
			GATE period	signal ON 1	Set the time to turn ON the GATE signal. This parameter is displayed and can be set only when [Handshake setting] is set to [No].	1 to 1,000 ms (Default: 20 ms)	System	* ¹
			IP add	dress	Sets the IP address to which to output. * Setting is not possible if the connection mode is set to a TCP server.	a.b.c.d a: 1 to 223 b: 0 to 255 c: 0 to 255 d: 1 to 255 d: 1 to 254 (Default:10.5.5.111)	System	<u></u> *1
			Outpu	ut port No.	Sets the output port number. * Setting is not possible if the connection mode is set to a TCP server.	0 to 65535 (Default: 9600)	System	*1
		it settings	Comr type	nunication	Specifies the type of communication used for Fieldbus data output.	Invalid (Default) EtherNet/IP PROFINET	System	* ¹
		eldbus data outpu	Outpu shake	ut hand-	Sets whether to establish an interlock with the PLC when data is output. OFF: Outputs data regardless of the state of the signal from the PLC. Handshake: Outputs data after recognition of DSA from the PLC.	No Yes (Default)	System	<u></u> *1
		Ē	Outpu	ut data size	Sets the data size to output for EtherNet/ IP or PROFIBUS output. If the data size that is set is exceeded, data will be output in more than one transfer.	32 bytes (Default) 64 bytes 128 bytes 256 bytes	System	* ¹
			Refre period	shing task d	Set the communications cycle for cyclic tag data link communications for the Sensor.	1 to 10,000 ms (Default:10 ms)	System	*1

	ľ	Men	u com	mand	Description	Setting range	Data	
· settings	output	ettings	Timeo	out	Sets the timeout time when handshaking is enabled.	0.1 to 120.0 s (Default: 10 s)	System	* ¹
Sensor se	Data	s data output se	Data o period	output I	Set the period for outputting measurement results. This parameter is displayed and can be set only when [Handshake setting] is set to [No].	2 to 5,000 ms (Default: 40 ms)	System	* ¹
		Fieldbu	GATE period	signal ON I	Set the time to turn ON the GATE signal. This parameter is displayed and can be set only when [Handshake setting] is set to [No].	1 to 1,000 ms (Default: 20 ms)	System	* ¹
	Init	ializ	e		Initializes the Sensor settings and saved data.			p. 428
	Re	star	t		Restarts the Sensor.			
	Up	date	9		Updates the Sensor system to the most recent data.			p. 575
F settings	Info	Information			Used to check the Touch Finder informa- tion.		Touch Finder data	p. 428
ΤF		Мо	del		Used to check the Touch Finder model.		Touch	
		Ve	rsion		Used to check the software version of the Touch Finder.		data	p. 428
		MA	MAC address		Used to check the MAC address of the Touch Finder.			
			Memo	ory state	Used to check the Touch Finder memory state.			p. 383
	Frr	or h	istory	View his- tory	Displays a history of errors that have occurred in the Touch Finder.			n 436
	Error history Delete his- tory			Delete his- tory	Deletes the error history.			p. 400
	Ba	ttery	/ level		Used to check the battery level.			p. 384
	File format	file Logging image file	File name prefix	ame prefix ame prefix	You can set a character string to add to the beginning of the file name for logged data.		Touch Finder data	p. 397
		data	Outpu	it format				
		Logging		Field sep- arator Decimal symbol Record separator	Used to set the output format for output log data to a file.	None Comma (Default) Tab Space Colon Semicolon CR CR+LF None Point (Default) Comma None Comma Tab Space Colon	Touch Finder data	p. 398
						Semicolon CR CR+LF (Default)		

	Menu com	mand	Description	Setting range	Data	
· settings	SD card	SD card informa- tion	Displays the capacity and remaining mem- ory in the SD card.		Touch Finder	p. 411
-		Format	Formats an SD card.		data	p. 412
:	Startup dis- blay	Startup screen type	You can select the display to appear on the Touch Finder when more than one Sensor is connected.	Multi Sensor NG sensor Single sensor Auto (Default)		p. 389
		Specify sensor	You can specify one Sensor to connect to the Touch Finder.	ON OFF (Default)	Touch	p. 417
		Display pattern	Sets the display to use in Run Mode. (Only appears when [Start screen type] under [Startup display] is set to [Single sensor].)	Graphic Graphics + Details All results/Region Statistical data Trend monitor Histogram	data	p. 356 p. 416
		Display update mode	Sets the image to update in Run Mode.	Latest image Last NG image		p. 383
I	CD back-	Brightness	Sets the brightness.	0 to 5	Touch	p. 384
	ignt	ECO mode	Enables (ON) or disables (OFF) ECO Mode.	ON OFF	data	p. 384
E	Ethernet	1			Touch	p. 67
	DHCP		Used to automatically connect to the IP address of the Touch Finder.	OFF (Default) ON	Data Finder data P Touch Finder data P Touch Finder data P P Touch Finder data P Finder data P Touch Finder data P Touch Finder data P Touch Finder P data P P Touch Finder P D Touch Finder P D D D D D D D D D D D D D D D D D D D	p. 67
	IP addres	SS	I nputs the IP address of the Touch Finder. (Valid only when the [IP address setting] is set to [Fixed].)	a.b.c.d a:1 to 223 b: 0 to 255 c: 0 to 255 d: 0 to 255 d: 0 to 255 (Default: 10.5.5.10)		p. 67
	Subnet m	nask	Inputs the subnet mask. (Valid only when the [IP address setting] is set to [Fixed].)	0.0.0.0 to 255.255.255.255 (Default: 255.255.255.0)	data	p. 67
	Gateway		Sets the Default gateway address. (When the [IP address setting] is set to [Fixed].)	1.0.0.1 to 223.255.255.254 (Default: 10.5.5.1)	_	p. 67
1	Auto sensor	detection	The Touch Finder can detect Sensors and automatically connect to them in the order that it detects them.	ON OFF (Default)	Tauah	p. 386
I	_ogging setti	ng	You must enable file logging before you can execute it.	ON (Default) OFF	Finder data	p. 399
I	₋anguage		Changes the language to display on the Touch Finder.	English, German French, Italian, Spanish, Traditional Chinese Simplified Chinese Korean, Japanese (The Default language is selected at startup.)		p. 427
-	Time settings	6	Used to set the current date and time.	Default: Selected at startup.		p. 427
-	Fouch screer	n calib	Used when there is an offset between the touch screen positions and pointers.			p. 427
I	nitialize		Initializes the Touch Finder settings.			p. 428
ł	Restart		Restarts the Touch Finder.			p. 428
l	Jpdate		Updates the Touch Finder system to the most recent data.			p. 575
ł	Re-assign IP	forcibly	Executed when a sensor on the same net- work cannot be detected and the sensor's IP address is not known.			p. 437
-	Pofor to EC		a Llear's Manual for Communications Sottings	(Cat No. 7229)		•

ngs (Cat. No. Z338).

Not supported on the FQ2-S1/S2/S3 Series. Not supported on the FQ2-CH Series.

^1 *2 *3

Run Mode

	ľ	lenu command	Description	Setting range	Data	
play	Gra	aphic	Displays the input image.			
Select dis	Gra	aphics + Details	Displays the inspection item individual judgement results and measurement val- ues.			
	Sta	tistical data	Displays the total number of measure- ments and the total number of NG overall judgements and the NG ratio from when the power supply was turned ON.			p. 354
	All	results/Region	Displays the inspection item individual judgement results for all inspection items.			
	Tre	nd Monitor	Displays the individual judgement results saved in the Sensor in a trend monitor.			p. 358
	His	togram	Displays the individual judgement results saved in the Sensor in a histogram.			p. 360
		Model region (Search, Shape Search III, Search, Shape Search II, and Sensi- tive Search only in [Adjustment mode in Run] to [ON])	Changes to Setup Mode to adjust the model region set for each inspection item.			
		Insp. region (Only in [Adjust- ment mode in Run] to [ON])	Changes to Setup Mode to adjust the inspection region set for each inspection item.			
		Select display image (Area and Labeling only)	Changes the display method of the extracted color.	 For Area and Labeling Measurement image (Default) Color extraction image Binary image after extraction For Area and Labeling Measurement image (Default) ImageMeas. Img.+Targ. Mdl. Edge Image Edge Image+Targ. Mdl. 	Touch Finder data	
		Adjust judgement (Except for statisti- cal data)	Adjusts judgement parameters without stopping measurements.			p. 362
		Auto display (trend monitor and histo- gram only)	Automatically sets the display range according to the measurement results.	OFF ON (Default)		p. 359 p. 361
		Display range (trend monitor and histo- gram only)	Changes the display range of measure- ment values.	Measurement value: -999,999,999 to 999,999,999 (Defaults: Lower limit: 0 Upper limit: 100) class: 5 to 100 (Default: 10) (Histograms only)		p. 359 p. 361
		Number of data (trend monitor only)	Changes the number of displayed mea- surement values.	200 400 1000 (Default: 200)	Touch Finder data	p. 359
		Number of data (his- togram only)	Changes the number of displayed mea- surement values (i.e., the vertical display range of the histogram).	5 to 1,000		p. 361
		Clear results (graphic or graphic + details list)	Clears the measurement results of the inspection items.			
		Delete stats (total data)	Clears the Statistical data.			

	ſ	Menu command	Description	Setting range	Data	
jing	Im	age logging	Starts and stops logging in external mem-	ON: Start or OFF: Stop		m 200
Logç	Da	ta logging	- ory.	ON: Start or OFF: Stop		- p. 399
TF	set	tings	The same as for Setup Mode. (This does not apply to the PC Tool.) The resolution of the measurement image can be set on the PC Tool.			
Sensor setting			Switches to Setup Mode.			p. 353
Sensor monitor	Sir	ngle sensor	Displays the image of a sensor specified from among multiple connected sensors.		Touch	
	Mu	ılti sensor	Simultaneously displays the images for multiple connected Sensors.		Finder data	
	•	Display position	Specifies the display position when multiple sensors are connected.			
		Auto position	Resets the display position.			
		Setting disp. info.	Specifies the information displayed for the connected sensor.	OFF IP address (Default) Sensor name	Touch	p. 389
	NG	S sensor	From multiple connected Sensors, dis- plays the image of only the Sensors with NG results.		data	
nsor	Se	lect	Switches to the selected Sensor.			
itch se	4	Display position	Specifies the display position when multiple sensors are connected.		Touch	
Sw		Setting disp. info.	Specifies the information displayed to identify the connected sensor.	OFF IP address (Default) Sensor name	Finder data	
Se	nso	r list	Specifies sensors to be connected.			
	Ne	twork	Changes the network settings of a sensor.			
	Sw	<i>v</i> itch sensor	Applies the connection settings and changes the displayed sensor.			
	De	lete	Deletes a sensor from the sensor list.			
	Co	mm. test	Tests communication with the sensor.			p. 388
	Ad	d	Adds a fixed IP address to the sensor list.			1
	Up	date list	Updates the sensor list to the most recent state.			1

Common Menu Commands

М	lenu command	Description	Setting range	Data	
C Or	ly-image Button	Hides text and displays only the image.			p. 384
Die	Coom-in Button	Enlarges the image display.			
play Button	Sutton Reduces the image display. Button Fits the image to the display size.				p. 380
	FIT Button	Fits the image to the display size.			
Live		Switches the camera image between a live	(Only in Satur Mada)		p. 380
	II Freeze	innage and a nozen innage.	(Only in Setup Mode)		p. 381
	Display But- ton	Changes the image display method.	Setup Mode: Camera (Live, Freeze) Log Logging image file Camera image file Run Mode: Latest image or Last NG image		p. 380 p. 381 p. 383
	Log Image Button (Only in Setup Mode)	You can save the Camera image that is displayed on the Touch Finder or com- puter.			p. 382
Ca	apture Button	Used to capture the current display and save it in external memory, e.g., an SD card.			p. 415

9-2 External Reference Parameters

FQ2-S1 FQ2-S2 FQ2-S3 FQ2-S4 FQ2-CH

Color Gray Filter (Color type only)

External reference number	Category	Data name	Set/Get	Data range	Default	Expres- sion text string	Logged data/ Judge- ment parameter
0	Measurement result	Judgement	Get only	 -2: No judgement (not measured), 0: Judgement is OK, -1: Judgement is NG, -13: Teaching not performed error -14: Figure not registered error -15: Out of range error 	-2	JG	
120		Source image	Set / Get	0: Camera image 1: Previous image	1		
121		Setting method	Set / Get	0: Filtering OFF, 1: Filtering ON	1		
122		Filter type	Set / Get	Filter type 0: RGB 1: HSV	0		
123	Measurement conditions	Color filter type	Set / Get	Color Filter Type 0: Red filter 1: Green filter 2: Blue filter 3: Cyan filter 4: Magenta filter 5: Yellow filter 6: Gray filter (R+G+B) 7: Gray filter (R+2G+B) 8: Gray filter (user-set)	0		
124		Color gray filter type	Set / Get	Color Gray Filter Type 0: High speed, 1: High precision	1		
125		RGB gain R	Set / Get	0.0001 to 9.9999	0.3		
126		RGB gain G	Set / Get	0.0001 to 9.9999	0.59		
127		RGB gain B	Set / Get	0.0001 to 9.9999	0.11		
128		Standard hue	Set / Get	0 to 359	0		
129		Hue range	Set / Get	10 to 180	90		
130	_	Chroma upper limit	Set / Get	0 to 255	255		
131		Chroma lower limit	Set / Get	0 to 255	0		

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Weak Smoothing

External refer- ence number	Category	Data name	Set / Get	Data range	Default	Expres- sion text string	Logged data/ Judgement parameter
0	Mea- sure- ment result	Judgement	Get only	 -2: No judgement (not measured), 0: Judgement is OK, -1: Judgement is NG, -13: Teaching not performed error, -14: Figure not registered error, -15: Out of range error 	-2	JG	
120	Mea- sure-	Source image	Set / Get	0: Camera image 1: Previous image	1		
121	condi- tions	Setting method	Set / Get	0: Filtering OFF 1: Filtering ON	1		

Strong Smoothing

External reference number	Category	Data name	Set / Get	Data range	Default	Expression text string	Logged data/ Judgement parameter
0	Mea- sure- ment result	Judgement	Get only	 -2: No judgement (not measured), 0: Judgement is OK, -1: Judgement is NG, -13: Teaching not performed error, -14: Figure not registered error, -15: Out of range error 	-2	JG	
120	Mea- sure-	Source image	Set / Get	0: Camera image, 1: Previous image	1		
121	condi- tions	Setting method	Set / Get	0: Filtering OFF, 1: Filtering ON	1		

Dilate

External reference number	Category	Data name	Set / Get	Data range	Default	Expression text string	Logged data/ Judgement parameter
0	Mea- sure- ment result	Judgement	Get only	 -2: No judgement (not measured), 0: Judgement is OK, -1: Judgement is NG, -13: Teaching not performed error, -14: Figure not registered error, -15: Out of range error 	-2	JG	
120	Mea- sure-	Source image	Set / Get	0: Camera image, 1: Previous image	1		
121	condi- tions	Setting method	Set / Get	0: Filtering OFF, 1: Filtering ON	1		

Erosion, Median, Extract Edges, Extract Horizontal Edges, Extract Vertical Edges, Enhance edges

External reference number	Category	Data name	Set / Get	Data range	Default	Expression text string	Logged data/ Judgement parameter
0	Mea- sure- ment result	Judgement	Get only	 -2: No judgement (not measured), 0: Judgement is OK, -1: Judgement is NG, -13: Teaching not performed error, -14: Figure not registered error, -15: Out of range error 	-2	JG	
120	Mea- sure-	Source image	Set / Get	0: Camera image, 1: Previous image	1		
121	condi- tions	Setting method	Set / Get	0: Filtering OFF, 1: Filtering ON	1		

Background Suppression

External reference number	Category	Data name	Set / Get	Data range	Default	Expression text string	Logged data/ Judgement parameter
0	Measure- ment result	Judgement	Get only	 -2: No judgement (not measured) 0: Judgement is OK -1: Judgement is NG -13: Teaching not performed error -14: Figure not registered error -15: Out of range error 	-2	JG	
120	Mea- sure-	Source image	Set / Get	0: Camera image 1: Previous image	1		
122	condi- tions	Image format	Set / Get	0: Binary image 1: Monochrome image 2: Color image	0		
123		Color setting mode	Set / Get	0: RGB common, 1: RGB individ- ual	0		
124	-	Common color lower limit	Set / Get	0 to 255	0		
125	-	Common color upper limit	Set / Get	0 to 255	255		
126		R lower limit	Set / Get	0 to 255	0		
127		R upper limit	Set / Get	0 to 255	255		
128		G lower limit	Set / Get	0 to 255	0		
129		G upper limit	Set / Get	0 to 255	255		

External reference number	Category	Data name	Set / Get	Data range	Default	Expression text string	Logged data/ Judgement parameter
130	Mea- sure-	B lower limit	Set / Get	0 to 255	0		
131	condi- tions	B upper limit	Set / Get	0 to 255	255		
132		Grayscale lower limit	Set / Get	0 to 255	0		
133		Grayscale upper limit	Set / Get	0 to 255	255		

Shape Search II (FQ2-S1/S2/S3 series or FQ2-S4 series only)

External refer- ence number	Category	Data name	Set / Get	Data range	Default	Expression text string	Logged data/ Judgement parameter
0	Measure- ment result	Judgement	Get only	 -2: No judgement (not measured) 0: Judgement is OK -1: Judgement is NG -13: Teaching not performed error -14: Figure not registered error -15: Out of range error 	-2	JG	Logged
5		Correlation	Get only	0 to 100	0	CR[0] to CR[31]	Logged
6		Position X	Get only	-99,999.9999 to 99,999.9999	0	Y[0] to Y[31]	Logged
7		Position Y	Get only	-99,999.9999 to 99,999.9999	0		Logged
8		Angle	Get only	-180 to 180	0		Logged
9		Reference X	Get only	-99,999.9999 to 99,999.9999	255		
10		Reference Y	Get only	-99,999.9999 to 99,999.9999	0		
11		Reference angle	Get only	-180 to 180	255		
12		Detection coordinate X	Get only	-99,999.9999 to 99,999.9999	0		
13		Detection coordinate Y	Get only	-99,999.9999 to 99,999.9999	255		
14		Count	Get only	0 to 32	0	С	
103	Output parame- ter	Reflect	Set / Get	0: Yes 1: No	0		
120	Model	Rotation	Set / Get	0: No 1: Yes	0		
121	region	Rotation angle upper limit	Set / Get	-180 to 180	180		
122		Rotation angle lower limit	Set / Get	-180 to 180	-180		
133	Mea- sure- ment condi- tions	Candidate level	Set / Get	0 to 100	80		

External refer- ence number	Category	Data name	Set / Get	Data range	Default	Expression text string	Logged data/ Judgement parameter
134	Detec- tion	Detection point X	Set / Get	0 to 9999	0		
135	- point coordi- nate	Detection point Y	Set / Get	0 to 9999	0		
136	Mea- sure- ment condition	Sort condition	Set / Get	 O: Ascending order of correlation value, Descending order of correlation value, Seconding order of position X, Descending order of position X, Ascending order of position Y, Descending order of position Y 	1		
138	Judge- ment	Judgement upper limit for correlation	Set / Get	0 to 100	100		Judgement condition
139	tions	Judgement lower limit for correlation	Set / Get	0 to 100	0		Judgement condition
140		Judgement upper limit for detection count	Set / Get	0 to 32	32		Judgement condition
141		Setting/Acquisition	Set / Get	0 to 32	0		Judgement condition
142		Judgement upper limit for search coordinate X	Set / Get	-99,999.9999 to 99,999.9999	99,999.9999		Judgement condition
143	-	Judgement lower limit for search coordinate X	Set / Get	-99,999.9999 to 99,999.9999	-99,999.999 9		Judgement condition
144		Judgement upper limit for search coordinate Y	Set / Get	-99,999.9999 to 99,999.9999	99,999.9999		Judgement condition
145		Judgement lower limit for search coordinate Y	Set / Get	-99,999.9999 to 99,999.9999	-99,999.999 9		Judgement condition
146		Judgement upper limit for search angle	Set / Get	-180 to 180	180		Judgement condition
147		Judgement lower limit for search angle	Set / Get	-180 to 180	-180		Judgement condition
152	Mea- sure-	Extraction condition, X upper limit	Set / Get	-99,999.9999 to 99,999.9999	99,999.9999		Judgement condition
153	condi- tions	Extraction condition, X lower limit	Set / Get	-99,999.9999 to 99,999.9999	-99,999.999 9		Judgement condition
154		Extraction condition, Y upper limit	Set / Get	-99,999.9999 to 99,999.9999	99,999.9999		Judgement condition
155		Extraction condition, Y lower limit	Set / Get	-99,999.9999 to 99,999.9999	-99,999.999 9		Judgement condition
161	-	Detection count	Set / Get	1 to 32	32		
170		Number of data log records upper limit	Set / Get	0: Fast 1: Stable	0		
300		Number of data log records upper limit	Set / Get	0: Data logging OFF 1: Data logging ON	1		
310		Data logging switch for entire unit	Set / Get	0: Data logging OFF 1: Data logging ON	1		
311		Data logging switch for judgement	Set / Get	0: Data logging OFF 1: Data logging ON	1		

External refer- ence number	Category	Data name	Set / Get	Data range	Default	Expression text string	Logged data/ Judgement parameter
312	Logging condi- tions	Data logging switch for correlation	Set / Get	0: Data logging OFF 1: Data logging ON	1		
313	lions	Data logging switch for position X	Set / Get	0: Data logging OFF 1: Data logging ON	1		
314		Data logging switch for position Y	Set / Get	0: Data logging OFF 1: Data logging ON	1		
315		Data logging switch for measurement angle	Set / Get	0: Data logging OFF 1: Data logging ON	1		
321		Data logging switch for detection count	Set / Get	0: Data logging OFF 1: Data logging ON	1		
700	Display settings	Correlation display	Set / Get	0: Display 1: Do not display	0		
701		Position X display	Set / Get	0: Display 1: Do not display	0		
702		Position Y display	Set / Get	0: Display 1: Do not display	0		
703		Measurement angle display	Set / Get	0: Display 1: Do not display	0		
704		Count display	Set / Get	0: Display 1: Do not display	0		
800		Position X display pat- tern	Set / Get	0: Absolute value 1: Relative value	0		
801		Position Y display pat- tern	Set / Get	0: Absolute value 1: Relative value	0		
802		Measurement angle display pattern	Set / Get	0: Absolute value 1: Relative value	0		

Shape Search III Position Compensation (FQ2-S1/S2/S3 series or FQ2-S4 series only)

Exter- nal ref- erence number	Category	Data name	Set / Get	Data range	Default	Expression text string	Logged data/ Judgement parameter
0	Measure- ment result	Judgement	Get only	 -2: No judgement (not measured) 0: Judgement is OK -1: Judgement is NG -13: Teaching not performed error -14: Figure not registered error -15: Out of range error 	-2	JG	Logged data
5		Scroll X	Get only	-99999.9999 to 99999.9999	0	DX	Logged data
6		Scroll Y	Get only	-99999.9999 to 99999.9999	0	DY	Logged data
7		Scroll θ	Get only	-180 to 180	0	DT	Logged data
8		Position X	Get only	-99999.9999 to 99999.9999	0	х	Logged data
9		Position Y	Get only	-99999.9999 to 99999.9999	0	Y	Logged data
10		Angle	Get only	-180 to 180	0	TH	Logged data
11		Reference X	Get only	0 to 9,999	0	SX	Logged data
12		Reference Y	Get only	0 to 9,999	0	SY	Logged data
13		Reference angle	Get only	-180 to 180	0	ST	Logged data
14		Correlation	Get only	0 to 100	0	CR	Logged data
103	Output parame- ter	Reflect	Set / Get	0: Yes 1: No	0		
120	Model	Position compensation precision	Set / Get	0: None 1: Bilinear	0		
122	region	Position compensation image	Set / Get	0: Camera image 1: Previous image	1		
123		Rotation	Set / Get	0: No rotation 1: Rotation	1		
124		Rotation	Set / Get	0 to 9,999	0		
125	Model	Reference X	Set / Get	0 to 9,999	0		
126	region	Reference Y	Set / Get	-180 to 180	0		
140		Reference angle	Set / Get	-180 to 180	180		
141		Rotation angle upper limit	Set / Get	–180 to 180	-180		
149	Mea sure- ment condition	Rotation angle lower limit	Set / Get	0 to 100	70		
150	Detec- tion point	Candidate level	Set / Get	0 to 9,999	0		
151	nate	Detection point X	Set / Get	0 to 9,999	0		
160	Judge- ment condi- tions	Judgement upper limit for search coordinate X	Set / Get	-99,999.9999 to 99,999.9999	99,999.9999		Judgement condition

Exter- nal ref- erence number	Category	Data name	Set / Get	Data range	Default	Expression text string	Logged data/ Judgement parameter
161	Judge- ment condi- tions	Judgement lower limit for search coordinate X	Set / Get	-99,999.9999 to 99,999.9999	99,999.9999		Judgement condition
162	10113	Judgement upper limit for search coordinate Y	Set / Get	-99,999.9999 to 99,999.9999	99,999.9999		Judgement condition
163		Judgement lower limit for search coordinate Y	Set / Get	-99,999.9999 to 99,999.9999	99,999.9999		Judgement condition
164		Judgement upper limit for search angle	Set / Get	-180 to 180	180		Judgement condition
165		Judgement lower limit for search angle	Set / Get	-180 to 180	-180		Judgement condition
166		Judgement upper limit for correlation	Set / Get	0 to 100	100		Judgement condition
167		Judgement lower limit for correlation	Set / Get	0 to 100	60		Judgement condition
168		Position compensation X upper limit	Set / Get	-99,999.9999 to 99,999.9999	99,999.9999		Judgement condition
169		Position compensation X lower limit	Set / Get	-99,999.9999 to 99,999.9999			Judgement condition
170		Position compensation Y upper limit	Set / Get	-99,999.9999 to 99,999.9999	99,999.9999		Judgement condition
171		Position compensation Y lower limit	Set / Get	-99,999.9999 to 99,999.9999	 99,999.9999		Judgement condition
172		Theta position compen- sation upper limit	Set / Get	–180 to 180	180		Judgement condition
173		Theta position compen- sation lower limit	Set / Get	–180 to 180	-180		Judgement condition
174	Judge con- dit6ion	Disp. Image Selection	Set / Get	0: Measurement image 1: Meas. Img.+Model Img. 2: Edge Image 3: Edge Img.+ Model Img.	1		
178		Edge Level	Set / Get	0: No 1: Yes	1		
179		Mask Size	Set / Get	0: 3 × 3 1: 5 × 5 2: 7 × 7	0		
182		Edge Level Auto	Set / Get	0: OFF 1: ON	1		
184		Acceptable Dist. Level	Set / Get	0: Low 1: Medium 2: High	2		
185		Noise Removal Level	Set / Get	0 to 100	0		

Exter- nal ref- erence number	Category	Data name	Set / Get	Data range	Default	Expression text string	Logged data/ Judgement parameter
310	Logging condi-	Data logging switch for entire unit	Set / Get	0: Data logging OFF 1: Data logging ON	0		
311	lions	Data logging switch for judgement	Set / Get	0: Data logging OFF 1: Data logging ON	0		
312		Data logging switch for scroll X	Set / Get	0: Data logging OFF 1: Data logging ON	0		
313		Data logging switch for scroll Y	Set / Get	0: Data logging OFF 1: Data logging ON	0		
314		Data logging switch for scroll $\boldsymbol{\theta}$	Set / Get	0: Data logging OFF 1: Data logging ON	0		
315		Position compensation X display	Set / Get	0: Data logging OFF 1: Data logging ON	0		
316		Position compensation Y display	Set / Get	0: Data logging OFF 1: Data logging ON	0		
317		Theta position compen- sation display	Set / Get	0: Data logging OFF 1: Data logging ON	0		
318		Correlation display	Set / Get	0: Data logging OFF 1: Data logging ON	0		
319		Position X display	Set / Get	0: Data logging OFF 1: Data logging ON	0		
320		Position Y display	Set / Get	0: Data logging OFF 1: Data logging ON	0		
321		Measurement angle display	Set / Get	0: Data logging OFF 1: Data logging ON	0		
700	Display settings	Position compensation X display	Set / Get	0: Display 1: Do not display	0		
701		Position compensation Y display	Set / Get	0: Display 1: Do not display	0		
702		Theta position compen- sation display	Set / Get	0: Display 1: Do not display	0		
703		Correlation display	Set / Get	0: Display 1: Do not display	0		
704		Position X display	Set / Get	0: Display 1: Do not display	0		
705		Position Y display	Set / Get	0: Display 1: Do not display	0		
706		Measurement angle display	Set / Get	0: Display 1: Do not display	0		

Shape Search Position Compensation

External reference number	Category	Data name	Set / Get	Data range	Default	Expression text string	Logged data/ Judgement parameter
0		Judgement	Get only	 -2: No judgement (not measured) 0: Judgement is OK -1: Judgement is NG -13: Teaching not performed error -14: Figure not registered error -15: Out of range error 	-2	JG	Logged data
5	-	Scroll X	Get only	-99999.9999 to 99999.9999	0	DX	Logged data
6	Mea- sure- ment	Scroll Y	Get only	-99999.9999 to 99999.9999	0	DY	Logged data
7		Scroll θ	Get only	-180 to 180	0	DT	Logged data
8	result	Position X	Get only	-99999.9999 to 99999.9999	0	Х	Logged data
9		Position Y	Get only	-99999.9999 to 99999.9999	0	Y	Logged data
10		Angle	Get only	-180 to 180	0	TH	Logged data
11	-	Reference X	Get only	0 to 9,999	0	SX	Logged data
12		Reference Y	Get only	0 to 9,999	0	SY	Logged data
13		Reference angle	Get only	-180 to 180	0	ST	Logged data
14		Correlation	Get only	0 to 100	0	CR	Logged data
103	Output parame- ter	Reflect	Set / Get	0: Yes 1: No	0		
120	Mea-	Position compensa- tion precision	Set / Get	0: None 1: Bilinear	0		
121	ment condi- tions	Setting method	Set / Get	0: Cancel position compensation 1: Position compensation based on internal search	1		
122		Position compensa- tion image	Set / Get	0: Camera image, 1: Previous image	1		
123		Rotation	Set / Get	0: No rotation 1: Rotation	1		
124		Reference X	Set / Get	0 to 9,999	0		
125	Model	Reference Y	Set / Get	0 to 9,999	0		
126	region	Reference angle	Set / Get	-180 to 180	0		
140]	Rotation angle upper limit	Set / Get	-180 to 180	180		
141		Rotation angle lower limit	Set / Get	-180 to 180	-180		
149	Mea- sure- ment condition	Candidate level	Set / Get	0 to 100	70		
150	Detec- tion point	Detection point X	Set / Get	0 to 9,999	0		
151	nate	Detection point Y	Set / Get	0 to 9,999	0		

External reference number	Category	Data name	Set / Get	Data range	Default	Expression text string	Logged data/ Judgement parameter							
156	Mea- sure- ment condition	Model mode	Set / Get	0: Stable 1: High-speed	0									
160	Judge- ment condi-	Judgement upper limit for search coor- dinate X	Set / Get	-99,999.9999 to 99,999.9999	99,999.999 9		Judgement condition							
161	uons	Judgement lower limit for search coor- dinate X	Set / Get	-99,999.9999 to 99,999.9999	99,999.999 9		Judgement condition							
162	-	Judgement upper limit for search coor- dinate Y	Set / Get	-99,999.9999 to 99,999.9999	99,999.999 9		Judgement condition							
163		Judgement lower limit for search coor- dinate Y	Set / Get	-99,999.9999 to 99,999.9999	99,999.999 9		Judgement condition							
164		Judgement upper limit for search angle	Set / Get	-180 to 180	180		Judgement condition							
165		Judgement lower limit for search angle	Set / Get	-180 to 180	-180		Judgement condition							
166		Judgement upper limit for correlation	Set / Get	0 to 100	100		Judgement condition							
167	Judge- ment condi-	Judgement lower limit for correlation	Set / Get	0 to 100	60		Judgement condition							
168	tions	Position compensa- tion X upper limit	Set / Get	-99,999.9999 to 99,999.9999	99,999.999 9		Judgement condition							
169		Position compensa- tion X lower limit	Set / Get	-99,999.9999 to 99,999.9999	99,999.999 9		Judgement condition							
170		Position compensa- tion Y upper limit	Set / Get	-99,999.9999 to 99,999.9999	99,999.999 9		Judgement condition							
171		Position compensa- tion Y lower limit	Set / Get	-99,999.9999 to 99,999.9999	99,999.999 9		Judgement condition							
172	-	Theta position com- pensation upper limit	Set / Get	-180 to 180	180		Judgement condition							
173		-	-	-	-			-	Theta position com- pensation lower limit	Set / Get	-180 to 180	-180		Judgement condition
310		Data logging switch for entire unit	Set / Get	0: Data logging OFF 1: Data logging ON	0									
311	-	Data logging switch for judgement	Set / Get	0: Data logging OFF 1: Data logging ON	0									
312	Logging condi- tions	Data logging switch for scroll X	Set / Get	0: Data logging OFF 1: Data logging ON	0									
313		Data logging switch for scroll Y	Set / Get	0: Data logging OFF 1: Data logging ON	0									
314		Data logging switch for scroll θ	Set / Get	0: Data logging OFF 1: Data logging ON	0									

External reference number	Category	Data name	Set / Get	Data range	Default	Expression text string	Logged data/ Judgement parameter
315		Data logging switch for position X	Set / Get	0: Data logging OFF 1: Data logging ON	0		
316	Logging	Data logging switch for position Y	Set / Get	0: Data logging OFF 1: Data logging ON	0		
317	tions	Data logging switch for measurement angle	Set / Get	0: Data logging OFF 1: Data logging ON	0		
321	_	Data logging switch for correlation	Set / Get	0: Data logging OFF 1: Data logging ON	0		
700	Display settings	Position compensa- tion X display	Set / Get	0: Display, 1: Do not display	0		
701		Position compensa- tion Y display	Set / Get	0: Display, 1: Do not display	0		
702		Theta position com- pensation display	Set / Get	0: Display, 1: Do not display	0		
703		Correlation display	Set / Get	0: Display, 1: Do not display	0		
704		Position X display	Set / Get	0: Display, 1: Do not display	0		
705		Position Y display	Set / Get	0: Display, 1: Do not display	0		
706		Measurement angle display	Set / Get	0: Display, 1: Do not display	0		

Search Position Compensation

External reference number	Category	Data name	Set / Get	Data range	Default	Expression text string	Logged data/ Judgement parameter
0	Mea- sure- ment result	Judgement	Get only	 -2: No judgement (not measured), 0: Judgement is OK, -1: Judgement is NG, -13: Teaching not performed error, -14: Figure not registered error, -15: Out of range error 	-2	JG	Logged data
5	Mea-	Scroll X	Get only	-99,999.9999 to 99,999.9999	0	DX	Logged data
6	ment	Scroll Y	Get only	-99,999.9999 to 99,999.9999	0	DY	Logged data
8	result	Position X	Get only	-99,999.9999 to 99,999.9999	0	Х	Logged data
9	-	Position Y	Get only	-99,999.9999 to 99,999.9999	0	Y	Logged data
11	-	Reference X	Get only	-99,999.9999 to 99,999.9999	0	SX	Logged data
12	-	Reference Y	Get only	-99,999.9999 to 99,999.9999	0	SY	Logged data
14	-	Correlation	Get only	0 to 100	0	CR	Logged data
103	Output parame- ter	Reflect	Set / Get	0: Yes 1: No	0		
120	Mea- sure-	Position compensation precision	Set / Get	0: None 1: Bilinear	0		
122	condi- tions	Position compensation image	Set / Get	0: Camera image, 1: Previous image	1		
124	Model region	Reference X	Set / Get	0 to 99,999.9999	0		
125	-	Reference Y	Set / Get	0 to 99,999.9999	0		
145	Detec- tion coor-	Detection point X	Set / Get	0 to 9,999	0		
146	unate	Detection point Y	Set / Get	0 to 9,999	0		
147	Mea- sure-	Sub-pixel	Set / Get	0: No, 1: Yes	0		
148	condi- tions	Candidate level	Set / Get	0 to 100	70		
166	Judge- ment	Judgement upper limit for correlation	Set / Get	0 to 100	100		Judgement condition
167	tions	Judgement lower limit for correlation	Set / Get	0 to 100	60		

External reference number	Category	Data name	Set / Get	Data range	Default	Expression text string	Logged data/ Judgement parameter
310	Logging condi-	Data logging switch for entire unit	Set / Get	0: Data logging OFF 1: Data logging ON	0		
311		Data logging switch for judgement	Set / Get	0: Data logging OFF 1: Data logging ON	0		
312	-	Data logging switch for scroll X	Set / Get	0: Data logging OFF 1: Data logging ON	0		
313		Data logging switch for scroll Y	Set / Get	0: Data logging OFF 1: Data logging ON	0		
315		Data logging switch for position X	Set / Get	0: Data logging OFF 1: Data logging ON	0		
316		Data logging switch for position Y	Set / Get	0: Data logging OFF 1: Data logging ON	0		
321		Data logging switch for correlation	Set / Get	0: Data logging OFF 1: Data logging ON	0		
700	Display settings	Position compensation X display	Set / Get	0: Display 1: Do not display	0		
701	-	Position compensation Y display	Set / Get	0: Display 1: Do not display	0		
702	1	Correlation display	Set / Get	0: Display 1: Do not display	0		
703		Position X display	Set / Get	0: Display, 1: Do not display	0		
704		Position Y display	Set / Get	0: Display 1: Do not display	0		

Edge Position Compensation

External reference number	Category	Data name	Get / Set	Data range	Default	Expres- sion text string	Logged data/ Judgement parameter
0	Mea- sure- ment result	Judgement	Get only	 -2: No judgement (not measured) 0: Judgement is OK -1: Judgement is NG -13: Teaching not performed error -14: Figure not registered error -15: Out of range error 	-2	JG	Logged data
5		Scroll X	Get only	-99,999.9999 to 99,999.9999	0	DX	Logged data
6		Scroll Y	Get only	-99,999.9999 to 99,999.9999	0	DY	Logged data
7		Edge position X	Get only	-99,999.9999 to 99,999.9999	0	Х	Logged data
8		Edge position Y	Get only	-99,999.9999 to 99,999.9999	0	Y	Logged data
9		Standard position X	Get only	-99,999.9999 to 99,999.9999	0	SX	Logged data
10		Standard position Y	Get only	-99,999.9999 to 99,999.9999	0	SY	Logged data
103	Output parame- ter	Reflect	Set / Get	0: Yes, 1: No	0		

External reference number	Category	Data name	Get / Set	Data range	Default	Expres- sion text string	Logged data/ Judgement parameter
120		Position compensation precision	Set / Get	0: None, 1: Bilinear	0		
122	Mea- sure-	Position compensation image	Set / Get	0: Camera image 1: Previous image	1		
140	condi- tions	Set color	Set / Get	0: No edge color specification, 1: Edge color specification	0		
141		Edge color red	Set / Get	0 to 255	255		
142		Edge color green	Set / Get	0 to 255	255		
143		Edge color blue	Set / Get	0 to 255	255		
147	Mea- sure-	Detection mode	Set / Get	0: Color IN 1: Color OUT	0		
149	condi-	Edge level	Set / Get	0 to 100	50		
150	tions	Noise level	Set / Get	0 to 442	5		
153		Monochrome density change	Set / Get	(Monochrome Cameras) 0: Light to Dark 1: Dark to Light	0		
154		Edge level absolute value	Set / Get	0 to 442	20		
155		Edge level specification method	Set / Get	0:%, 1: Absolute value	0		
157		Measurement method	Set / Get	(Monochrome Cameras) 0: Projection 1: Differentiation	0		
158		Edge level absolute value (Monochrome Cameras)	Set / Get	0 to 255	20		
180	Judge- ment	Edge position X upper limit	Set / Get	-99,999.9999 to 99,999.9999	99,999.9999		Judgement condition
181	tions	Edge position X lower limit	Set / Get	-99,999.9999 to 99,999.9999	-99,999.9999		Judgement condition
182		Edge position Y upper limit	Set / Get	-99,999.9999 to 99,999.9999	99,999.9999		Judgement condition
183		Edge position Y lower limit	Set / Get	-99,999.9999 to 99,999.9999	-99,999.9999		Judgement condition
184	-	Position compensation X upper limit	Set / Get	-99,999.9999 to 99,999.9999	99,999.9999		Judgement condition
185		Position compensation X lower limit	Set / Get	-99,999.9999 to 99,999.9999	-99,999.9999		Judgement condition
186		Position compensation Y upper limit	Set / Get	-99,999.9999 to 99,999.9999	99,999.9999		Judgement condition
187		Position compensation Y lower limit	Set / Get	-99,999.9999 to 99,999.9999	-99,999.9999		Judgement condition

External reference number	Category	Data name	Get / Set	Data range	Default	Expres- sion text string	Logged data/ Judgement parameter
310	Logging condi-	Data logging switch for entire unit	Set / Get	0: Data logging OFF 1: Data logging ON	0		
311	10113	Data logging switch for judgement	Set / Get	0: Data logging OFF 1: Data logging ON	0		
312		Data logging switch for scroll X	Set / Get	0: Data logging OFF 1: Data logging ON	0		
313		Data logging switch for scroll Y	Set / Get	0: Data logging OFF 1: Data logging ON	0		
314		Data logging switch for detected edge position X	Set / Get	0: Data logging OFF 1: Data logging ON	0		
315		Data logging switch for detected edge position Y	Set / Get	0: Data logging OFF 1: Data logging ON	0		
700	Display settings	Position compensation X display	Set / Get	0: ON 1: OFF	0		
701		Position compensation Y display	Set / Get	0: ON 1: OFF	0		
702		Detected edge position X display	Set / Get	0: ON 1: OFF	0		
703		Detected edge position Y display	Set / Get	0: ON 1: OFF	0		

Two-edge Position Compensation

External refer- ence number	Category	Data name	Set / Get	Data range	Default	Expres- sion text string	Logged data/ Judgement parameter
0		Judgement	Get only	 -2: No judgement (not measured) 0: Judgement is OK, -1: Judgement is NG, -13: Teaching not performed error -14: Figure not registered error -15: Out of range error 	-2	JG	Logged data
5		Scroll X	Get only	-99,999.9999 to 99,999.9999	0	DX	Logged data
6		Scroll Y	Get only	-99,999.9999 to 99,999.9999	0	DY	Logged data
7		Detected edge position X0	Get only	-99,999.9999 to 99,999.9999	0	X0	Logged data
8	Mea- sure- ment	Detected edge position Y0	Get only	-99,999.9999 to 99,999.9999	0	Y0	Logged data
9	result	Detected edge position X1	Get only	-99,999.9999 to 99,999.9999	0	X1	Logged data
10		Detected edge position Y1	Get only	-99,999.9999 to 99,999.9999	0	Y1	Logged data
11		Standard position X0	Get only	-99,999.9999 to 99,999.9999	0	SX0	Logged data
12		Standard position Y0	Get only	-99,999.9999 to 99,999.9999	0	SY0	Logged data
13		Standard position X1	Get only	-99,999.9999 to 99,999.9999	0	SX1	Logged data
14	1	Standard position Y1	Get only	-99,999.9999 to 99,999.9999	0	SY1	Logged data

External refer- ence number	Category	Data name	Set / Get	Data range	Default	Expres- sion text string	Logged data/ Judgement parameter
103	Output parame- ter	Reflect	Set / Get	0: Yes 1: No	0		
120		Position compensation precision	Set / Get	0: None 1: Bilinear	0		
122	-	Position compensation image	Set / Get	0: Camera image 1: Previous image	0		
140	-	Edge color specifica- tion 0	Set / Get	0: No edge color specification, 1: Edge color specification	0		
141		Edge color R0	Set / Get	0 to 255	255		
142		Edge color G0	Set / Get	0 to 255	255		
143	Mea- sure-	Edge color B0	Set / Get	0 to 255	255		
147	ment condi- tions	Density change 0	Set / Get	0: Color IN 1: Color OUT	0		
149	uono	Edge level 0	Set / Get	0 to 100	50		
150		Noise level 0	Set / Get	0 to 442	5		
153	-	Monochrome density change 0	Set / Get	(Monochrome Cameras) 0: Light to Dark 1: Dark to Light	0		
154		Edge level absolute value	Set / Get	0 to 442	20		
155		Edge level specification method	Set / Get	0:% 1: Absolute value	0		
157	-	Measurement method 0	Set / Get	(Monochrome Cameras) 0: Projection 1: Differentiation	0		
158		Edge level absolute value (Monochrome Cameras)	Set / Get	0 to 255	20		
160		Edge color specifica- tion 1	Set / Get	0: No edge color specification, 1: Edge color specification	0		
161]	Edge color R1	Set / Get	0 to 255	255		
162	Mea- sure-	Edge color G1	Set / Get	0 to 255	255		
163	ment condi-	Edge color B1	Set / Get	0 to 255	255		
167	tions	Density change 1	Set / Get	0: Color IN 1: Color OUT	0		
169		Edge level 1	Set / Get	0 to 100	50		
170	-	Noise level 1	Set / Get	0 to 442	5		
173	_	Monochrome density change 1	Set / Get	(Monochrome Cameras) 0: Light to Dark 1: Dark to Light	0		
177		Measurement method 1	Set / Get	(Monochrome Cameras) 0: Projection 1: Differentiation	0		
180	Judge-	Edge position X upper limit 0	Set / Get	-99,999.9999 to 99,999.9999	99,999.9999		Judgement condition
181	condi- tions	Edge position X lower limit 0	Set / Get	-99,999.9999 to 99,999.9999	-99,999.9999		Judgement condition
182		Edge position Y upper limit 0	Set / Get	-99,999.9999 to 99,999.9999	99,999.9999		Judgement condition

External refer- ence number	Category	Data name	Set / Get	Data range	Default	Expres- sion text string	Logged data/ Judgement parameter
183		Edge position Y lower limit 0	Set / Get	-99,999.9999 to 99,999.9999	-99,999.9999		Judgement condition
185		Edge position X upper limit 1	Set / Get	-99,999.9999 to 99,999.9999	99,999.9999		Judgement condition
186	-	Edge position X lower limit 1	Set / Get	-99,999.9999 to 99,999.9999	-99,999.9999		Judgement condition
187	Judge- ment condi-	Edge position Y upper limit 1	Set / Get	-99,999.9999 to 99,999.9999	99,999.9999		Judgement condition
188	tions	Edge position Y lower limit 1	Set / Get	-99,999.9999 to 99,999.9999	-99,999.9999		Judgement condition
190		Position compensation X upper limit	Set / Get	-99,999.9999 to 99,999.9999	99,999.9999		Judgement condition
191	-	Position compensation X lower limit	Set / Get	-99,999.9999 to 99,999.9999	-99,999.9999		Judgement condition
192	-	Position compensation Y upper limit	Set / Get	-99,999.9999 to 99,999.9999	99,999.9999		Judgement condition
193	-	Position compensation Y lower limit	Set / Get	-99,999.9999 to 99,999.9999	-99,999.9999		Judgement condition
310		Data logging switch for entire unit	Set / Get	0: Data logging OFF 1: Data logging ON	0		
311	-	Data logging switch for judgement	Set / Get	0: Data logging OFF 1: Data logging ON	0		
312	Logging condi-	Data logging switch for scroll X	Set / Get	0: Data logging OFF 1: Data logging ON	0		
313	tions	Data logging switch for scroll Y	Set / Get	0: Data logging OFF 1: Data logging ON	0		
314		Data logging switch for detected edge posi- tion X0	Set / Get	0: Data logging OFF 1: Data logging ON	0		
315		Data logging switch for detected edge posi- tion Y0	Set / Get	0: Data logging OFF 1: Data logging ON	0		
316	Logging condi- tions	Data logging switch for detected edge posi- tion X1	Set / Get	0: Data logging OFF 1: Data logging ON	0		
317		Data logging switch for detected edge posi- tion Y1	Set / Get	0: Data logging OFF, 1: Data logging ON	0		
700		Position compensation X display	Set / Get	0: ON 1: OFF	0		
701		Position compensation Y display	Set / Get	0: ON 1: OFF	0		
702	Display settings	Detected edge position X0 display	Set / Get	0: ON 1: OFF	0		
703		Detected edge position Y0 display	Set / Get	0: ON 1: OFF	0		
704	Display settings	Detected edge position X1 display	Set / Get	0: ON 1: OFF	0		
705		Detected edge position Y1 display	Set / Get	0: ON 1: OFF	0		

Two-edge Midpoint Compensation

Exter- nal ref- erence number	Category	Data name	Set / Get	Data range	Default	Expres- sion text string	Logged data/ Judgement parameter
0		Judgement	Get only	 -2: No judgement (not measured), 0: Judgement is OK, -1: Judgement is NG, -13: Teaching not performed error, -14: Figure not registered error, -15: Out of range error 	-2	JG	Logged data
5		Scroll X	Get only	-99,999.9999 to 99,999.9999	0	DX	Logged data
6		Scroll Y	Get only	-99,999.9999 to 99,999.9999	0	DY	Logged data
7		Detected edge position X0	Get only	-99,999.9999 to 99,999.9999	0	X0	Logged data
8	Mea-	Detected edge position Y0	Get only	-99,999.9999 to 99,999.9999	0	Y0	Logged data
9	sure- ment result	Detected edge position X1	Get only	-99,999.9999 to 99,999.9999	0	X1	Logged data
10		Detected edge position Y1	Get only	-99,999.9999 to 99,999.9999	0	Y1	Logged data
11		Detected edge mid- point position X	Get only	-99,999.9999 to 99,999.9999	0	MX	Logged data
12	-	Detected edge mid- point position Y	Get only	-99,999.9999 to 99,999.9999	0	MY	Logged data
13		Standard position X0	Get only	-99,999.9999 to 99,999.9999	0	SX0	Logged data
14		Standard position Y0	Get only	-99,999.9999 to 99,999.9999	0	SY0	Logged data
15		Standard position X1	Get only	-99,999.9999 to 99,999.9999	0	SX1	Logged data
16		Standard position Y1	Get only	-99,999.9999 to 99,999.9999	0	SY1	Logged data
17	-	Standard midpoint position X	Get only	-99,999.9999 to 99,999.9999	0	SMX	Logged data
18	-	Standard midpoint position Y	Get only	-99,999.9999 to 99,999.9999	0	SMY	Logged data
103	Output parame- ter	Reflect	Set / Get	0: Yes 1: No	0		
120		Position compensation precision	Set / Get	0: None 1: Bilinear	0		
122		Position compensation image	Set / Get	0: Camera image 1: Previous image	0		
140	Mea-	Edge color specifica- tion 0	Set / Get	0: No edge color specification, 1: Edge color specification	0		
141	sure- ment condi-	Edge color R0	Set / Get	0 to 255	255		
142	tions	Edge color G0	Set / Get	0 to 255	255		

Exter- nal ref- erence number	Category	Data name	Set / Get	Data range	Default	Expres- sion text string	Logged data/ Judgement parameter
143	_	Edge color B0	Set / Get	0 to 255	255		
147		Density change 0	Set / Get	0: Color IN, 1: Color OUT	0		
149		Edge level 0	Set / Get	0 to 100(Monochrome Cameras)	50		
150	-	Noise level 0	Set / Get	0 to 442	5		
153		Monochrome density change 0	Set / Get	(Monochrome Cameras) 0: Light to Dark 1: Dark to Light	0		
154		Edge level absolute value	Set / Get	0 to 442	20		
155		Edge level specification method	Set / Get	0:% 1: Absolute value	0		
157		Measurement method 0	Set / Get	(Monochrome Cameras) 0: Projection 1: Differentiation	0		
158	Mea-	Edge level absolute value (Monochrome Cameras)	Set / Get	0 to 255	20		
160	ment condi-	Edge color specifica- tion 1	Set / Get	0: No edge color specification, 1: Edge color specification	0		
161	tions	Edge color R1	Set / Get	0 to 255	255		
162	-	Edge color G1	Set / Get	0 to 255	255		
163	-	Edge color B1	Set / Get	0 to 255	255		
167	-	Density change 1	Set / Get	0: Color IN 1: Color OUT	0		
169	-	Edge level 1	Set / Get	0 to 100	50		
170	-	Noise level 1	Set / Get	0 to 442	5		
173		Monochrome density change 1	Set / Get	(Monochrome Cameras) 0: Light to Dark 1: Dark to Light	0		
177		Measurement method 1	Set / Get	(Monochrome Cameras) 0: Projection 1: Differentiation	0		
180	Judge- ment	Edge position X upper limit 0	Set / Get	-99,999.9999 to 99,999.9999	99,999.9999		Judgement condition
181	- condi- tions	Edge position X lower limit 0	Set / Get	-99,999.9999 to 99,999.9999	-99,999.9999		Judgement condition
182		Edge position Y upper limit 0	Set / Get	-99,999.9999 to 99,999.9999	99,999.9999		Judgement condition
183		Edge position Y lower limit 0	Set / Get	-99,999.9999 to 99,999.9999	-99,999.9999		Judgement condition
185		Edge position X upper limit 1	Set / Get	-99,999.9999 to 99,999.9999	99,999.9999		Judgement condition
186		Edge position X lower limit 1	Set / Get	-99,999.9999 to 99,999.9999	-99,999.9999		Judgement condition

Exter- nal ref- erence number	Category	Data name	Set / Get	Data range	Default	Expres- sion text string	Logged data/ Judgement parameter
187	Judge- ment	Edge position Y upper limit 1	Set / Get	- 99,999.9999 to 99,999.9999	99,999.9999		Judgement condition
188	tions	Edge position Y lower limit 1	Set / Get	-99,999.9999 to 99,999.9999	-99,999.9999		Judgement condition
190	-	Edge midpoint position X upper limit	Set / Get	-99,999.9999 to 99,999.9999	99,999.9999		Judgement condition
191	-	Edge midpoint position X lower limit	Set / Get	-99,999.9999 to 99,999.9999	-99,999.9999		Judgement condition
192		Edge midpoint position Y upper limit	Set / Get	-99,999.9999 to 99,999.9999	99,999.9999		Judgement condition
193		Edge midpoint position Y lower limit	Set / Get	-99,999.9999 to 99,999.9999	-99,999.9999		Judgement condition
194		Position compensation X upper limit	Set / Get	–99,999.9999 to 99,999.9999	99,999.9999		Judgement condition
195		Position compensation X lower limit	Set / Get	-99,999.9999 to 99,999.9999	-99,999.9999		Judgement condition
196		Position compensation Y upper limit	Set / Get	-99,999.9999 to 99,999.9999	99,999.9999		Judgement condition
197		Position compensation Y lower limit	Set / Get	-99,999.9999 to 99,999.9999	-99,999.9999		Judgement condition
310	Logging condi- tions	Data logging switch for entire unit	Set / Get	0: Data logging OFF, 1: Data logging ON	0	-	
311	liono	Data logging switch for judgement	Set / Get	0: Data logging OFF, 1: Data logging ON	0		
312		Data logging switch for scroll X	Set / Get	0: Data logging OFF, 1: Data logging ON	0		
313		Data logging switch for scroll Y	Set / Get	0: Data logging OFF, 1: Data logging ON	0		
314		Data logging switch for detected edge posi- tion X0	Set / Get	0: Data logging OFF, 1: Data logging ON	0		
315		Data logging switch for detected edge posi- tion Y0	Set / Get	0: Data logging OFF, 1: Data logging ON	0		
316		Data logging switch for detected edge posi- tion X1	Set / Get	0: Data logging OFF, 1: Data logging ON	0		
317		Data logging switch for detected edge posi- tion Y1	Set / Get	0: Data logging OFF, 1: Data logging ON	0		
318	Logging condi- tions	Data logging switch for detected edge mid- point position X	Set / Get	0: Data logging OFF, 1: Data logging ON	0		
319		Data logging switch for detected edge mid- point position Y	Set / Get	0: Data logging OFF, 1: Data logging ON	0		

Exter- nal ref- erence number	Category	Data name	Set / Get	Data range	Default	Expres- sion text string	Logged data/ Judgement parameter
700	Display settings	Position compensation X display	Set / Get	0: ON, 1: OFF	0		
701		Position compensation Y display	Set / Get	0: ON, 1: OFF	0		
702		Detected edge mid- point position X display	Set / Get	0: ON, 1: OFF	0		
703		Detected edge mid- point position Y display	Set / Get	0: ON, 1: OFF	0		
704		Detected edge position X0 display	Set / Get	0: ON, 1: OFF	0		
705		Detected edge position Y0 display	Set / Get	0: ON, 1: OFF	0		
706		Detected edge position X1 display	Set / Get	0: ON, 1: OFF	0		
707	1	Detected edge position Y1 display	Set / Get	0: ON, 1: OFF	0		

Edge Rotation Position Compensation

Exter- nal ref- erence number	Category	Data name	Set / Get	Data range	Default	Expres- sion text string	Logged data/ Judgement parameter
0		Judgement	Get only	 -2: No judgement (not measured) 0: Judgement is OK -1: Judgement is NG -13: Teaching not performed error -14: Figure not registered error -15: Out of range error 	-2	JG	Logged data
5		Position compensation TH	Get only	-99,999.9999 to 99,999.9999	0	DT	Logged data
6	Mea-	Detected edge position X0	Get only	-99,999.9999 to 99,999.9999	0	X0	Logged data
7	sure- ment	Detected edge position Y0	Get only	-99,999.9999 to 99,999.9999	0	Y0	Logged data
8	result	Detected edge position X1	Get only	-99,999.9999 to 99,999.9999	0	X1	Logged data
9		Detected edge position Y1	Get only	-99,999.9999 to 99,999.9999	0	Y1	Logged data
10		Detected edge angle	Get only	-180 to 180	0	ТН	Logged data
11		Standard position X0	Get only	-99,999.9999 to 99,999.9999	0	SX0	Logged data
12		Standard position Y0	Get only	-99,999.9999 to 99,999.9999	0	SY0	Logged data
13		Standard position X1	Get only	-99,999.9999 to 99,999.9999	0	SX1	Logged data
14	Moa	Standard position Y1	Get only	-99,999.9999 to 99,999.9999	0	SY1	Logged data
15	sure- ment result	Standard edge angle	Get only	-180 to 180	0	STH	Logged data
103	Output parame- ter	Reflect	Set / Get	0: Yes, 1: No	0		

Exter- nal ref- erence number	Category	Data name	Set / Get	Data range	Default	Expres- sion text string	Logged data/ Judgement parameter
120		Position compensation pre- cision	Set / Get	0: None, 1: Bilinear	0		
122		Position compensation image	Set / Get	0: Camera image, 1: Previous image	1		
140		Edge color specification 0	Set / Get	0: No edge color specification, 1: Edge color specification	0		
141		Edge color R0	Set / Get	0 to 255	255		
142		Edge color G0	Set / Get	0 to 255	255		
143		Edge color B0	Set / Get	0 to 255	255		
147		Density change 0	Set / Get	0: Color IN, 1: Color OUT	0		
149		Edge level 0	Set / Get	0 to 100	50		
150		Noise level 0	Set / Get	0 to 442	5		
153		Monochrome density change 0	Set / Get	(Monochrome Cameras) 0: Light to Dark, 1: Dark to Light	0		
154		Edge level absolute value	Set / Get	0 to 442	20		
155	_	Edge level specification method	Set / Get	0:% 1: Absolute value	0		
157		Measurement method 0	Set / Get	(Monochrome Cameras) 0: Projection 1: Differentiation	0		
158	Mea- sure- ment	Edge level absolute value (Monochrome Cameras)	Set / Get	0 to 255	20		
160	condi- tions	Edge color specification 0	Set / Get	0: No edge color specification, 1: Edge color specification	0		
161		Edge color R1	Set / Get	0 to 255	255		
162	-	Edge color G1	Set / Get	0 to 255	255		
163		Edge color B1	Set / Get	0 to 255	255		
167		Density change 1	Set / Get	0: Color IN, 1: Color OUT	0		
169		Edge level 1	Set / Get	0 to 100	50		
170		Noise level 1	Set / Get	0 to 442	5		
173	-	Monochrome density change 1	Set / Get	(Monochrome Cameras) 0: Light to Dark 1: Dark to Light	0		
177	-	Measurement method 1	Set / Get	(Monochrome Cameras) 0: Projection 1: Differentiation	0		
180	Judge- ment	Edge position X upper limit 0	Set / Get	-99,999.9999 to 99,999.9999	99,999.99 99		Judgement condition
181	tions	Edge position X lower limit 0	Set / Get	-99,999.9999 to 99,999.9999	99,999.99 99		Judgement condition
182	_	Edge position Y upper limit 0	Set / Get	-99,999.9999 to 99,999.9999	99,999.99 99		Judgement condition
183		Edge position Y lower limit 0	Set / Get	-99,999.9999 to 99,999.9999	99,999.99 99		Judgement condition
185		Edge position X upper limit	Set / Get	-99,999.9999 to 99,999.9999	99,999.99 99		Judgement condition
186		Edge position X lower limit 1	Set / Get	–99,999.9999 to 99,999.9999	99,999.99 99		Judgement condition

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Exter- nal ref- erence number	Category	Data name	Set / Get	Data range	Default	Expres- sion text string	Logged data/ Judgement parameter
187	Judge- ment	Edge position Y upper limit 1	Set / Get	-99,999.9999 to 99,999.9999	99,999.99 99		Judgement condition
188	tions	Edge position Y lower limit 1	Set / Get	-99,999.9999 to 99,999.9999	_ 99,999.99 99		Judgement condition
190	-	Edge angle upper limit	Set / Get	-180 to 180	180		Judgement condition
191	-	Edge angle lower limit	Set / Get	-180 to 180	-180		Judgement condition
310	Logging condi-	Data logging switch for entire unit	Set / Get	0: Data logging OFF 1: Data logging ON	0		
311	lions	Data logging switch for judgement	Set / Get	0: Data logging OFF 1: Data logging ON	0		
312		Data logging switch for position compensation TH	Set / Get	0: Data logging OFF 1: Data logging ON	0		
313		Data logging switch for detected edge position X0	Set / Get	0: Data logging OFF 1: Data logging ON	0		
314		Data logging switch for detected edge position Y0	Set / Get	0: Data logging OFF 1: Data logging ON	0		
315		Data logging switch for detected edge position X1	Set / Get	0: Data logging OFF 1: Data logging ON	0		
316	Logging condi- tions	Data logging switch for detected edge position Y1	Set / Get	0: Data logging OFF 1: Data logging ON	0		
317		Data logging switch for detected edge angle	Set / Get	0: Data logging OFF 1: Data logging ON	0		
700	Display settings	Position compensation theta display	Set / Get	0: ON 1: OFF	0		
701		Detected edge angle dis- play	Set / Get	0: ON 1: OFF	0		
702	Display settings	Detected edge position X0 display	Set / Get	0: ON 1: OFF	0		
703		Detected edge position Y0 display	Set / Get	0: ON 1: OFF	0		
704		Detected edge position X1 display	Set / Get	0: ON 1: OFF	0		
705		Detected edge position Y1 display	Set / Get	0: ON 1: OFF	0		
Position Compensation (Image Rotation, Parameter)

External refer- ence number	Category	Data name	Set / Get	Data range	Default	Expres- sion text string	Logged data/ Judgement parameter
0	Measure- ment result	Judgement	Get only	 -2: No judgement (not measured) 0: Judgement is OK -1: Judgement is NG 	-2	JG	
5		Scroll X	Get only	-99999.9999 to 99999.9999	0	DX	
6		Scroll Y	Get only	-99999.9999 to 99999.9999	0	DY	
7		Scroll θ	Get only	-180.0000 to 180.0000	0	DT	
8		Position X	Get only	-99999.9999 to 99999.9999	0	х	
9		Position Y	Get only	-99999.9999 to 99999.9999	0	Y	
10		Angle	Get only	-180.0000 to 180.0000	0	ТН	
11		Reference X	Get only	-99999.9999 to 99999.9999	0	SX	
12		Reference Y	Get only	-99999.9999 to 99999.9999	0	SY	
13		Reference angle	Get only	-180.0000 to 180.0000	0	ST	
200	Measure- ment	Ref. position X (reference position X)	Set / Get	-99999.9999 to 99999.9999	*1		
201	conditions	Ref. position Y (reference position Y)	Set / Get	-99999.9999 to 99999.9999	*1		
202	_	Ref. position θ (reference position θ)	Set / Get	-180.0000 to 180.0000	90		
203		Measurement position X	Set / Get	-99999.9999 to 99999.9999	*1		
204		Measurement position Y	Set / Get	-99999.9999 to 99999.9999	*1		
205			Set / Get	-180.0000 to 180.0000	0		

*1: Depends on the model. Refer to Compensating for Position Offset (Position Compensation Items): p. 102.

Linear Correction

External refer- ence number	Category	Data name	Set / Get	Data range	Default	Expres- sion text string	Logged data/ Judgement parameter
0	Mea- sure- ment result	Judgement	Get only	 -2: No judgement (not measured) 0: Judgement is OK -1: Judgement is NG 	-2	JG	
120	Mea-	Position interpolation	Set / Get	0: None, 1: Bilinear	1		
122	ment condi- tions	Source image	Set / Get	0: Camera image, 1: Previ- ous image	1		

OCR (FQ2-S4 or FQ2-CH series only)

Exter- nal ref- erence number	Category	Data name	Set / Get	Data range	Default	Expres- sion text string	Logged data/ Judgement parameter
0	Mea- sure- ment result	Judgement	Get only	 -2: No judgement (not measured) 0: Judgement is OK -1: Judgement is NG -11: Model mismatch error -13: Teaching not performed error -16: Measurement timeout error -17: Format not entered error 	-2	JG	Logged data
5		Index number	Get only	 -2: No verification pattern or read was NG, -1: Verification result is NG 0 to 31: Master data number 	0	IN	Logged data
6		Number of characters	Get only	0 to 128	0	Ν	Logged data
7		Read character string	Get only	128 characters max.			
8		Similarity	Get only	0 to 100	0	SIM	Logged data
9		Stability	Get only	0 to 100	0	STB	Logged data
103	Output parame- ter	Reflect	Set / Get	0: Yes 1: No	0		
110		Reading speed	Set / Get	0: Normal 1: Fast	0		
120	Mea- sure-	Character color	Set / Get	0: Black 1: White	0		
121	condi-	Dot horizontal interval	Set / Get	0 to 30	0		
122	uons	Dot vertical interval	Set / Get	0 to 30	0		
123		Character thickness threshold	Set / Get	-128 to 128	0		
124		Boundary correction	Set / Get	0: OFF 1: ON	1		
126		Slender character thresh- old	Set / Get	1 to 10	3		
127		Hyphen height upper threshold	Set / Get	0 to 100	30		

Exter- nal ref- erence number	Category	Data name	Set / Get	Data range	Default	Expres- sion text string	Logged data/ Judgement parameter
128	Mea- sure-	Hyphen height lower threshold	Set / Get	0 to 100	70		
129	condi- tions	Printing type	Set / Get	0: Solid character 1: Dot character	1		
130		Rotation compensation	Set / Get	0: OFF 1: ON	0		
131	-	Slant compensation	Set / Get	0: OFF 1: ON	1		
132	Judge- ment	Similarity judgement upper limit	Set / Get	0 to 100	100		Judgement condition
133	tions	Similarity judgement lower limit	Set / Get	0 to 100	60		Judgement condition
134	-	Stability judgement upper limit	Set / Get	0 to 100	100		Judgement condition
135		Stability judgement lower limit	Set / Get	0 to 100	10		Judgement condition
136	Output parame- ter	Line delimiter	Set / Get	0: None 1: Comma 2: Space	0		
138	-	String output ON/OFF	Set / Get	0: OFF 1: ON	0		
139		NG error code output	Set / Get	0: OFF 1: ON	1		
141 ^{*1}		Error string	Set / Get	20 characters max.	NG		
142		Partial output ON/OFF	Set / Get	0: No 1: Yes	0		
143		Output end digit	Set / Get	1 to 128	128		
144		Output beginning digit	Set / Get	1 to 128	1		
146	Mea- sure-	Reading speed	Set / Get	0: Fixed 1: Variable	1		
150 ^{*1}	condi-	Format character string 0	Set / Get	32 characters max.			
151 ^{*1}	tions	Format character string 1	Set / Get	32 characters max.			
152 ^{*1}		Format character string 2	Set / Get	32 characters max.			
153 ^{*1}		Format character string 3	Set / Get	32 characters max.			
154 ^{*1}		Teach mode	Set / Get	0: Simple teach 1: Correct string	1		
155 ^{*1}		Correct string (L.1)	Set / Get	32 characters max.			
156 ^{*1}		Correct string (L.2)	Set / Get	32 characters max.			
157 ^{*1}		Correct string (L.3)	Set / Get	32 characters max.			
158 ^{*1}	1	Correct string (L.4)	Set / Get	32 characters max.			
160		Dictionary reference	Set / Get	-1: None 0 to 31	-1		
170	Output charac-	String output ON/OFF (memory link)	Set / Get	0: OFF 1: ON	0		
171	lei sel	NG error code output (memory link)	Set / Get	0: OFF 1: ON	1		
172	1	Partial output ON/OFF (memory link)	Set / Get	0: OFF 1: ON	0		

Exter- nal ref- erence number	Category	Data name	Set / Get	Data range	Default	Expres- sion text string	Logged data/ Judgement parameter
173	Output charac- tor sot	Output end digit (memory link)	Set / Get	1 to 128	128		
174		Output beginning digit (memory link)	Set / Get	1 to 128	1		
195	-	Max width setting	Set / Get	0: OFF 1: ON	0		
196	Mea-	Max width	Set / Get	0 to 9999	0		
197	ment	Max height	Set / Get	0 to 9999	0		
198	condition	Min height	Set / Get	0 to 100	50		
250	Judge- ment	Number of characters upper limit (L.1)	Set / Get	0 to 32	32		
251	tions	Number of characters upper limit (L.2)	Set / Get	0 to 32	32		
252	-	Number of characters upper limit (L.3)	Set / Get	0 to 32	32		
253	-	Number of characters upper limit (L.4)	Set / Get	0 to 32	32		
260	-	Number of characters lower limit (L.1)	Set / Get	0 to 32	0		
261	-	Number of characters lower limit (L.2)	Set / Get	0 to 32	0		
262	-	Number of characters lower limit (L.3)	Set / Get	0 to 32	0		
263	-	Number of characters lower limit (L.4)	Set / Get	0 to 32	0		
300	Logging	Data logging count	Set / Get	1 to 128	128		
310	tions	Data logging switch (unit)	Set / Get	0: Data logging OFF 1: Data logging ON	1		
311		Data logging switch (judgement)	Set / Get	0: Data logging OFF 1: Data logging ON	1		
312	-	Data logging switch (mini- mum similarity)	Set / Get	0: Data logging OFF 1: Data logging ON	1		
313	-	Data logging switch (mini- mum stability)	Set / Get	0: Data logging OFF 1: Data logging ON	1		
314		Data logging switch (num- ber of characters 1)	Set / Get	0: Data logging OFF 1: Data logging ON	1		
315		Data logging switch (num- ber of characters 2)	Set / Get	0: Data logging OFF 1: Data logging ON	1		
316		Data logging switch (num- ber of characters 3)	Set / Get	0: Data logging OFF 1: Data logging ON	1		
317		Data logging switch (num- ber of characters 4)	Set / Get	0: Data logging OFF 1: Data logging ON	1		
318		Data logging switch (simi- larity (individual))	Set / Get	0: Data logging OFF 1: Data logging ON	1		
319	Logging condi- tions	Data logging switch (sta- bility (individual))	Set / Get	0: Data logging OFF 1: Data logging ON	1		

Exter- nal ref- erence number	Category	Data name	Set / Get	Data range	Default	Expres- sion text string	Logged data/ Judgement parameter
400	Verifica- tion con- ditions	Verification master data	Set / Get	 -1: OFF 0: All master data, 1 to 32: Selected master data 	-1		
401		Matching mode	Set / Get	0: Direct input 1: Calendar matching 2: Code matching	0		
410		Auto master data number	Set / Get	-1: OFF 0 to 31: Selected master data	-1		
420	Judge- ment	Judgement mode	Set / Get	0: All 1: Individual	0		
450+N (N=0 to 9)	tions	Individual characters (number)	Set / Get	0: Disable 1: Enable	1		
450+N (N=10 to 35)		Individual characters (Alphabet)	Set / Get	0: Disable 1: Enable	1		
450+N (N=36 to 39)		Individual characters (Symbol)	Set / Get	0: Disable 1: Enable	1		
500	Verifica- tion con- ditions	Selected master data number	Set / Get	0 to 31	0		
700	Display settings	Similarity display	Set / Get	0: Display 1: Do not display	0		
701		Stability display	Set / Get	0: Display 1: Do not display	0		
702		Number of read characters display	Set / Get	0: Display 1: Do not display	1		
703		Character display	Set / Get	0: Display 1: Do not display	0		
704		Character count display Ver.2.10 or later	Set / Get		0		
705		Characters display Ver.2.10 or later	Set / Get	0: Display 1: Do not display	0		
706		Verification string display Ver.2.10 or later	Set / Get		0		
800+N (N=0 to 39)	Judge- ment conditions	Similarity upper limit	Set / Get	0 to 100	100		
850+N (N=0 to 39)		Similarity lower limit	Set / Get	0 to 100	60		
900+N (N=0 to 39)		Stability upper limit	Set / Get	0 to 100	100		
950+N (N=0 to 39)		Stability lower limit	Set / Get	0 to 100	10		
1001	Verificati on condi- tions	Reference unit number 0	Set / Get	-1: OFF 0 to 31	-1		

Exter- nal ref- erence number	Category	Data name	Set / Get	Data range	Default	Expres- sion text string	Logged data/ Judgement parameter
1002+N ×2 (N = 0 to 3)	Verificati on condi-	Verification end digit 0N	Set / Get	1 to 1024	1024		
1003+N ×2 (N = 0 to 3)		Verification beginning digit 0N	Set / Get	1 to 1024	1		
$1011+N \times 2 (N = 0 \text{ to } 3)^{*1}$		Master data 0N	Set / Get	32 characters max.			
1021		Reference unit number 1	Set / Get	-1: OFF 0 to 31	-1		
1022+N ×2 (N = 0 to 3)		Verification end digit 1N	Set / Get	1 to 1024	1024		
1023+N ×2 (N = 0 to 3)		Verification beginning digit 1N	Set / Get	1 to 1024	1		
$1031+N \times 2 (N = 0 \text{ to } 3)^{*1}$		Master data 1N	Set / Get	32 characters max.			
1041		Reference unit number 2	Set / Get	–1: OFF 0 to 31	-1		
1042+N ×2 (N = 0 to 3)		Verification end digit 2N	Set / Get	1 to 1024	1024		
1043+N ×2 (N = 0 to 3)	_	Verification beginning digit 2N	Set / Get	1 to 1024	1		
$1051+N \times 2 (N = 0 \text{ to } 3)^{*1}$		Master data 2N	Set / Get	32 characters max.			
1061		Reference unit number 3	Set / Get	–1: OFF, 0 to 31	-1		
1062+N ×2 (N = 0 to 3)		Verification end digit 3N	Set / Get	1 to 1024	1024		
1063+N ×2 (N = 0 to 3)		Verification beginning digit 3N	Set / Get	1 to 1024	1		
$1071+N \times 2 (N = 0 \text{ to } 3)^{*1}$		Master data 3N	Set / Get	32 characters max.			
1081		Reference unit number 4	Set / Get	–1: OFF 0 to 31	-1		
1082+N ×2 (N = 0 to 3)		Verification end digit 4N	Set / Get	1 to 1024	1024		
1083+N ×2 (N = 0 to 3)		Verification beginning digit 4N	Set / Get	1 to 1024	1		
$1091+N \times 2 (N = 0 \text{ to } 3)^{*1}$		Master data 4N	Set / Get	32 characters max.			
1101		Reference unit number 5	Set / Get	-1: OFF 0 to 31	-1		

Exter- nal ref- erence number	Category	Data name	Set / Get	Data range	Default	Expres- sion text string	Logged data/ Judgement parameter
1102+N ×2 (N = 0 to 3)	Verificati on condi-	Verification end digit 5N	Set / Get	1 to 1024	1024		
1103+N ×2 (N = 0 to 3)	tions	Verification beginning digit 5N	Set / Get	1 to 1024	1		
$1111+N \times 2 (N = 0 \text{ to } 3)^{*1}$		Master data 5N	Set / Get	32 characters max.			
1121	1	Reference unit number 6	Set / Get	-1: OFF, 0 to 31	-1		
1122+N ×2 (N = 0 to 3)		Verification end digit 6N	Set / Get	1 to 1024	1024		
1123+N ×2 (N = 0 to 3)		Verification beginning digit 6N	Set / Get	1 to 1024	1		
$1131+N \times 2 (N = 0 \text{ to } 3)^{*1}$		Master data 6N	Set / Get	32 characters max.			
1141		Reference unit number 7	Set / Get	-1: OFF, 0 to 31	-1		
1142+N ×2 (N = 0 to 3)		Verification end digit 7N	Set / Get	1 to 1024	1024		
1143+N ×2 (N = 0 to 3)		Verification beginning digit 7N	Set / Get	1 to 1024	1		
$1151+N \times 2 (N = 0 \text{ to } 3)^{*1}$		Master data 7N	Set / Get	32 characters max.			
1161		Reference unit number 8	Set / Get	-1: OFF, 0 to 31	-1		
1162+N ×2 (N = 0 to 3)		Verification end digit 8N	Set / Get	1 to 1024	1024		
1163+N ×2 (N = 0 to 3)		Verification beginning digit 8N	Set / Get	1 to 1024	1		
$1171+N \times 2 (N = 0 \text{ to } 3)^{*1}$		Master data 8N	Set / Get	32 characters max.			
1181		Reference unit number 9	Set / Get	–1: OFF, 0 to 31	-1		
1182+N ×2 (N = 0 to 3)		Verification end digit 9N	Set / Get	1 to 1024	1024		
1183+N ×2 (N = 0 to 3)		Verification beginning digit 9N	Set / Get	1 to 1024	1		
$1191+N \times 2 (N = 0 \text{ to } 3)^{*1}$		Master data 9N	Set / Get	32 characters max.			
1201		Reference unit number 10	Set / Get	-1: OFF, 0 to 31	-1		

Exter- nal ref- erence number	Category	Data name	Set / Get	Data range	Default	Expres- sion text string	Logged data/ Judgement parameter
1202+N ×2 (N = 0 to 3)	Verificati on condi- tions	Verification end digit 10N	Set / Get	1 to 1024	1024		
1203+N ×2 (N = 0 to 3)	uons	Verification beginning digit 10N	Set / Get	1 to 1024	1		
$1211+N \times 2 (N = 0 \text{ to } 3)^{*1}$		Master data 10N	Set / Get	32 characters max.			
1221		Reference unit number 11	Set / Get				
1222+N ×2 (N = 0 to 3)		Verification end digit 11N	Set / Get	1 to 1024	1024		
1223+N ×2 (N = 0 to 3)		Verification beginning digit 11N	Set / Get	1 to 1024	1		
$1231+N \times 2 (N = 0 \text{ to } 3)^{*1}$		Master data 11N	Set / Get	32 characters max.			
1241		Reference unit number 12	Set / Get	-1: OFF, 0 to 31	-1		
1242+N ×2 (N = 0 to 3)		Verification end digit 12N	Set / Get	1 to 1024	1024		
1243+N ×2 (N = 0 to 3)	-	Verification beginning digit 12N	Set / Get	1 to 1024	1		
$1251+N \times 2 (N = 0 \text{ to } 3)^{*1}$	-	Master data 12N	Set / Get	32 characters max.			
1261		Reference unit number 13	Set / Get	-1: OFF, 0 to 31	-1		
1262+N ×2 (N = 0 to 3)	-	Verification end digit 13N	Set / Get	1 to 1024	1024		
1263+N ×2 (N = 0 to 3)	-	Verification beginning digit 13N	Set / Get	1 to 1024	1		
$1271+N \times 2 (N = 0 \text{ to } 3)^{*1}$	-	Master data 13N	Set / Get	32 characters max.			
1281		Reference unit number 14	Set / Get	-1: OFF 0 to 31	-1		
1282+N ×2 (N = 0 to 3)		Verification end digit 14N	Set / Get	1 to 1024	1024		
1283+N ×2 (N = 0 to 3)		Verification beginning digit 14N	Set / Get	1 to 1024	1		
$1291+N \times 2 (N = 0 \text{ to } 3)^{*1}$		Master data 14N	Set / Get	32 characters max.			
1301		Reference unit number 15	Set / Get	-1: OFF, 0 to 31	-1		
1302+N ×2 (N = 0 to 3)		Verification end digit 15N	Set / Get	1 to 32	32		

Exter- nal ref- erence number	Category	Data name	Set / Get	Data range	Default	Expres- sion text string	Logged data/ Judgement parameter
1303+N ×2 (N = 0 to 3)	Verifica- tion con- ditions	Verification beginning digit 15N	Set / Get	1 to 32	1		
$1311+N \times 2 (N = 0 \text{ to } 3)^{*1}$	-	Master data 15N	Set / Get	32 characters max.			
1321		Reference unit number 16	Set / Get	-1: OFF 0 to 31	-1		
1322+N ×2 (N = 0 to 3)	-	Verification end digit 16N	Set / Get	1 to 1024	1024		
1323+N ×2 (N = 0 to 3)		Verification beginning digit 16N	Set / Get	1 to 1024	1		
$1331+N \times 2 (N = 0 \text{ to } 3)^{*1}$		Master data 16N	Set / Get	32 characters max.			
1341		Reference unit number 17	Set / Get	-1: OFF, 0 to 31	-1		
1342+N ×2 (N = 0 to 3)	-	Verification end digit 17N	Set / Get	1 to 32	32		
1343+N ×2 (N = 0 to 3)		Verification beginning digit 17N	Set / Get	1 to 32	1		
$1351+N \times 2 (N = 0 \text{ to } 3)^{*1}$		Master data 17N	Set / Get	32 characters max.			
1361		Reference unit number 18	Set / Get	–1: OFF, 0 to 31	-1		
1362+N ×2 (N = 0 to 3)		Verification end digit 18N	Set / Get	1 to 32	32		
1363+N ×2 (N = 0 to 3)		Verification beginning digit 18N	Set / Get	1 to 32	1		
$1371+N \times 2 (N = 0 \text{ to } 3)^{*1}$		Master data 18N	Set / Get	32 characters max.			
1381		Reference unit number 19	Set / Get	-1: OFF, 0 to 31	-1		
1382+N ×2 (N = 0 to 3)		Verification end digit 19N	Set / Get	1 to 32	32		
1383+N ×2 (N = 0 to 3)		Verification beginning digit 19N	Set / Get	1 to 32	1		
$1391+N \times 2 (N = 0 \text{ to } 3)^{*1}$		Master data 19N	Set / Get	32 characters max.			
1401		Reference unit number 20	Set / Get	-1: OFF, 0 to 31	-1		
1402+N ×2 (N = 0 to 3)		Verification end digit 20N	Set / Get	1 to 32	32		

Exter- nal ref- erence number	Category	Data name	Set / Get	Data range	Default	Expres- sion text string	Logged data/ Judgement parameter
1403+N ×2 (N = 0 to 3)	Verifica- tion con- ditions	Verification beginning digit 20N	Set / Get	1 to 32	1		
$1411+N \times 2 (N = 0 \text{ to } 3)^{*1}$		Master data 20N	Set / Get	32 characters max.			
1421		Reference unit number 21	Set / Get	–1: OFF, 0 to 31	-1		
1422+N ×2 (N = 0 to 3)		Verification end digit 21N	Set / Get	1 to 1024	1024		
1423+N ×2 (N = 0 to 3)		Verification beginning digit 21N	Set / Get	1 to 1024	1		
$1431+N \times 2 (N = 0 \text{ to } 3)^{*1}$		Master data 21N	Set / Get	32 characters max.			
1441		Reference unit number 22	Set / Get	–1: OFF, 0 to 31	-1		
1442+N ×2 (N = 0 to 3)		Verification end digit 22N	Set / Get	1 to 1024	1024		
1443+N ×2 (N = 0 to 3)		Verification beginning digit 22N	Set / Get	1 to 1024	1		
$1451+N \times 2 (N = 0 \text{ to } 3)^{*1}$		Master data 22N	Set / Get	32 characters max.			
1461		Reference unit number 23	Set / Get	–1: OFF, 0 to 31	-1		
1462+N ×2 (N = 0 to 3)		Verification end digit 23N	Set / Get	1 to 1024	1024		
1463+N ×2 (N = 0 to 3)		Verification beginning digit 23N	Set / Get	1 to 1024	1		
$1471+N \times 2 (N = 0 \text{ to } 3)^{*1}$		Master data 23N	Set / Get	32 characters max.			
1481		Reference unit number 24	Set / Get	-1: OFF, 0 to 31	-1		
1482+N ×2 (N = 0 to 3)		Verification end digit 24N	Set / Get	1 to 1024	1024		
1483+N ×2 (N = 0 to 3)		Verification beginning digit 24N	Set / Get	1 to 1024	1		
$1491+N \times 2 (N = 0 \text{ to } 3)^{*1}$		Master data 24N	Set / Get	32 characters max.			
1501		Reference unit number 25	Set / Get	-1: OFF, 0 to 31	-1		
1502+N ×2 (N = 0 to 3)		Verification end digit 25N	Set / Get	1 to 1024	1024		

Exter- nal ref- erence number	Category	Data name	Set / Get	Data range	Default	Expres- sion text string	Logged data/ Judgement parameter
1503+N ×2 (N = 0 to 3)	Verifica- tion con- ditions	Verification beginning digit 25N	Set / Get	1 to 1024	1		
$1511+N \times 2 (N = 0 \text{ to } 3)^{*1}$		Master data 25N	Set / Get	32 characters max.			
1521		Reference unit number 26	Set / Get	-1: OFF, 0 to 31	-1		
1522+N ×2 (N = 0 to 3)		Verification end digit 26N	Set / Get	1 to 1024	1024		
1523+N ×2 (N = 0 to 3)		Verification beginning digit 26N	Set / Get	1 to 1024	1		
$1531+N \times 2 (N = 0 \text{ to } 3)^{*1}$		Master data 26N	Set / Get	32 characters max.			
1541		Reference unit number 27	Set / Get	-1: OFF, 0 to 31	-1		
1542+N ×2 (N = 0 to 3)	-	Verification end digit 27N	Set / Get	1 to 1024	1024		
1543+N ×2 (N = 0 to 3)	-	Verification beginning digit 27N	Set / Get	1 to 1024	1		
$1551+N \times 2 (N = 0 \text{ to } 3)^{*1}$	-	Master data 27N	Set / Get	32 characters max.			
1561		Reference unit number 28	Set / Get	-1: OFF 0 to 31	-1		
1562+N ×2 (N = 0 to 3)	-	Verification end digit 28N	Set / Get	1 to 1024	1024		
1563+N ×2 (N = 0 to 3)	-	Verification beginning digit 28N	Set / Get	1 to 1024	1		
$1571+N \times 2 (N = 0 \text{ to } 3)^{*1}$	-	Master data 28N	Set / Get	32 characters max.			
1582	-	Reference unit number 29	Set / Get	-1: OFF, 0 to 31	-1		
1582+N ×2 (N = 0 to 3)		Verification end digit 29N	Set / Get	1 to 1024	1024		
1583+N ×2 (N = 0 to 3)		Verification beginning digit 29N	Set / Get	1 to 1024	1		
$1591+N \times 2 (N = 0 \text{ to } 3)^{*1}$		Master data 29N	Set / Get	32 characters max.			
1601		Reference unit number 30	Set / Get	-1: OFF, 0 to 31	-1		
1602+N ×2 (N = 0 to 3)		Verification end digit 30N	Set / Get	1 to 1024	1024		

Exter- nal ref- erence number	Category	Data name	Set / Get	Data range	Default	Expres- sion text string	Logged data/ Judgement parameter
1603+N ×2 (N = 0 to 3)	Verifica- tion con- ditions	Verification beginning digit 30N	Set / Get	1 to 1024	1		
$1611+N \times 2 (N = 0 \text{ to } 3)^{*1}$		Master data 30N	Set / Get	32 characters max.			
1621		Reference unit number 31	Set / Get	-1: OFF 0 to 31	-1		
1622+N ×2 (N = 0 to 3)		Verification end digit 31N	Set / Get	1 to 1024	1024		
1623+N ×2 (N = 0 to 3)		Verification beginning digit 31N	Set / Get	1 to 1024	1		
$1631+N \times 2 (N = 0 \text{ to } 3)^{*1}$		Master data 31N	Set / Get	32 characters max.			
1701		Reference unit number (in code matching mode)	Set / Get	-1: OFF 0 to 31			
1702+N ×2 (N=0 to 3)		Verification end digit Nth line (in calendar matching mode, or code matching mode)	Set / Get	1 to 1024	1024		
1703+N ×2 (N=0 to 3)		Verification beginning digit Nth line (in calendar matching mode, or code matching mode)	Set / Get	1 to 1024	1		
1711+N ×2 (N=0 to 3) to 1		Master data Nth line (in calendar matching mode, or code matching mode)	Set / Get	32 characters max.			
1720+N ×2 (N=0 to 3)		Verification line select Nth line (in code matching mode)	Set / Get	0: Disable 1: Enable	0		
1800*1		Code data file name	Set / Get	32 characters max.	code		
1825		Period setting: Year	Set / Get	0 to 99	0		
1826		Period setting: Month	Set / Get	0 to 99	0		
1827		Period setting: Day	Set / Get	-999 to 999	0		
1828		Auto update	Set / Get	0: Don't update 1: First update 2: Always update	2		
1829		Zero suppress	Set / Get	0: 0 1: Space	0		
1830		Data calc. order	Set / Get	0: Month→Day 1: Day→Month	0		
1831		Month end adjust	Set / Get	0: Last day of current month 1: First day of next month 2: Gap day of next month	0		
1832		Ahead margin	Set / Get	0 to 99	0		
1833		Back margin	Set / Get	0 to 99	0		

Exter- nal ref- erence number	Category	Data name	Set / Get	Data range	Default	Expres- sion text string	Logged data/ Judgement parameter
2000	Mea- sure-	Number of read characters on line 1	Get only	0 to 32	0		
2001	result	Number of read characters on line 2	Get only	0 to 32	0		
2002		Number of read characters on line 3	Get only	0 to 32	0		
2003		Number of read characters on line 4	Get only	0 to 32	0		
2100		Read character string on line 1	Get only	32 characters max.			
2101 ^{*1}		Read character string on line 2	Get only	32 characters max.			
2102 ^{*1}		Read character string on line 3	Get only	32 characters max.			
2103 ^{*1}		Read character string on line 4	Get only	32 characters max.			
2500+N (N= 0 to 127*1		Individual read character	Get only	1 character			
3000+N (N= 0 to 127)		Individual similarity	Get only	0 to 100	0		
3500+N (N= 0 to 127)		Individual stability	Get only	0 to 100	0		

*1: To acquire the detected text string, use the ITEMDATA2 command.

Bar code (FQ2-S4 series only)

External refer- ence number	Category	Data name	Set / Get	Data range	Default	Expres- sion text string	Logged data/ Judgement parameter
0	Mea- sure- ment result	Judgement	Get only	 -2: No judgement (not measured), 0: Judgement is OK, 1: Judgement is NG, -16: Measurement timeout error 	-2	JG	Logged data
5		Index No.	Get only	 -2: No verification pattern, or reading error -1: Verification is NG, 0 to 31: Master data No. 	-2	IN	
6		Num. of characters	Get only	0 to 1024	0	Ν	Logged data
7 ^{*1}		Characters	Get only	32 characters max.	0		
103	Output parame- ter	Reflect	Get only	0: Yes, 1: No	0		
121	Verifica- tion con- dition	Verified master data	Set / Get	-1: OFF 0: Verify all master data 1: Verify master data 0 2: Verify master data 1 31: Verify master data 31	-1		
122		Partial verif. on/off	Set / Get	0: No 1: Yes	0		

External refer- ence number	Category	Data name	Set / Get	Data range	Default	Expres- sion text string	Logged data/ Judgement parameter
123	Verifica-	Last compared digit	Set / Get	1 to 1024	1024		
124	dition	First compared digit	Set / Get	1 to 1024	1		
125	Output parame- ter	String output on/off	Set / Get	0: None 1: Enable	0		
127 ^{*1}		Error string	Set / Get	20 characters max	NG		
128		Partial output on/off	Set / Get	0: None 1: Enable	0		
129		Output last digit	Set / Get	1 to 1024	1024		
130		Output first digit	Set / Get	1 to 1024	1		
131	Mea- sure- ment condition	Code type	Set / Get	0: JAN/EAN/UPC 1: Code 39 2: Codabar 3: ITF 4: Code 93 5: Code128/GS1-128 6: GS1 DataBar 7: Pharmacode	0		
132		Timeout time (ms)	Set / Get	1 to 9999	9999		
133		Check digit on/off	Set / Get	0: None 1: Enable	1		
134		Composite codes on/off	Set / Get	0: None 1: Enable	0		
135	Mea- sure-	Direction	Set / Get	0: Horizontal mode 1: Vertical mode	0		
136	result	Reverse on/off	Set / Get	0: None 1: Enable	0		
141		Code color	Set / Get	0: Black 1: White	0		
150	Verifica- tion con-	Selected master num- ber	Set / Get	1 to 31	0		
152	dition	Auto master data num- ber	Set / Get	0 to 31: Master data number –1: OFF	-1		
160	Output parame-	NG error code output	Set / Get	0: OFF 1: ON	1		
170		String output ON/OFF (memory link)	Set / Get	0: OFF 1: ON	0		
171		NG error code output (memory link)	Set / Get	0: OFF 1: ON	1		
172		Partial output ON/OFF (memory link)	Set / Get	0: OFF 1: ON	0		
173		Output end digit (memory link)	Set / Get	1 to 1024	1024		
174		Output beginning digit (memory link)	Set / Get	1 to 1024	1		
202+3N (N=0 to 31)	Verifica- tion con- dition	Master data N	Set / Get	32 characters max.	None		
300+N (N=0 to 31)		Reference unit number N	Set / Get	0 to 31	0		

External refer- ence number	Category	Data name	Set / Get	Data range	Default	Expres- sion text string	Logged data/ Judgement parameter
410	Logging condi- tions	Data logging switch for unit	Set / Get	0: Data logging OFF 1: Data logging ON	1		
411	10113	Data logging switch for judgement	Set / Get	0: Data logging OFF 1: Data logging ON	1		
412		Data logging switch for number of characters	Set / Get	0: Data logging OFF 1: Data logging ON	1		
500	Display setting	Number of characters display	Set / Get	0: OFF 1: ON	0		
501		Character display	Set / Get	0: ON 1: OFF	0		

*1 Use the ITEMDATA2 command to set and/or acquire a text string.

2D-code (FQ2-S4 series only)

External refer- ence number	Category	Data name	Set / Get	Data range	Default	Expres- sion text string	Logged data/ Judgement parameter
0	Mea- sure- ment result	Judgement	Get only	 -2: Not measured, 0: Judgement is OK, 1: Judgement is NG, -16: Measurement timeout error 	-2	JG	Logged data
5		Index No.	Get only	 -2: No verification pattern, or reading error -1: Verification is NG, 0 to 31: Master data No. 	-2	IN	
6		Num. of characters	Get only	0 to 1024	0	Ν	Logged data
7 ^{*1}		Characters	Get only	32 characters max.	0		
50		Overall quality	Get only	0 to 4	0	GD0	Logged data
51		Decode	Get only	0 to 4	0	GD1	Logged data
52	-	Cell Contrast	Get only	0 to 4	0	GD2	Logged data
53		Cell Modulation	Get only	0 to 4	0	GD3	Logged data
54		Fixed pattern damage	Get only	0 to 4	0	GD4	Logged data
55		Axial nonuniformity	Get only	0 to 4	0	GD5	Logged data
56		Grid nonuniformity	Get only	0 to 4	0	GD6	Logged data
57		Unused err. Corr.	Get only	0 to 4	0	GD7	Logged data
58		Print scale	Get only	0 to 4	0	GD8	Logged data
59		Print Scale X	Get only	0 to 4	0	GD9	Logged data
60	1	Print Scale Y	Get only	0 to 4	0	GD10	Logged data
103	Output parame- ter	Reflect	Set / Get	0: Yes, 1: No	0		

External refer- ence number	Category	Data name	Set / Get	Data range	Default	Expres- sion text string	Logged data/ Judgement parameter
121	Verifica- tion con- dition	Verified master data	Set / Get	 -1: OFF 0: Verify all master data 1: Verify master data 0 2: Verify master data 1 : 	0		
122		Partial verif. on/off	Set / Get	0: No 1: Yes	0		
123		Last compared digit	Set / Get	1 to 1024	1024		
124		First compared digit	Set / Get	1 to 1024	1		
125	Output parame-	String output on/off	Set / Get	0: None 1: Enable	0		
126	lei	Error string size (bytes)	Set / Get	1 to 20	2		
127 ^{*1}		Error string	Set / Get	20 characters max.	NG		
128		Partial output on/off	Set / Get	0: None 1: Enable	0		
129		Output last digit	Set / Get	1 to 1024	1024		
130		Output first digit	Set / Get	1 to 1024	1		
131	Mea- sure- ment condition	Code type	Set / Get	0: Data Matrix 1: QR Code 2: MicroQR Code 3: PDF417 4: MicroPDF417	0		
132		Timeout time (ms)	Set / Get	1 to 9999	9999		
133		Reverse (Data Matrix, QR Code, Micro QR Code only)	Set / Get	0: Normal 1: Reverse	0		
134		Code color (Data Matrix, QR Code, Micro QR Code only)	Set / Get	0: Black 1: White 2: Auto	2		
135	Mea- sure- ment result	Shape (DataMatrix only)	Set / Get	0: Square 1: Square or Rect.	0		
150	Verifica- tion con-	Selected master num- ber	Set / Get	0 to 31	0		
152		Auto master data num- ber	Set / Get	0 to 31: Master data number –1: OFF	-1		
160	Output parame- ter	NG error code output	Set / Get	0: OFF 1: ON	1		
167	Judge- ment	Print quality threshold upper limit	Set / Get	0 to 4	4		Judgement condition
168	tion threshold	Print quality threshold lower limit	Set / Get	0 to 4	0		Judgement condition

External refer- ence number	Category	Data name	Set / Get	Data range	Default	Expres- sion text string	Logged data/ Judgement parameter
170	Output parame-	String output ON/OFF (memory link)	Set / Get	0: OFF 1: ON	0		
171		NG error code output (memory link)	Set / Get	0: OFF 1: ON	1		
172		Partial output ON/OFF (memory link)	Set / Get	0: OFF 1: ON	0		
173		Output end digit (mem- ory link)	Set / Get	1 to 1024	1024		
174		Output beginning digit (memory link)	Set / Get	1 to 1024	1		
180	Mea- sure-	GS conversion	Set / Get	0: OFF 1: ON	0		
181	condition	Replacement charac- ter string	Set / Get	Maximum 16 characters	None		
186		Print quality	Set / Get	0: OFF 1: ON	0		
190		Grid correction (MicroQR Code)	Set / Get	0: OFF 1: ON	0		
202+3N (N=0 to 31) ^{*1}	Verifica- tion con- dition	Master data N	Set / Get	32 characters max.	None		
300+N (N=0 to 31)		Reference unit number N	Set / Get	0 to 31	0		
410	Logging condi-	Data logging switch for unit	Set / Get	0: Data logging OFF 1: Data logging ON	1		
411	tions	Data logging switch for judgement	Set / Get	0: Data logging OFF 1: Data logging ON	1		
412		Data logging switch for number of characters	Set / Get	0: Data logging OFF 1: Data logging ON	1		
440		Data logging switch (overall quality)	Set / Get	0: Data logging OFF 1: Data logging ON	1		
441		Data logging switch (decode)	Set / Get	0: Data logging OFF 1: Data logging ON	0		
442		Data logging switch (cell contrast)	Set / Get	0: Data logging OFF 1: Data logging ON	0		
443		Data logging switch (cell modulation)	Set / Get	0: Data logging OFF 1: Data logging ON	0		
444		Data logging switch (fixed pattern damage)	Set / Get	0: Data logging OFF 1: Data logging ON	0		
445		Data logging switch (axial nonuniformity)	Set / Get	0: Data logging OFF 1: Data logging ON	0		
446		Data logging switch (grid nonuniformity)	Set / Get	0: Data logging OFF 1: Data logging ON	0		
447		Data logging switch (unused error correc- tion)	Set / Get	0: Data logging OFF 1: Data logging ON	0		
448		Data logging switch (print scale)	Set / Get	0: Data logging OFF 1: Data logging ON	0		
449		Data logging switch (print scale X)	Set / Get	0: Data logging OFF 1: Data logging ON	0		
450		Data logging switch (print scale Y)	Set / Get	0: Data logging OFF 1: Data logging ON	0		

Category	Data name	Set / Get	Data range	Default	Expres- sion text string	Logged data/ Judgement parameter
Display setting	Number of characters display	Set / Get	0: ON 1: OFF	0		
-	Character display	Set / Get	0: ON 1: OFF	0		
	Display ON/OFF (over- all quality)	Set / Get	0: ON 1: OFF	0		
	Display ON/OFF (decode)	Set / Get	0: ON 1: OFF	0		
	Display ON/OFF (cell contrast)	Set / Get	0: ON 1: OFF	0		
-	Display ON/OFF (cell modulation)	Set / Get	0: ON 1: OFF	0		
-	Display ON/OFF (fixed pattern damage)	Set / Get	0: ON 1: OFF	0		
-	Display ON/OFF (axial nonuniformity)	Set / Get	0: ON 1: OFF	0		
	Display ON/OFF (grid nonuniformity)	Set / Get	0: ON 1: OFF	0		
	Display ON/OFF (unused error correc- tion)	Set / Get	0: ON 1: OFF	0		
	Display ON/OFF (print scale)	Set / Get	0: ON 1: OFF	0		
	Display ON/OFF (print scale X)	Set / Get	0: ON 1: OFF	0		
	Display ON/OFF (print scale Y)	Set / Get	0: ON 1: OFF	0		
	Category Display setting	CategoryData nameDisplay settingNumber of characters displayDisplayCharacter displayDisplay ON/OFF (over- all quality)Display ON/OFF (over- all quality)Display ON/OFF (cell contrast)Display ON/OFF (cell contrast)Display ON/OFF (cell modulation)Display ON/OFF (cell modulation)Display ON/OFF (cell modulation)Display ON/OFF (cell modulation)Display ON/OFF (cell modulation)Display ON/OFF (fixed pattern damage)Display ON/OFF (grid nonuniformity)Display ON/OFF (grid nonuniformity)Display ON/OFF (grid nonuniformity)Display ON/OFF (print scale X)Display ON/OFF (print scale X)Display ON/OFF (print scale Y)	CategoryData nameSet / GetDisplay settingNumber of characters displaySet / GetDisplayCharacter displaySet / GetDisplay ON/OFF (over- all quality)Set / GetDisplay ON/OFF (cell contrast)Set / GetDisplay ON/OFF (cell contrast)Set / GetDisplay ON/OFF (cell modulation)Set / GetDisplay ON/OFF (cell nonuniformity)Set / GetDisplay ON/OFF (fixed pattern damage)Set / GetDisplay ON/OFF (fixed nonuniformity)Set / GetDisplay ON/OFF (grid nonuniformity)Set / GetDisplay ON/OFF (grid nonuniformity)Set / GetDisplay ON/OFF (print scale)Set / GetDisplay ON/OFF (print scale X)Set / GetDisplay ON/OFF (print scale X)Set / GetDisplay ON/OFF (print scale Y)Set / Get	CategoryData nameSet / GetData rangeDisplay settingNumber of characters displaySet / Get0: ON 1: OFFCharacter displaySet / Get0: ON 1: OFFDisplay ON/OFF (over- all quality)Set / Get0: ON 1: OFFDisplay ON/OFF (cell (decode)Set / Get0: ON 1: OFFDisplay ON/OFF (cell contrast)Set / Get0: ON 1: OFFDisplay ON/OFF (cell contrast)Set / Get0: ON 1: OFFDisplay ON/OFF (cell modulation)Set / Get0: ON 1: OFFDisplay ON/OFF (fixed pattern damage)Set / Get0: ON 1: OFFDisplay ON/OFF (fixed pattern damage)Set / Get0: ON 1: OFFDisplay ON/OFF (grid nonuniformity)Set / Get0: ON 1: OFFDisplay ON/OFF (grid nonuniformity)Set / Get0: ON 1: OFFDisplay ON/OFF (grid nonuniformity)Set / Get0: ON 1: OFFDisplay ON/OFF (print scale)Set / Get0: ON 1: OFFDisplay ON/OFF (print scale)Set / Get0: ON 1: OFFDisplay ON/OFF (print scale X)Set / Get0: ON 1: OFFDisplay ON/OFF (print scale X)Set / Get0: ON 1: OFFDisplay ON/OFF (print scale Y)Set / Get0: ON 1: OFFDisplay ON	CategoryData nameSet / GetData rangeDefaultDisplay settingNumber of characters displaySet / Get0: ON 1: OFF0Character displaySet / Get0: ON 1: OFF0Display ON/OFF (over- all quality)Set / Get0: ON 1: OFF0Display ON/OFF (cover- all quality)Set / Get0: ON 1: OFF0Display ON/OFF (cover- (decode)Set / Get0: ON 1: OFF0Display ON/OFF (cell contrast)Set / Get0: ON 1: OFF0Display ON/OFF (cell modulation)Set / Get0: ON 1: OFF0Display ON/OFF (cell modulation)Set / Get0: ON 1: OFF0Display ON/OFF (fixed pattern damage)Set / Get0: ON 1: OFF0Display ON/OFF (grid nonuniformity)Set / Get0: ON 1: OFF0Display ON/OFF (grid nonuniformity)Set / Get0: ON 1: OFF0Display ON/OFF (print scale)Set / Get0: ON 1: OFF0Display ON/OFF (print scale Y)Set / Get0: ON 1: OFF0Display ON/OFF (print scale Y)Set / Get0: ON 1: OFF0	CategoryData nameSet / GetData rangeDefaultExpression text stringDisplay settingNumber of characters displaySet / Get0: ON 1: OFF0Character displaySet / Get0: ON 1: OFF0Display ON/OFF (over- all quality)Set / Get0: ON 1: OFF0Display ON/OFF (cour- all quality)Set / Get0: ON 1: OFF0Display ON/OFF (cell contrast)Set / Get0: ON 1: OFF0Display ON/OFF (cell contrast)Set / Get0: ON 1: OFF0Display ON/OFF (cell pattern damage)Set / Get0: ON 1: OFF0Display ON/OFF (fixed pattern damage)Set / Get0: ON 1: OFF0Display ON/OFF (fixed pattern damage)Set / Get0: ON 1: OFF0Display ON/OFF (grid nonuniformity)Set / Get0: ON 1: OFF0Display ON/OFF (grid nonuniformity)Set / Get0: ON 1: OFF0Display ON/OFF (print scale X)Set / Get0: ON 1: OFF

*1 Use the ITEMDATA2 command to set and/or acquire a text string.

2D Codes (DPM) (FQ2-S4 series only)

External refer- ence number	Category	Data name	Set / Get	Data range	Default	Expres- sion text string	Logged
0	Mea- sure- ment result	Judgment	Get only	-2: No judgment (not inspected) 0: Judgment result OK -1: Judgment result NG -16: Inspection timeout error	-2	JG	Logged
5		Num. of char.	Get only	0 to 1024	0	Ν	Logged
6 ^{*1}		Characters	Get only	Text string			
8		Cell Recog. Rate	Get only	0 to 100	0	E	Logged
9		Contrast	Get only	0 to 100	0	С	Logged
10		Focus	Get only	0 to 100	0	F	
17		Index number	Get only	 -2: No verification pattern or reading error -1: Verification is NG 0 to 31: Master data No. 	-2	IN	
50		Overall quality	Get only	0 to 4	0	GDA0	Logged
51		Decode	Get only	0 to 4	0	GDA1	Logged
52		Cell Contrast	Get only	0 to 4	0	GDA2	Logged
53		Cell Modulation	Get only	0 to 4	0	GDA3	Logged
54		Fixed pattern damage	Get only	0 to 4	0	GDA4	Logged
55		Axial nonuniformity	Get only	0 to 4	0	GDA5	Logged
56		Grid nonuniformity	Get only	0 to 4	0	GDA6	Logged
57		Unused err. Corr.	Get only	0 to 4	0	GDA7	Logged
103	Output parame- ter	Reflect	Set / Get	0: Yes, 1: No	0		

External refer- ence number	Category	Data name	Set / Get	Data range	Default	Expres- sion text string	Logged
120	Mea- sure- ment	Code type	Set / Get	0: Auto 1: DataMatrix 2: QR Code	0		
121	condition	Code color	Set / Get	0: Auto 1: Black 2: White	0		
122		Cell (DataMatrix Square)	Set / Get	0: Auto 1: 10 × 10 2: 12 × 12 16: 16 × 64	0		
123		Cell (DataMatrix Rect- angle)	Set / Get	0: Auto 1: 8 × 18 2: 8 × 32 3: 12 × 26 4: 12 × 36 5: 16 × 36 6: 16 × 48	0		
124	-	Cell (QR Code)	Set / Get	0: Auto 1: 21 × 21 2: 25 × 25 10: 57 × 57	0		
405	-		0.1.0.1		0		
125		trix)	Set / Get	0: Auto 1: Square 2: Rectangle	0		
127		Size	Set / Get	50 to 480	480		
128		Reverse	Set / Get	0: Auto 1: Normal 2: Reverse	0		
129		QR Code Model	Set / Get	0: Auto 1: Model 1 2: Model 2	0		
130	Mea- sure- ment result	Error Correction Level	Set / Get	0: Auto 1: M (15%) 2: L (7%) 3: H (30%) 4: Q (25%)	0		
131		Timeout time (ms)	Set / Get	1 to 9999	9999		
132		Fast mode	Set / Get	0: OFF 1: ON	0		
133	Output parame- ter	String output on/off	Set / Get	0: OFF 1: ON	0		
134		Partial output on/off	Set / Get	0: OFF 1: ON	0		
135		Output end digit	Set / Get	1 to 1024	1024		
136		Output starting digit	Set / Get	1 to 1024	1		
137	Mea- sure- ment result	Auto length	Set / Get	0: OFF 1: ON	1		
138	Output parame- ter	NG String output on/off	Set / Get	0: OFF 1: ON	0		
140		Error string	Set / Get	0: OFF 1: ON	0		

External refer- ence number	Category	Data name	Set / Get	Data range	Default	Expres- sion text string	Logged
142	Verifica- tion con- dition	Verification master data	Set / Get	 -1: OFF 0: All master data 1: Master data 0 verification 2: Master data 1 verification : 	-1		
143		Partial verification ON/ OFF	Set / Get	0: No 1: Yes	0		
144		Verification end digit	Set / Get	1 to 1024	1024		
145		Verification beginning digit	Set / Get	1 to 1024	1		
150		Selected master num- ber	Set / Get	0 to 31	0		
152		Auto master data num- ber	Set / Get	0 to 31: Master data number −1: OFF	-1		
161	Judge- ment	Upper limit for cell rec- ognition rate threshold	Set / Get	0 to 100	100		Judgement condition
162	tion threshold	Lower limit for cell rec- ognition rate threshold	Set / Get	0 to 100	0		Judgement condition
163		Contrast threshold upper limit	Set / Get	0 to 100	100		Judgement condition
164		Contrast threshold lower limit	Set / Get	0 to 100	0		Judgement condition
165		Focus threshold upper limit	Set / Get	0 to 100	100		Judgement condition
166		Focus threshold lower limit	Set / Get	0 to 100	0		Judgement condition
167		Threshold upper limit for print quality DPM	Set / Get	0 to 4	4		Judgement condition
168		Threshold lower limit for print quality DPM	Set / Get	0 to 4	0		Judgement condition
170	Output parame- ter	String output ON/OFF (memory link)	Set / Get	0: OFF 1: ON	0		
171		NG error code output (memory link)	Set / Get	0: OFF 1: ON	1		
172		Partial output ON/OFF (memory link)	Set / Get	0: OFF 1: ON	0		
173		Output end digit (mem- ory link)	Set / Get	1 to 1024	1024		
174		Output beginning digit (memory link)	Set / Get	1 to 1024	1		
186	Mea- sure- ment	DPM print quality	Set / Get	0: OFF 1: ON	0		
190	condition	Grid correction (Data- Matrix)	Set / Get	0: OFF 1: ON	0		
191		Grid correction (QR codes)	Set / Get	0: OFF 1: ON	0		
202+3×N (N=0 to 31) ^{*1}	Verifica- tion con- dition	Master data N	Set / Get	32 characters max.			
300+N (N=0 to 31)		Reference unit number N	Set / Get	0 to 31	0		

External refer- ence number	Category	Data name	Set / Get	Data range	Default	Expres- sion text string	Logged										
410	Logging condi- tions	Data logging switch for unit	Set / Get	0: Data logging OFF 1: Data logging ON	1												
411	10113	Data logging switch for judgement	Set / Get	0: Data logging OFF 1: Data logging ON	1												
412		Data logging switch for number of characters	Set / Get	0: Data logging OFF 1: Data logging ON	1												
413		Data logging switch for cell recognition rate	Set / Get	0: Data logging OFF 1: Data logging ON	1												
414		Data logging switch for contrast	Set / Get	0: Data logging OFF 1: Data logging ON	1												
415		Data logging switch for focus	Set / Get	0: Data logging OFF 1: Data logging ON	1												
440		Data logging switch (overall quality)	Set / Get	0: Data logging OFF 1: Data logging ON	1												
441		Data logging switch (decode)	Set / Get	0: Data logging OFF 1: Data logging ON	0												
442		Data logging switch (cell contrast)	Set / Get	0: Data logging OFF 1: Data logging ON	0												
443			-	-	-	Data logging switch (cell modulation)	Set / Get	0: Data logging OFF 1: Data logging ON	0								
444												Data logging switch (fixed pattern damage)	Set / Get	0: Data logging OFF 1: Data logging ON	0		
445							Data logging switch (axial nonuniformity)	Set / Get	0: Data logging OFF 1: Data logging ON	0							
446		Data logging switch (grid nonuniformity)	Set / Get	0: Data logging OFF 1: Data logging ON	0												
447		Data logging switch (unused error correc- tion)	Set / Get	0: Data logging OFF 1: Data logging ON	0												

External refer- ence number	Category	Data name	Set / Get	Data range	Default	Expres- sion text string	Logged									
500	Display setting	Characters display	Set / Get	0: ON 1: OFF	0											
501		Character display	Set / Get	0: ON 1: OFF	0											
502		Cell recognition rate display	Set / Get	0: ON 1: OFF	0											
503	-	Contrast display	Set / Get	0: ON 1: OFF	0											
504		Focus display	Set / Get	0: ON 1: OFF	0											
520		Display ON/OFF (over- all quality)	Set / Get	0: ON 1: OFF	0											
521		Display ON/OFF (decode)	Set / Get	0: ON 1: OFF	0											
522	-	Display ON/OFF (cell contrast)	Set / Get	0: ON 1: OFF	0											
523	_		-	-	Display ON/OFF (cell modulation)	Set / Get	0: ON 1: OFF	0								
524											Display ON/OFF (fixed pattern damage)	Set / Get	0: ON 1: OFF	0		
525								Display ON/OFF (axial nonuniformity)	Set / Get	0: ON 1: OFF	0					
526		Display ON/OFF (grid nonuniformity)	Set / Get	0: ON 1: OFF	0											
527		Display ON/OFF (unused error correc- tion)	Set / Get	0: ON 1: OFF	0											

*1 To acquire the detected text string, use the ITEMDATA2 command.

Search (FQ2-S1/S2/S3 series or FQ2-S4 series only)

External refer- ence number	Category	Data name	Set / Get	Data range	Default	Expres- sion text string	Logged data/ Judgement parameter
0	Mea- sure- ment result	Judgement	Get only	 -2: No judgement (not measured), 0: Judgement is OK, -1: Judgement is NG, -13: Teaching not performed error, -14: Figure not registered error, -15: Out of range error 	-2	JG	Logged data
5	-	Correlation	Get only	0 to 100	0	CR[0] to CR[31]	Logged data
6		Position X	Get only	-99,999.9999 to 99,999.9999	0	X[0] to X[31]	Logged data
7		Position Y	Get only	-99,999.9999 to 99,999.9999	0	Y[0] to Y[31]	Logged data
8		Angle	Get only	-180 to 180	0	TH[0] to TH[31]	Logged data
9		Reference X	Get only	-99,999.9999 to 99,999.9999	0	SX	
10		Reference Y	Get only	-99,999.9999 to 99,999.9999	0	SY	
11		Reference angle	Get only	-180 to 180	0	ST	
12		Detection coordinate X	Get only	-99,999.9999 to 99,999.9999	0	RX	
13		Detection coordinate Y	Get only	-99,999.9999 to 99,999.9999	0	RY	
14		Count	Get only	0 to 32	0	С	Logged data
103	Output parame- ter	Reflect	Set / Get	0: Yes 1: No	0		
121	Model region	Rotation	Set / Get	0: Yes 1: No	0		
122		Rotation angle upper limit	Set / Get	–180 to 180	180		
123		Rotation angle lower limit	Set / Get	-180 to 180	-180		
126		Stability	Set / Get	1 to 15	12		
127		Precision	Set / Get	1 to 3	2		
132	Detec-	Detection point X	Set / Get	-99,999.9999 to 99,999.9999	0		
133	dinate	Detection point Y	Set / Get	-99,999.9999 to 99,999.9999	0		
134	Mea- sure- ment condition	Sub-pixel	Set / Get	0: Yes 1: No	0		
136	Judge- ment	Judgement upper limit for search coordinate X	Set / Get	-99,999.9999 to 99,999.9999	99,999.9999		Judgement condition
137	tions	Judgement lower limit for search coordinate X	Set / Get	-99,999.9999 to 99,999.9999	-99,999.9999		Judgement condition
138		Judgement upper limit for search coordinate Y	Set / Get	-99,999.9999 to 99,999.9999	99,999.9999		Judgement condition
139		Judgement lower limit for search coordinate Y	Set / Get	-99,999.9999 to 99,999.9999	-99,999.9999		Judgement condition
140		Judgement upper limit for search angle	Set / Get	-180 to 180	180		Judgement condition

External refer- ence number	Category	Data name	Set / Get	Data range	Default	Expres- sion text string	Logged data/ Judgement parameter
141	Judge- ment	Judgement lower limit for search angle	Set / Get	–180 to 180	-180		Judgement condition
142	tions	Judgement upper limit for correlation	Set / Get	0 to 100	100		Judgement condition
143		Judgement lower limit for correlation	Set / Get	0 to 100	60		Judgement condition
145		Search candidate level	Set / Get	0 to 100	70		
146	Mea- sure- ment condi- tions	Sort condition	Set / Get	For Multiple Searches 0: Ascending order of correlation value, 1: Descending order of correlation value, 2: Ascending order of position X, 3: Descending order of position X, 4: Ascending order of position Y, 5: Descending order of position Y	1		
148	Judge- ment	Judgement upper limit for detection count	Set / Get	0 to 32	32		Judgement condition
149	tions	Judgement lower limit for detection count	Set / Get	0 to 32	0		Judgement condition
150	Mea-	Multiple output	Set / Get	0: No, 1: Yes	0		
152	ment condi-	Extraction condition, X upper limit	Set / Get	-99,999.9999 to 99,999.9999	99,999.9999		
153	uons	Extraction condition, X lower limit	Set / Get	-99,999.9999 to 99,999.9999			
154	-	Extraction condition, Y upper limit	Set / Get	-99,999.9999 to 99,999.9999	99,999.9999		
155		Extraction condition, Y lower limit	Set / Get	-99,999.9999 to 99,999.9999	_ 99,999.9999		
160		Detection count	Set / Get	1 to 32	32		
300	Logging condi- tions	Number of data log records	Set / Get	1 to 32	32		
310		Data logging switch for entire unit	Set / Get	0: Data logging OFF 1: Data logging ON	1		
311		Data logging switch for judgement	Set / Get	0: Data logging OFF 1: Data logging ON	1		
312		Data logging switch for correlation	Set / Get	0: Data logging OFF 1: Data logging ON	1		
313	Logging condi- tions	Data logging switch for position X	Set / Get	0: Data logging OFF 1: Data logging ON	1		
314	1013	Data logging switch for position Y	Set / Get	0: Data logging OFF 1: Data logging ON	1		
315		Data logging switch for measurement angle	Set / Get	0: Data logging OFF 1: Data logging ON	1		
321		Data logging switch for detection count	Set / Get	0: Data logging OFF 1: Data logging ON	1		

External refer- ence number	Category	Data name	Set / Get	Data range	Default	Expres- sion text string	Logged data/ Judgement parameter
700	Display settings	Correlation display	Set / Get	0: Display 1: Do not display	0		
701		Position X display	Set / Get	0: Display 1: Do not display	0		
702		Position Y display	Set / Get	0: Display 1: Do not display	0		
703		Measurement angle display	Set / Get	0: Display 1: Do not display	0		
704	-	Count display	Set / Get	0: Display 1: Do not display	0		
800	-	Position X display pat- tern	Set / Get	0: Absolute value 1: Relative value	0		
801	-	Position Y display pat- tern	Set / Get	0: Absolute value 1: Relative value	0		
802		Measured angle dis- play pattern	Set / Get	0: Absolute value 1: Relative value	0		

Sensitive Search (FQ2-S1/S2/S3 series or FQ2-S4 series only)

External refer- ence number	Category	Data name	Set / Get	Data range	Default	Expres- sion text string	Logged data/ Judgement parameter
0	Mea- sure- ment result	Judgement	Get only	 -2: No judgement (not measured), 0: Judgement is OK, -1: Judgement is NG, -13: Teaching not performed error, -14: Figure not registered error, -15: Out of range error 	-2	JG	Logged data
5		Correlation	Get only	0 to 100	0	CR	Logged data
6		Deviation	Get only	Color Camera: 0.000 to 219.9705 Monochrome Camera: 0.000 to 127.000	0	DV	Logged data
7		Measurement position X (search center posi- tion)	Get only	-99,999.9999 to 99,999.9999	0	x	Logged data
8		Measurement position Y (search center posi- tion)	Get only	-99,999.9999 to 99,999.9999	0	Y	Logged data
9		Angle	Get only	-180 to 180	0	TH	Logged data
10	Mea-	Detection X	Get only	-99,999.9999 to 99,999.9999	0	RX	Logged data
11	ment	Detection Y	Get only	-99,999.9999 to 99,999.9999	0	RY	Logged data
12	result	Reference position X	Get only	-99,999.9999 to 99,999.9999	0	SX	Logged data
13		Reference position Y	Get only	-99,999.9999 to 99,999.9999	0	SY	Logged data
14		Reference angle	Get only	–180 to 180	0	ST	Logged data
15		NG sub-region	Get only	0 to 100	0	СТ	Logged data
16		Sub-region number	Get only	0 to 99	0	AN	Logged data
17		Sub-region number (X)	Get only	0 to 9	0	ANX	Logged data

External refer- ence number	Category	Data name	Set / Get	Data range	Default	Expres- sion text string	Logged data/ Judgement parameter
18	Mea-	Sub-region number (Y)	Get only	0 to 9	0	ANY	Logged data
19	ment result	Measurement position X (sub-region)	Get only	-99,999.9999 to 99,999.9999	0	DX	Logged data
20		Measurement position Y (sub-region)	Get only	-99,999.9999 to 99,999.9999	0	DY	Logged data
103	Output parame- ter	Reflect	Set / Get	0: Yes 1: No	0		
121	Model region	Rotation	Set / Get	0: No rotation 1: Rotation	0		
122	-	Rotation angle upper limit	Set / Get	-180 to 180	180		
123	-	Rotation angle lower limit	Set / Get	-180 to 180	-180		
132	Detec-	Detection point X	Set / Get	0 to 9999	0		
133	tion point coordi- nate	Detection point Y	Set / Get	0 to 9999	0		
134	Mea- sure-	Sub-pixel	Set / Get	0: No 1: Yes	0		
135	condi- tions	Candidate level	Set / Get	0 to 100	70		
136	Judge- ment	Judgement upper limit for search coordinate X	Set / Get	-99,999.9999 to 99,999.9999	99,999.9999		Judgement condition
137	tions	Judgement lower limit for search coordinate X	Set / Get	-99,999.9999 to 99,999.9999	-99,999.9999		Judgement condition
138	-	Judgement upper limit for search coordinate Y	Set / Get	-99,999.9999 to 99,999.9999	99,999.9999		Judgement condition
139	-	Judgement lower limit for search coordinate Y	Set / Get	-99,999.9999 to 99,999.9999	-99,999.9999		Judgement condition
140		Judgement upper limit for search angle	Set / Get	-180 to 180	180		Judgement condition
141		Judgement lower limit for search angle	Set / Get	-180 to 180	-180		Judgement condition
142	Judge- ment	Judgement upper limit for correlation	Set / Get	0 to 100	100		Judgement condition
143	tions	Judgement lower limit for correlation	Set / Get	0 to 100	60		Judgement condition
145		Density deviation upper limit	Set / Get	Color Cameras: 0 to 221 Monochrome Cameras: 0 to 127	Color Cam- era: 221 Monochrome Camera: 127		Judgement condition
146		Density deviation lower limit	Set / Get	Color Cameras: 0 to 221 Monochrome Cameras: 0 to 127	0		Judgement condition
147		NG sub-region upper limit	Set / Get	0 to 100	100		
148		NG sub-region lower limit	Set / Get	0 to 100	0		

External refer- ence number	Category	Data name	Set / Get	Data range	Default	Expres- sion text string	Logged data/ Judgement parameter
153	Mea- sure- ment	Plain inspection	Set / Get	0: No 1: Yes	0		
169	condi- tions	Gain setting	Set / Get	0: 3×3 sub-divisions 1: 5×5 sub-divisions 2: 9×9 sub-divisions	1		
310	Logging condi- tions	Data logging switch for entire unit	Set / Get	0: Data logging OFF 1: Data logging ON	1		
311	10113	Data logging switch for judgement	Set / Get	0: Data logging OFF 1: Data logging ON	1		
312		Data logging switch for correlation	Set / Get	0: Data logging OFF 1: Data logging ON	1		
313		Data logging switch for density deviation	Set / Get	0: Data logging OFF 1: Data logging ON	1		
314		Data logging switch for position X	Set / Get	0: Data logging OFF 1: Data logging ON	1		
315		Data logging switch for position Y	Set / Get	0: Data logging OFF 1: Data logging ON	1		
316		Data logging switch for measurement angle	Set / Get	0: Data logging OFF 1: Data logging ON	1		
320		Data logging switch for NG sub-region	Set / Get	0: Data logging OFF 1: Data logging ON	1		
321		Data logging switch for sub-region correla- tion	Set / Get	0: Data logging OFF 1: Data logging ON	1		
322		Data logging switch for sub-region density deviation	Set / Get	0: Data logging OFF 1: Data logging ON	1		
323		Data logging switch for sub-region number	Set / Get	0: Data logging OFF 1: Data logging ON	1		
324		Data logging switch for sub-region number (X)	Set / Get	0: Data logging OFF 1: Data logging ON	1		
325		Data logging switch for sub-region number (Y)	Set / Get	0: Data logging OFF 1: Data logging ON	1		
326	Logging condi- tions	Data logging switch for measurement position X (sub-region)	Set / Get	0: Data logging OFF 1: Data logging ON	1		
327		Data logging switch for measurement position Y (sub-region)	Set / Get	0: Data logging OFF 1: Data logging ON	1		
700	Display settings	Correlation display	Set / Get	0: Display 1: Do not display	0		
701		Position X display	Set / Get	0: Display 1: Do not display	0		
702		Position Y display	Set / Get	0: Display 1: Do not display	0		
703		Measurement angle display	Set / Get	0: Display 1: Do not display	0		
704		Density deviation dis- play	Set / Get	0: Display 1: Do not display	0		

External refer- ence number	Category	Data name	Set / Get	Data range	Default	Expres- sion text string	Logged data/ Judgement parameter
800	Mea- sure- ment	Position X display pat- tern	Set / Get	0: Absolute value 1: Relative value	0		
801	result display	Position Y display pat- tern	Set / Get	0: Absolute value 1: Relative value	0		
802		Measured angle dis- play pattern	Set / Get	0: Absolute value 1: Relative value	0		
1000+N (N=0 to 99)	Mea- sure- ment	Sub-region correlation N	Get only	0 to 100	0	CRN	
1100+N (N=0 to 99)	result	Sub-region density deviation N	Get only	Sub-region density deviation N	0	DVN	

Shape Search II (FQ2-S1/S2/S3 series or FQ2-S4 series only)

External refer- ence number	Category	Data name	Set / Get	Data range	Default	Expres- sion text string	Logged data/ Judgement parameter
0	Mea- sure- ment result	Judgement	Get only	 -2: No judgement (not measured), 0: Judgement is OK, -1: Judgement is NG, -13: Teaching not performed error, -14: Figure not registered error, -15: Out of range error 	-2	JG	Logged data
5		Correlation	Get only	0 to 100	0	CR[0] to CR[31]	Logged data
6		Position X	Get only	-99,999.9999 to 99,999.9999	0	X[0] to X[31]	Logged data
7		Position Y	Get only	-99,999.9999 to 99,999.9999	0	Y[0] to Y[31]	Logged data
8		Angle	Get only	-180 to 180	0	TH[0] to TH[31]	Logged data
9	Mea-	Reference X	Get only	-99,999.9999 to 99,999.9999	0	SX	
10	ment	Reference Y	Get only	-99,999.9999 to 99,999.9999	0	SY	
11	result	Reference angle	Get only	-180 to 180	0	ST	
12		Detection coordinate X	Get only	-99,999.9999 to 99,999.9999	0	RX	
13		Detection coordinate Y	Get only	-99,999.9999 to 99,999.9999	0	RY	
14		Count	Get only	0 to 32	0	С	Logged data
103	Output parame- ter	Reflect	Set / Get	0: Yes 1: No	0		
120	Model region	Rotation	Set / Get	0: Yes 1: No	0		
121		Rotation angle upper limit	Set / Get	-180 to 180	180		
122		Rotation angle lower limit	Set / Get	-180 to 180	-180		

External refer- ence number	Category	Data name	Set / Get	Data range	Default	Expres- sion text string	Logged data/ Judgement parameter
133	Mea- sure- ment condi- tions	Candidate level	Set / Get	0 to 100	80		
134	Detec-	Detection point X	Set / Get	0 to 9999	0		
135	coordi- nate	Detection point Y	Set / Get	0 to 9999	0		
136	Mea- sure- ment condition	Sort condition	Set / Get	0: Ascending order of correlation value, 1: Descending order of correla- tion value, 2: Ascending order of position X, 3: Descending order of position X, 4: Ascending order of position Y, 5: Descending order of position Y	1		
138	Judge- ment condi-	Judgement upper limit for correlation	Set / Get	0 to 100	100		Judgement condition
139	tions	Judgement lower limit for correlation	Set / Get	0 to 100	60		Judgement condition
140		Judgement upper limit for detection count	Set / Get	0 to 32	32		Judgement condition
141		Judgement lower limit for detection count	Set / Get	0 to 32	0		Judgement condition
142		Judgement upper limit for search coordinate X	Set / Get	-99,999.9999 to 99,999.9999	99,999.9999		Judgement condition
143		Judgement lower limit for search coordinate X	Set / Get	-99,999.9999 to 99,999.9999	-99,999.9999		Judgement condition
144		Judgement upper limit for search coordinate Y	Set / Get	-99,999.9999 to 99,999.9999	99,999.9999		Judgement condition
145	Judge- ment	Judgement lower limit for search coordinate Y	Set / Get	–99,999.9999 to 99,999.9999	-99,999.9999		Judgement condition
146	tions	Judgement upper limit for search angle	Set / Get	–180 to 180	180		Judgement condition
147		Judgement lower limit for search angle	Set / Get	–180 to 180	-180		Judgement condition
152	Mea- sure-	Extraction condition, X upper limit	Set / Get	-99,999.9999 to 99,999.9999	99,999.9999		Judgement condition
153	condi- tions	Extraction condition, X lower limit	Set / Get	-99,999.9999 to 99,999.9999	-99,999.9999		Judgement condition
154		Extraction condition, Y upper limit	Set / Get	-99,999.9999 to 99,999.9999	99,999.9999		Judgement condition
155		Extraction condition, Y lower limit	Set / Get	-99,999.9999 to 99,999.9999	-99,999.9999		Judgement condition
161		Detection count	Set / Get	1 to 32	32		
170		Model mode	Set / Get	0: Fast 1: Stable	0		
300	Logging condi- tions	Number of data log records upper limit	Set / Get	1 to 32	32		
310	1010	Data logging switch for entire unit	Set / Get	0: Data logging OFF 1: Data logging ON	1		
311		Data logging switch for judgement	Set / Get	0: Data logging OFF 1: Data logging ON	1		

External refer- ence number	Category	Data name	Set / Get	Data range	Default	Expres- sion text string	Logged data/ Judgement parameter
312	Logging condi- tions	Data logging switch for correlation	Set / Get	0: Data logging OFF 1: Data logging ON	1		
313		Data logging switch for position X	Set / Get	0: Data logging OFF 1: Data logging ON	1		
314		Data logging switch for position Y	Set / Get	0: Data logging OFF 1: Data logging ON	1		
315		Data logging switch for measurement angle	Set / Get	0: Data logging OFF 1: Data logging ON	1		
321		Data logging switch for detection count	Set / Get	0: Data logging OFF 1: Data logging ON	1		
700	Display settings	Correlation display	Set / Get	0: Display 1: Do not display	0		
701		Position X display	Set / Get	0: Display 1: Do not display	0		
702		Position Y display	Set / Get	0: Display 1: Do not display	0		
703		Measurement angle display	Set / Get	0: Display 1: Do not display	0		
704		Count display	Set / Get	0: Display 1: Do not display	0		
800	_	Position X display pat- tern	Set / Get	0: Absolute value 1: Relative value	0		
801		Position Y display pat- tern	Set / Get	0: Absolute value 1: Relative value	0		
802		Measurement angle display pattern	Set / Get	0: Absolute value 1: Relative value	0		

Shape Search III (FQ2-S1/S2/S3 series or FQ2-S4 series only)

External refer- ence number	Category	Data name	Set / Get	Data range	Default	Expres- sion text string	Logged data/ Judgement parameter
0	Mea- sure- ment result	Judgement	Get only	 -2: No judgement (not measured) 0: Judgement is OK -1: Judgement is NG -13: Teaching not performed error -14: Figure not registered error -15: Out of range error 	-2	JG	Logged data
5		Correlation	Get only	0 to 100	0	CR[0] to CR[31]	Logged data
6		Position X	Get only	-99,999.9999 to 99,999.9999	0	X[0] to X[31]	Logged data
7		Position Y	Get only	-99,999.9999 to 99,999.9999	0	Y[0] to Y[31]	Logged data
8		Angle	Get only	-180 to 180	0	TH[0] to TH[31]	Logged data

External refer- ence number	Category	Data name	Set / Get	Data range	Default	Expres- sion text string	Logged data/ Judgement parameter
9	Mea-	Reference X	Get only	-99,999.9999 to 99,999.9999	0	SX	
10	ment	Reference Y	Get only	-99,999.9999 to 99,999.9999	0	SY	
11	result	Reference angle	Get only	-180 to 180	0	ST	
12		Detection coordinate X	Get only	-99,999.9999 to 99,999.9999	0	RX	
13	-	Detection coordinate Y	Get only	-99,999.9999 to 99,999.9999	0	RY	
14		Count	Get only	0 to 32	0	С	Logged data
103	Output parame- ter	Reflect	Set / Get	0: Yes 1: No	0		
120	Model region	Rotation	Set / Get	0: No 1: Yes	0		
121	-	Rotation angle upper limit	Set / Get	-180 to 180	180		
122	-	Rotation angle lower limit	Set / Get	-180 to 180	-180		
123	Mea-	Edge level (model)	Set / Get	0 to 1024	20		
133	ment condi- tions	Candidate level	Set / Get	0 to 100	50		
134	Detec-	Detection point X	Set / Get	0 to 9999	0		
135	coordi- nate	Detection point Y	Set / Get	0 to 9999	0		
136	Mea- sure- ment condition	Sort condition	Set / Get	0: Ascending order of correlation value, 1: Descending order of correlation value, 2: Ascending order of position X, 3: Descending order of position X, 4: Ascending order of position Y, 5: Descending order of position Y	1		
138	Judge- ment	Judgement upper limit for correlation	Set / Get	0 to 100	100		Judgement condition
139	tions	Judgement lower limit for correlation	Set / Get	0 to 100	60		Judgement condition
140	-	Judgement upper limit for detection count	Set / Get	0 to 32	32		Judgement condition
141	-	Judgement lower limit for detection count	Set / Get	0 to 32	0		Judgement condition
142		Judgement upper limit for search coordinate X	Set / Get	-99,999.9999 to 99,999.9999	99,999.9999		Judgement condition
143		Judgement lower limit for search coordinate X	Set / Get	-99,999.9999 to 99,999.9999	-99,999.9999		Judgement condition
144		Judgement upper limit for search coordinate Y	Set / Get	-99,999.9999 to 99,999.9999	99,999.9999		Judgement condition
145	Judge- ment	Judgement lower limit for search coordinate Y	Set / Get	-99,999.9999 to 99,999.9999	-99,999.9999		Judgement condition
146	tions	Judgement upper limit for search angle	Set / Get	-180 to 180	180		Judgement condition
147		Judgement lower limit for search angle	Set / Get	-180 to 180	-180		Judgement condition

External refer- ence number	Category	Data name	Set / Get	Data range	Default	Expres- sion text string	Logged data/ Judgement parameter
150	Mea- sure-	Edge level (measurement)	Set / Get	0 to 1024	30		
152	condi- tions	Extraction condition, X upper limit	Set / Get	-99,999.9999 to 99,999.9999	99,999.9999		Judgement condition
153	-	Extraction condition, X lower limit	Set / Get	-99,999.9999 to 99,999.9999	-99,999.9999		Judgement condition
154		Extraction condition, Y upper limit	Set / Get	-99,999.9999 to 99,999.9999	99,999.9999		Judgement condition
155	-	Extraction condition, Y lower limit	Set / Get	-99,999.9999 to 99,999.9999	-99,999.9999		Judgement condition
160		Image type	Set / Get	0: Measurement image 1: Measurement image + Model image 2: Edge image 3: Edge image + Model image	1		
161		Detection count	Set / Get	1 to 32	32		
172		Edge level auto (measurement)	Set / Get	0: OFF 1: ON	1		
174		Mask size	Set / Get	0: 3 x 3 1: 5 x 5 2: 7 x 7	0		
178		Edge level auto (model)	Set / Get	0: OFF 1: ON	1		
180		Acceptable distortion level	Set / Get	0: Low 1: Middle 2: High	2		
181		Noise Removal Level	Set / Get	0 to 100	0		
188		Model mode	Set / Get	0: Stable 1: Fast	0		
229	-	Overlay judgement	Set / Get	0: No 1: Yes	0		
230		Overlay rejection	Set / Get	0 to 100	100		
300	Logging condi-	Number of data log records upper limit	Set / Get	1 to 32	32		
310	lions	Data logging switch for entire unit	Set / Get	0: Data logging OFF 1: Data logging ON	1		
311		Data logging switch for judgement	Set / Get	0: Data logging OFF 1: Data logging ON	1		
312	_	Data logging switch for correlation	Set / Get	0: Data logging OFF 1: Data logging ON	1		
313		Data logging switch for position X	Set / Get	0: Data logging OFF 1: Data logging ON	1		
314		Data logging switch for position Y	Set / Get	0: Data logging OFF 1: Data logging ON	1		
315		Data logging switch for measurement angle	Set / Get	0: Data logging OFF 1: Data logging ON	1		
321		Data logging switch for detection count	Set / Get	0: Data logging OFF 1: Data logging ON	1		

External refer- ence number	Category	Data name	Set / Get	Data range	Default	Expres- sion text string	Logged data/ Judgement parameter
700	Display settings	Correlation display	Set / Get	0: Display 1: Do not display	0		
701		Position X display	Set / Get	0: Display 1: Do not display	0		
702		Position Y display	Set / Get	0: Display 1: Do not display	0		
703		Measurement angle display	Set / Get	0: Display 1: Do not display	0		
704		Count display	Set / Get	0: Display 1: Do not display	0		
800		Position X display pat- tern	Set / Get	0: Absolute value 1: Relative value	0		
801		Position Y display pat- tern	Set / Get	0: Absolute value 1: Relative value	0		
802		Measurement angle display pattern	Set / Get	0: Absolute value 1: Relative value	0		

Edge Position (FQ2-S1/S2/S3 series or FQ2-S4 series only)

Exter- nal ref- erence number	Category	Data name	Set / Get	Data range	Default	Expres- sion text string	Logged data/ Judgement parameter
0	Mea- sure- ment result	Judgement	Get only	 -2: No judgement (not measured) 0: Judgement is OK -1: Judgement is NG -13: Teaching not performed error -14: Figure not registered error -15: Out of range error 	-2	JG	Logged data
5		Edge position X	Get only	-99,999.9999 to 99,999.9999	0	Х	Logged data
6		Edge position Y	Get only	-99,999.9999 to 99,999.9999	0	Y	Logged data
7		Standard position X	Get only	-99,999.9999 to 99,999.9999	0	SX	
8		Standard position Y	Get only	-99,999.9999 to 99,999.9999	0	SY	
9		Difference in position	Get only	-99,999.9999 to 99,999.9999	0	DF	Logged data
103	Output parame- ter	Reflect	Set / Get	0: Yes, 1: No	0		
120	Set color	Set color	Set / Get	0: No edge color specification, 1: Edge color specification	0		
121		Edge color red	Set / Get	0 to 255	255		
122		Edge color green	Set / Get	0 to 255	255		
123		Edge color blue	Set / Get	0 to 255	255		
132	Mea-	Edge level	Set / Get	0 to 100	50		
133	ment condi- tions	Noise level	Set / Get	0 to 442	5		

Exter- nal ref- erence number	Category	Data name	Set / Get	Data range	Default	Expres- sion text string	Logged data/ Judgement parameter
136	Judge- ment	Edge position X upper limit	Set / Get	-99,999.9999 to 99,999.9999	99,999.9999		Judgement condition
137	tions	Edge position X lower limit	Set / Get	-99,999.9999 to 99,999.9999	-99,999.9999		Judgement condition
138		Edge position Y upper limit	Set / Get	-99,999.9999 to 99,999.9999	99,999.9999		Judgement condition
139		Edge position Y lower limit	Set / Get	-99,999.9999 to 99,999.9999	-99,999.9999		Judgement condition
140	Mea- sure-	Detection mode for Monochrome Sensor	Set / Get	0: Light to Dark 1: Dark to Light	0		
141	condition	Edge level absolute value	Set / Get	0 to 442	20		
142		Edge level specification method	Set / Get	0:% 1:Absolute value	0		
144		Measurement method	Set / Get	0: Projection 1: Differentiation	0		
145	Judge- ment	Edge position offset upper limit	Set / Get	-99,999.9999 to 99,999.9999	99,999.9999		Judgement condition
146	tions	Edge position offset lower limit	Set / Get	-99,999.9999 to 99,999.9999	-99,999.9999		Judgement condition
147	Mea- sure- ment condition	Edge level absolute value (Monochrome Cameras)	Set / Get	0 to 255	20		
310	Logging condi- tions	Data logging switch for entire unit	Set / Get	0: Data logging OFF 1: Data logging ON	1		
311	10113	Data logging switch for judgement	Set / Get	0: Data logging OFF 1: Data logging ON	1		
312		Data logging switch for detected edge position X	Set / Get	0: Data logging OFF 1: Data logging ON	1		
313		Data logging switch for detected edge position Y	Set / Get	0: Data logging OFF 1: Data logging ON	1		
316		Data logging switch for scroll	Set / Get	0: Data logging OFF 1: Data logging ON	0		
700	Display settings	Edge position offset display	Set / Get	0: Display 1: Do not display	1		
701		Detected edge position X display	Set / Get	0: Display 1: Do not display	0		
702		Detected edge position Y display	Set / Get	0: Display 1: Do not display	0		
800		Detected edge position X display pattern	Set / Get	0: Absolute value 1: Relative value	0		
801		Detected edge position Y display pattern	Set / Get	0: Absolute value 1: Relative value	0		

Edge Width (FQ2-S1/S2/S3 series or FQ2-S4 series only)

External refer- ence number	Category	Data name	Set / Get	Data range	Default	Expres- sion text string	Logged data/ Judgement parameter
0	Mea- sure- ment result	Judgement	Get only	 -2: No judgement (not measured), 0: Judgement is OK -1: Judgement is NG -13: Teaching not performed error -14: Figure not registered error -15: Out of range error 	-2	JG	
5		Edge width	Get only	0 to 99,999.9999	0	W	Logged data
6		Reference edge width	Get only	0 to 99,999.9999	0	SW	Logged data
7		Difference in edge width	Get only	0 to 99,999.9999	0	DF	Logged data
103	Output parame- ter	Reflect	Set / Get	0: Yes 1: No	0		
120	Mea- sure- ment condi- tions	Edge level specification method	Set / Get	0:% 1: Absolute value	0		
121	Set color	Set color	Set / Get	Edge color specification 0: Not specified, 1: Specified	0		
122	Mea- sure-	Measurement method	Set / Get	0: Projection 1: Differentiation	0		
131	condi-	Edge color red	Set / Get	0 to 255	255		
132	tions	Edge color green	Set / Get	0 to 255	255		
133		Edge color blue	Set / Get	0 to 255	255		
137		Edge level	Set / Get	0 to 100	50		
138		Edge level absolute value	Set / Get	0 to 442	20		
139		Noise level	Set / Get	5 to 442	5		
142		Density change	Set / Get	0: Light to Dark 1: Dark to Light	0		
143		Edge level absolute value (Monochrome Cameras)	Set / Get	0 to 255	20		
190	Judge- ment	Edge width upper limit	Set / Get	-99,999.9999 to 99,999.9999	99,999.9 999		Judgement condition
191	tions	Edge width lower limit	Set / Get	-99,999.9999 to 99,999.9999	0		
310	Logging condi- tions	Data logging switch for entire unit	Set / Get	0: Data logging OFF 1: Data logging ON	1		
311		Data logging switch for judgement	Set / Get	0: Data logging OFF 1: Data logging ON	1		
312		Data logging switch for edge width	Set / Get	0: Data logging OFF 1: Data logging ON	1		
700	Display settings	Edge width display	Setting/ Acquisition	0: Display 1: Do not display	0		
800		Wedge width display pattern	Setting/ Acquisition	0: Absolute value 1: Relative value 2: Percentage	0		
Edge Pitch (FQ2-S1/S2/S3 series or FQ2-S4 series only)

External refer- ence number	Category	Data name	Set / Get	Data range	Default	Expres- sion text string	Logged data/ Judgement parameter
0	Mea- Judgement sure- ment result		Get only	 -2: No judgement (not measured), 0: Judgement is OK, -1: Judgement is NG -13: Teaching not performed error, -14: Figure not registered error, -15: Out of range error 	-2	JG	Logged data
5		Edge pitch	Get only	0 to 999	0	Ν	Logged data
6		Average pitch	Get only	0 to 99,999.9999	0	Р	Logged data
7		Maximum pitch	Get only	0 to 99,999.9999	0	PH	Logged data
8		Minimum pitch	Get only	0 to 99,999.9999	0	PL	Logged data
9		Average width	Get only	0 to 99,999.9999	0	W	Logged data
10		Maximum pitch	Get only	0 to 99,999.9999	0	WH	Logged data
11		Minimum pitch	Get only	0 to 99,999.9999	0	WL	Logged data
103	Output parame- ter	Reflect	Set / Get	0: Yes 1: No	0		
120	Mea-	Edge color red	Set / Get	0 to 255	255		
121	ment	Edge color green	Set / Get	0 to 255	255		
122	tions	Edge color blue	Set / Get	0 to 255	255		
127		Edge level	Set / Get	0 to 100	50		
128		Noise level	Set / Get	0 to 442	5		
130	Judge- ment	Edge pitch upper limit	Set / Get	0 to 1,000	1,000		Judgement condition
131	tions	Edge pitch lower limit	Set / Get	0 to 1,000	0		Judgement condition
132		Average pitch upper limit	Set / Get	0 to 99,999.9999	99,999.9 999		Judgement condition
133		Average pitch lower limit	Set / Get	0 to 99,999.9999	0		Judgement condition
134		Pitch upper limit	Set / Get	0 to 99,999.9999	99,999.9 999		Judgement condition
135		Pitch lower limit	Set / Get	0 to 99,999.9999	0		Judgement condition
136		Average width upper limit	Set / Get	0 to 99,999.9999	99,999.9 999		Judgement condition
137		Average width lower limit	Set / Get	0 to 99,999.9999	0		Judgement condition
138		Width upper limit	Set / Get	0 to 99,999.9999	99,999.9 999		Judgement condition
139		Width lower limit	Set / Get	0 to 99,999.9999	0		Judgement condition

External refer- ence number	Category	Data name	Set / Get	Data range	Default	Expres- sion text string	Logged data/ Judgement parameter
140	Mea- sure- ment	Edge enhancement level	Set / Get	0 to 442	100		
141	condi- tions	Color to count	Set / Get	(Monochrome Cameras) 0: White 1: Black	0		
142		Mode	Set / Get	(Monochrome Cameras) 0: Standard 1: Precise	0		
310	Logging condi- tions	Data logging switch for entire unit	Set / Get	0: Data logging OFF 1: Data logging ON	1		
311	lions	Data logging switch for judgement	Set / Get	0: Data logging OFF 1: Data logging ON	1		
312		Data logging switch for edge pitch	Set / Get	0: Data logging OFF 1: Data logging ON	1		
313		Data logging switch for average pitch	Set / Get	0: Data logging OFF 1: Data logging ON	1		
314		Data logging switch for maximum pitch	Set / Get	0: Data logging OFF 1: Data logging ON	1		
315		Data logging switch for minimum pitch	Set / Get	0: Data logging OFF 1: Data logging ON	1		
316		Data logging switch for average width	Set / Get	0: Data logging OFF 1: Data logging ON	1		
317		Data logging switch for maximum width	Set / Get	0: Data logging OFF 1: Data logging ON	1		
318		Data logging switch for minimum width	Set / Get	0: Data logging OFF 1: Data logging ON	1		
700	Display settings	Edge pitch display	Set / Get	0: Display 1: Do not display	0		
701		Average pitch display	Set / Get	0: Display 1: Do not display	0		
702		Pitch display	Set / Get	0: Display 1: Do not display	0		
703		Average width display	Set / Get	0: Display 1: Do not display	0		
704		Width display	Set / Get	0: Display 1: Do not display	0		

Area (FQ2-S1/S2/S3 series or FQ2-S4 series only)

External reference number	Category	Data name	Set / Get	Data range	Default	Expres- sion text string	Logged data/ Judgement parameter
0	Mea- sure- ment result	Judgement	Get only	 -2: No judgement (not measured), 0: Judgement is OK, -1: Judgement is NG, -13: Teaching not performed error, -14: Figure not registered error, -15: Out of range error 	-2	JG	
5	Mea-	Area	Get only	0 to 999,999,999.9999	0	AR	
6	ment	Gravity X	Get only	-99,999.9999 to 99,999.9999	0	Х	Logged data
7	result	Gravity Y	Get only	-99,999.9999 to 99,999.9999	0	Y	Logged data
8		Reference area	Get only	0 to 999,999,999	0	SA	Logged data
9		Reference position X	Get only	-99,999.9999 to 99,999.9999	0	SX	
10		Reference position Y	Get only	-99,999.9999 to 99,999.9999	0	SY	
11		Area deviation	Get only	-999,999,999.9999 to 999,999,999.9999	0	DF	Logged data
103	Output parame- ter	Reflect	Set / Get	0: Yes 1: No	0		
127	Mea- sure- ment condi- tions	Background color	Set / Get	0: Black 1: White 2: Red 3: Green 4: Blue	0		
128		Fill profile	Set / Get	0: No 1: Fill outline, 2: Filling up holes	0		
129		Area color inversion	Set / Get	0: None 1: Enabled The binary inversion is displayed for a Monochrome Camera.	0		
135	Judge- ment	Judgement upper limit for area	Set / Get	0 to 999,999,999.9999	999,999,999 .9999		
136		Judgement lower limit for area	Set / Get	0 to 999,999,999.9999	0		
137		Judgement upper limit for gravity X	Set / Get	-99,999.9999 to 99,999.9999	99,999.9999		
138		Judgement lower limit for gravity X	Set / Get	-99,999.9999 to 99,999.9999	99,999.9999		
139		Judgement upper limit for gravity Y	Set / Get	-99,999.9999 to 99,999.9999	99,999.9999		
140		Judgement lower limit for gravity Y	Set / Get	-99,999.9999 to 99,999.9999	 99,999.9999		
141		Judgement upper limit for binary threshold	Set / Get	0 to 255	255		
142		Judgement lower limit for binary threshold	Set / Get	0 to 255	128		

External reference number	Category	Data name	Set / Get	Data range	Default	Expres- sion text string	Logged data/ Judgement parameter
143	Mea- sure- ment condi-	Binary image display	Set / Get	(Monochrome Cameras) 0: No binary image display, 1: Binary image display	1		
144	tions	Image type	Set / Get	0: Measurement image, 1: Color extraction image, 2: Selected color image, 3: Binary image after extraction	1		
145		Enable/disable multi- ple selection	Set / Get	0: Enabled, 1: Disabled	1		
160+N×10 (N=0 to 3)) Set color	Registered color usage flag N	Set / Get	0: Not used 1: Used	1(N=0), 0(N=1 to 3)		
161+N×10 (N=0 to 3)		Registered color OR/ NOT flag N	Set / Get	0: OR, 1: NOT	0		
162+N×10 (N=0 to 3)		Registered color maxi- mum hue N	Set / Get	0 to 359	359		
163+N×10 (N=0 to 3)		Registered color mini- mum hue N	Set / Get	0 to 359	0		
164+N×10 (N=0 to 3)		Registered color maxi- mum saturation N	Set / Get	0 to 255	255		
165+N×10 (N=0 to 3)		Registered color mini- mum saturation N	Set / Get	0 to 255	0		
166+N×10 (N=0 to 3)	-	Registered color maxi- mum brightness N	Set / Get	0 to 255	255		
167+N×10 (N=0 to 3)	Set color	Registered color mini- mum brightness N	Set / Get	0 to 255	0		
310	Logging condi-	Data logging switch for entire unit	Set / Get	0: Data logging OFF 1: Data logging ON	1		
311	lions	Data logging switch for judgement	Set / Get	0: Data logging OFF 1: Data logging ON	1		
312	-	Data logging switch for area	Set / Get	0: Data logging OFF 1: Data logging ON	1		
313		Data logging switch for gravity X	Set / Get	0: Data logging OFF 1: Data logging ON	1		
314		Data logging switch for gravity Y	Set / Get	0: Data logging OFF 1: Data logging ON	1		
700	Display settings	Area display	Set / Get	0: Display area 1: Do not display area	0		
701	-	Gravity X display	Set / Get	0: Display gravity X 1: Do not display gravity X	0		
702		Gravity Y display	Set / Get	0: Display gravity Y 1: Do not display gravity Y	0		
800		Area display pattern	Set / Get	0: Absolute value 1: Relative value 2: Percentage	0		
801		Gravity X display pat- tern	Set / Get	0: Absolute value 1: Relative value	0		
802		Gravity Y display pat- tern	Set / Get	0: Absolute value 1: Relative value	0		

Color Data (FQ2-S1/S2/S3 series or FQ2-S4 series only)

External refer- ence number	Category	Data name	Set / Get	Data range	Default	Expres- sion text string	Logged data/ Judgement parameter
0	Mea- sure- ment result	Judgement	Get only	 -2: No judgement (not measured), 0: Judgement is OK, -1: Judgement is NG, -10: Image error, -13: Teaching not performed error, -14: Figure not registered error, -15: Out of range error, -20: Other error 	-2	JG	
5		R average	Get only	0 to 255	0	AR	
6		G average	Get only	0 to 255	0	AG	
7		B average	Get only	0 to 255	0	AB	
8		Color difference	Get only	0 to 442 The density average is displayed for a Monochrome Camera.	0	AD	Logged data
9		Color deviation	Get only	0 to 221 The standard deviation of the den- sity is displayed for a Monochrome Camera.	0	DV	
103	Output Reflect S parame- ter S		Set / Get	0: Yes, 1: No	0		
124	Judge- ment	Color difference upper limit	Set / Get	0 to 442	442		Judgement condition
125	tions Color difference lower limit		Set / Get	0 to 442	0		
126	Mea- sure-	Color deviation upper limit	Set / Get	0 to 221	221		
127	condi- tions	Color deviation lower limit	Set / Get	0 to 221	0		
130		Density average upper limit	Set / Get	0 to 255	255		
131		Density average lower limit	Set / Get	0 to 255	0		
132		Density deviation upper limit	Set / Get	0 to 127	127		
133		Density deviation lower limit	Set / Get	0 to 127	0		
134	1	R average upper limit	Set / Get	0 to 255	255		
135	1	R average lower limit	Set / Get	0 to 255	0		
136	1	G average upper limit	Set / Get	0 to 255	255		
137	1	G average lower limit	Set / Get	0 to 255	0		
138	Mea-	B average upper limit	Set / Get	0 to 255	255		
139	ment condi- tions	B average lower limit	Set / Get	0 to 255	0		

External refer- ence number	Category	Data name	Set / Get	Data range	Default	Expres- sion text string	Logged data/ Judgement parameter
310	Logging condi- tions	Data logging switch for entire unit	Set / Get	0: Data logging OFF 1: Data logging ON	1		
311	10113	Data logging switch for judgement	Set / Get	0: Data logging OFF 1: Data logging ON	1		
312		Data logging switch for average deviation/den- sity average	Set / Get	0: Data logging OFF 1: Data logging ON	1		
313		Data logging switch for color deviation/density deviation	Set / Get	0: Data logging OFF 1: Data logging ON	1		
314		Data logging switch for R average	Set / Get	0: Data logging OFF 1: Data logging ON	1		
315		Data logging switch for G average	Set / Get	0: Data logging OFF 1: Data logging ON	1		
316		Data logging switch for B average	Set / Get	0: Data logging OFF 1: Data logging ON	1		
317		Data logging switch for reference average	Set / Get	0: Data logging OFF 1: Data logging ON	1		
318	-	Data logging switch for standard deviation	Set / Get	0: Data logging OFF 1: Data logging ON	1		
319		Data logging switch for density average differ- ence	Set / Get	0: Data logging OFF 1: Data logging ON	1		
320		Data logging switch for density deviation differ- ence	Set / Get	0: Data logging OFF 1: Data logging ON	1		
700	Display settings	Average color display	Set / Get	0: Display 1: Do not display	0		
701		Color deviation display	Set / Get	0: Display 1: Do not display	0		
702		R average display	Set / Get	0: Display 1: Do not display	1		
703		G average display	Set / Get	0: Display 1: Do not display	1		
704		B average display	Set / Get	0: Display 1: Do not display	1		
705		Density average dis- play	Set / Get	0: Display 1: Do not display	0		
706		Density deviation dis- play	Set / Get	0: Display 1: Do not display	0		

Labeling (FQ2-S1/S2/S3 series or FQ2-S4 series only)

External refer- ence number	Category	Data name	Set / Get	Data range	Default	Expres- sion text string	Logged data/ Judgement parameter
0	Mea- sure- ment result	Judgement	Get only	 -2: No judgement (not measured), 0: Judgement is OK, -1: Judgement is NG, -13: Teaching not performed error, -14: Figure not registered error, -15: Out of range error 	-2	JG	Logged data
5		Number of labels	Get only	0 to 100	0	L	Logged data
6		Area	Get only	0 to 999,999,999.9999	0	AR[0] to AR[99]	Logged data
7		Gravity center X	Get only	-99,999.9999 to 99,999.9999	0	X[0] to X[99]	Logged data
8		Gravity center Y	Get only	-99,999.9999 to 99,999.9999	0	Y[0] to Y[99]	Logged data
9		Reference area	Get only	0 to 999,999,999.9999	0	SA	
10		Reference position X	Get only	-99,999.9999 to 99,999.9999	0	SX	
11		Reference position Y	Get only	-99,999.9999 to 99,999.9999	0	SY	
15		Total label area	Get only	0 to 999,999,999.9999	0	TAR	Logged data
55		Master angle	ngle Get only -180 to 180		0	ATH[0] to ATH[99]	Logged data
103	Output parame- ter	Reflect	Set / Get	0: Yes 1: No	0		
127	Extracte d image display condition	Background color	Set / Get	0: Black 1: White 2: Red 3: Green 4: Blue	0		
131	Set color Binary	Area color inversion	Set / Get Set / Get	0: None 1: Enabled The binary value is displayed for a Monochrome Camera.	0		
132	Mea- sure-	Filling up holes	Set / Get	0: No 1: Yes	0		
133	condi- tions	Outside trimming	Set / Get	0: No 1: Yes	0		
136		Label sort condition	Set / Get	0: Ascending order of area, 1: Descending order of area, 2: Ascending order of gravity X, 3: Descending order of gravity X, 4: Ascending order of gravity Y, 5: Descending order of gravity Y	1		
146	Binary	Binary level upper limit	Set / Get	0 to 255	255		
147	IEVEI	Binary level lower limit	Set / Get	0 to 255	128		
148	Extracte d image	Binary image display	Set / Get	0: No binary image display, 1: Binary image display	1		
149	condition	Image type	Set / Get	0: Measurement image, 1: Color extraction image, 2: Selected color image 3: Binary image after extraction	1		

External refer- ence number	Category	Data name	Set / Get	Data range	Default	Expres- sion text string	Logged data/ Judgement parameter
152	Mea- sure-	External reference label number	Set / Get	0 to 99	0		
156	condi- tions detection count Set / Get 1 to 100		1 to 100	100			
160+N×10 (N=0 to 3)	Set color	Registered color usage flag N	Set / Get	0: Not used 1: Used	1		
161+N×10 (N=0 to 3)		Registered color exclu- sion flag N	Set / Get	0: OR 1: NOT	0		
162+N×10 (N=0 to 3)		Registered color maxi- mum hue N	Set / Get	0 to 359	359		
163+N×10 (N=0 to 3)		Registered color mini- mum hue N	Set / Get	0 to 359	0		
164+N×10 (N=0 to 3)		Registered color maxi- mum saturation N	Set / Get	0 to 255	255		
165+N×10 (N=0 to 3)		Registered color mini- mum saturation N	Set / Get	0 to 255	0		
166+N×10 (N=0 to 3)		Registered color maxi- mum brightness N	Set / Get	0 to 255	255		
167+N×10 (N=0 to 3)		Registered color mini- mum brightness N	Set / Get	0 to 255	0		
300	Logging condi-	g Number of data log records Set / Get 1 to 100		100			
310	tions	tions Data logging switch for Set / Get entire unit			1		
311		Data logging switch for judgement	Set / Get		1		
312		Data logging switch for number of labels	Set / Get		1		
313		Data logging switch for area	Set / Get		1		
314		Data logging switch for gravity X	Set / Get	0: Data logging OFF 1: Data logging ON	1		
315		Data logging switch for gravity Y	Set / Get		1		
317		Data logging switch for Reference average	Set / Get		0		
319		Data logging switch for total label area	Set / Get		1		
326		Data logging switch for master angle	Set / Get		1		
503	Mea- sure-	Extraction condition, Upper limit (Area)	Set / Get	0.0000 to 999,999,999.9999	999,999,999 .9999		
504	- ment condition	Extraction condition, Lower limit (Area)	Set / Get	0.0000 to 999,999,999.9999	0		
513		Extraction condition, Upper limit (gravity X)	Set / Get	-999,999,999.9999 to 999,999,999.9999	9999999999. 9999		
514		Extraction condition, Lower limit (gravity X)	Set / Get	-999,999,999.9999 to 999,999,999.9999	_ 999,999,999 .9999		
523		Extraction condition, Upper limit (gravity Y)	Set / Get	-999,999,999.9999 to 999,999,999.9999	9999999999. 9999		
524		Extraction condition, Lower limit (gravity Y)	Set / Get	-999,999,999.9999 to 999,999,999.9999	999,999,999. 9999		

External refer- ence number	Category	Data name	Set / Get	Data range	Default	Expres- sion text string	Logged data/ Judgement parameter
602	Judge- ment	Judgement upper limit for number of labels	Set / Get	1 to 100	100		
603		Judgement lower limit for number of labels	Set / Get	1 to 100	0	-	
612		Judgement upper limit for label area Set / Get 0 to 999,999,999.9999		0 to 999,999,999.9999	999,999,999 .9999		
613		Judgement lower limit for label area	Set / Get	0 to 999,999,999.9999	0		
622		Judgement upper limit for area	Set / Get	0 to 999,999,999.9999	999,999,999 .9999		
623		Judgement lower limit for area	Set / Get	0 to 999,999,999.9999	0		
632		Judgement upper limit for gravity X	Set / Get	-99,999.9999 to 99,999.9999	99,999.9999		
633		Judgement lower limit for gravity X	Set / Get	-99,999.9999 to 99,999.9999	99,999.9999		
642		Judgement upper limit for gravity Y	Set / Get	-99,999.9999 to 99,999.9999	99,999.9999		
643		Judgement lower limit for gravity Y	Set / Get	-99,999.9999 to 99,999.9999			
652		Judgement upper limit for master angle	Set / Get	-180 to 180	180		
653		Judgement lower limit for master angle	Set / Get	-180 to 180	-180		
700	Display settings	Number of labels dis- play	Set / Get	0: ON 1: OFF	0		
701		Total label area display	Set / Get	0: ON 1: OFF	0		
702		Area display	Set / Get	0: ON 1: OFF	1		
703	1	Gravity X display	Set / Get	0: ON 1: OFF	1		
704		Gravity Y display	Set / Get	0: ON 1: OFF	1		
705		Master angle display	Set / Get	0: ON 1: OFF	1		

9-3 Specifications and Dimensions

FQ2-S1 FQ2-S2 FQ2-S3 FQ2-S4 FQ2-CH

Sensor

Specifications

FQ2-S1/S2/S3 Series

Item		Single-function models	Standard mod- els	High-resolution mo	odels							
Model	NPN	FQ2-S10	FQ2-S20	FQ2- S30	FQ2- S30====-08M	FQ2-S30-13	FQ2-S30- 13M					
	PNP	FQ2-S150000	FQ2-S25	FQ2- S35====-08	FQ2- S35====-08M	FQ2-S35-13	FQ2-S35- 13M					
Field of view	N	Refer to Table 1.				Lens is select	according to					
Installation	distance	Refer to Table 1.		tion distance.	the field of vision and installa- tion distance. Refer to the Optical Chart page.							
Main func- tions	Inspection items	Search, shape s labeling	earch II, sensitive	search, area, color	⁻ data, edge positior	n, edge pitch, eo	lge width, and					
	Number of simultaneous measurements	1	32									
	Position com- pensation	Supported (360°	upported (360° Model position compensation, Edge position compensation, Linear correction)									
	Number of reg- istered scenes* ¹	8	32									
	Calibration	Supported										
Image input	Image process- ing method	Real color			Monochrome	Real color	Monochrome					
	Image filter	High dynamic ra smoothing, stron vertical edges, e ance (Sensors w	High dynamic range (HDR), pre-processing (color gray filter (Sensors with Color Cameras only), weak smoothing, strong smoothing, dilate, erosion, median, extract edges, extract horizontal edges, extract vertical edges, enhance edges, and background suppression), polarizing filter (attachment), white balance (Sensors with Color Cameras only), and brightness correction									
	Image elements	1/3-inch color CM	MOS	1/2-inch color CMOS	1/2-inch Mono- chrome CMOS	1/2-inch color CMOS	1/2-inch Monochrome CMOS					
	Shutter	Built-in lighting lit: Built-in lighting not	1/250 to 1/50,000 i lit: 1/1 to 1/50,000	Built-in lighting lit: Built-in lighting not	1/250 to 1/60,000 t lit: 1/1 to 1/4,155	1/1 to 1/4,155						
	Processing res- olution	752×480		928×828		1280×1024						
	Partial input function	Supported horizo	ontally only.	Supported horizon	tally and vertically							
	Image display	Zoom-in/Zoom-o	ut/Fit Width/Rotat	te 180°								
	Lens mounts					C-mounts						
Lighting	Lighting method	Pulse				-						
	Lighting color	White				-						
Data log- ging	Measurement data	In Sensor: 1,000 card.)	items (If a Touch	Finder is used, res	ults can be saved u	p to the capacit	y of an SD					
	Images	In Sensor: 20 im card.)	ages (If a Touch F	Finder is used, imag	jes can be saved uj	o to the capacity of an SD						

Item		Single-function models	Standard mod- els	- High-resolution models						
Model	NPN	FQ2-S10	FQ2-S20	FQ2- S30===-08	FQ2- S30===-08M	FQ2-S30-13	FQ2-S30- 13M			
	PNP	FQ2-S150000	FQ2-S250000	FQ2- S35000-08	FQ2- S35000-08M	FQ2-S35-13	FQ2-S35- 13M			
Auxiliary fu	nction	Statistical data, t history, calibratic	est measurement on, math (arithmet	t, I/O monitor, pass ic, calculation funct	word function, simul	ation software, functions, and l	sensor error ogic functions)			
Measureme	ent trigger	External trigger (Communications protocol, PROFI	single or continue trigger (Ethernet NET, EtherNet/IP,	ous) TCP no-protocol, E or PLC Link)	Ethernet UDP no-pro	otocol, Ethernet	FINS/TCP no-			
I/O specifi- cations	Input signals	7 signals • Single measurement input (TRIG) • Control command input (IN0 to IN5)								
	Output signals	 Signals Control output (BUSY) Overall judgement output (OR) Error output (ERROR) Note: The assignments of the three output signals (OUT0 to OUT2) can also be changed to the following. READY RUN STG (Strobe trigger) OR (Item0 judgment) to OR31 (Item31 judgment) Exp.0 judgment to Exp.31 judgment 								
	Ethernet specifi- cations	100Base-TX/10Base-T								
	Communica- tions	Ethernet TCP no-protocol, Ethernet UDP no-protocol, Ethernet FINS/TCP no-protocol, EtherNet/IP, or PLC Link PROFINET								
	I/O expansion		Possible by connecting FQ-SDU1□ Sensor Data Unit. 11 inputs and 24 outputs							
	RS-232C			Possible by conne 8 inputs and 7 out	ecting FQ-SDU2⊡ S puts	ensor Data Unit	t.			
	Input specifica- tions	Refer to Table 2.								
	Output specifi- cations									
Connection method Special connector cables Power supply and I/O: 1 cable (FQ-WD==) Touch Finder and computer: 1 cable (FQ-WN==) Special connector cables Power supply I/O and Sensor Data Units: 1 cable (FQ-WD FQ-WU==) Touch Finder and computer: 1 cable (FQ-WN==) Touch Finder and computer: 1 Touch Finder and computer: 1 Touch Finder and computer: 1							Q-WD⊡⊡ and			
Indications		BUSY indicator (Ethernet commu Note: The assigr	BUSY, green), Junications indicato nications indicato niment of the BUS	dgment result indic r (ETN, orange) Y indicator can be o	ator (OR, orange), e	error indicator (l ndicator (displa	ERROR, red), y color: green).			
Ratings	Power supply voltage	21.6 to 26.4 VD0	C (including ripple)						
	Insulation resis- tance	Between all lead	wires and case:	0.5 MΩ (at 250 V)						
	Current con- sumption	2.4 A max.				0.3 A max.				

Item		Single-function models	Standard mod- els	High-resolution mo	odels					
Model	NPN	FQ2-S10	FQ2-S20	FQ2- S30====-08	FQ2- S30====-08M	FQ2-S30-13	FQ2-S30- 13M			
	PNP	FQ2-S150000	FQ2-S25	FQ2- S35====-08	FQ2- S35====-08M	FQ2-S35-13	FQ2-S35- 13M			
Environ- mental immunity	Ambient tem- perature range	Operating: 0 to 5 Storage: –25 to 6 (with no icing or	0°C 65°C condensation)	Operating: 0 to 40 (with no icing or co	°C, Storage: –25 to ondensation)	, −25 to 65°C)				
	Ambient humid- ity range	Operating and st	torage: 35% to 85	% (with no condens	sation)					
	Ambient atmo- sphere	ere No corrosive gas								
	Vibration resis- tance (destruc- tion)	10 to 150 Hz, single amplitude: 0.35 mm, X/Y/Z directions 3 min each, 10 times								
	Shock resis- tance (destruc- tion)	150 m/s ² 3 times	150 m/s ² 3 times each in 6 direction (up, down, right, left, forward, and backward)							
	Degree of pro- tection	IEC 60529 IP67 or connector cap	IEC 60529 IP4	10						
Materials		Sensor: PBT, PC, SUS Cover: Zii Mounting Bracket: PBT Thickness Polarizing Filter Attachment: PBT, PC Case: Alu Ethernet connector: Oil-resistance vinyl compound alloy (ADU I/O connector: Lead-free heat-resistant PVC Mounting ate ABS ate ABS					ated steel, 5 mm Im diecast) 9: Polycarbon-			
Weight		Depends on field	l of view and insta	allation distance. Re	efer to Table 1.	Approx. 160 g Approx. 185 g	without base, with base			
Accessories		Mounting Bracket (FQ-XL) (1) Mounting Base (FQ-Z) Polarizing Filter Attachment (FQ-XF1) (1) Four Mounting Screw Instruction Manual XLC) (M3×8 mm)(4) Member Registration Sheet Instruction Manual					e (FQ-XLC) (1) J Screws (FQ- nm)(4) nual stration Sheet			
LED class*	2	Risk Group 2								

Table 1

Single-function models		Standard models		Field of view	Installation dis-	Num-	Weight
NPN	PNP	NPN	PNP	(H×V) ^3	tance	ber of LEDs	
FQ2-S10010F	FQ2-S15010F	FQ2-S20010F	FQ2-S25010F	7.5×4.7 to 13×8.2 mm	38 to 57 mm	4	Approx.
FQ2-S10050F	FQ2-S15050F	FQ2-S20050F	FQ2-S25050F	13 × 8.2 to 53 × 33 mm	56 to 215 mm	4	160 g
FQ2-S10100F	FQ2-S15100F	FQ2-S20100F	FQ2-S25100F	53 × 33 to 240 × 153 mm	220 to 970 mm	8	Approx. 150 g
FQ2-S10100N	FQ2-S15100N	FQ2-S20100N	FQ2-S25100N	29 × 18 to 300 × 191 mm	32 to 380 mm	8	

High-resolution models	Field of view	Installation dis-	Num-	Weight	
NPN	PNP	(H×V) ^3	tance	ber of LEDs	
FQ2-S30010F-□□□	FQ2-S35010F-□□□	7.5×6.7 to 13×11.6 mm	38 to 57 mm	4	Approx. 160 g
FQ2-S30050F-□□□	FQ2-S35050F-□□□	13×11.6 to 53×47.3 mm	56 to 215 mm	4	
FQ2-S30100F-□□□	FQ2-S35100F-□□□	53×47.3 to 240×214 mm	220 to 970 mm	8	Approx. 150 g
FQ2-S30100N-□□□	FQ2-S35100N-□□□	29×25.9 to 300×268 mm	32 to 380 mm	8	

*1: Registration may not be possible for all scenes, depending on the settings.
*2: Applicable standards:IEC62471-2
*3: Tolerance: ±10% max.

Table 2

Item	NPN	PNP
Input specifi- cations	ON: Shorted to 0 V, or 1.5 V max. OFF: Open (leakage current: 0.1 mA max.)	ON: Shorted to power supply voltage, or power supply volt- age -1.5 V max. OFF: Open (leakage current: 0.1 mA max.)
Output speci- fications ^{*3}	NPN open collector 30 VDC, 50 mA max., residual voltage: 2.0 V max.	PNP open collector 30 VDC, 50 mA max., residual voltage: 2.0 V max.

*4: Do not allow the load current to exceed 50 mA. The output circuit may be damaged if the load current exceeds 50 mA.

FQ2-S4 Series

Item		Inspection and ID models							
Model	NPN	FQ2-S40	FQ2- S40□□□-M	FQ2- S40===-08	FQ2- S40===-08M	FQ2-S40-13	FQ2-S40- 13M		
	PNP	FQ2-S450000	FQ2- S45□□□-M	FQ2- S45===08	FQ2- S45000-08M	FQ2-S45-13	FQ2-S45- 13M		
Field of vie	W	Refer to Table 1.	I			Lens is select	according to		
Installation	distance	Refer to Table 1.				the field of vision and installa- tion distance. Refer to the Optical Chart page.			
Main func- tions	Inspection items	Shape Search II Labeling, OCR, I	Shape Search II, Search, Sensitive Search, Edge Position, Edge Width, Edge Pitch, Area, Color Da abeling, OCR, Bar Code, 2D Code, 2D Code (DPM), and Model Dictionary						
	Number of simultaneous measurements	32							
	Position com- pensation	Supported (360°	Supported (360° Model position compensation, Edge position compensation, Linear correction)						
	Number of reg- istered scenes* ¹	32	32						
	Calibration	Supported							
	Retrying	Normal retry, exposure retry, scene retry, and trigger retry							
Print quality ISO/IEC TR 29158 (AIM DPM-1-2006) (Supports code : Datamatrix ECC200)									
Image input	Image process- ing method	Real color	Monochrome	Real color	Monochrome	Real color	Monochrome		
	Image filter	High dynamic range (HDR), pre-processing (color gray filter (Sensors with Color Cameras only), weak smoothing, strong smoothing, dilate, erosion, median, extract edges, extract horizontal edges, extract vertical edges, enhance edges, and background suppression), polarizing filter (attachment), white balance (Sensors with Color Cameras only), and brightness correction							
	Image elements	1/3-inch color CMOS	1/3-inch Mono- chrome CMOS	1/2-inch color CMOS	1/2-inch Mono- chrome CMOS	1/2-inch color CMOS	1/2-inch Monochrome CMOS		
	Shutter	Built-in lighting lit: Built-in lighting not	1/250 to 1/50,000 i lit: 1/1 to 1/50,000	Built-in lighting lit: Built-in lighting no	1/250 to 1/60,000 t lit: 1/1 to 1/4,155	1/1 to 1/4,155	<u> </u>		
	Processing res- olution	752×480		928×828		1,280×1,024			
	Partial input function	Supported horizo	ontally only.	Supported horizor	ntally and vertically				
	Image display	Zoom-in/Zoom-out/Fit Width/Rotate 180°							
	Lens mounts					C-mounts			
Lighting	Lighting method	Pulse				-			
	Lighting color	White				-			
Data log- ging	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.)				y of an SD			
	Images	In Sensor: 20 images (If a Touch Finder is used, images can be saved up to the capacity of an SD card.)					/ of an SD		
Auxiliary fu	nction	Statistical data, t history, calibratio	est measurement on, math (arithmet	i, I/O monitor, pass ic, calculation funct	word function, simul tions, trigonometric	ation software, functions, and lo	sensor error ogic functions)		
Measureme	ent trigger	External trigger (single or continuous) Communications trigger (Ethernet TCP no-protocol, Ethernet UDP no-protocol, Ethernet FINS/TCP no- protocol, EtherNet/IP, PROFINET, or PLC Link)							

Item		Inspection and ID models							
Model	NPN	FQ2-S40	FQ2- S40===-M	FQ2- S40===-08	FQ2- S40===-08M	FQ2-S40-13	FQ2-S40- 13M		
	PNP	FQ2-S450000	FQ2- S45□□□-M	FQ2- S45===08	FQ2- S45===-08M	FQ2-S45-13	FQ2-S45- 13M		
I/O specifi- cations	Input signals	7 signals • Single measu • Control comm	 ⁷ signals Single measurement input (TRIG) Control command input (IN0 to IN5) 						
	Output signals	3 signals • Control output (BUSY) • Overall judgement output (OR) • Error output (ERROR) Note: The assignments of the three output signals (OUT0 to OUT2) can also be changed to the following. READY RUN STG (Strobe trigger) OR (Item0 judgment) to OR31 (Item31 judgment) Exp.0 judgment to Exp.31 judgment					1		
	Ethernet specifi- cations	100Base-TX/10Base-T							
	Communica- tions	Ethernet TCP no-protocol, Ethernet UDP no-protocol, Ethernet FINS/TCP no-protocol, EtherNet/IP, PLC Link, or PROFINET							
	I/O expansion	Possible by conr 11 inputs and 32	ecting FQ-SDU1 outputs	□ Sensor Data Unit					
	RS-232C	Possible by connecting FQ-SDU2□ Sensor Data Unit. 8 inputs and 7 outputs							
	Input specifica- tions	Refer to Table 2.							
	Output specifi- cations								
	Connection method	Special connector cables Special connector cables Power supply and I/O: 1 cable Power supply I/O and Sensor Data Unit.s: 1 cable (FQ-WD == and FQ-WU == a) Touch Finder and computer: 1 cable (FQ-WN == a) Touch Finder and computer: 1 cable (FQ-WN == and FQ-WN == and							
Indications		BUSY indicator (BUSY, green), Judgement result indicator (OR, orange), error indicator (ERROR, red), Ethernet communications indicator (ETN, orange) Note: The assignment of the BUSY indicator can be changed to a RUN indicator (display color: green).							
Ratings	Power supply voltage	21.6 to 26.4 VD0	C (including ripple)					
	Insulation resis- tance	Between all lead	wires and case:	0.5 MΩ (at 250 V)					
	Current con- sumption	2.4 A max.				0.3 A max.			

Item		Inspection and ID models								
Model	NPN	FQ2-S40	FQ2- S40===-M	FQ2- S40===-08	FQ2- S40===-08M	FQ2-S40-13	FQ2-S40- 13M			
	PNP	FQ2-S450000	FQ2- S45===-M	FQ2- S4500008	FQ2- S45===-08M	FQ2-S45-13	FQ2-S45- 13M			
Environ- mental immunity	Ambient tem- perature range	Operating: 0 to 40°C Storage: -25 to 65°C (with no icing or condensation)								
	Ambient humid- ity range	Operating and st	Operating and storage: 35% to 85% (with no condensation)							
	Ambient atmo- sphere	No corrosive gas	No corrosive gas							
	Vibration resis- tance (destruc- tion)	10 to 150 Hz, single amplitude: 0.35 mm, X/Y/Z directions 8 min each, 10 times								
	Shock resis- tance (destruc- tion)	150 m/s ² 3 times each in 6 direction (up, down, right, left, forward, and backward)								
	Degree of pro- tection	IEC 60529 IP67 (Except when Polarizing Filter Attachment is mounted or connector cap is removed.)								
Materials		Sensor: PBT, PC, SUS Cover: Zinc-pla Mounting Bracket: PBT Thickness: 0.6 Polarizing Filter Attachment: PBT, PC Case: Aluminur Ethernet connector: Oil-resistance vinyl compound alloy (ADC-12) I/O connector: Lead-free heat-resistant PVC Mounting base: ate ABS				ated steel, 6 mm Im diecast) 9: Polycarbon-				
Weight		Depends on field of view and installation distance. Refer to Table 1.				Approx. 160 g without base, Approx. 185 g with base				
Accessories		Mounting Bracket (FQ-XL)(1) Mounting Base (Polarizing Filter Attachment (FQ-XF1) (1) Four Mounting S Instruction Manual mm)(4) Member Registration Sheet Instruction Manu Member Registration Sheet			e (1) Screws (M3×8 nual stration Sheet					
LED class*	2	Risk Group 2								

Table 1

350,000-pixel Models	Field of view	Installation dis-	Num-	Weight	
NPN	PNP	(H×V) ^3	tance	LEDs	
FQ2-S40010F-□	FQ2-S45010F-□	7.5×4.7 to 13 × 8.2 mm	38 to 57 mm	4	Approx. 160 g
FQ2-S40050F-□	FQ2-S45050F-□	13 × 8.2 to 53 × 33 mm	56 to 215 mm	4	
FQ2-S40100F-□	FQ2-S45100F-□	53 × 33 to 240 × 153 mm	220 to 970 mm	8	Approx. 150 g
FQ2-S40100N-□	FQ2-S45100N-□	29 × 18 to 300 × 191 mm	32 to 380 mm	8	

760,000-pixel Models	Field of view	Installation dis-	Num-	Weight	
NPN	PNP	(H×V) ^3	tance	LEDs	
FQ2-S40010F-□□□	FQ2-S45010F-□□□	7.5×6.7 to 13×11.6 mm	38 to 57 mm	4	Approx. 160 g
FQ2-S40050F-□□□	FQ2-S45050F-000	13×11.6 to 53×47.3 mm	56 to 215 mm	4	
FQ2-S40100F-□□□	FQ2-S45100F-□□□	53×47.3 to 240×214 mm	220 to 970 mm	8	Approx. 150 g
FQ2-S40100N-□□□	FQ2-S45100N-□□□	29×25.9 to 300×268 mm	32 to 380 mm	8	

*1: Registration may not be possible for all scenes, depending on the settings.
*2: Applicable standards:IEC62471-2
*3: Tolerance: ±10% max.

Table 2

Item	NPN	PNP
Input specifi- cations	ON: Shorted to 0 V, or 1.5 V max. OFF: Open (leakage current: 0.1 mA max.)	ON: Shorted to power supply voltage, or power supply volt- age -1.5 V max. OFF: Open (leakage current: 0.1 mA max.)
Output speci- fications ^{*3}	NPN open collector 30 VDC, 50 mA max., residual voltage: 2.0 V max.	PNP open collector 30 VDC, 50 mA max., residual voltage: 2.0 V max.

*4: Do not allow the load current to exceed 50 mA. The output circuit may be damaged if the load current exceeds 50 mA.

FQ2-CH Series

Item		Inspection and ID models
Model	NPN	FQ2-CH10====-M
	PNP	FQ2-CH15====M
Field of view		Refer to Table 1.
Installation dista	nce	Refer to Table 1.
Main functions	Inspection items	OCR, and Model Dictionary
	Number of simultaneous measure- ments	32
	Position compensation	Supported (360° Model position compensation, Edge position compensa- tion, Linear correction)
	Number of registered scenes	32
	Retrying	Normal retry, exposure retry, scene retry, and trigger retry
Image input	Image processing method	Monochrome
	Image filter	High dynamic range (HDR), pre-processing (weak smoothing, strong smoothing, dilate, erosion, median, extract edges, extract horizontal edges, extract vertical edges, enhance edges, and background suppression), polarizing filter (attachment), and brightness correction
	Image elements	1/3-inch Monochrome CMOS
	Shutter	Built-in lighting lit: 1/250 to 1/50,000 Built-in lighting not lit: 1/1 to 1/50,000
	Processing resolution	752×480
	Partial input function	Supported horizontally only.
	Image display	Zoom-in/Zoom-out/Fit Width/Rotate 180°
Lighting	Lighting method	Pulse
	Lighting color	White
Data logging	Measurement data	In Sensor: 1,000 items (If a Touch Finder is used, results can be saved up to the capacity of an SD card.)
	Images	In Sensor: 20 images (If a Touch Finder is used, images can be saved up to the capacity of an SD card.)
Auxiliary function		Statistical data, test measurement, I/O monitor, password function, simula- tion software, sensor error history, math (arithmetic, calculation functions, trigonometric functions, and logic functions)
Measurement tri	gger	External trigger (single or continuous) Communications trigger (Ethernet TCP no-protocol, Ethernet UDP no-pro- tocol, Ethernet FINS/TCP no-protocol, EtherNet/IP, PROFINET, or PLC Link)

Item		Inspection and ID models		
Model	NPN	FQ2-CH10		
	PNP	FQ2-CH15====-M		
I/O specifica- tions	Input signals	7 signals • Single measurement input (TRIG) • Control command input (IN0 to IN5)		
	Output signals	3 signals • Control output (BUSY) • Overall judgement output (OR) • Error output (ERROR) Note: The assignments of the three output signals (OUT0 to OUT2) can also be changed to the following. READY RUN STG (Strobe trigger) OR (Item0 judgment) to OR31 (Item31 judgment) Exp.0 judgment to Exp.31 judgment		
	Ethernet specifications	100Base-TX/10Base-T		
	Communications	Ethernet TCP no-protocol, Ethernet UDP no-protocol, Ethernet FINS/TCP no-protocol, EtherNet/IP, PLC Link, or PROFINET		
	I/O expansion	Possible by connecting FQ-SDU1 Sensor Data Unit. 11 inputs and 32 outputs		
	RS-232C	Possible by connecting FQ-SDU2□ Sensor Data Unit. 8 inputs and 7 outputs		
	Input specifications	Pafar ta Tabla 2		
	Output specifications			
	Connection method	Special connector cables Power supply and I/O: 1 cable (FQ-WD□□□) Touch Finder and computer: 1 cable (FQ-WN□□□)		
Indications		BUSY indicator (BUSY, green), Judgement result indicator (OR, orange), error indicator (ERROR, red), Ethernet communications indicator (ETN, orange) Note: The assignment of the BUSY indicator can be changed to a RUN indi- cator (display color: green).		
Ratings	Power supply voltage	21.6 to 26.4 VDC (including ripple)		
	Insulation resistance	Between all lead wires and case: 0.5 M Ω (at 250 V)		
	Current consumption	2.4 A max.		
Environmental immunity	Ambient temperature range	Operating: 0 to 40°C Storage: –25 to 65°C (with no icing or condensation)		
	Ambient humidity range	Operating and storage: 35% to 85% (with no condensation)		
	Ambient atmosphere	No corrosive gas		
	Vibration resistance (destruction)	10 to 150 Hz, single amplitude: 0.35 mm, X/Y/Z directions 8 min each, 10 times		
	Shock resistance (destruction)	150 m/s ² 3 times each in 6 direction (up, down, right, left, forward, and backward)		
	Degree of protection	IEC 60529 IP67 (Except when Polarizing Filter Attachment is mounted or connector cap is removed.)		
Materials		Sensor: PBT, PC, SUS Mounting Bracket: PBT Polarizing Filter Attachment: PBT, PC Ethernet connector: Oil-resistance vinyl compound I/O connector: Lead-free heat-resistant PVC		
Weight		Depends on field of view and installation distance. Refer to Table 1.		

Item		Inspection and ID models
Model	NPN	FQ2-CH10===-M
	PNP	FQ2-CH15====-M
Accessories		Mounting Bracket (FQ-XL)(1) Polarizing Filter Attachment (FQ-XF1) (1) Instruction Manual Member Registration Sheet
LED class ^{*2}		Risk Group 2

Table 1

350,000-pixel Models	Field of view	Installation dis-	Num-	Weight	
NPN	PNP		lance	LEDs	
FQ2-CH10010F-M	FQ2-CH15010F-M	7.5×4.7 to 13 × 8.2 mm	38 to 57 mm	4	Approx. 160 g
FQ2-CH10050F-M	FQ2-CH15050F-M	13 × 8.2 to 53 × 33 mm	56 to 215 mm	4	
FQ2-CH10100F-M	FQ2-CH15100F-M	$\begin{array}{c} 53\times33 \text{ to} \\ 240\times153 \text{ mm} \end{array}$	220 to 970 mm	8	Approx. 150 g
FQ2-CH10100N-M	FQ2-CH15100N-M	29 × 18 to 300 × 191 mm	32 to 380 mm	8	Ī

*1: Tolerance: ±10% max. *2: Applicable standards:IEC62471-2

Table 2

Item	NPN	PNP
Input specifi- cations	ON: Shorted to 0 V, or 1.5 V max. OFF: Open (leakage current: 0.1 mA max.)	ON: Shorted to power supply voltage, or power supply volt- age -1.5 V max. OFF: Open (leakage current: 0.1 mA max.)
Output speci- fications ^{*3}	NPN open collector 30 VDC, 50 mA max., residual voltage: 2.0 V max.	PNP open collector 30 VDC, 50 mA max., residual voltage: 2.0 V max.

*3: Do not allow the load current to exceed 50 mA. The output circuit may be damaged if the load current exceeds 50 mA.

FQ2-S10010F/-S10050F

FQ2-S15010F/-S15050F

FQ2-S40010F/-S40010F-M/-S40050F/-S40050F-M

FQ2-S45010F/-S45010F-M/-S45050F/-S45010F-M

FQ2-CH10010F-M/-CH10050F-M

FQ2-CH15010F-M/-CH15050F-M

FQ2-S30010F-08/-S35010F-08/-S30010F-08M/-S35010F-08M

FQ2-S30050F-08/-S35050F-08/-S30050F-08M/-S35050F-08M

FQ2-S40010F-08/-S45010F-08/-S40010F-08M/-S45010F-08M

FQ2-S40050F-08/-S45050F-08/-S40050F-08M/-S45050F-08M



FQ2-S20010F/-S20050F

FQ2-S25010F/-S25050F

FQ2-S/CH User's Manual

(Unit: mm)

FQ2-S10100F/-S10100N/-S20100N FQ2-S15100F/-S15100N/-S25100N FQ2-S40100F/-S40100N/-S40100N FQ2-S45100F/-S45100N/-S45100N FQ2-CH10100F-M/-CH10100N-M FQ2-CH15100F-M/-CH15100N-M FQ2-S20100F FQ2-S25100F FQ2-S40100F FQ2-S45100F

FQ2-S30100F-08/-S35100F-08/-S30100F-08M/-S35100F-08M FQ2-S30100N-08/-S35100N-08/-S30100N-08M/-S35100N-08M FQ2-S40100F-08/-S45100F-08/-S40100F-08M/-S45100F-08M FQ2-S40100N-08/-S45100N-08/-S40100N-08M/-S45100N-08M



See the diagram below when mounting bracket FQ-XL2 is attached.

(Unit: mm)



FQ2-S30-13/-S35-13/-S30-13M/-S35-13M FQ2-S40-13/-S45-13/-S40-13M/-S45-13M

(Unit: mm)



Mounting Base (FQ2-S - only)



(Unit: mm)



Mounting screw recommended tightening torque: 0.54 $\ensuremath{N}\xspace$ m

Touch Finder

Specifications

Item			Model with DC power supply	Model with AC/DC/battery power supply	
			FQ2-D30	FQ2-D31	
Number	of connectable Se	ensors	Number of sensors that can be recognized (switched): 32, number or sensor that can displayed on monitor: 8		
Main	Types of measu	rement displays	Last result display, last NG display, trend monitor, histograms		
tions	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, or Japanese		
Indica-	LCD	Display device	3.5-inch TFT color LCD		
tions		Pixels	320 × 240		
		Display colors	16,777,216		
	Backlight	Life expec- tancy ^{*1}	50,000 hours at 25°C		
		Brightness adjustment	Provided		
	Screen saver		Provided (The time setting can be changed.)		
	Indicators		Power indicator (color: green): POWER Error indicator (color: red): ERROR SD card access indicator (color: yellow): SD ACCESS	Power indicator (color: green): POWER Error indicator (color: red): ERROR SD card access indicator (color: yellow): SD ACCESS Charge indicator (color: orange): CHARGE	
Opera-	Touch screen	Method	Resistance film		
tion interface		Life expec- tancy ^{*3}	1,000,000 operations		
Exter-	Ethernet		100BASE-TX/10BASE-T		
nal inter- face	SD card		SDHC-compliant, Class 4 or higher recomr	nended, FAT/FAT32 formatted.	
Battery	Charging function	on	No	Yes*2	
Ratings	Power supply vo	bltage	DC power connection: 21.6 to 26.4 VDC (including ripple)	DC power connection: 21.6 to 26.4 VDC (including ripple) AC adapter (manufactured by Sino-Ameri- can Japan Co., Ltd) connection: 100 to 240 VAC, 50/60 Hz Battery connection: FQ-BAT1 Battery (1 cell, 3.7 V)	
	Continuous ope tery ^{*4}	ration on Bat-		1.5 h	
	Current consum	ption	DC power connection: 0.2 A max.	DC power connection: 0.2 A max., Charging battery: 0.4 A max.	
	Insulation resistance		Between all lead wires and case: 0.5 MΩ (at 250 V)		

Item		Model with DC power supply Model with AC/DC/battery power		
		FQ2-D30	FQ2-D31	
Environ- mental immu- nity	Ambient temperature range	Operating: 0 to 50°C Operating: 0 to 50°C when mou Storage: -25 to 65°C Track or panel (with no icing or condensation) 0 to 40°C when operated on a B Storage: -25 to 65°C Storage: -25 to 65°C (with no icing or condensation) 0 to 40°C when operated on a B		
	Ambient humidity range	Operating and storage: 35% to 85% (with no	o condensation)	
	Ambient atmosphere			
	Vibration resistance (destruction)	10 to 150 Hz, single amplitude: 0.35 mm, X/ 8 min each, 10 times	Y/Z directions	
	Shock resistance (destruction)	150 m/s ² 3 times each in 6 direction (up, down, right, left, forward, and backward)		
	Degree of protection	IEC 60529 IP20		
Weight		Approx. 270 g (without Battery and hand strap)		
Dimensions		95 × 85 × 32.5 mm		
Materials		Case: ABS		
Accessories		Touch Pen (FQ-XT), Instruction Manual		

This is a guideline for the time required for the brightness to diminish to half the initial brightness at room temperature and humidity. No guarantee is implied. The life of the backlight is greatly affected by the ambient temperature and humidity. It will be shorter at lower or *1 higher temperatures. The battery can only be charged when the Touch Finder power is switched OFF. This value is only a guideline. No guarantee is implied. The value will be affected by operating conditions. This value is only a guideline. No guarantee is implied. The value will be affected by the operating environment and operating conditions.

*2 *3 *4

· Battery Specifications

Item	FQ-BAT1
Battery type	Secondary lithium ion battery
Nominal capacity	1,800 mAh
Rated voltage	3.7 V
Dimensions	35.3 × 53.1 × 11.4 mm
Ambient temperature range	Operating: 0 to 40°C Storage: –25 to 65°C (with no icing or condensation)
Ambient humidity range	Operating and storage: 35% to 85% (with no condensation)
Charging method	Charged in Touch Finder (FQ2-D31).
Charging time ^{*1}	2 h
Usage time ^{*1}	1.5 h
Battery backup life ^{*2}	300 charging cycles
Weight	50 g max.

*1 *2

This value is only a guideline. No guarantee is implied. The value will be affected by operating conditions 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.

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Dimensions

FQ2-D30/-D31

(Unit: mm)





*1: Provided on the FQ2-D31 only.



Panel cutout dimensions



Sensor Data Units

Specifications

Item			Sensor Data Units	
			FQ-SDU1	
I/O Parallel I/ SDU1		SDU1□	11 inputs (TRIG, RESET, IN0 to IN7, and DSA) 24 outputs (GATE, D0 to D15, ACK, RUN, BUSY, OR, ERROR, STGOUT, and SHTOUT)	
outions		SDU2□	8 inputs (IN0 to IN5, TRIG, and RESET) 7 outputs (ACK, RUN, BUSY, OR, ERROR, STGOUT, SHTOUT)	
	RS-232C		1 channel, 115,200 bps max. *FQ-SDU2□ only.	
	Sensor inte	rface	FQ2-S3, FQ2-S4, FQ2-CH connected with FQ-WU□□□): OMRON interface *Number of connected Sensors: 1	
	Input specif	ications	Refer to Table 2.	
	Output spec	cifications		
Rat-	Power supp	oly voltage	21.6 to 26.4 VDC (including ripple)	
ings	Insulation resistance		Between all DC external terminals and case: 0.5 $M\Omega$ min. (at 250 VDC)	
	Current consumption		2.5 A max. (FQ2-CH, FQ2-S□□□□□□ + FQ-SDU□□) 0.4 A max. (FQ2-S3□-□□ + FQ-SDU□□, FQ2-S4□-□□ + FQ-SDU□□) 0.1 A max. (for FQ-SDU□□)	
Envi- ron- Ambient temperature		nperature	Operating: 0 to 50°C, Storage: –20 to 65°C (with no icing or condensation)	
immu- nity	Ambient humidity range		Operating and storage: 35% to 85% (with no condensation)	
	Ambient atmosphere		No corrosive gas	
	Vibration resistance (destruction)		10 to 150 Hz, single amplitude: 0.35 mm, X/Y/Z directions, 8 min each, 10 times	
	Shock resistance (destruction)		150 m/s ² 3 times each in 6 directions (up, down, right, left, forward, and backward)	
	Degree of p	protection	IEC 60529 IP20	
Material	s		Case: PC + ABS, PC	
Size			$62 \times 90 \times 65$ (W×H×D) (Excluding connectors, DIN Track, and protrusions.)	
Weight			Approx. 150 g	
Accessories			Instruction Manual	

Table 1

Item	NPN	PNP
Input specifi- cations	ON: Shorted to 0 V, or 1.5 V max. OFF: Open (leakage current: 0.1 mA max.)	ON: Shorted to power supply voltage, or power supply volt- age -1.5 V max. OFF: Open (leakage current: 0.1 mA max.)
Output speci- fications ^{*1}	NPN open collector 30 VDC, 50 mA max., residual voltage: 1.2 V max.	PNP open collector 30 VDC, 50 mA max., residual voltage: 1.2 V max.

*1: Do not allow the load current to exceed 50 mA. The output circuit may be damaged if the load current exceeds 50 mA.

FQ-SDU10/-SDU15

(Unit: mm)







31.4













System Requirements for PC Tool for FQ

The system requirements for the PC Tool are given in the following table.

Item	Requirement
OS	 Microsoft Windows 7 Home Premium or higher (32-bit edition or 64-bit edition) Microsoft Windows 8.1 Pro Edition or higher (32-bit edition or 64-bit edition) Microsoft Windows 10 Home Editionor higher (32-bit edition or 64-bit edition)
Hardware	 CPU: Core 2 Duo 1.06 GHz or the equivalent or higher RAM: 1 GB min. HDD: 500 MB min. available space^{*1} Monitor: 1,024 x 768 dots min.

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

Options

Specifications

• I/O Cables

Item	Model	FQ-WD002	FQ-WD005	FQ-WD010	FQ-WD020	
Cable length		2 m	5 m	10 m	20 m	
Cable type		Robot cable				
Wire gauge	Power line	AWG24		AWG24 to AWG20		
	Other lines	AWG28				
Cable diameter		6.4		6.4 to 6.7		
Minimum bending radius 41.4 mm						
Weight		100 g	250g	500 g	1500 g	

• FQ Ethernet Cable

Item Model	FQ-WN002	FQ-WD005	FQ-WN010	FQ-WN020	
Cable length	2 m	5 m	10 m	20 m	
Cable type	Robot cable				
Minimum bending radius	40 mm				
Weight	125 g	310 g	620 g	1780 g	

• Parallel Cable for FQ-SDU1

Item Model	FQ-VP1002	FQ-VP1005	FQ-VP1010	
Applicable Units	FQ-SDU1			
Cable length	2 m 5 m 10 m		10 m	
Cable type Flat cable				
Minimum bending radius	5.5 mm			
Weight	150 g	380 g	750 g	

Important

Do not bend any Cable beyond the specified minimum bending radius. Doing so may damage the Cable.

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• Parallel Cable for FQ-SDU2

Item	Model	FQ-VP2002	FQ-VP2005	FQ-VP2010	
Applicable Units		FQ-SDU2			
Cable length		2 m	5 m	10 m	
Cable type Flat cable		lat cable			
Minimum bending radius		5.5 mm			
Weight		80 g	200 g	400 g	

• Sensor Data Unit Cable

Item Model	FQ-WU002	FQ-WU005	FQ-WU010	FQ-WU020	
Cable length	2 m	5 m	10 m	20 m	
Cable type	Robot cable				
Cable diameter	7				
Minimum bending radius	35 mm				
Weight	200 g	400 g	800 g	1500 g	

Important

Do not bend any Cable beyond the specified minimum bending radius. Doing so may damage the Cable.

• AC Adapter

Item	Model	FQ-AC1	FQ-AC2	FQ-AC3	FQ-AC4	FQ-AC5	FQ-AC6
Plug type		A	A	A	С	BF	0
Certified standard	s	PSE	UL/CSA	CCC mark			
Input voltage		100 to 240 VAC (90 to 264 VAC)					
Input current		0.4 A max., 100 VAC, 50 Hz when connected to maximum load					
Input frequency		47 to 63 Hz					
Output voltage		15 VDC±5%					
Output current		1 A max.					
Ambient temperat range	ure	Operating: 0 to 40°C Storage: –20 to 65°C (with no icing or condensation)					
Ambient humidity	range	Operating and storage: 35% to 80% (with no condensation)					
Material		Case: PPE					
Cable length		1.5 m					
Dimensions		$78 \times 50 \times 30$ mm (without power cable)					
Weight		Approx. 270 g					
Contents of label of Adapter	on AC						

• I/O Cables

FQ-WD002/WD005



FQ-WD010/WD020



*2: The relay connector does not have water-proofing.

• FQ Ethernet Cable

FQ-WN002/WN005/WN010/WN020



Ethernet CableSensor Data Unit Cable

FQ-WU002/WU005/WU010/WU020



• Parallel Cable for FQ-SDU1

FQ-VP1002/VP1005/VP1010





*1: The cable lengths are given in the following table.

Model	Cable length
FQ-VP1002	2 m
FQ-VP1005	5 m
FQ-VP1010	10 m

• Parallel Cable for FQ-SDU2

FQ-VP2002/VP2005/VP2010





6.1

*1: The cable lengths are given in the following table.

Model	Cable length
FQ-VP2002	2 m
FQ-VP2005	5 m
FQ-VP2010	10 m

AC Adapter

FQ-AC1


Updating the Software

FQ2-S1 FQ2-S2 FQ2-S3 FQ2-S4 FQ2-CH

The most recent version of the software and PC Tool can be downloaded from the following website for OMRON members. Refer to the *Member Registration Sheet* that is enclosed with the Sensor.

After you download the software, use the following procedure to update.

When you update the software, always update the software for the Touch Finder or PC Tool first, and then update the software for the Sensor.

Step 1 Update the software for the PC Tool or Touch Finder.

• Update the PC Tool

Install the PC Tool that was downloaded.

- Update the software for the Touch Finder
 - **1** Place the update file that you obtained directly in the root folder of an SD card.
 - 2 Insert the SD card into the Touch Finder.
 - 3 Press 📥 (Setup Mode or Run Mode) [TF settings] [Update].

Step 2 Update the software for the Sensor.

- Updating from the PC Tool
 - 1 Store the update file you obtained in the following directory. \\....\My Documents\OMRON FQ\SDCard\UPDATE\SENSOR
 - 2 To update the software in the Sensor, press 📥 (Setup Mode) [Sensor settings] [Update].

· Updating from the Touch Finder

- **1** Place the update file that you obtained directly in the root folder of the SD card.
- **2** Insert an SD card into the Touch Finder.
- 3 To update the software in the Sensor, press 📥 (Setup Mode) [Sensor settings] [Update].

The software will be updated automatically.

Important

Do not turn OFF the power supply until updating the software has been completed.

The Sensor or Touch Finder may not start normally if power is turned OFF during the update.

9-5 Connecting a Previous Touch Finder (FQ-D30/D31) to the FQ2-S Sensor

FQ2-S1 FQ2-S2 FQ2-S3 FQ2-S4

If you update the previous FQ-D30/D31 Touch Finder to version 1.6 or higher, you can connect it to an FQ2-S Sensor. However, the memory size that is required to use all of the filter items, position compensation items, and inspection items exceeds the memory capacity of the previous FQ-D30/D31 Touch Finder, so you will not be able to use all of the filter items, position compensation items, and inspection items that are provided in the FQ2-S Sensor.

Therefore, it is necessary to select only the filter items, position compensation items, and inspection items that you need to use and register them in the Sensor.

If you connect the Touch Finder without doing this, the Touch Finder may freeze as soon as it is connected or during operation.

Apart from the filter items, position compensation items, and inspection items, you can use all of the functions of the Sensor.

Download the update file for the Touch Finder (version 1.6 or higher) and the FQ Item Selector from the member website, and then use the following procedures to update the Touch Finder and register the filter items, position compensation items, and inspection items in the Sensor.

• Updating the Touch Finder

- **1** Place the update file directly in the root folder of an SD card.
- **2** Insert the SD card into the Touch Finder.
- **3** Press **:** (Setup Mode or Run Mode) [TF settings] [Update]. The Touch Finder will be updated automatically.

Important

Do not turn OFF the power supply until updating the Touch Finder has been completed.

The Touch Finder may not start normally if power is turned OFF during the update.

Re-registering Inspection Items, Filter Items, and Position Compensation Items in the Sensor

Re-register the inspection items, filter items, and position compensation items in the Sensor using the FQ Item Selector. Unpack the FQ Item Selector file that you downloaded, execute the setup.exe file, and install the FQ Item Selector.

Important

Perform the following procedure without starting the PC Tool for FQ. If you start the PC Tool, Sensor detection and overwriting the file will not be performed normally.

- **1** Connect the Sensor to the PC.
- 2 Select [All Programs] [OMRON] [FQ] [Tool] [FQ Item Selector] from the Windows Start Menu to start the FQ Item Selector.
- **3** Select the language to display.
- **4** Select the models and versions of the Sensor and Touch Finder to be used.

FQ Item Selector						_ 🗆 🗙
File(F) View(V) Help(H)						
Create Install Data	Sensor Model: FQ2-S1 Sensor VersionF 1.62	•	Touch Finder Model: FQ-D3X Touch Finder VersionF 1.62	•		
	Item List:	Color Gray Filte	er	^	Create	
		Weak Smooth Strong Smooth	ing ning		Memory Infomation	Unit:Byte
		Erosion			Total Memory Size Use Memory Size	4928112 0
		Extract Edges	5			
		Extr. ver. edge				

5 Select the inspection items to use.

The memory size that is required to use the selected inspection items will be displayed. You must select inspection items so that the total memory size of the Touch Finder is not exceeded.

FQ Item Selector			
File(F) View(V) Help(H)			
Create Instal Data	Sensor Model: Tou FQ2-S1 V FQ Sensor VersionF Tou 1.62 V 1.6	uch Finder Model: 2-D3X v uch Finder VersionF 62 v	
	tem List:		
	Color Gray Filter	<u>^</u>	Create
	Strong Smoothing		Memory Infomation Unit:Byte
	Erosion		Total Memory Size 4928112
	Median		Use Memory Size 0
	Extract Edges		
	Extr. ver. edges		
	Enhance edges		
	Shape pos. comp.		
	Search p. comp.		
	Edge pos. comp.		
	2ed. midp. comp.		
	Ed. r. p. comp.		
	Search II		
	Constitute Correst	Ŧ	

Note

Grayed-out Inspection Items

If selecting an inspection item would cause the total memory size to be exceeded, that inspection item will be grayed-out on the display. Select the inspection items with the highest priority first.

File(F) View(V) Help(H)						
Create Install Data	Sensor Model: FQ2-S1	•	Touch Finder Model: FQ-D3X	•		
	Sensor VersionF 1.62	•	Touch Finder VersionF 1.62	•		
	Item List:					
		Extr. hor. edg	*	^	Create	
		Extr. ver. edg	**	- 1	Memory Infomation	
		Backgr, Supp	es r.	- 1		Unit:Byte
	V	Shape pos. c	omp.		Total Memory Size	4928112
		Search p. cor	ıp.		Use Memory Size	4483160
		Edge pos. co	np.	- 11		
		2Edge pos. c	omp.	-11		
		Zed. midp. co	mp.	-11		
		Search		- 11		
		Shape Search	1II			
	V	Sensitive Sea	rch	=		
		Edge Position				
		Edge Width		- 11		
		Edge Pitch		-11		
		Area		- 11		
		Labeling				

6 Click the [Create] Button to save the installation data.

属 FQ Item Selector					
File(F) View(V) Help(H)					
- Create Install Data - Install Exe	Sensor Model: FQ2-S1 Sensor VersionF 1.62	•	Touch Finder Model: FQ-D3X Touch Finder VersionF 1.62	•	
	Item List:	Extr. hor. edg	es	-	Create
		Extr. ver. edg Enhance edg	es		Memory Infomation
	V V	Backgr. Supp Shape pos. c	r. omp.		Unit:Byte Total Memory Size 4928112
		Search p. con	np.		Use Memory Size 4483160
		2Edge pos. ci 2ed midp. co	omp.		
		Ed. r. p. comp			
		Shape Search Sensitive Sea	ı II	Е	
		Edge Position			
		Edge Pitch			
		Area		1	
		Labeling		-	

7 Click [Install Exe].

FQ Item Selector		
File(F) View(V) Help(H)		
Create Initial Data	Select File Sensor Find Method Sensor Find Method File Lut File Lut	
	Select Network Card	

8 Select the Browse Button (...) and select the file that was saved in step 6, above.

Create Install Data Install Exe	Select File		
	Sensor Find Method		
Select the installation data	*		— ×
OO - 📕 « OMRON F	FQ → FQ Item Selector → SensorData	✓ Search SensorD	ata 🔎
Organize 🔻 New folde	r	8	•
👉 Eavorites	Name	Date modified	Туре
Desktop	New Install File.bin	11/22/2013 12:14	BIN File
Downloads			
Recent Places			
🔚 Libraries 🗉			
Documents			
J Music			
Pictures			
Videos			
: Computer			
A Local Disk (C:)			
Local Disk (E:)	•	III	
File na	ime:	 Bin File(^.bin) 	
		Onen -	Cancel

9 Set the Sensor Find Method parameter to [Local Auto].

rile(r) viev	(V) Help(H)			
Create Ins	all Data		Select File	
		٢	Sensor Find Method © Local Auto	

When a sensor cannot be detected automatically, or when connecting across routers, use the [File List] function. Sensors, whose IP addresses are listed in the file, can be detected with this function.

10 If there is more than one network card (NIC) installed in the PC, select the NIC that is connected to the Sensor.

More than one NIC will be displayed for a PC with a wireless LAN.

🔽 FQ Item Selector		
File(F) View(V) Help(H)		
Create Install Data Install Exe	Select File Jinerta'OMRON FQ/FQ item Selector/SensorData/Wew Install File bin Sensor Find Method © Local Akto © File List Select Network Card 10.5.5.111 10.5.5.80 10.0.5.111 10.5.5.80 10.0.5.111 10.5.5.80 10.0.5.111 10.5.5.80 10.0.5.111 10.5.5.80 10.0.5.111 10.5.5.80 10.0.5.111 10.5.5.80 10.0.5.80 10.0.5.80 10.0.5.80 1	Name Progress

11 Click the [Update Sensor List] Button.

V FQ Item Selector			
File(F) View(V) Help(H)			
Create Install Data	Select Fie Imenta'sOMRON FQ\FQ kem Selecton' Sensor Find Method © Local Akto © Fie Lot Select Network Card 10.5.5.111	SensorData Wew Install File bin	
	Select IP Ad	ldress Sensor Name	Progress
	10.5.5.20	FQ.	
	Intel	Update Sensor List	
	<u></u>		

12 Select the Sensor from the list and click the [Install] Button.

File(F) View(V) Help(H)	Select File ments/OMRON FOLVE0 I Sensor Find Method © File List Select Network Card 10.5.5.111	am Selector\SensorData\\	iew Install File bin	
		JP Address 5.20	Sensor Name	Progress Stand by

If Installation completed normally is displayed in the dialog box, the data has been overwritten normally.

13 Reset the Sensor.

• Restoring Inspection Items to the Sensor

It is not necessary to delete any inspection items to connect the FQ2-D30/D31 Touch Finder. To connect the FQ2-D30/D31 Touch Finder after performing the above operation, repeat the above operation, but select all of the inspection items in step 5 to re-register all of the inspection items in the original state.

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Revision History

A manual revision code appears as a suffix to the catalog number at the bottom of the front and back covers of this manual.



Revision code	Date	Revised contents
01	December 2013	Original production
02	July 2014	Corrected minor mistakes and added information on the numerical position compensation item.
03	April 2015	Corrected minor mistakes and added linear correction items, etc. (Supports sensor version 2.0)
04	August 2015	Additions corresponding to change of EN standard.
05	January 2016	Corrected minor mistakes and added information on the shape search III inspection item.(Supports sensor version 2.1)
06	November 2016	Corrected minor mistakes 2D-code inspection item specification change (sensor version 2.20) 2D-code (DPM) inspection item specification change (sensor version 2.20)
07	August 2017	Corrected minor mistakes
08	October 2021	Corrected minor mistakes
09	May 2022	Corrected minor mistakes
10	September 2022	Added information about Security Measures to Safety Precautions