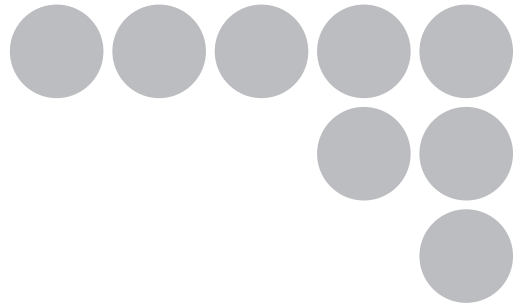


Fixed Mount 2D Code Reader FQ-CR2



User's Manual



Introduction

Thank you for purchasing the FQ-CR2.

This manual provides information regarding functions, performance and operating methods that are required for using the FQ-CR2.

When using the FQ-CR2, be sure to observe the following:

- The FQ-CR2 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.

User's Manual

APPLICATION CONSIDERATIONS
(Please Read)

Introduction

1

Installation and Connections

2

Taking Images

3

Setting Up Inspections

4

Testing and Saving Settings

5

Operation

6

Convenient Functions

7

Communications with External Devices

8

Troubleshooting

9

Appendices

10

READ AND UNDERSTAND THIS DOCUMENT

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

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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

| | |
|--|--|
| | Indicates general prohibitions for which there is no specific symbol. |
| | Indicates the possibility of laser radiation. |
| | Indicates the possibility of explosion under specific conditions. |
| | Indicates prohibition when there is a risk of minor injury from electrical shock or other source if the product is disassembled. |

WARNING

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.



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 \pm 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 (FQ-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.

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. 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.
- Connect the special products (Sensor, Touch Finder, Cables). The product might break down or malfunction if you use a part not included in the special products.
- 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 (FQ-CR2), Touch Finder (FQ-D), Cables (FQ-WN and FQ-WD), 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.

6. Laws and Regulations, Standards

- This product complies with the following EC Directives and EN Standards:
EC Directive No.2004/104/EC
EN Standards EN61326

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

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.

 p.178, p.179

- 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.
- Connector cover
Always attach the covers of I/O cable connector and Ethernet cable connector. This prevents extraneous material from making malfunction of 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, 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) moistened with a small amount of alcohol. Do not use excessive force to wipe off dust particles. Scratches to the Camera might cause error.

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

Important

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

Note

Indicates application procedures.



Indicates pages where related information can be found.

Table of Contents

1. Introduction

| | |
|--|----|
| 1-1 Fixed Mount 2D Code Reader FQ-CR2 | 12 |
| 1-2 Measurement Process | 13 |
| 1-3 Startup Display and Display Elements | 14 |
| 1-4 Basic Operational Flow..... | 16 |

2. Installation and Connections

| | |
|-----------------------------------|----|
| 2-1 System Configuration | 18 |
| 2-2 Part Names and Functions..... | 19 |
| 2-3 Installation | 21 |
| 2-4 Wiring | 26 |
| 2-5 Setting Up Ethernet..... | 31 |

3. Taking Images

| | |
|--|----|
| 3-1 Selecting a Sensor for Configuration | 34 |
| 3-2 Adjusting Image Quality | 35 |
| 3-3 Adjusting the Object Position | 41 |
| 3-4 Preventing Mutual Interference of Multiple Sensors | 43 |
| 3-5 Setting How the Image is Processed After Scanning | 44 |

4. Setting Up Inspections

| | |
|---|----|
| 4-1 Setup Procedure for Inspection Items | 46 |
| 4-2 Configuring Inspection Items..... | 47 |
| 4-3 Setting 2D Code Inspection Conditions | 49 |

5. Testing and Saving Settings

| | |
|--|----|
| 5-1 Performing Test Measurements..... | 54 |
| 5-2 Shortening the Measurement Takt Time..... | 56 |
| 5-3 Checking a List of All Inspection Item Results | 57 |
| 5-4 Saving Data to the Sensor | 58 |

6. Operation

| | |
|---|----|
| 6-1 Starting Operation..... | 60 |
| 6-2 Configuring the Run Mode Display | 62 |
| 6-3 Checking the Trend of Measurement Results with Graphs | 64 |
| 6-4 If Scanning Fails | 67 |

7. Convenient Functions

| | |
|---|----|
| 7-1 Changing the Scene to Change the Line Process | 70 |
| 7-2 Display Functions | 72 |
| 7-3 Monitoring the Signal I/O Status | 75 |
| 7-4 Logging Measurement Data and Image Data | 76 |
| 7-5 Saving Sensor Settings | 83 |
| 7-6 SD Card Operations | 84 |
| 7-7 Convenient Functions for Operation..... | 86 |
| 7-8 Convenient Functions for Setup | 88 |
| 7-9 Functions Related to the System..... | 89 |
| 7-10 Setting the Retry Function | 91 |

8. Communications with External Devices

| | |
|--|-----|
| 8-1 Controlling/Outputting in Parallel | 96 |
| 8-2 Outputting/Controlling with Ethernet | 118 |

9. Troubleshooting

| | |
|---------------------------------|-----|
| 9-1 Error Table..... | 154 |
| 9-2 Basic Troubleshooting | 156 |

10. Appendices

| | |
|--|-----|
| 10-1 Menu Tables..... | 158 |
| 10-2 External Reference Parameters | 168 |
| 10-3 Specifications and Dimensions | 170 |
| 10-4 Updating the Software | 180 |
| 10-5 LED Safety | 181 |
| 10-6 Requirements from Regulations and Standards | 182 |
| Index..... | 186 |
| Revision History | 190 |

Introduction

| | |
|---|-----------|
| 1-1 Fixed Mount 2D Code Reader FQ-CR2 | 12 |
| 1-2 Measurement Process | 13 |
| 1-3 Startup Display and Display Elements | 14 |
| 1-4 Basic Operational Flow | 16 |

1-1 Fixed Mount 2D Code Reader FQ-CR2

The FQ-CR2 is a fixed mount 2D code reader that is easy to use and has advanced scanning features. Once configured, they are used stand-alone for quality inspection of presence, position, and other product characteristics. To set up or monitor the sensors, either the touch screen based console 'Touch Finder' or a 'PC Tool' can be used.

Fixed Mount 2D Code Reader
FQ-CR2



Includes the camera, lighting, measurement processor, and I/O functions. After the Sensor has been set up, it can be operated alone to perform measurements without the Touch Finder or PC Tool.

Setup, Image Confirmation, and Logging Tools

Touch Finder



Used to check images and set the judgement parameters. It can also be used to save measurement results and check status during operation.

PC Tool



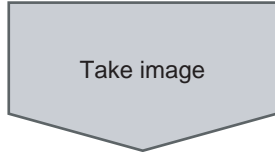
The same functions as those that are provided by the Touch Finder can be performed from a computer. The PC Tool is available free of charge.

1-2 Measurement Process

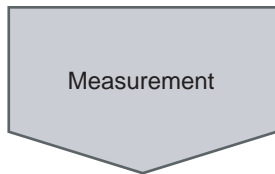
This section describes the basic flow of the measurement process.



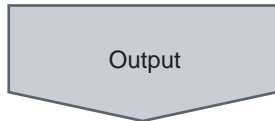
- The measurement is started by inputting a trigger signal from an external device.



- Images are taken according to the trigger.



- The image is measured to see if it matches the configured settings.



- The overall judgement of all inspection items are output using OR logic.
- You can output detailed measurement results from the inspection items. (An Ethernet connection is required.)



- Measurement data and image data can be logged in memory in the Sensor or in an SD card.

1-3 Startup Display and Display Elements

Startup Display


- 1 The Sensor is automatically detected by the Touch Finder when power supply to the Sensor and Touch Finder is turned ON.**

The Auto Connect Display will appear if the Sensor cannot be detected. Check that cables are connected correctly to the Sensor and Touch Finder, and then press [Auto connect].



Note

If the Sensor is still not detected after pressing [Auto Connect], refer to the following information.

 The Sensor cannot be detected: p. 156

- 2 When the Sensor is detected, the following display will appear.**




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.

 Setting Up Ethernet: p. 31

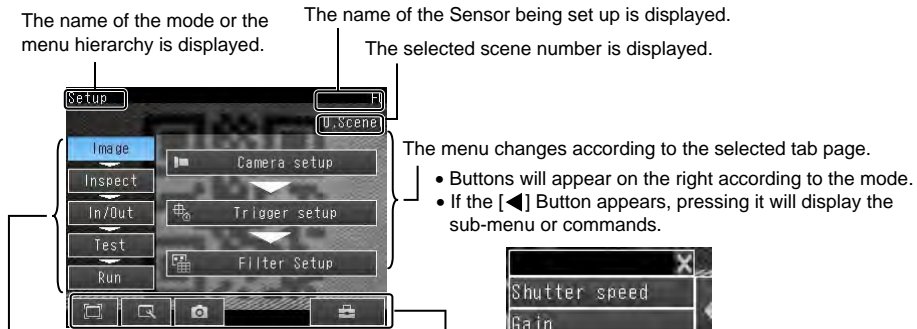
Display Elements

This Sensor has a Setup Mode and a Run Mode.
Refer to the following information for menu items.

 p. 158

Setup Mode







In Setup Mode, you can set the image conditions, judgement parameters, and I/O settings for the Sensor.



The setup flow is shown by these five tabs.

- [Image]: Used to adjust the image.
- [Inspect]: Used to set the inspection items.
- [In/Out]: Used to set the I/O.
- [Test]: Used to test and adjust the set measurements.
- [Run]: Used to switch to Run Mode.

This button menu is always displayed.

-  Only-image Button: Used to select either displaying the camera image and messages, or only the camera image.
-  Display Button: Used to select the source of the image or to zoom the image.
 Display Functions: p. 72
-  Capture Button: Used to capture the current screen to the SD card.
 p. 87
-  Tool Button: Used to call functions, such as saving data or select scenes.


Note

The Display Button can be used to switch between the following images.

- Live: The live image is displayed.
- Freeze: The image that was taken last is displayed.
- Log: An image saved in internal memory is displayed.
- File: An image saved on an SD card is displayed.

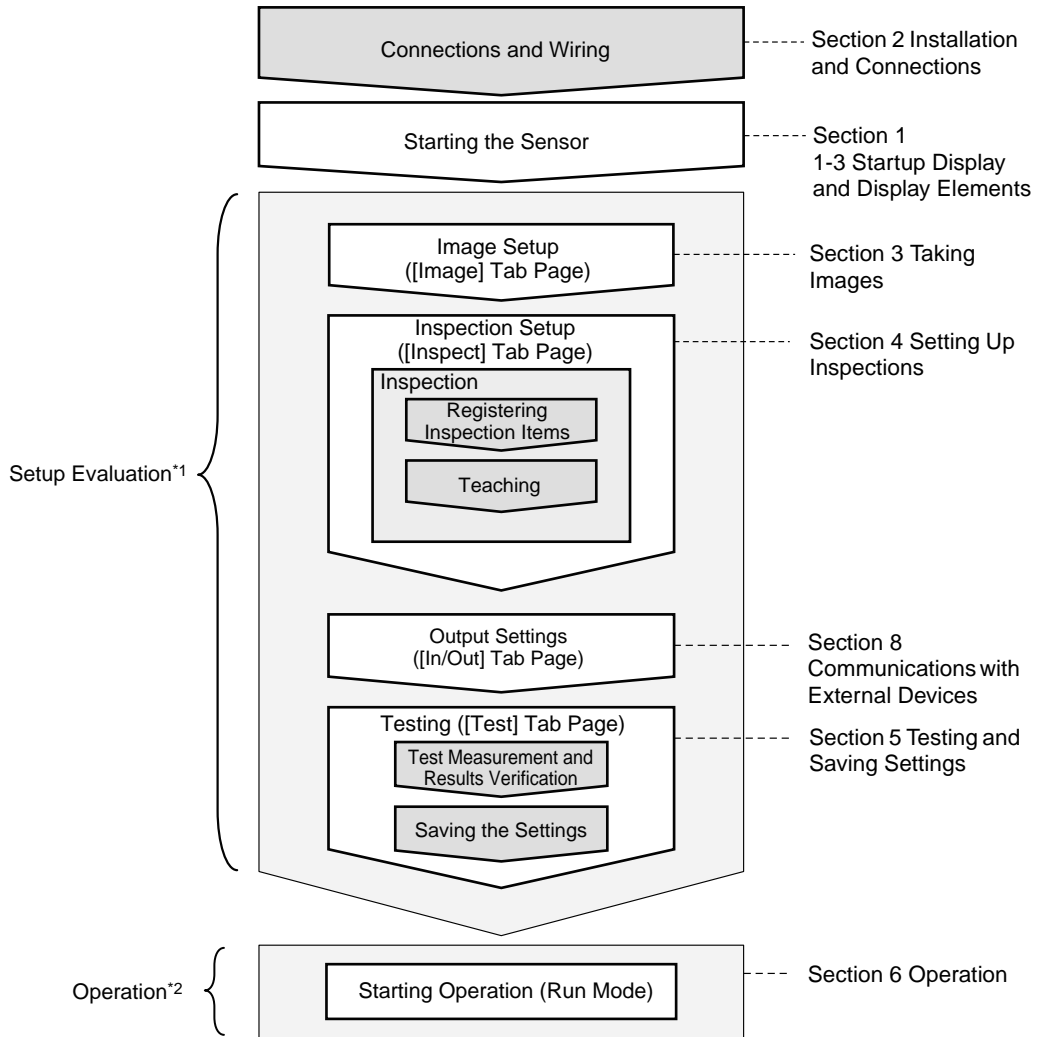
Run Mode

In Run Mode, measurements are performed, and measurement results are output.

 p. 59

1-4 Basic Operational Flow

The following flow shows the basic operation of FQ-CR2 Sensors.



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

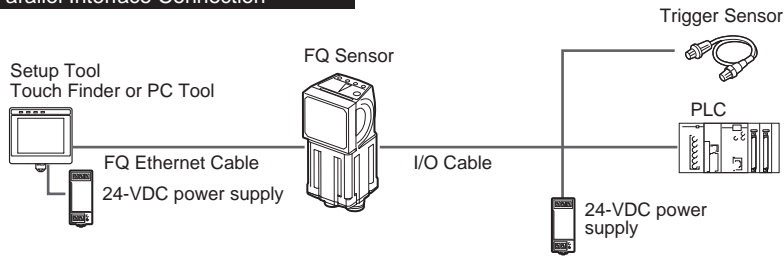
*2: In Run Mode, the Sensor performs measurements and outputs signals on the I/O lines.

Installation and Connections

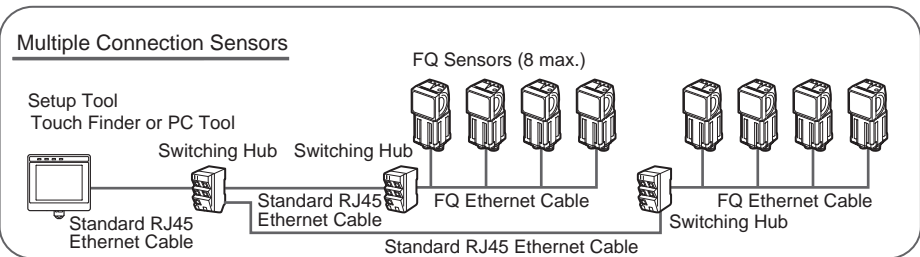
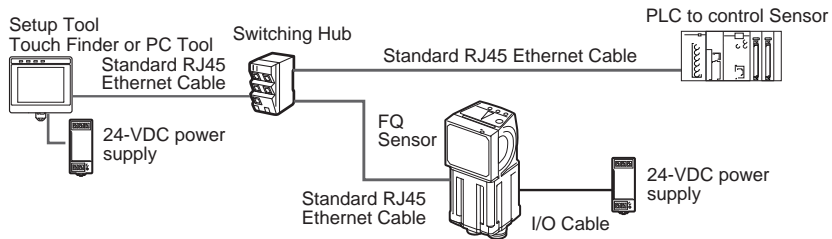
| | |
|---|-----------|
| 2-1 System Configuration | 18 |
| 2-2 Part Names and Functions | 19 |
| 2-3 Installation | 21 |
| 2-4 Wiring | 26 |
| 2-5 Setting Up Ethernet | 31 |

2-1 System Configuration

Parallel Interface Connection



Connecting to Ethernet



| Product | Model number | Remarks |
|--------------------------------|---------------|---|
| FQ Sensor | FQ-CR2□□□□□-M | This is the Sensor. |
| Touch Finder | FQ-D□□ | This is a setup console (Software Version 1.3 or higher). |
| PC Tool | --- | The PC Tool can be used instead of the Touch Finder (Software Version 1.3 or higher). 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. |
| FQ Ethernet Cable | FQ-WN0□□ | Connects the Sensors to external devices such as the Touch Finder, computers, and PLCs. |
| Standard RJ45 Ethernet Cable*1 | --- | 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-WD0□□ | 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. |

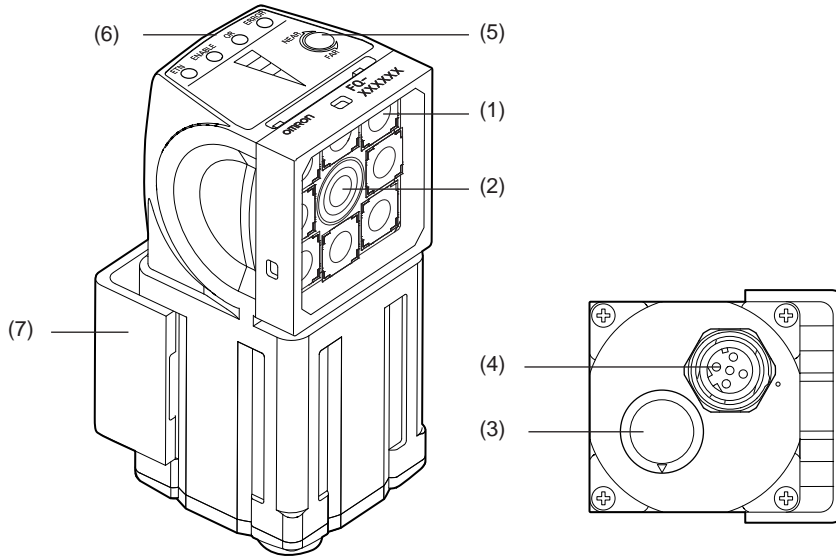
*1: The shape and dimensions of the Ethernet connector plug and jack are specified in ISO/IEC8877:1992 (JIS X 5110:1996) and RJ-45 of the FCC regulations. To prevent connector connection failures, the structure of the jack of this product does not allow insertion of plugs that do not comply with the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


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.

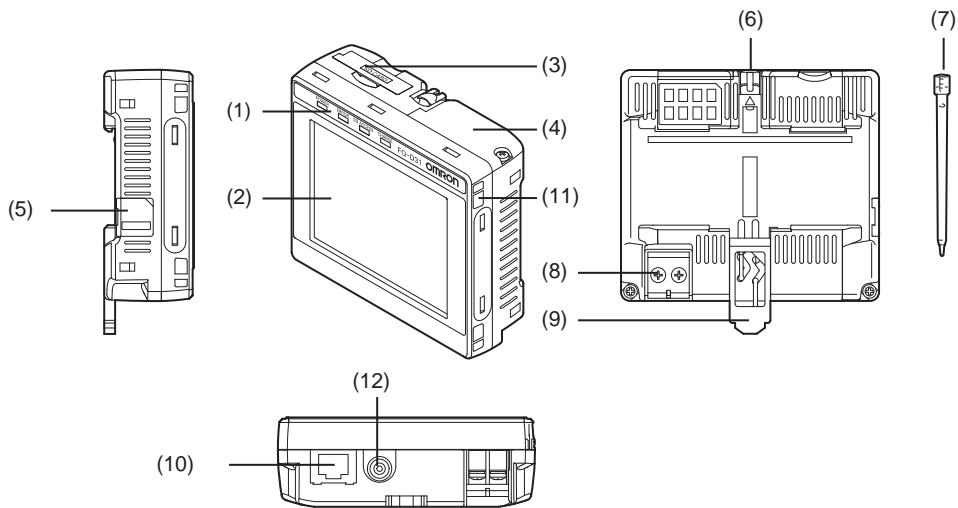
2-2 Part Names and Functions



FQ Sensor



| No. | Name | Description | |
|-----|--------------------------|---|---|
| (1) | Lighting | LEDs for illumination | |
| (2) | Camera lens | This lens can be focused. | |
| (3) | I/O Cable connector | An I/O Cable is used to connect the Sensor to the power supply and external I/O. | |
| (4) | Ethernet cable connector | An 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. | |
| (6) | Operation indicators | OR | Lights orange when the OR output signal turns ON. |
| | | ETN | Lights orange during Ethernet communications. |
| | | ERROR | Lights red when an error occurs.  9-1 Error Table p. 154. |
| | | BUSY | Lights green when the Sensor is executing a process. |
| (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. | |

Touch Finder



| No. | Name | Description |
|------|---|--|
| (1) | Operation indicators | POWER Lights green when the Touch Finder is turned ON. |
| | | ERROR Lights red when an error occurs.  9-1 Error Table p. 154. |
| | | 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 panel | 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 supply connector | Used to connect a DC power supply.  p. 28 |
| (9) | Slider | Used to mount the Touch Finder to a DIN Track. |
| (10) | 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 supply connector* ¹ | Used to connect the AC adapter. |

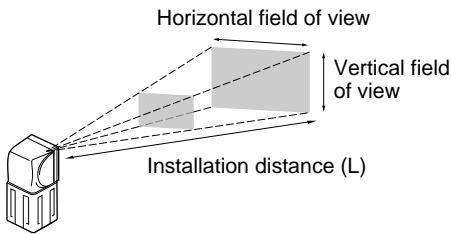
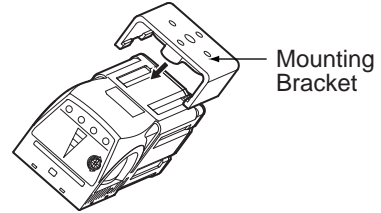
*1: Applicable to the FQ-D31 only.

2-3 Installation

Installing the Sensor

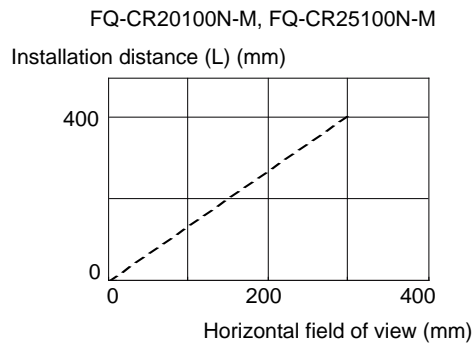
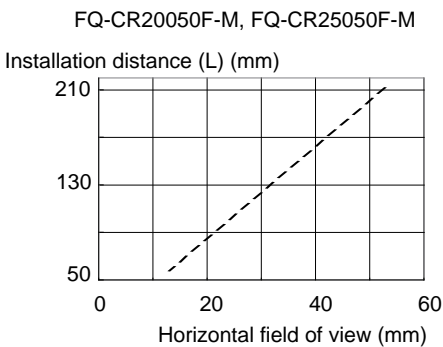
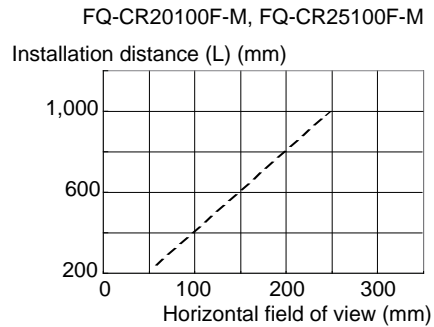
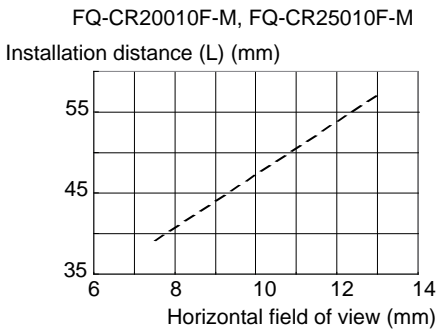
Installation Procedure

- 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



The optical chart indicates the horizontal field of view. The vertical field of view will be approximately 60% of the horizontal field of view.

Note: The tolerance is $\pm 10\%$.

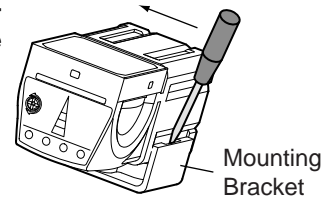


Important

- 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.



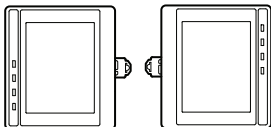
Installing the Touch Finder

Installation Precautions

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

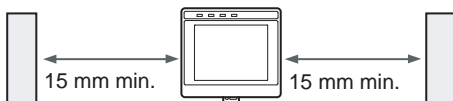


Do not mount it in the following orientations.



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.

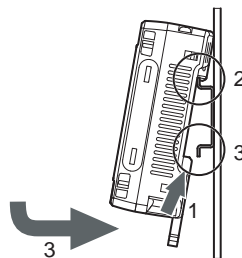


- Make sure that the ambient temperature is 50°C or lower. If it exceeds 50°C, install a cooling fan or an air conditioner and maintain the temperature at 50°C or lower.
- To prevent interference by noise, do not mount the Sensor on panels which contain high-voltage devices.
- To keep the level of noise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

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.

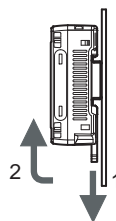


Important

- 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.



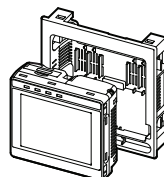
Mounting to a Control Panel

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

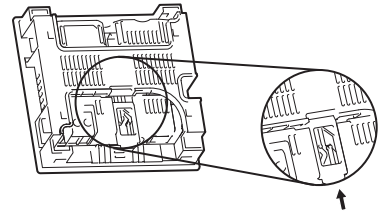
Important

- 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.


- 1** Set the Touch Finder in the Panel Mount Adapter.



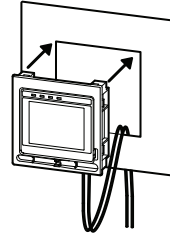
2 Press the slider up on the Touch Finder.



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

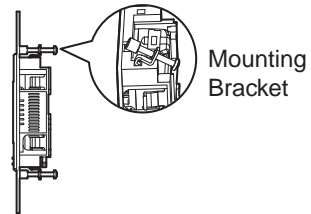
 p. 176

4 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)

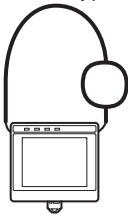


7 Check that the Touch Finder is attached properly to the Panel.

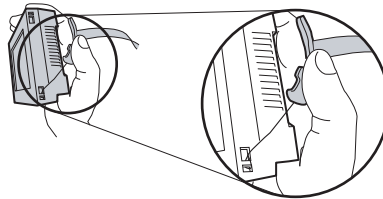
Using the Touch Finder as a Portable Device (with Battery)

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.



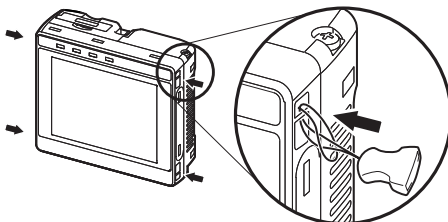
Neck Strap



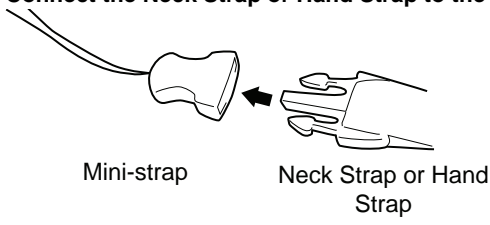
Hand Strap

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.



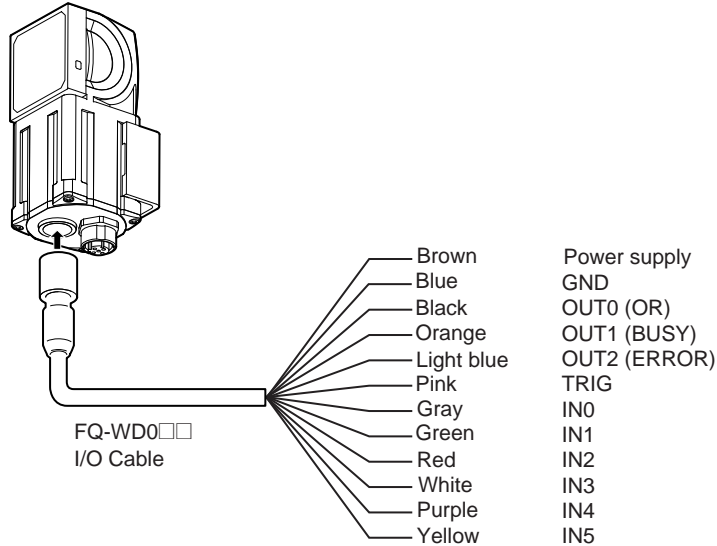
2 Connect the Neck Strap or Hand Strap to the Mini-strap.



2-4 Wiring

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.

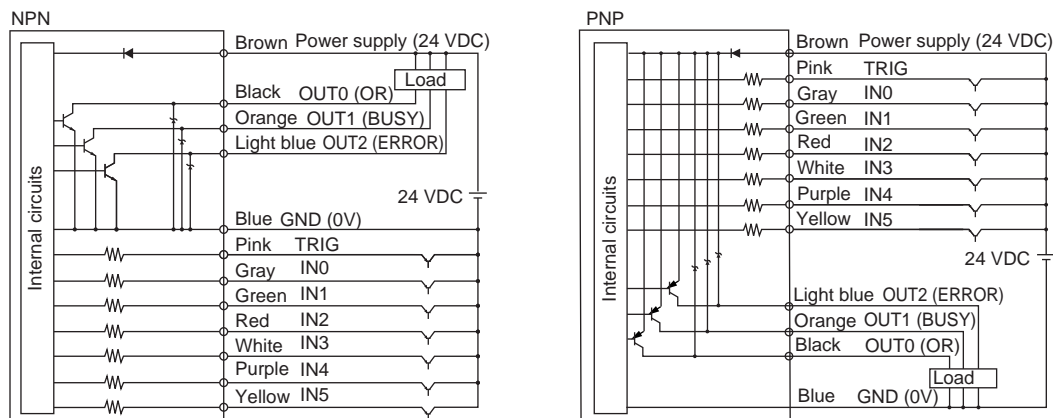
| Classification | Signal | Application |
|----------------|---------------------|--|
| Power supply | Power supply (24 V) | <p>These terminals are for the external power supply (24 V).</p> <p>Important Wire the power supply separately from other devices. If the wiring for other devices is placed together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

Note

The assignments of I/O signals can be changed.

 Section 8 Communications with External Devices: p. 95

I/O Signal Circuit Diagrams



Important

Preventing Chattering

- The Sensor is equipped with an anti-chattering function, but if the chattering is 100 μ s or longer, a faulty input may occur. (Input signals of 99 μ s or shorter are ignored. Signals of 100 μ s 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.)

| Item | Model | |
|---------------------------------------|---------------------------------|---------------------------------|
| | FQ-CR2□010F-M/ FQ-CR2□050F-M | FQ-CR2□100F-M/ FQ-CR2□100N-M |
| Power supply voltage | 24 VDC (21.6 to 26.4 V) | |
| Output current | 1.25 A max. | 2.5 A max. |
| Recommended Power Supply | S8VS-030024□ (24 VDC, 1.25 A) | S8VS-060024□ (24 VDC, 2.5 A) |
| External power supply terminal screws | M4 (Tightening torque: 1.2 N·m) | |

Important

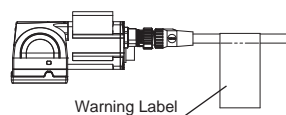
Supply power from a DC power supply for which measures have been applied to prevent high voltages (e.g., a safety extra low voltage circuit).

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

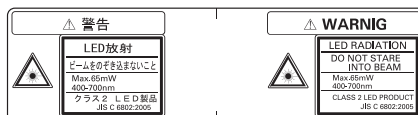
Attaching the LED Warning Label

Attach the enclosed LED warning label to the cable or other location. The LED warning label must be attached to a location that is readily visible from the Sensor.

Attachment Example



Warning Label



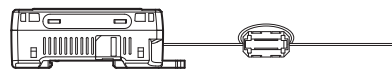
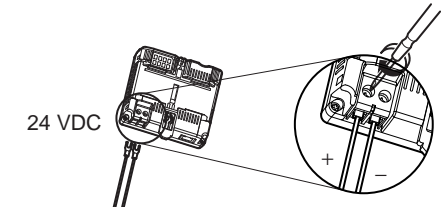
10-5 LED Safety p. 181

Wiring the Touch Finder

Power Supply Wiring

Connecting the Power Supply

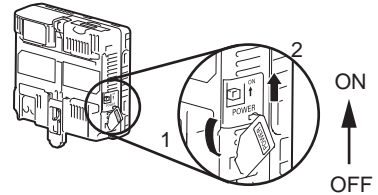
- 1** Loosen the two terminal screws using a Phillips screwdriver.
- 2** Attach crimp terminals to the power lines. Secure the positive and negative lines as indicated using M3 screws.
Power supply tightening torque: 0.54 N-m
- 3** In environments where there is excessive noise, attach a ferrite core (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.

Turning ON the Touch Finder

- 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 | M4 (tightening torque: 1.2 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 FQ-D31, do not connect a switching regulator and AC Adapter (FQ-AC□) at the same time.

Charging the Battery

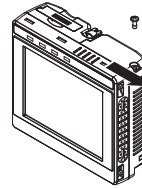
This section describes how to charge and install the FQ-D31 Battery and provides applicable precautions.

Charge the Battery while it is attached to the Touch Finder.

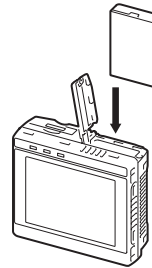
Use the AC adapter to charge the battery.

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.



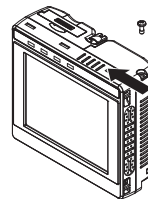
- 2 Face the rounded side of the battery toward the back of the Touch Finder and insert the battery.



Important

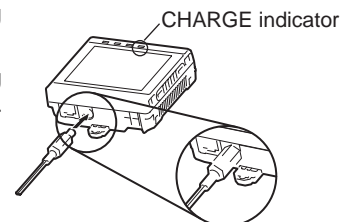
Do not insert the battery in the wrong orientation.

- 3 Close the battery cover, slide the battery cover in the direction of the arrow, and tighten the screw on the battery cover.



- 4 Attach the AC adapter to the Touch Finder to start charging the battery.

The CHARGE indicator will be lit while the battery is being charged. It will go out when charging the battery has been completed.



Note

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 (FQ-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.

Japan



Li-ion00

EU



Taiwan



- California regulations concerning perchlorate:

This product is a lithium battery that contains perchlorate, which is regulated by the State of California. Please comply with these regulations. For details see the following URL:

www.dtsc.ca.gov/hazardouswaste/perchlorate/


2-5 Setting Up Ethernet

Connecting to Sensors from the Touch Finder

When the Sensor is used with a Touch Finder, IP addresses are automatically assigned. No settings are required to use Ethernet.


However, if a Sensor or Touch Finder is connected to a network where a PLC or computer is already connected, the Ethernet must be set to be compatible with the existing network.

- Sensor

▶  (Setup Mode) – [Sensor settings] – [Network] – [Ethernet]

- 1 Set [Auto connection] to [OFF].
- 2 Set the IP address and subnet mask according to the network settings.

- Touch Finder

▶  (Setup Mode) – [TF settings] – [Ethernet]

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

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]

- 1 Set [Auto] to [OFF].
- 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*

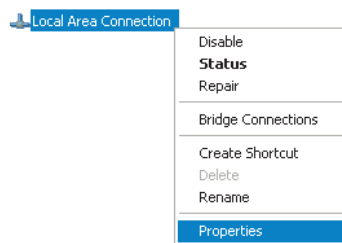
Connecting to Sensors from a Computer Using the PC Tool

When connecting the Sensor directly to a computer using an Ethernet Cable, set the network settings on the computer as given below. Setting a fixed IP address is not required if there is a hub between the computer and Sensor and a DHCP server is used.

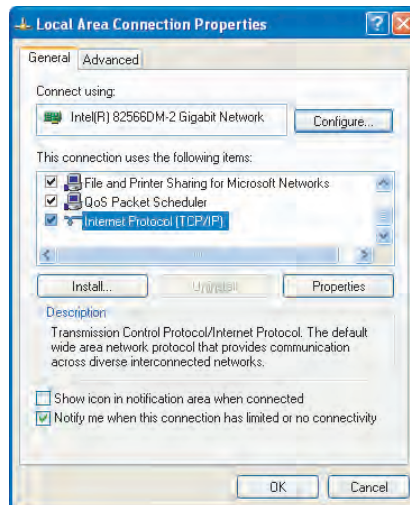
The following procedure is for Windows XP.

- 1 Select [Control Panel] from the Windows Start Menu.
- 2 Click [Network and Internet Connections] in the control panel and then double-click [Network Connections].

- 3** Right-click the [Local Area Connection] Icon and select [Properties].



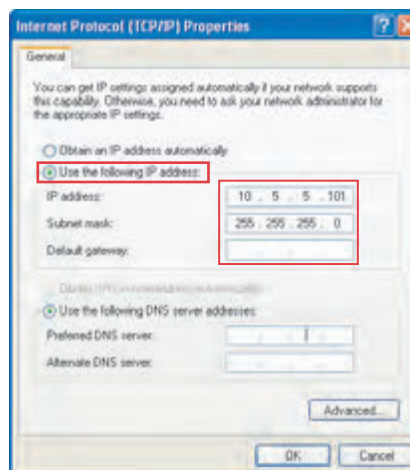
- 4** On the [General] Tab Page, double-click *Internet Protocol (TCP/IC)*.



- 5** 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

- 6** Click the [OK] Button. This completes the settings.



Taking Images

| | |
|---|-----------|
| 3-1 Selecting a Sensor for Configuration | 34 |
| 3-2 Adjusting Image Quality | 35 |
| 3-3 Adjusting the Object Position | 41 |
| 3-4 Preventing Mutual Interference of Multiple Sensors | 43 |
| 3-5 Setting How the Image is Processed After Scanning | 44 |

3-1 Selecting a Sensor for Configuration



If multiple Sensors are connected to a single Touch Finder or computer, you can select the Sensor that you want to set up.

- 1 Press [Run].**
This will enable setting the current Sensor into RUN Mode before selecting another Sensor.
- 2 Then press [Switch to Run mode].**




- 3 Press [Yes].**




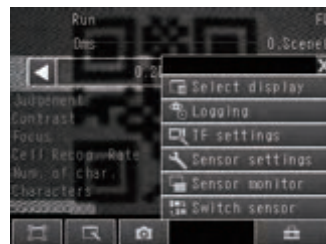
- 4 Press  - [Switch Sensor].**
- 5 Press the image of the Sensor to be set up.**
 will be displayed for Sensors that are not yet set.

Note

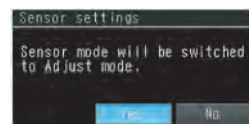
Once the Touch Finder detects and records a Sensor, the display order for showing more than one Sensor is fixed. Even if the system configuration is changed to reduce the number of Sensors, the previous display location will remain for Sensors that were removed. To update displays of multiple Sensors to the current connection status, press [] - [Auto connect] on the right of the display in step 5, above, to automatically reconnect.



- 6 Press  - [Sensor settings] to return to Setup Mode.**



- 7 Press [Yes].**



3-2 Adjusting Image Quality

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 Manually adjust the focus using the focus adjustment screw on the Sensor while checking the image and focus value on the Touch Finder.

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

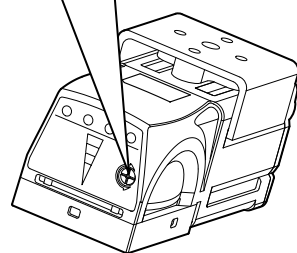
3 Press [Back].

Focus adjustment screw

Turn clockwise to focus on closer objects.
(The field of view will narrow.)



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



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 knob with a force that is greater than 0.1 N·m. This may damage it.

Increasing the Brightness of the Image

The brightness of the display can be adjusted by adjusting the shutter speed and gain. To automatically adjust the shutter time and gain, press the [AUTO] button in the display. To set the shutter speed and gain individually, follow the steps below.

The image can be made brighter by increasing the shutter speed.

- 1 Press [Shutter speed] on the right side of the display.**
- 2 Move the adjustment bar left or right to adjust the brightness of the display.**
- 3 Press [OK].**



Important

The exposure time is longer when a larger value is set. This may cause the image to blur if the object is moving fast. When using the reader on a high-speed line, verify that the image is not blurred under actual operating conditions.

If sufficient brightness cannot be obtained by adjusting the shutter speed, increase the gain.

- 1 Press [Gain] on the right side of the display.**
- 2 Move the adjustment bar left or right to adjust the brightness of the display.**
- 3 Press [OK].**



Important

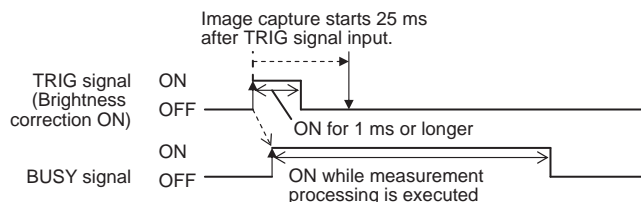
If the image brightness fluctuates and is not stable each time an image is captured, turn on brightness correction.

- ▶ **[Brightness]** - [**◀**] - **[Brightness correction]**.
- ▶ **[Shutter speed]** - [**◀**] - **[Brightness correction]**.
- ▶ **[Gain]** - [**◀**] - **[Brightness correction]**.

When brightness correction is turned on, the brightness stabilizes but the image timing is delayed by 25 ms. Make sure that suitable images of the measured objects are captured when brightness correction is on.

Timing chart when brightness correction is ON

Timing Chart When the Brightness Correction Mode Is ON



Timing chart when brightness correction is off: p.97

Capturing Moving Objects Without Blur

For fast moving objects, blurring can be reduced by decreasing the shutter speed.

- 1** Press **[Shutter speed]** on the right side of the display.
- 2** Move the adjustment bar left or right to adjust the gain.
- 3** Press **[OK]**.

If sufficient brightness cannot be obtained by adjusting the shutter speed, increase the gain.

Important

When the shutter speed is decreased, the image becomes darker. Increasing the gain can improve the brightness, but the image will become grainier. Make sure that measurement stability is not affected under actual operating conditions.

Improving the Image Quality of Objects with Shiny or Metallic Surfaces

When measuring objects with shiny or metallic surfaces, light may reflect off the surface and affect the image. Two functions are available to remove reflected light from the image.

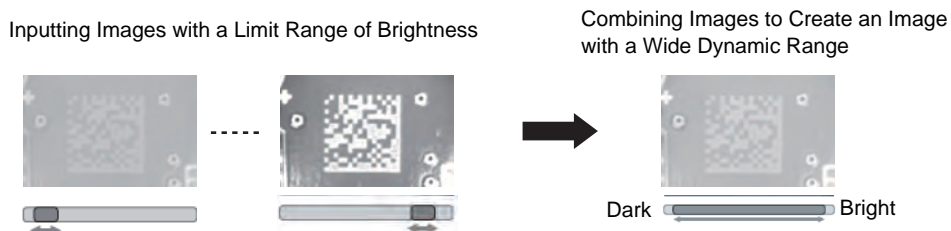
| Function | Description |
|--------------------------|---|
| HDR (High Dynamic Range) | Widens the dynamic range to improve the image quality of objects with contrasting light and dark areas. |
| Polarizing filter | A polarizing filter can be attached to the sensor to remove specular reflection. |

Hints

| | |
|--|---------------------------|
| • The object being inspected can be stopped | Use the HDR function |
| • The object being inspected cannot be stopped | Use the polarizing filter |

HDR Function

This function widens the dynamic range to improve the image quality of objects with contrasting light and dark areas. This function is particularly effective for objects with highly contrasting light and dark areas, and when bright objects are mixed together with dark objects.



Note the following points:

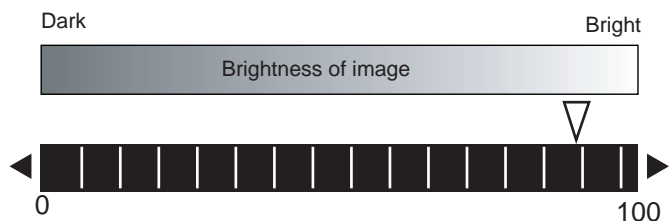
- Only use the HDR function when the inspected object is stopped. Images are captured using different shutter speeds and combined. If the object moves, a blurred image will result.
- Because images of differing brightness are combined, the resulting combined image will have slightly less contrast.

► [Image] - [Camera setup]

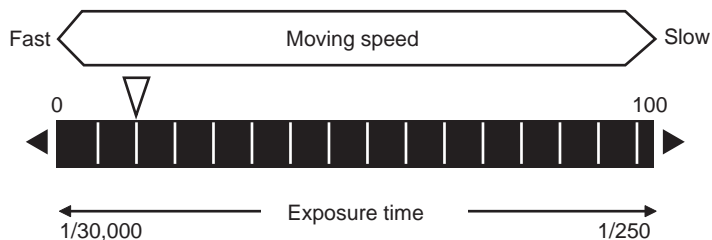
- 1 Press [◀] - [HDR] on the right side of the display.**
Select the HDR level.
- 2 Press [◀] - [Brightness] on the right side of the display.**
- 3 Move the adjustment bar left or right to adjust the brightness.**
A larger "Brightness" value makes the image brighter.
A smaller "Brightness" value makes the image darker.



- Relation between brightness parameter and image brightness



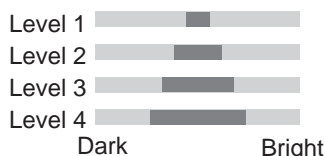
- Relation between brightness parameter and shutter time



4 To automatically adjust HDR, press the [AUTO] button.

Note

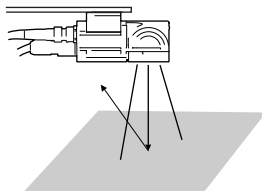
- If the object is changed after the HDR function is set, press the [AUTO] button to repeat auto adjustment.
- If auto adjustment does not achieve the desired result, press [◀] - [HDR] on the right side of the display and manually select the optimum HDR mode.
- As shown below, a higher level gives a wider combined dynamic range.



- If reflected light cannot be sufficiently removed using the HDR function, use the polarizing filter in combination with the HDR function.


Using a Polarizing Filter

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



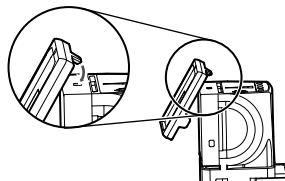
Observe the following precautions.

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

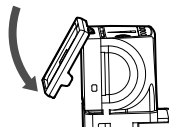
 p. 39

• 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.



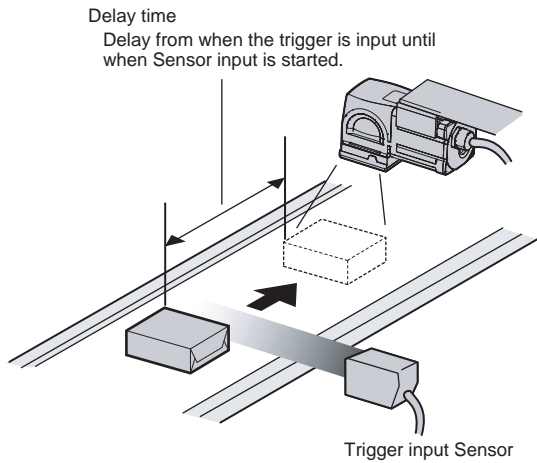
3-3 Adjusting the Object Position

If objects are moving, the position in the image of the characteristic that is to be measured will vary according to the timing of the trigger signal. The FQ Sensor offers two different ways to adjust this position variation.

| Function | Description | Reference |
|---------------|---|-----------|
| Trigger delay | A delay can be applied from when the trigger (the TRIG signal) is input until when the image is input, to synchronize the timing of image input with the speed of the moving objects. | p. 41 |

Adjusting the Image Timing

The internal timing for taking an image can be set to be delayed in relation to the external trigger signal. This can be used to adjust the object position in the image, e.g., if an external trigger sensor is used. If the object position still varies in the image the Position Compensation function must also be used.



► [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].**



Note

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



Move the bar to the left or right.

Or

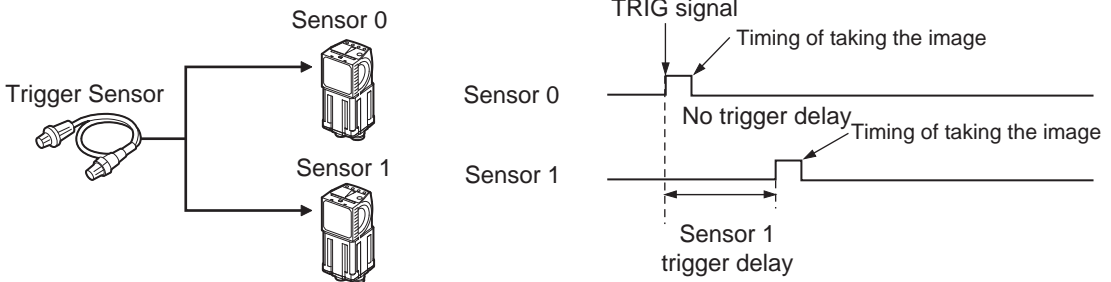
Directly input the delay time.

3-4 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.

p. 34

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

3 Set the trigger input delay time for Sensor 1.

p. 41



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 Setting How the Image is Processed After Scanning

The method of processing the image after scanning can be set. This reduces scanning failures. Three filter processes can be set, and Smooth, Dilate, Erosion, or Median can be selected for each filter process.

► [Image] - [Filter Setup] - [◀] - [Select Filter]

1 Press the number of the filter you wish to set.



2 Set the filter type and filter size.

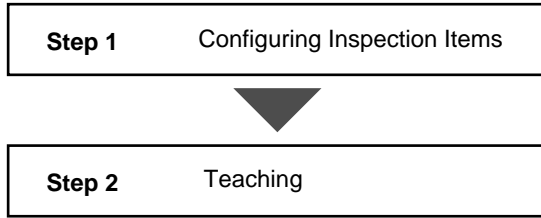
| Parameter | Selections | Description |
|-------------|---|---|
| Filter Type | Smooth Dilate Erosion Median None (default) | Sets the filter type. Smooth: Makes the image smoother. Dilate: Makes the periphery around any white parts white. If the code is black, makes the cell smaller. Erosion: Makes the periphery around any black parts black. If the code is black, makes the cell larger. Median: Reduces noise. |
| Filter Size | 3 × 3 (default) 5 × 5 | Sets the filter size for filter processing. Setting a larger filter size increases processing time. 3 × 3: Filter processing takes place using the density value of each pixel and the surrounding 8 pixels. 5 × 5: Filter processing takes place using the density value of each pixel and the surrounding 24 pixels. |

Setting Up Inspections

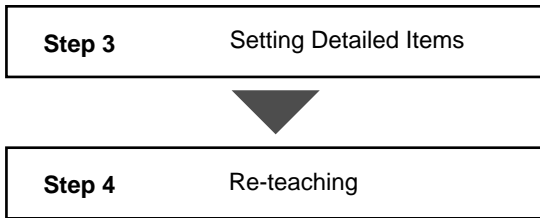
| | |
|---|----|
| 4-1 Setup Procedure for Inspection Items | 46 |
| 4-2 Configuring Inspection Items | 47 |
| 4-3 Setting 2D Code Inspection Conditions | 49 |

4-1 Setup Procedure for Inspection Items

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



If measurements are unstable



Note

-
- Up to 32 inspection items can be used on the FQ-CR2.
-

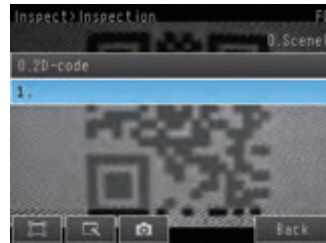
4-2 Configuring Inspection Items

Adding New Inspection Items

1 Press [Inspect] – [Inspection].



2 Press an unused inspection item number.



3 Press [Add item.] on the menu.




4 The Settings tab appears.



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

Note

If more than six inspection items are set, drag the  icon at the bottom of the menu up to display the next inspection item numbers.

Modifying Existing Inspection Items

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

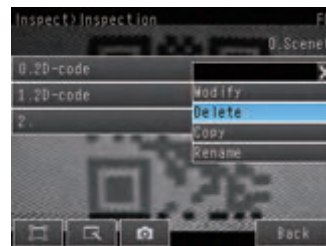


- 2 Press [Modify] on the menu.



Deleting Inspection Items

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



Note

Executing Similar Measurements in Different Places

→ Copy an inspection item that is already registered: [Copy].

→ Change the name of an inspection item: [Rename].

4-3 Setting 2D Code Inspection Conditions

2D Codes

The sensor scans and verifies 2D codes.

The scan result and verification result can be externally output.

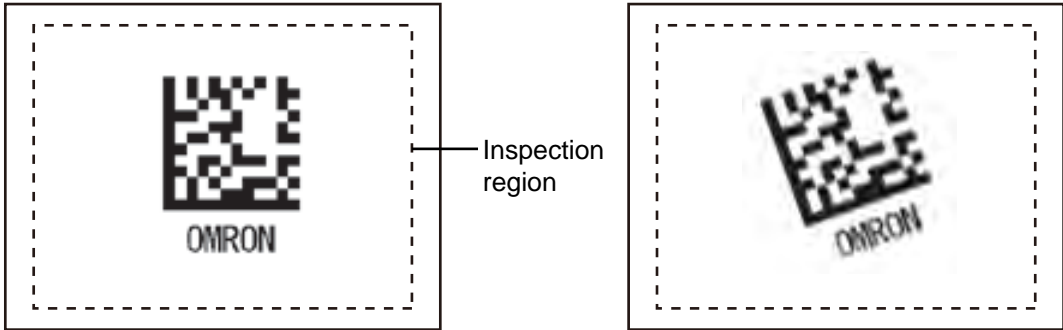
Codes that can be scanned are Data Matrix (EC200) and QR Codes.

Inspection image

When the inspection region is set, the code image is displayed, and teaching is executed, the code type and detailed parameters are automatically set.

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.



Operation Procedure

Step 1 Select the Inspection Item

► [Inspect] - [Modify]

- 1 A 2D code is preset in Inspection item 0.**
To add an Inspection Item, press a blank Inspection Item and add.
- 2 Press the Inspection Item that you wish to set.**
- 3 Press [Modify].**



Step 2 Teaching

"Teaching" is the process of registering the area to be inspected and the 2D code within that area as master data.

► [Inspect] - [Modify] - [Add item] - [2D-code] - [Settings] tab

1 Press [Teach].



2 Display the image of the 2D code you wish to register.



3 To change the inspection region, press [Insp. region] on the right side of the display, and adjust the following:

- Change the size
Press one of the four corner points of the frame.
- Move the position
Drag the inside of the frame to move it.



4 Press [TEACH]. Scanning is executed and the result is displayed.



Detailed Parameters

Each parameter is automatically set by default.

If scanning cannot be performed because the code is different or otherwise, set the detailed parameters manually and execute teaching.

► [Inspect] - [Modify] - [Add item] - [2D-code] - [Details] tab

Detailed Parameter Settings

| Parameter | Setting | Description |
|--|--|---|
| Code type | DataMatrix QR Code Auto (default) | Sets the type of code to be scanned. |
| Auto length | OFF ON (default) | Sets whether the code length is automatically acquired. |
| Reverse | Normal Reverse Auto (default) | Sets normal image or reverse (mirror) image. |
| Code color | Black White Auto (default) | Sets the color of the code. |
| Fast mode | ON, OFF (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) | 21 × 21, 25 × 25, 29 × 29, 33 × 33, 37 × 37, 41 × 41, 45 × 45, 49 × 49, 53 × 53, 57 × 57, Auto (default) | Sets the number of code cells. |
| Cell (DataMatrix only) | Shape: Square 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, Auto (default) Shape: Rectangle 8 × 18, 8 × 32, 12 × 26, 12 × 36, 16 × 36, 16 × 48, Auto (default) | Sets the number of code cells. |

Important

- With the exception of "Fast mode", the detailed parameters are 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 | |
| Reverse | |
| Code color | |
| Fast mode | |
| Shape | Initialized |
| QR Code Model | Initialized |
| Error Correction Level | Initialized |
| Cell | Initialized |

Inspection Data that Can be Logged

The following values can be logged as inspection data.

| Inspection item | Value range | Description |
|-----------------------|-------------|------------------------------------|
| Cell recognition rate | 0 to 100 | Outputs the cell recognition rate. |

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.



Increasing the Brightness of the Image: p. 36

Testing and Saving Settings

| | |
|--|----|
| 5-1 Performing Test Measurements | 54 |
| 5-2 Shortening the Measurement Takt Time..... | 56 |
| 5-3 Checking a List of All Inspection Item Results | 57 |
| 5-4 Saving Data to the Sensor | 58 |

5-1 Performing Test Measurements

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 judgement 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].



Note

The same five types of displays are available for the [Continuous test] on the [Test] Tab Page, i.e., [Graphic], [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. 62

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 judgement parameters when objects are not available.

► [Test] – [Continuous test] – (Any display)

- 1 Press  - .




2 Select [Log] or [File].

Images in the Sensor's built-in memory: Press *Log*.



Images on the SD card: Press *File*.

3 The display switches to the saved image and measurements are taken again.

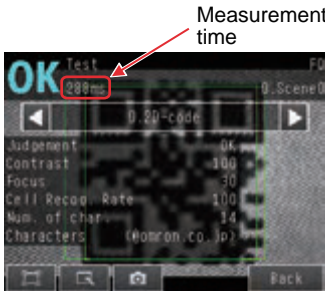
 Saving images: p. 88



5-2 Shortening the Measurement Takt Time

Checking the Measurement Takt Time

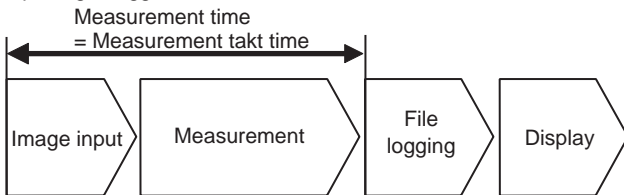
The measurement time of this Sensor can be checked from the Setup or Run Mode display.



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.

Inputting a trigger



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 thus the image input time is shortened.

► [Image] – [Camera setup]

- 1 Press [**◀**] – [Partial input] on the right side of the display.
- 2 Change the input size.
- 3 Press [OK].
- 4 Press [Back].



Important

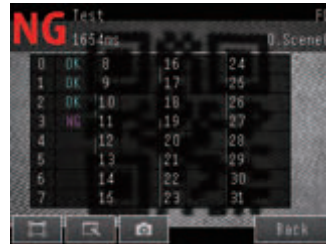
If you use partial input, perform teaching again.

5-3 Checking a List of All Inspection Item Results

Individual judgement results for all inspection items can be checked in a list. The individual inspection items can be selected to change the judgement parameters.

► [Test] – [Continuous test]

- 1 Press [All results/region] to display the list.



5-4 Saving Data to the Sensor

Until you have saved your settings explicitly to the memory in the FQ 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 FQ 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 FQ Sensor the next time you turn ON the FQ Sensor.

Important




Do not turn the power supply OFF while data is being saved. The data that is being saved may become corrupted.

► [Test]

- 1 Press [Save data].
- 2 Press [Yes].



Note

- Scene data and system data can be saved in this way.
 Scene data and system data details: p. 83
- Measurement data and image data cannot be saved in this way.
 Logging measurement data: p. 76
- Settings data can also be backed up to an external memory.
 Saving settings: p. 83

Operation

| | |
|--|-----------|
| 6-1 Starting Operation | 60 |
| 6-2 Configuring the Run Mode Display | 62 |
| 6-3 Checking the Trend of Measurement Results with Graphs | 64 |
| 6-4 If Scanning Fails | 67 |

6-1 Starting Operation

When test measurements and adjustments in Setup Mode have been finished, the display moves to Run Mode and actual measurements begin. In Run Mode, the Sensor operates stand-alone and outputs the measurement judgement 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

The present display name.

Overall judgement

Measurement processing time
The time taken from when an image is input until all measurements have been completed.

Inspection results can be displayed in six formats, such as in a list or as a trend graph. p. 62

These buttons are displayed both in Setup and Run Mode. p. 14

Selected inspection item

Connected Sensor name

Selected scene number

Sub-menu

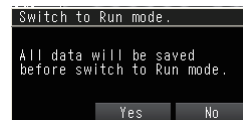
Corrected position
A red circle appears in a corrected position.

Tool Button or OK Button

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.



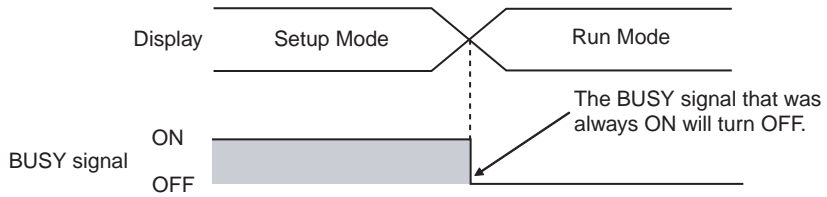
Note

- 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

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.

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

All results/region
(Standard Models Only)



The judgement results of all inspection items can be checked in a list.

Displaying Measurement Result Histories

Trend monitor



The statistical data for the currently selected inspection item can be checked against time.

p. 64

Histogram



The distribution of measurement results of the currently selected inspection item can be checked.

p. 65

▶ (Run Mode) – [Select display]

The following displays are convenient if more than one Sensor is connected.

Multi sensor



Displays the measurement results of all connected Sensors.
Green display: OK, Red display: NG

NG sensor



Automatically changes to the display for any Sensor with an NG result.

▶ (Run Mode) – [Sensor monitor]

Specifying the Startup Run Mode Display

The display that appears when power supply is turned ON can be set.
The default setting is [Graphics].

▶  **(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. 71

Displaying the Inspection Item Results

You can scroll through the measurement results of all the configured inspection items by using the following operations.

Switches to the previous inspection item.

Switches to the next inspection item.



Note

The following are also displayed in addition to the measurement results for each inspection item.

- Camera input: The image that is being measured is displayed.
- Filter: Shows the image after filter processing.

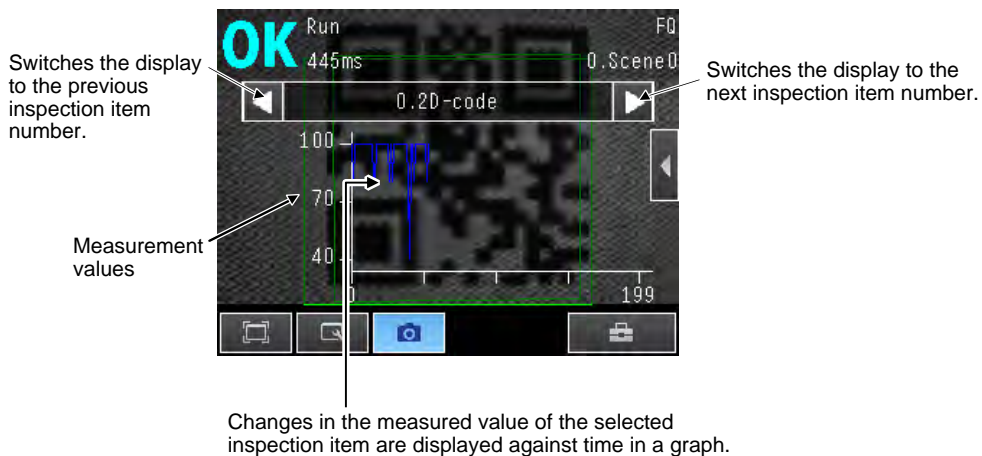
6-3 Checking the Trend of Measurement Results with Graphs

Measurement result histories can be checked using the trend monitor and histograms.

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



▶ (Run Mode) – [Select display] – [Trend monitor]

Arranging the Trend Monitor Display

The display range for the vertical axis and display conditions for the horizontal axis can be changed. However, the display range and the number of data settings are disabled when a display other than the trend monitor is displayed.

• Disabling Automatic Selection of the Display Range

- 1 Press [◀] – [Auto display] on the right of the trend monitor.
- 2 Press [OFF].

• Changing the Display Range of the Vertical Axis


- 1 Press [◀] – [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 [◀] – [Number of data] on the right of the trend monitor.
- 2 Select the number of values from 200, 400, and 1,000.

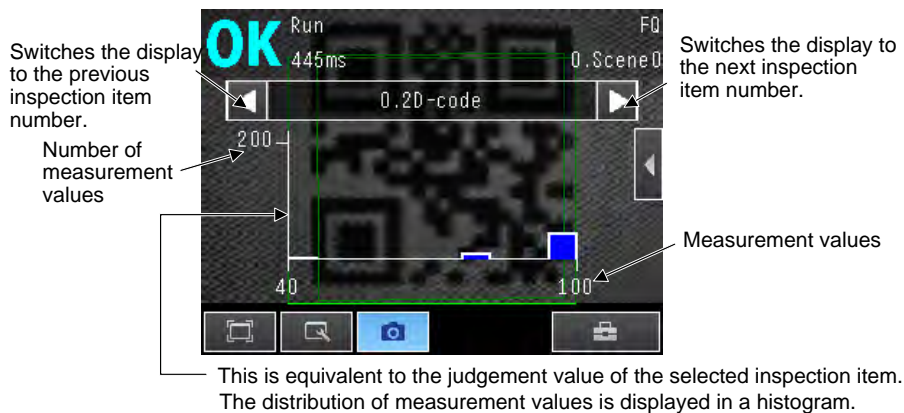
Note

- Trend monitor data is held until the power supply is turned OFF.
- 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. 79

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.

• Disabling Automatic Adjustment of the Display Range

- 1 Press [◀] – [Auto display] on the right of the histogram.
- 2 Press [OFF].

• Changing the Display Range of the Horizontal Axis

- 1 Press [◀] – [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

- 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 judgement is NG. Logging settings are applied to the histogram as well. However, they are not applied to histograms displayed in Setup Mode.



Check recent measurement trends (recent results logging): p. 79

6-4 If Scanning Fails

If the 2D code is not successfully scanned, an NG scanning result will appear in the "Characters" field of the detailed result display. Refer to the table below for the appropriate action to take for the NG scanning result.



| NG scanning result | Action |
|--------------------|---|
| ?E000 | The background may not be uniform; unable to find the 2D code. Check the surface of the work and lighting conditions. |
| ?E100 | Unable to recognize the cells of the 2D code. Check the marking and lighting conditions, and repeat teaching. |
| ?E200 | Unable to scan within the set time. Check the surface of the work and lighting conditions, and repeat teaching. Set a larger inspection timeout value. |
| ?E300 | Unable to recognize the 2D code because there were too many 2D codes in the inspection region. Make the inspection region smaller. |

MEMO

Convenient Functions

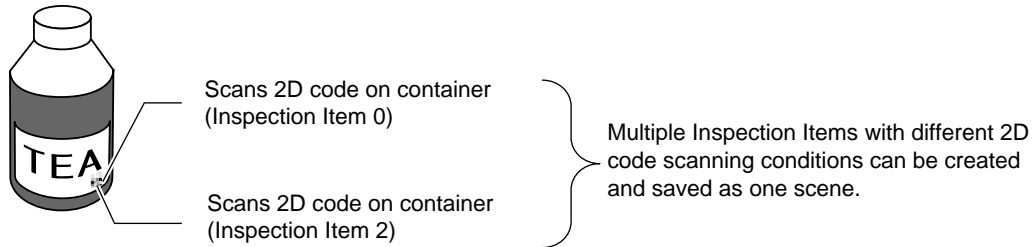
| | |
|---|----|
| 7-1 Changing the Scene to Change the Line Process | 70 |
| 7-2 Display Functions | 72 |
| 7-3 Monitoring the Signal I/O Status..... | 75 |
| 7-4 Logging Measurement Data and Image Data | 76 |
| 7-5 Saving Sensor Settings | 83 |
| 7-6 SD Card Operations | 84 |
| 7-7 Convenient Functions for Operation..... | 86 |
| 7-8 Convenient Functions for Setup..... | 88 |
| 7-9 Functions Related to the System | 89 |
| 7-10 Setting the Retry Function | 91 |

7-1 Changing the Scene to Change the Line Process

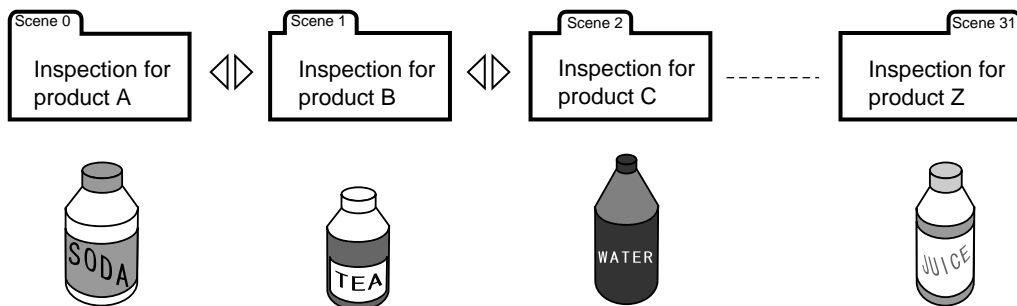
What Are Scenes?

With an FQ 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. A maximum of 32 screens can be created.

Example:



Line Process Changes:



• Settings Included with Scenes

The following settings are changed when the scene is changed: Camera image ([Image] Tab Page) and Inspection Items ([Inspect] Tab Page). The settings related to external I/O specifications that are included in the output settings and the system settings for the overall Sensor are used for all of the scenes.

Refer to the following information for the data that is included in the scene data.

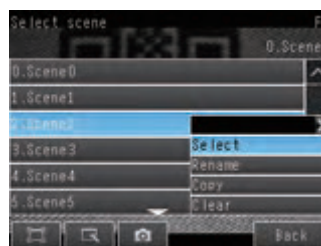
10-1 Menu Tables: p. 158

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]

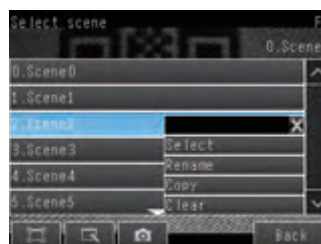
- 1 Press the number of the scene to change to and then press [Select].
- 2 The scene will change. Make the settings for the scene.



Changing Scene Names, Copying Scenes, and Deleting Scenes

► (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.



Switching Scenes from an External Device

- Controlling with Parallel Inputs
 - ◻ Changing the Scene: p. 107
- Controlling with Ethernet Inputs
 - ◻ Command Details: p. 127

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 |

7-2 Display Functions

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.

▶ (Setup Mode or Run Mode)




- Enlarges the display.
- Reduces the display.
- Fits the image to the display size.

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.

▶ (Setup Mode)


- 1 Press .
- 2 Press [Camera].
- 3 Press [Live].
- 4 Press the [Back] Button to return to the [Display] Display.



Displaying a Frozen Image

You can display a frozen image to stop image refreshing and display the last image that was input.

▶ (Setup Mode)


- 1 Press .
- 2 Press [Camera].
- 3 Press [Freeze].
- 4 Press the [Back] Button to return to the [Display] Display.



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.


▶ (Setup Mode)

- 1 Press  .
- 2 Images in the Sensor's built-in memory: Press [Log].
Images on the SD card: Press [File].
- 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. 76

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.

▶ (Run Mode)

- 1 Press  .
- 2 Press [Last NG image].
- 3 Press [Back].



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. 79

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.

▶  (Run Mode) – [Sensor monitor] – [NG Sensor]

Hiding the Menu

You can hide the menu and display only the image on the Touch Finder or PC Tool to check the part of the image hidden behind the menu.

If you press the icon again, the menu will be displayed.

▶  (Setup Mode or Run Mode)

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.

▶  (Setup Mode or Run Mode) – [TF settings] – [LCD Backlight] – [ECO mode]

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]

7-3 Monitoring the Signal I/O Status

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 [I/O monitor] 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.

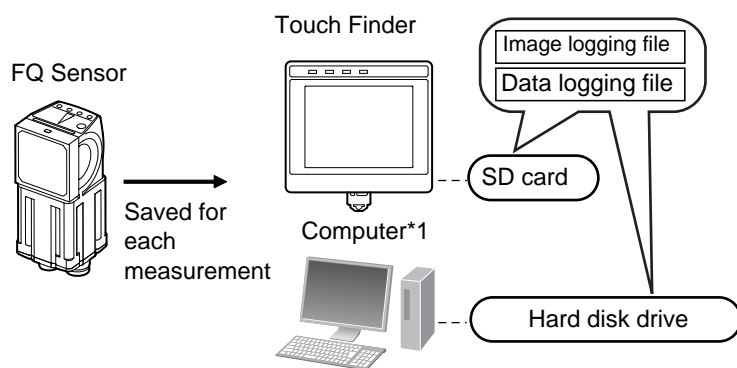
7-4 Logging Measurement Data and Image Data

There are two ways to log data. Data can be temporarily saved in memory inside the Sensor (called recent results logging) or large amounts of data can be saved in SD cards or other external media (called file logging). The amounts of data that can be logged are given in the following table.

| Logged data | Recent results logging | File logging |
|------------------------------------|-------------------------------|---|
| Measurement data (Measured values) | 1,000 measurement values max. | Up to the capacity of the external memory |
| Image data (Measured values) | 20 images max. | |

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. 18

Note

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 the Data To Be Logged

You can select the data to be logged.

► [In/Out] – [Log setting]

- 1 Press the data for which to change the logging parameter.
- 2 Change the logging parameter and then press [Back].



| Item | Description |
|---------------|---|
| Image logging | <ul style="list-style-type: none"> All: All images will be logged regardless of the measurement results. Only NG: Only images for which the overall judgement was NG will be logged. None: No images will be logged (default). |
| Data logging | <ul style="list-style-type: none"> All: All measurement data (Measured values) will be logged regardless of the measurement results. Only NG: Only measurement data (Measured values) for which the overall judgement was NG will be logged. None: No measurement data (Measured values) will be logged (default). |

Note

The logging parameter settings are the same for file logging and recent results logging.

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.

(Run Mode)

- 1 Press [Logging].
- 2 Press [Image logging] or [Data logging].
- 3 Press [ON] to start logging.
Press [OFF] to stop logging.
- 4 Press [Back].

Saved Log Data

• Storage Locations and File Names for Logged File Data

| Data | Storage location | File name |
|---------------|--|--|
| Image logging | \sensor_name\ LOGIMAGE\number ^{*1, *2} | YYYY_MM_DD-HH_MM_SS.IFZ Example: The following name would be used for measurements performed at 10:10:21 pm on March 10, 2010. 2010_03_10-22_10_21.IFZ |
| Data logging | \sensor_name\LOGDATA ^{*2} | YYYY_MM_DD-HH_MM_SS.CSV Example: The following name would be used for measurements performed at 10:10:21 pm on March 10, 2010. 2010_03_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

• File format

Image logging: Image data is saved in a special format for OMRON Sensors. (The file name extension is IFZ.)

Data logging: Measurement data is saved in the following CSV format.

```
<Date*1>,<Time*1>,<Measurement value for inspection item 0>,<Measurement value for inspection item 1>,<...>,<Measurement value for inspection item 31>,<Delimiter>
```

↑
↑
 Field separator
 Record separator

*1: The date is given in the following format: 2010/6/1 (for June 1, 2010). The time is given in the following format: 12:01:20 (for 12:01 and 20 seconds pm).

Changing the File Format

The output CSV file format can be changed according to the external device.

| Item | Symbol |
|------------------|---|
| Field separator | None, comma (default), tab, space, or semicolon |
| Decimal symbol | None, point (default), or comma |
| Record separator | None, comma, tab, space, or CR or CF+LF (default) |

Use the following menu command to change the output CSV file format.

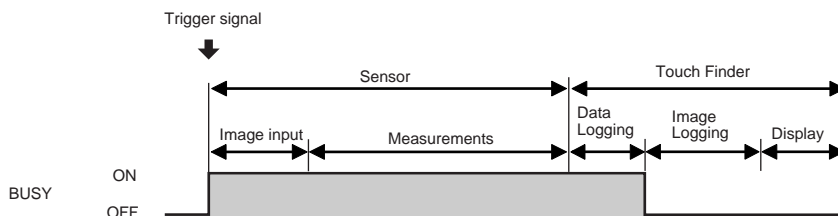
▶  (Setup Mode or Run Mode) – [TF settings] – [File format]

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

- 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.

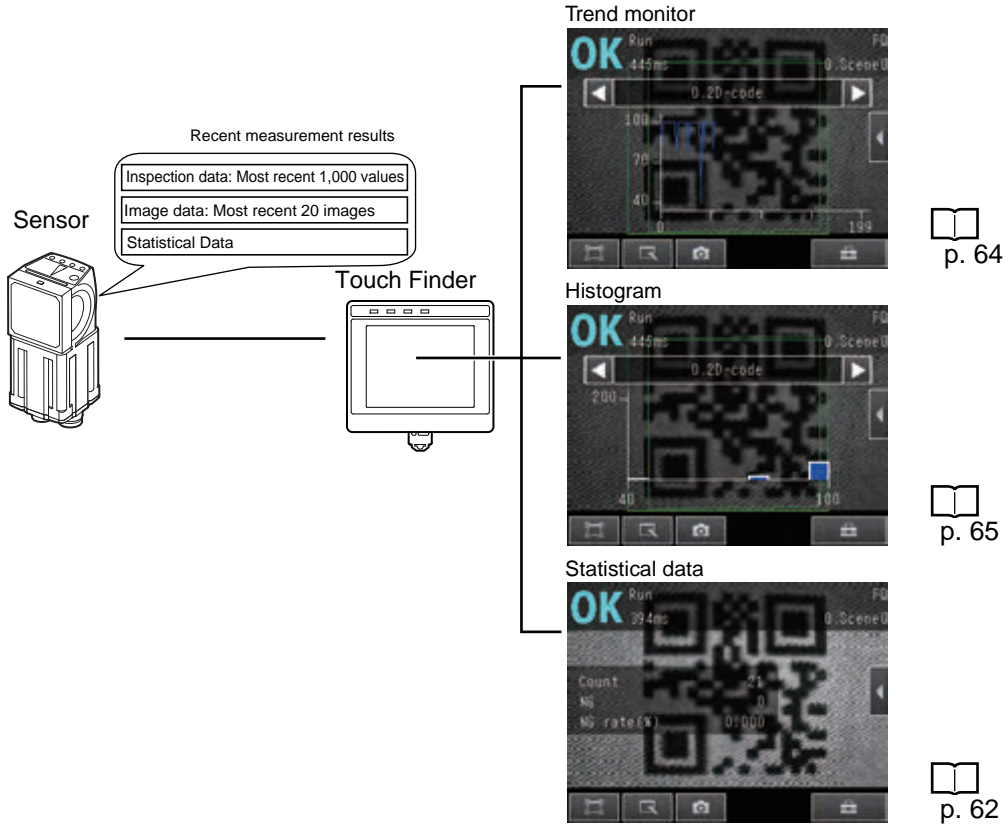
Reference value: For SDHC class 4, the time required to write image data is approx. 200 to 800 ms.

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 or the scene is changed, this data will be lost.




Setting the Data To Be Logged

Use the following procedure to set the statistical data, image data, and measurement data that will be logged.

► [In/Out] – [Log setting]

- 1 Press the data for which to change the logging parameters.
- 2 Change the logging parameter and then press [Back].



| Item | Description |
|------------------|---|
| Statistical Data | Statistical data, such as the number of measurements, the number of NG overall judgements, and the NG rate, since the power supply was turned ON will be logged. <ul style="list-style-type: none">• ON: Statistical data will be displayed (default).• OFF: Statistical data will not be displayed. |
| Image logging | These are the same as for file logging. |
| Data logging |  Logging All Data (File Logging): p. 76 |

Note

The logging parameters for image data and measurement data are the same as those for file logging.

Starting Logging

Logging will be started as soon as the data to be logged has 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.

 p. 62

Use the following menu command to check the measurement images.

-  (Setup Mode) –  – [Log]

Deleting Logged Data

The logged data will be deleted when the power supply to the Sensor is turned OFF or the scene is changed. The logged data can also be deleted without turning OFF the power supply.

• Setup Mode


► [In/Out] – [Log setting]

- 1 Press [Delete Log].

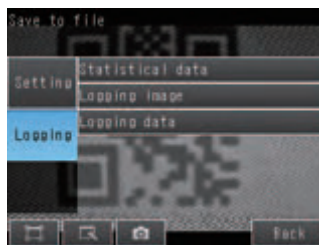
Saving Logged Recent Results Data in a File

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 will be saved.

►  (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 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 | \sensor_name\LOGDATA* ¹ | YYYY_MM_DD-HH_MM_SS.CSV Example: The following name would be used for files saved at 10:10:21 pm on March 10, 2010. 2010_03_10-22_10_21.CSV |
| Logging data | | |
| Logging image | \sensor_name\LOGIMAGE* ¹ | YYYY_MM_DD-HH_MM_NNN.IFZ Example: The following name would be used for files saved at 10:10:21 pm on March 10, 2010. 2010_03_10-22_10_21_000.IFZ "NNN" is a serial number that is added when images are logged at the same time. |

* Files are stored in the following folder when the PC Tool is used.

\My Documents\OMRON FQ\ SDCard

• File format

Statistical data: The data is saved in the following CSV format.

Number of measurements, number of OKs, number of NGs, OK rate, NG rate (delimiter)

Logging image: Image data is saved in a special format for OMRON Sensors.
(The file name extension is IFZ.)

Logging data: Measurement data is saved in the following CSV format.

<Data number*1>,<Measurement value for inspection item 0>,<Measurement value for inspection item 1>,...,<Measurement value for inspection item 31>,<Delimiter>

↑
↑
 Field separator

*1: Data number 1 is always the data for the oldest measurement and data number 1,000 is always the most recent.

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.
- The recent log data will be cleared if the scene is changed.

Changing the File Format

The output CSV file format can be changed as shown below according to the external device.



Changing the File Format: p. 78

7-5 Saving Sensor Settings

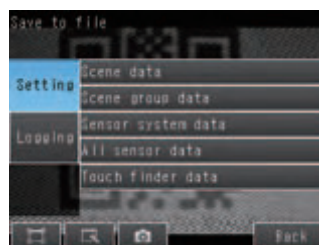
The Sensor settings are saved in flash memory inside the Sensor.

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

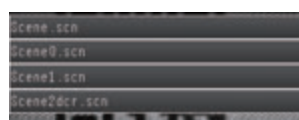
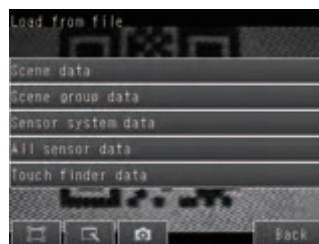
| Data | Storage location | Description |
|--|-------------------|---|
| Scene data (The file name extension is SCN.) | \\sensor_name\SCN | The following data is backed up for each scene. • Settings for all inspection items • Order of inspection items |
| Scene group data (The file name extension is SGP.) | \\sensor_name\SGP | All scene data is backed up. |
| Sensor system data (The file name extension is SYD.) | \\sensor_name\SYD | All system data in the Sensor is backed up. The system data is the same for all scenes. |
| All Sensor data (The file name extension is BKD.) | \\sensor_name\BKD | All settings in the Sensor (all scene data and Sensor system data) is 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

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.



7-6 SD Card Operations

With an FQ 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\SYD | Sensor system data (The file name extension is SYD.) |
| \\sensor_name\BKD | All sensor data (The file name extension is BKD.) |
| \\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.) |

*1: For the PC Tool, data will be saved in the following folder: \\.\My Documents\OMRON FQ

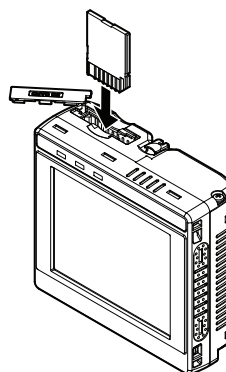
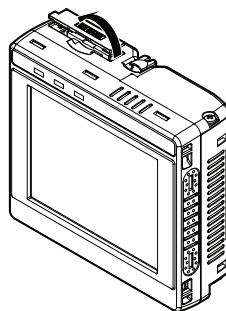
Note

The PC Tool does not support SD card operations.

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.



Removing an SD Card from the Touch Finder

- 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]

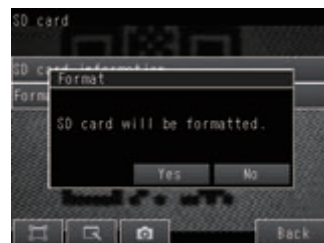
The following information in the SD card inserted in the Touch Finder can be checked.



Formatting an SD Card

- ▶  (Setup Mode or Run Mode) – [TF settings] – [SD card] – [Format]

Press [Yes] to start formatting.



7-7 Convenient Functions for Operation

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]

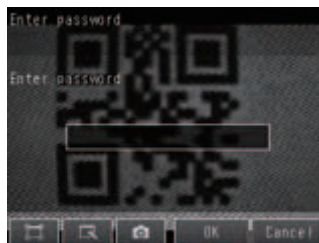
Press [Password on/off] and press [OFF].

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.

▶  (Setup Mode) – [Sensor settings]

- 2 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_MS.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

7-8 Convenient Functions for Setup

This section describes the functions that can be used when setting inspection items.

Making Settings with Stored Images

With an FQ Sensor, judgement parameters can be set by using the following images.

- Images saved in internal Sensor memory
- Image files in an SD card

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. 79

• 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 |
|------------------------|---|
| \\sensor_name\LOGIMAGE | YYYY_MM_DD-HH_MM_SS.IFZ Example: The following name would be used for files saved at 10:10:21 pm on March 10, 2010. 2010_03_10-22_10_21.IFZ |

• Saving Images in an SD Card

The image data can be saved in the SD card each time measurements are performed.

▶  **(Run Mode)** – **[Logging]**

 Logging All Data (File Logging): p. 76

Displaying Image Data

• Images Saved in Internal Sensor Memory

▶  **(Setup Mode)** –  – **[Log]**

• Image Files in a SD Card

▶  **(Setup Mode)** –  – **[File]**

 Arranging the Display - Displaying a Saved Image: p. 73

7-9 Functions Related to the System

This section describes system settings.

Turning OFF the Integrated Sensor 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 Touch Finder

You can set the date and time.

▶  (Setup Mode or Run Mode) – [TF settings] – [Time settings]

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

- ▶  (Setup Mode) – [Sensor settings] – [Information]

• Checking the Touch Finder Version

- ▶  (Setup Mode or Run Mode) – [TF settings] – [Information]

Checking the Touch Finder Battery Level

- ▶  (Setup Mode or Run Mode) – [TF settings] – [Battery level]

Important

- The battery level is displayed only for a Touch Finder with a DC/AC/battery power supply (FQ-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 PC.

- ▶  (Run Mode) – [TF settings] – [Resolution]

Setting the Inspection Timeout Time

The time after which inspection times out can be set (msec).

- ▶  (Run Mode) – [Sensor settings] – [Timeout]

7-10 Setting the Retry Function

Retry Function

At one inspection trigger, this function repeats scanning until the entire code is successfully scanned. The retry function has four modes: normal retry, exposure retry (*1), scene retry, and trigger retry.

*1: 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 | Description |
|----------------|---|
| Normal retry | Scanning is repeated the specified number of times at the specified interval until the entire code is successfully scanned. The maximum count and interval are set. The settings are configured in the retry settings of each scene. |
| Exposure retry | Scanning is repeated the specified number of times while varying the exposure (when HDR is OFF, the shutter time 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 | Scanning is repeated the specified number of times while switching the scene until the entire code is successfully scanned. [Auto] or [Fixed] is selected for the switch order. [Auto]: Automatically decides the switch order based on the scanning success rate. [Fixed]: Switches scenes in the set order. |
| Trigger retry | When the trigger signal is ON, scanning is repeated until the entire code is successfully scanned. To use trigger retry, the I/O input mode must be set to expanded mode. |
| 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 shutter speed step, increment count, and decrement count.



| Parameter | Settings | Description |
|---------------------------------|--|--|
| Brightness (shutter speed) step | Brightness: 1 to 20, default: 2 Shutter speed: 0.01 to 1.00 (default: 1.00) | 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. |

Setting scene retry

- 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.



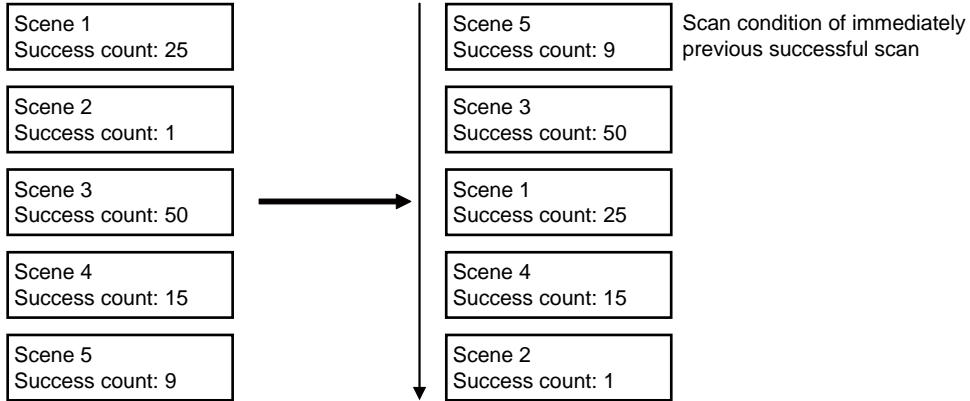
| Parameter | Settings | Description |
|--------------|-----------------------|--|
| Switch Order | Auto (default), Fixed | Sets the scene switching order. Auto: Switches through the scenes in the order of highest frequency of use. Fixed: Switches through the scenes in the order that the scenes were 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. |

Auto scanning order

The scanning procedure when the sort order is set to auto is shown below.

1st : The immediately previous scene that scanned successfully

2nd and following: Order of largest number of 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.

Setting trigger retry

- Set the retry mode to [Trigger retry] in "Retry details".

▶  (Setup Mode) – [Sensor settings] – [Retry details]

1 Press [Trigger retry] for the retry mode.

Important

To use trigger retry, the I/O input mode must be set to expanded mode.

▶ [In/Out] – [I/O setting] – [I/O terminals] – [Input] tab – [Input mode]
Press "Expanded mode".

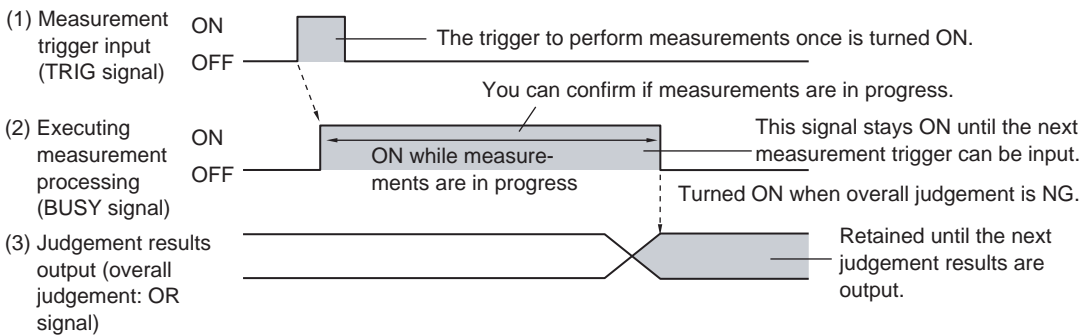
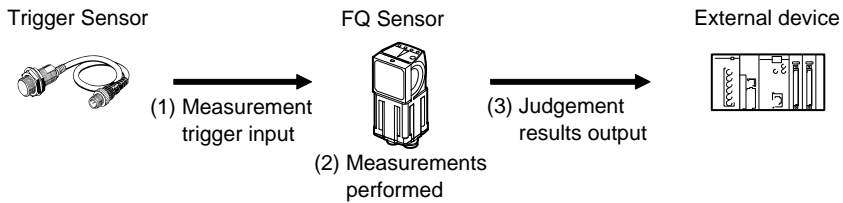
Communications with External Devices

| | |
|--|-----|
| 8-1 Controlling/Outputting in Parallel | 96 |
| 8-2 Outputting/Controlling with Ethernet | 118 |

8-1 Controlling/Outputting in Parallel

Operation with Default Configuration

This section describes the basic connections and signal flow with external devices. With the default settings, the Sensor operates in the following manner.

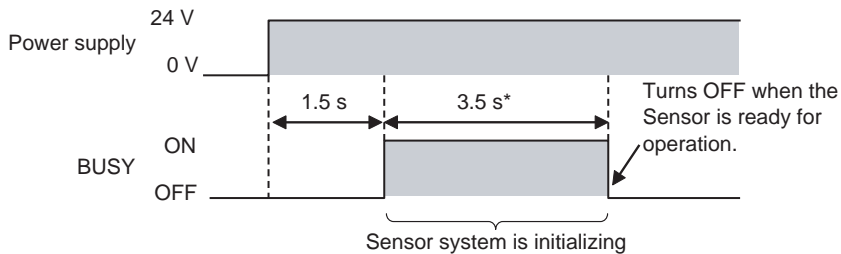


Important

- Create the ladder program to control the TRIG and IN5 input signals so that they do not turn ON while the BUSY signal is ON. If not, a TRIG input error will occur and the ERROR signal will turn ON.
- Operation When the Sensor Power Supply Is Turned ON

The BUSY signal will operate as shown below when the Sensor's power supply is turned ON.

Create the ladder program in the PLC or other external device so that the BUSY signal is ignored while it turns OFF, ON, and OFF again for up to 5 s after the power supply is turned ON.



* Depends on the scene data.

Configuring the Operation

The following settings can be selected depending on the system configuration and application.

| Type of change | Change | Reference |
|---|---|-----------|
| Changing the type of measurement trigger | Performing continuous measurements | p. 99 |
| Changing the output method of the judgement results | Obtaining individual judgement results | p. 102 |
| | Adjust the judgement output timing | p. 104 |
| | Changing the judgement output ON conditions | p. 106 |
| Changing the polarity of the BUSY output | Reversing the polarity of the BUSY signal | p. 106 |

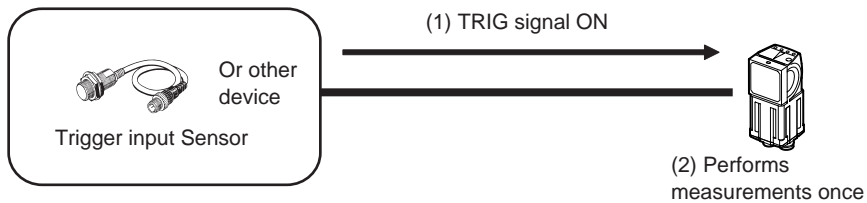
Setting the Measurement Trigger

The measurement trigger can be chosen from the following two types:

- One-shot measurement: One measurement is performed for each external trigger.
- Continuous measurement: Measurements are performed continuously.

Performing One Measurement for Each External Trigger

A measurement trigger is input as the TRIG signal from a proximity sensor, PLC, or other external device. One measurement is performed when the TRIG signal turns ON.



Wiring

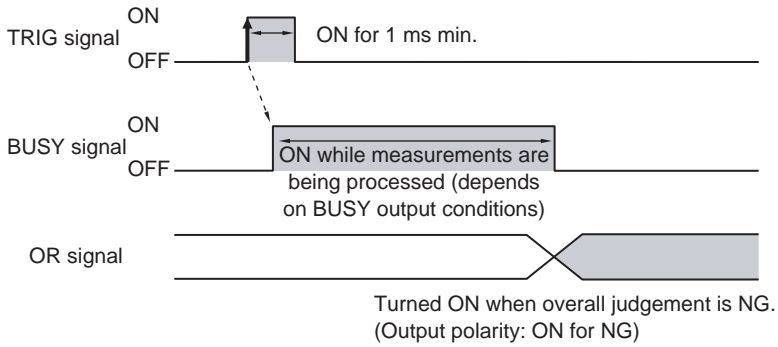
| Color | Signal | Description |
|--------|-------------|---|
| Pink | TRIG | Trigger signal |
| Black | OUT0 (OR) | Overall judgement (default assignment) |
| Orange | OUT1 (BUSY) | Processing in progress (default assignment) |

The signals shown at the left are used. Refer to the following information for signal wiring.



Wiring: p. 26

Timing Chart



1. Turn ON the TRIG signal while the BUSY signal is OFF.
2. Measurement begins and the BUSY signal is turned ON during the measurement process.
3. When the measurement has been finished, the measurement result is output using an OR signal, and the BUSY signal is turned OFF. *1

*1: You can also set the signal to be turned OFF after data logging, image logging, or displaying results in the [BUSY output].

Important

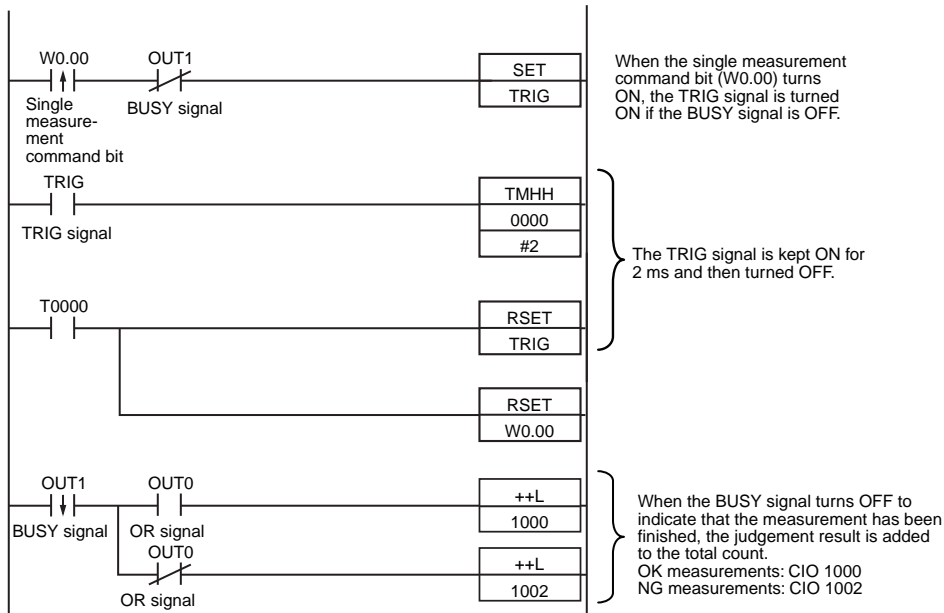
When the Brightness Correction Mode is ON, the timing when images are taken is delayed.



Timing Chart When the Brightness Correction Mode Is ON: p. 39

Sample Ladder Program

The following sample program is used to input a TRIG signal to perform a single measurement. A single measurement will be performed when W0.00 turns ON.



• I/O Signal Allocations

| Signal | | Address |
|----------------|--------------------|----------|
| Output signals | OUT0 (OR signal) | CIO 0.00 |
| | OUT1 (BUSY signal) | CIO 0.01 |
| Input signals | TRIG | CIO 1.00 |

Important

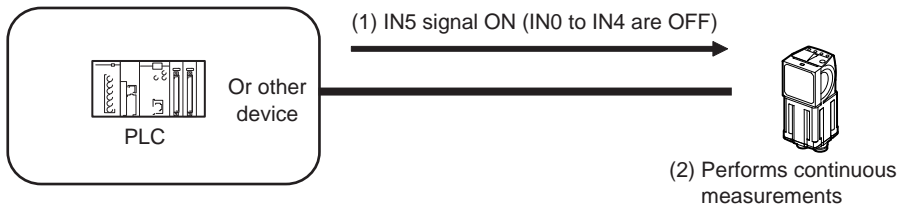
The BUSY signal will remain ON while the measurement is being executed.

Performing Continuous Measurements

Continuous measurements are performed while the continuous measurement command is input from an external device.

Immediately after a measurement is performed, the next measurement is performed.

This is repeated while a continuous measurement command is input with the IN0 to IN5 signals.



Note

This function can be used only when the input mode is set to Expanded Mode.

Wiring

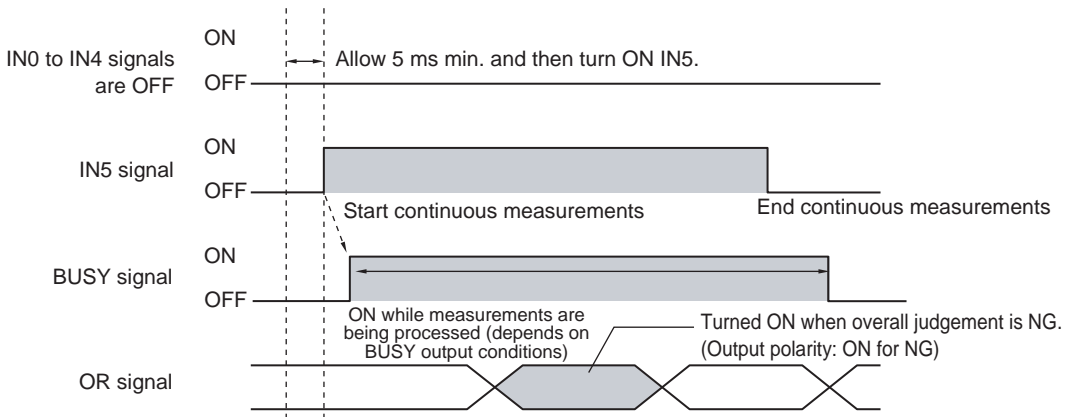
| Color | Signal | State | Description |
|--------|-------------|-------|--|
| Gray | IN0 | OFF | Command parameters for continuous measurements |
| Green | IN1 | OFF | |
| Red | IN2 | OFF | |
| White | IN3 | OFF | |
| Purple | IN4 | OFF | |
| Yellow | IN5 | ON | Command input for continuous measurements |
| Black | OUT0 (OR) | -- | Overall judgement (default assignment) |
| Orange | OUT1 (BUSY) | -- | Processing in progress (default assignment) |

The signals shown at the left are used. Refer to the following information for signal wiring.



Wiring: p. 26

Timing Chart



1. Turn ON IN5 while IN0 to IN4 are OFF. If status is held while the BUSY signal is OFF, continuous measurements will begin and the BUSY signal will remain ON while continuous measurements are being performed.
2. Continuous measurements end when IN5 is turned OFF.

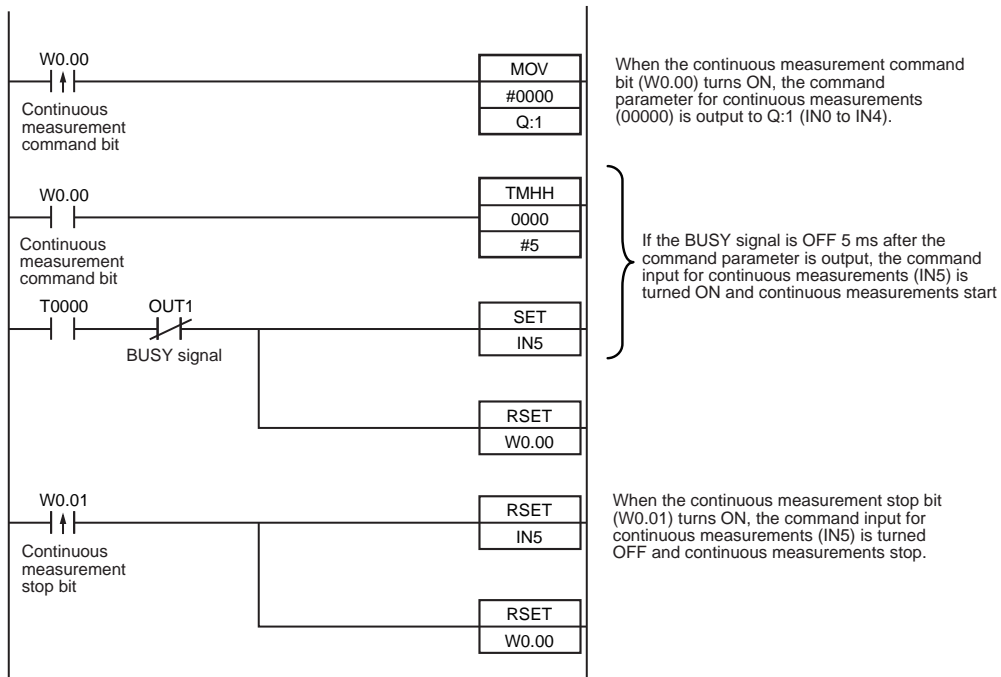
Settings

► [In/Out] – [I/O setting] – [I/O terminals] – [Input] – [Input mode]

Press [Expanded mode].

Sample Ladder Program

The following sample program is used to input a IN5 signal to perform continuous measurements. Continuous measurements will be started when W0.00 turns ON and stopped when W0.01 turns ON.



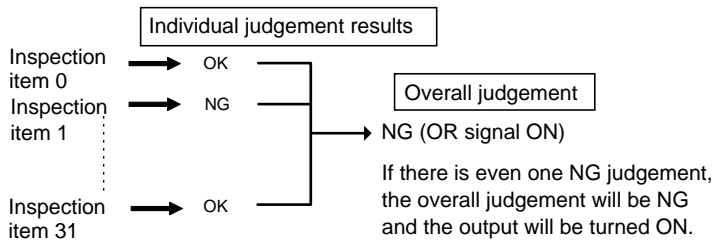
• I/O Signal Allocations

| Signal | | Address |
|----------------|--------------------|----------|
| Output signals | OUT1 (BUSY signal) | CIO 0.01 |
| Input signals | IN0 | CIO 1.08 |
| | IN1 | CIO 1.09 |
| | IN2 | CIO 1.10 |
| | IN3 | CIO 1.11 |
| | IN4 | CIO 1.12 |
| | IN5 | CIO 1.15 |

Setting the Outputs

Using the Overall Judgement Result

When the results of the inspection items are judged, if even one individual judgement result is NG, the OR output signal is turned ON.



Note

The overall judgement result output signal can also be turned ON when all individual judgement results are OK.

Changing the judgement output ON condition: p. 106

Wiring

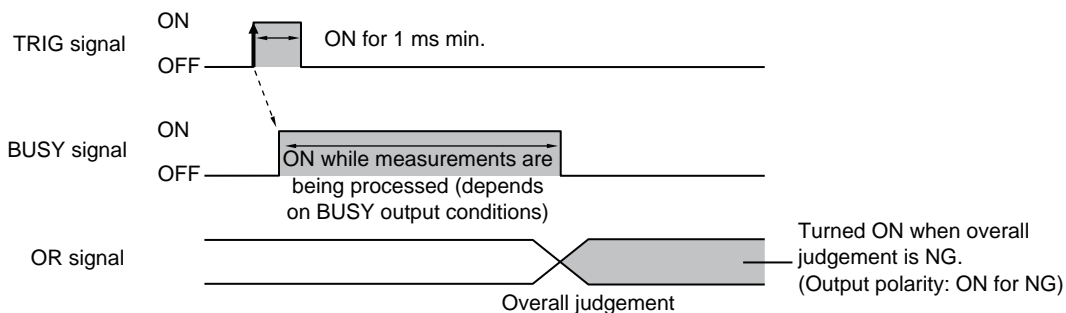
| Color | Signal | Description |
|-------|-----------|--|
| Black | OUT0 (OR) | Overall judgement (default assignment) |

The signals shown at the left are used. Refer to the following information for signal wiring.

2-4 Wiring: p. 26


Timing Chart

The OR signal that is output is held until the next overall judgement is output.



Note

The timing for updating the OR signal and the ON time after judgement processing can be adjusted.

 Adjusting the judgement output timing: p. 104

Obtaining Individual Judgement Results

Up to three judgement results of individual inspection items (individual judgement signals OR0 to OR31) can be assigned to terminals OUT0 to OUT2 and output to external devices.

| Output terminal | Output signals that can be assigned |
|-----------------|--|
| OUT0 | <ul style="list-style-type: none"> OR (Total judgement)...(default) OR0 (Item 0 judgement) to OR31 (Item 31 judgement) |
| OUT1 | <ul style="list-style-type: none"> BUSY (default) OR0 (Item 0 judgement) to OR31 (Item 31 judgement) |
| OUT2 | <ul style="list-style-type: none"> ERROR (default) OR0 (Item 0 judgement) to OR31 (Item 31 judgement) |

Wiring

Example: Signals are assigned to terminals OUT0 to OUT2 as shown below.

- OUT0: Inspection number 2 (OR2)
- OUT1: Inspection number 5 (OR5)
- OUT2: Inspection number 14 (OR14)

| Color | Signal | Description |
|------------|-------------|---------------------------------|
| Black | OUT0 (OR2) | Outputs the judgement for OR2. |
| Orange | OUT1 (OR5) | Outputs the judgement for OR5. |
| Light blue | OUT2 (OR14) | Outputs the judgement for OR14. |

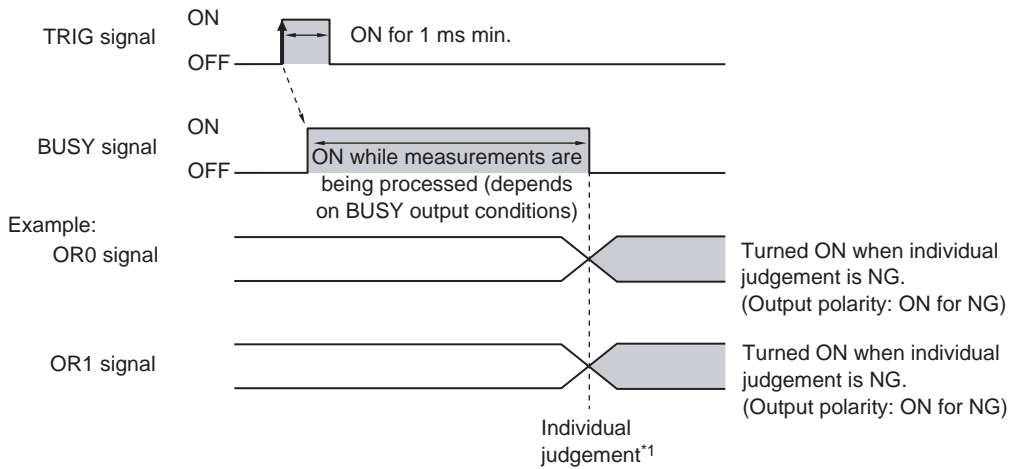
The signals shown at the left are used.
Refer to the following information for signal wiring.

 2-4 Wiring: p. 26

As described above, if terminals OUT0 to OUT2 are all assigned to individual judgement output signals, the BUSY signal and ERROR signal assigned as the default settings will no longer be output.

Timing Chart

Output OR0 to OR31 signals are held until the next judgement output.



*1: The timing for updating the OR signal is when the measurement results are finalized, regardless of the output settings of the BUSY signal (BUSY output conditions).

Note

The timing for updating the OR0 to OR31 signals and the ON time after judgement processing can be changed.

Adjusting the judgement output timing: p. 104

Settings

► [In/Out] – [I/O setting] – [I/O terminals] – [Output]

- 1** Press [OUT0].
- 2** Press [OR2 (Item 2 judgement)].
OR2 output signal was assigned to OUT0.
- 3** Assign the others in the following manner.
OUT1: OR5
OUT2: OR14

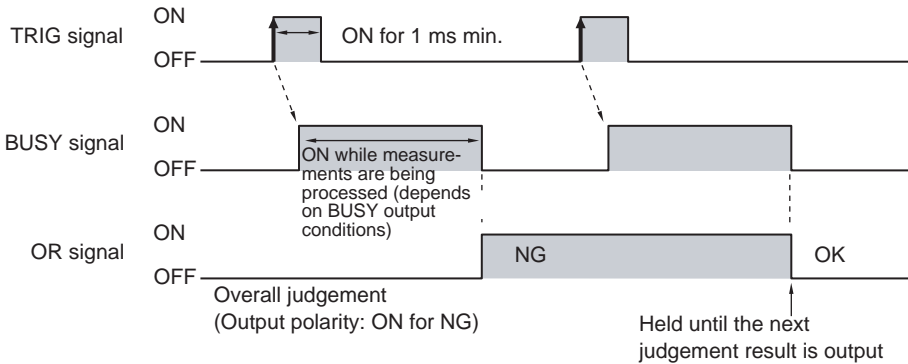
Adjusting the Judgement Output Timing

The output timing of the OR signal or OR0 to OR31 signals can be selected from two modes depending on the external device.

Selecting the OFF Timing

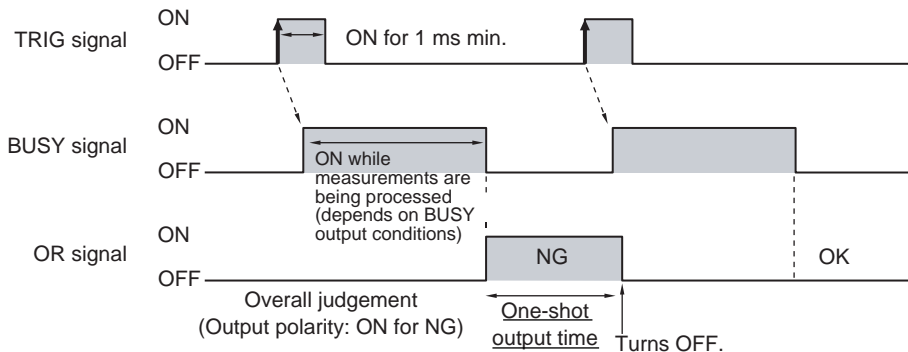
- Level output (default)

The status of the output OR signal is held until the next OR signal is output.



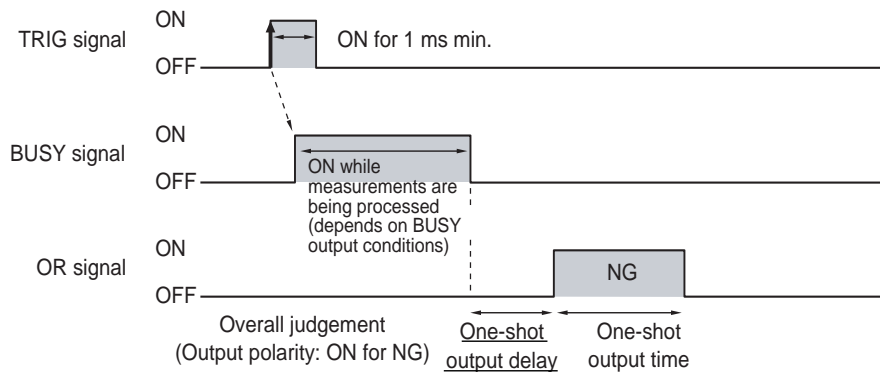
- One-shot output

The status of the output OR signal is turned OFF after a specified time has passed. (Setting range: 0 to 1,000 ms)



Delaying the Output Timing

When using one-shot output, the output timing of the OR signal can be delayed. (Setting range: 0 to 1,000 ms)



Settings

► [In/Out] – [I/O setting] – [I/O terminals] – [Output]

- 1 Press [Output mode] and press [Level output] or [One-shot output].
- 2 Press [Output delay] and set the one-shot output delay.
- 3 Press [OK].



- 4 Press [Output time] and set the one-shot output time.
- 5 Press [OK].



| Item | | Description |
|--------------|------------------------|---|
| Output mode | One-shot output | After the measurement results are finalized, if the judgement output ON condition is met, the OR signal is turned ON for the one-shot output time. It is then turned OFF once the specified time has expired. |
| | Level output (default) | The judgement is output after measurement results are finalized and the ON/OFF status of the OR signal is held until it is changed for the next measurement result. |
| Output delay | | When one-shot output mode is selected, this parameter sets the delay from when a measurement is completed until when the OR signal turns ON. (Setting range: 0 to 1,000 ms) |
| Output time | | When one-shot output mode is selected, this parameter sets the time that the OR signal is ON. (Setting range: 1 to 1,000 ms) |

Important

When one-shot output is selected as the output mode, make the following value smaller than the trigger input period.

- One-shot delay time + One-shot output time

Changing the Judgement Output ON Conditions

The ON condition for the OR signal or the OR0 to OR31 signals can be set to be output when the judgement results are OK or when they are NG. The default setting is when they are NG.

Settings

► [In/Out] – [I/O setting] – [I/O terminals] – [Output] – [Output polarity]

| Item | | Description |
|-----------------|------------------|---|
| Output polarity | OK: ON | The output is turned ON if the judgement is OK. For the overall judgement, the output is turned ON if all judgements are OK. |
| | NG: ON (default) | The output is turned ON if the judgement is NG. For the overall judgement, the output is turned ON if even one judgements is NG. |

Changing the Polarity of the BUSY Output

The Sensor turns ON the BUSY output signal during measurements and other processing to indicate that a measurement trigger cannot be received. The polarity of the BUSY signal can be reversed so that it is ON only when a trigger signal can be received.

Settings

► [In/Out] – [I/O setting] – [I/O terminals] – [Output] – [BUSY polarity]

| Item | | Description |
|---------------|--------------------|--|
| BUSY polarity | BUSY: ON (default) | The BUSY signal is ON while the Sensor is processing data. |
| | READY: ON | The BUSY signal is ON while the Sensor can receive a trigger signal. |

Important

All timing charts in this manual show the operation of the BUSY signal at the default setting. If you change the polarity of the BUSY signal, take this into consideration when reading the timing charts.

Changing the BUSY Output Condition

The end timing of the BUSY signal can be changed.

► [In/Out] – [I/O setting] – [I/O terminals] – [Output] Tab Page – [BUSY output]

| Item | | Description |
|-------------|-----------------------|---|
| BUSY output | Measurement (default) | The BUSY signal turns OFF when the measurement is completed. |
| | Data logging | The BUSY signal turns OFF when data logging is completed. |
| | Image logging | The BUSY signal turns OFF when image logging is completed. |
| | Result display | The BUSY signal turns OFF when the result display is completed. |

Setting trigger error output

You can set whether an ERROR is output if an inspection trigger is detected when the BUSY signal is ON. The default setting is ON.

Settings

► [In/Out] – [I/O setting] – [I/O terminals] – [Output] – [Output trigger error]

| Parameter | | Description |
|----------------------------|--------------|---|
| Trigger error signal??ntlp | ON (default) | Outputs an ERROR if an inspection trigger is detected when the BUSY signal is ON. |
| | OFF | Does not output an ERROR if an inspection trigger is detected when the BUSY signal is ON. An inspection trigger detected while the BUSY signal is ON is disregarded. |

Controlling the Sensor from an External Device

The following Sensor functions can be controlled with command inputs from an external device without connecting the Touch Finder.

| Function | Description | Reference |
|------------------------|--|-----------|
| Switching the scene | This command changes the scene when the line process changes. | p. 107 |
| Clearing an error | This command turns the ERROR signal OFF. | p. 110 |
| Continuous measurement | Continuous measurement is performed while this command is input. | p. 99 |
| Trigger retry | Continues inspection when the trigger signal is ON. | p. 111 |
| Reset??ntlp | Resets the sensor. | p. 114 |
| Teach | Registers a 2D code. | p. 116 |

Changing the Scene

This section describes how to change the line process by changing the scene.

Wiring

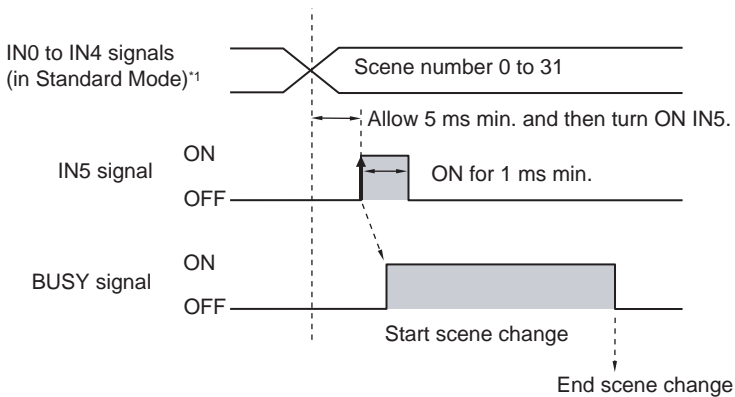
| Color | Signal | State | | Description |
|--------|----------------|---------------------------|---------------------------|----------------------------------|
| | | Input Mode | | |
| | | Standard Mode | Expanded Mode | |
| Gray | IN0 | Scene number (0 to 31) | Scene number (0 to 15) | Specifies the scene number. |
| Green | IN1 | | | |
| Red | IN2 | | | |
| White | IN3 | | | |
| Purple | IN4 | ON | | |
| Yellow | IN5 | ON | | Trigger to change the scene |
| Orange | OUT1 (BUSY) | -- | | Processing in progress (default) |

The signals shown at the left are used.
Refer to the following information for signal wiring.



2-4 Wiring: p. 26

Timing Chart



*1: In Expanded Mode, specify scene numbers 0 to 15 using the IN0 to IN3 signals.

- 1 Specify the scene number with the IN0 to IN4 signals. (Standard Mode)
- 2 Turn ON the IN5 signal while the BUSY signal is ON to change the scene to the specified scene.
- 3 The BUSY signal turns ON while the scene is being switched.

Settings

► [In/Out] – [I/O setting] – [I/O terminals] – [Input] – [Input mode]

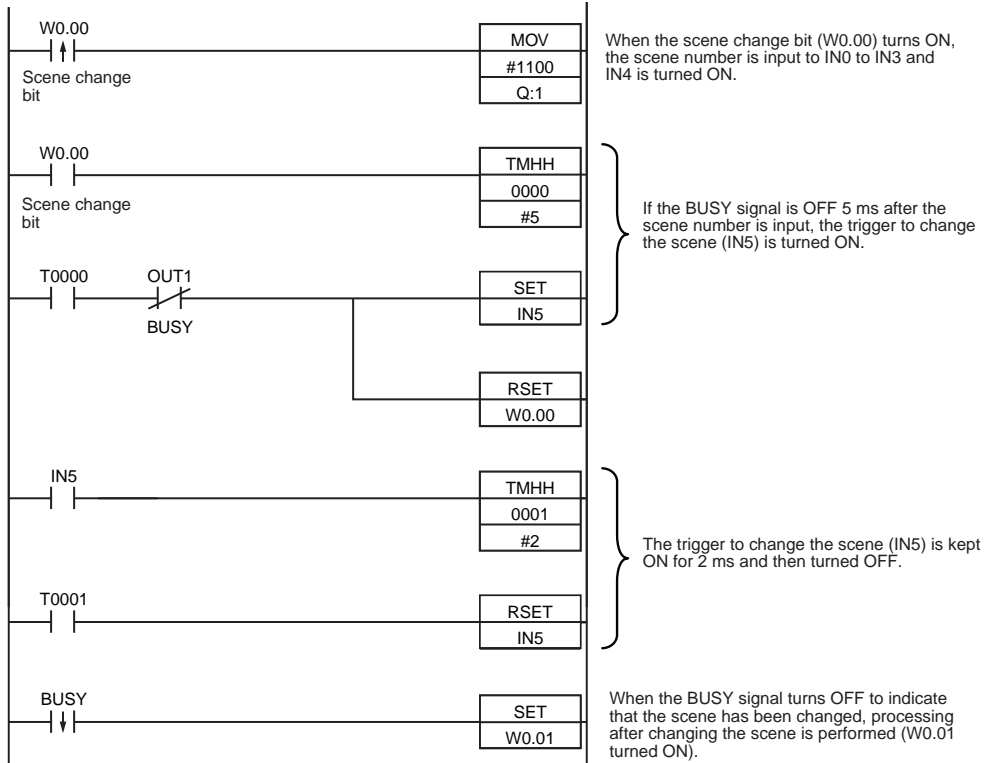
The scene numbers that can be used depend on the input mode.

[Standard mode] (default): Scene 0 to 31

[Expanded mode]: Scene 0 to 15

Sample Ladder Program

This sample program is used to change the scene when the input mode is set to Expanded Mode. The scene changes to scene 1 when W0.00 turns ON.



• I/O Signal Allocations

| Signal | Address |
|----------------|-----------------------------|
| Output signals | OUT1 (BUSY signal) CIO 0.01 |
| Input signals | IN0 CIO 1.08 |
| | IN1 CIO 1.09 |
| | IN2 CIO 1.10 |
| | IN3 CIO 1.11 |
| | IN4 CIO 1.12 |
| | IN5 CIO 1.15 |

Note

The BUSY signal will be ON while the scene it being changed.

Important

If the cycle time is too long, the PLC may not be able to detect when the BUSY signal is ON. If necessary, turn OFF W0.00 after a suitable time elapses.

Turning the ERROR Signal OFF

The ERROR signal turns ON when an error occurs.

After removing the cause of the error, turn the ERROR signal OFF using one of the following methods.

Method 1: Input an error clear command from an external device such as a PLC.

Method 2: Input a measurement trigger again.

(For example, turn the TRIG signal ON during a one-shot measurement.)

The ERROR signal will turn OFF when measurement is executed correctly.

Note

This function can be used in Run Mode only.

Settings

▶ **[In/Out] – [I/O setting] – [I/O terminals] – [Input] – [Input mode]**

Press [Expand mode].

Wiring

| Color | Signal | State | Description |
|------------|--------------|-------|---------------------------------------|
| Gray | IN0 | OFF | Command parameter for clearing errors |
| Green | IN1 | OFF | |
| Red | IN2 | ON | |
| White | IN3 | OFF | |
| Purple | IN4 | OFF | |
| Yellow | IN5 | ON | Command input for clearing errors |
| Orange | OUT1 (BUSY) | -- | Processing in progress (default) |
| Light blue | OUT2 (ERROR) | -- | ERROR signal (default) |

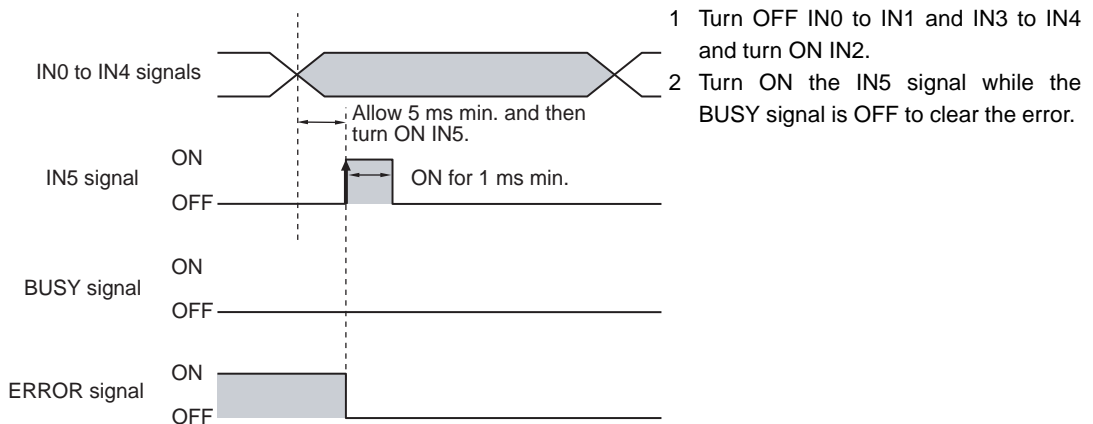
The signals shown at the left are used.

Refer to the following information for signal wiring.



2-4 Wiring: p. 26

Timing Chart



Retry inspection by external signal (trigger retry)

Inspection is repeated until all inspection items have been successfully scanned.

Retry inspection ends when any one of the following conditions is satisfied:

- (1) The scanning result of all inspection items is OK.
- (2) The trigger retry command turns OFF.
- (3) The timeout time is exceeded.

Note

This function can only be used in run mode.

Settings

To use this function, the input mode must be set to "Expanded mode".

► [In/Out] – [I/O setting] – [I/O terminals] – [Input] – [Input mode]

Wiring

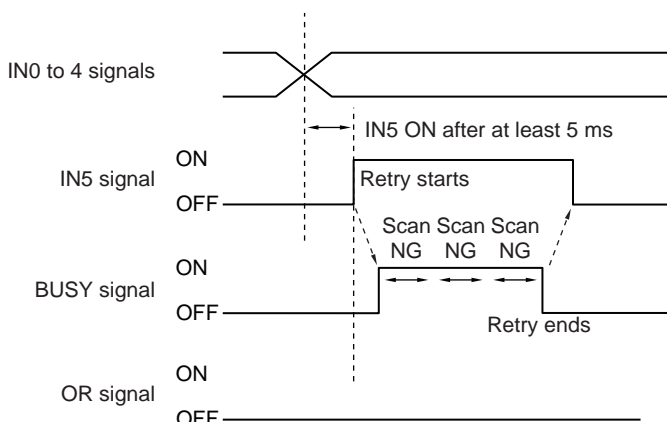
| Color | Signal | State | Description |
|--------|-------------|-------|--------------------------------------|
| Gray | IN0 | OFF | Command parameters for trigger retry |
| Green | IN1 | OFF | |
| Red | IN2 | ON | |
| White | IN3 | ON | |
| Purple | IN4 | OFF | |
| Yellow | IN5 | ON | Command input for trigger retry |
| Orange | OUT1 (BUSY) | -- | Busy |
| Black | OUT0 (OR) | -- | Overall judgment (default) |

The signals at left are used. For the wiring of each signal, refer to the following:



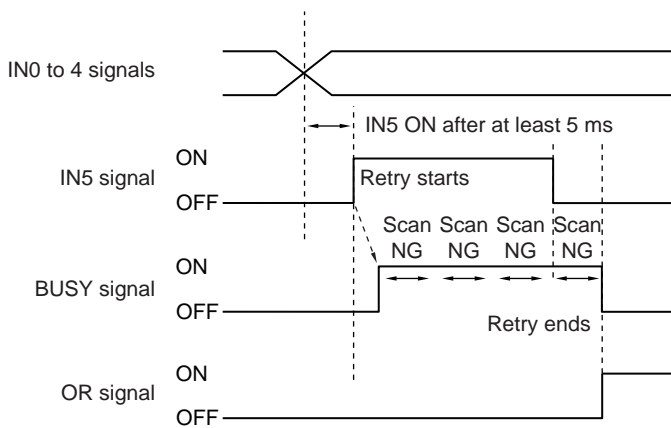
2-4 Wiring: p. 26

Timing chart When inspection is OK



- 1 IN0, 1 and 4 are turned OFF, IN2 and 3 are turned ON.
- 2 When IN5 is turned OFF > ON with the BUSY signal OFF, trigger retry inspection starts.
- 3 When retry inspection starts, the BUSY signal turns ON.
- 4 When the overall judgment turns ON, retry inspection ends and the BUSY signal turns OFF.
- 5 After verifying that the BUSY signal has turned ON > OFF, IN5 is turned ON > OFF.

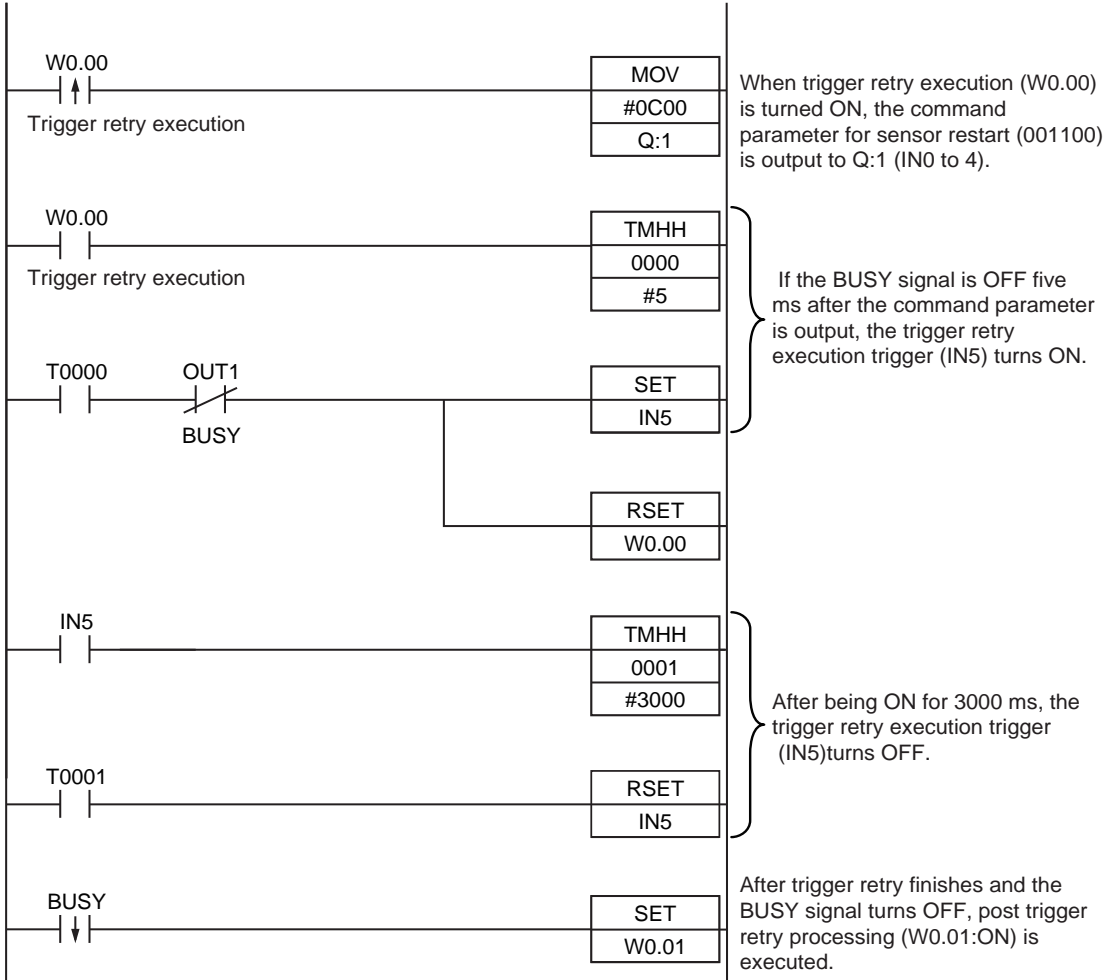
Timing chart When inspection is NG



- 1 IN0, 1 and 4 are turned OFF, IN2 and 3 are turned ON.
- 2 When IN5 is turned OFF > ON with the BUSY signal OFF, trigger retry inspection starts.
- 3 When retry inspection starts, the BUSY signal turns ON.
- 4 If retry inspection ends but the overall judgment is NG, the OR signal turns ON. (Output polarity: When ON at NG)

Sample Ladder Program

This sample ladder program executes trigger retry when the I/O input mode is expanded mode. Trigger retry is executed at W0.00 ON.



• I/O Signal Allocations

| Signal type | Address | |
|---------------|--------------------|----------|
| Output signal | OUT1 (BUSY signal) | CIO 0.01 |
| Input signals | IN0 | CIO 1.08 |
| | IN1 | CIO 1.09 |
| | IN2 | CIO 1.10 |
| | IN3 | CIO 1.11 |
| | IN4 | CIO 1.12 |
| | IN5 | CIO 1.15 |

Note

The time the BUSY signal is ON is the trigger retry execution time.

Important

It may happen that the PLC is unable to recognize BUSY signal ON because the sample time is slow or otherwise. In this event, have W0.00 turn OFF at a suitable time.

Resetting the sensor

Sensor reset is explained below.

Note

This function can only be used in Run mode.

Settings

To use this function, the input mode must be set to "Expanded mode".

► [In/Out] – [I/O setting] – [I/O terminals] – [Input] – [Input mode]

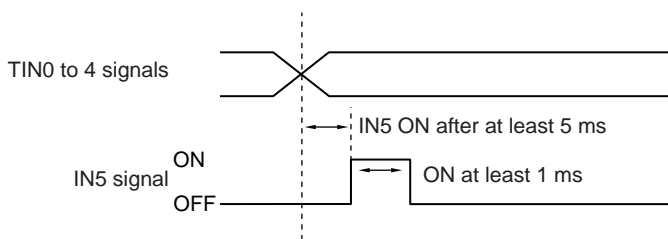
Wiring

| Color | Signal | State | Description |
|--------|-------------|-------|-------------------------------------|
| Gray | IN0 | OFF | Command parameters for sensor reset |
| Green | IN1 | ON | |
| Red | IN2 | OFF | |
| White | IN3 | ON | |
| Purple | IN4 | OFF | Command input for sensor reset |
| Yellow | IN5 | ON | |
| Orange | OUT1 (BUSY) | -- | |

The signals at left are used.
For the wiring of each signal, refer to the following:



2-4 Wiring: p. 26



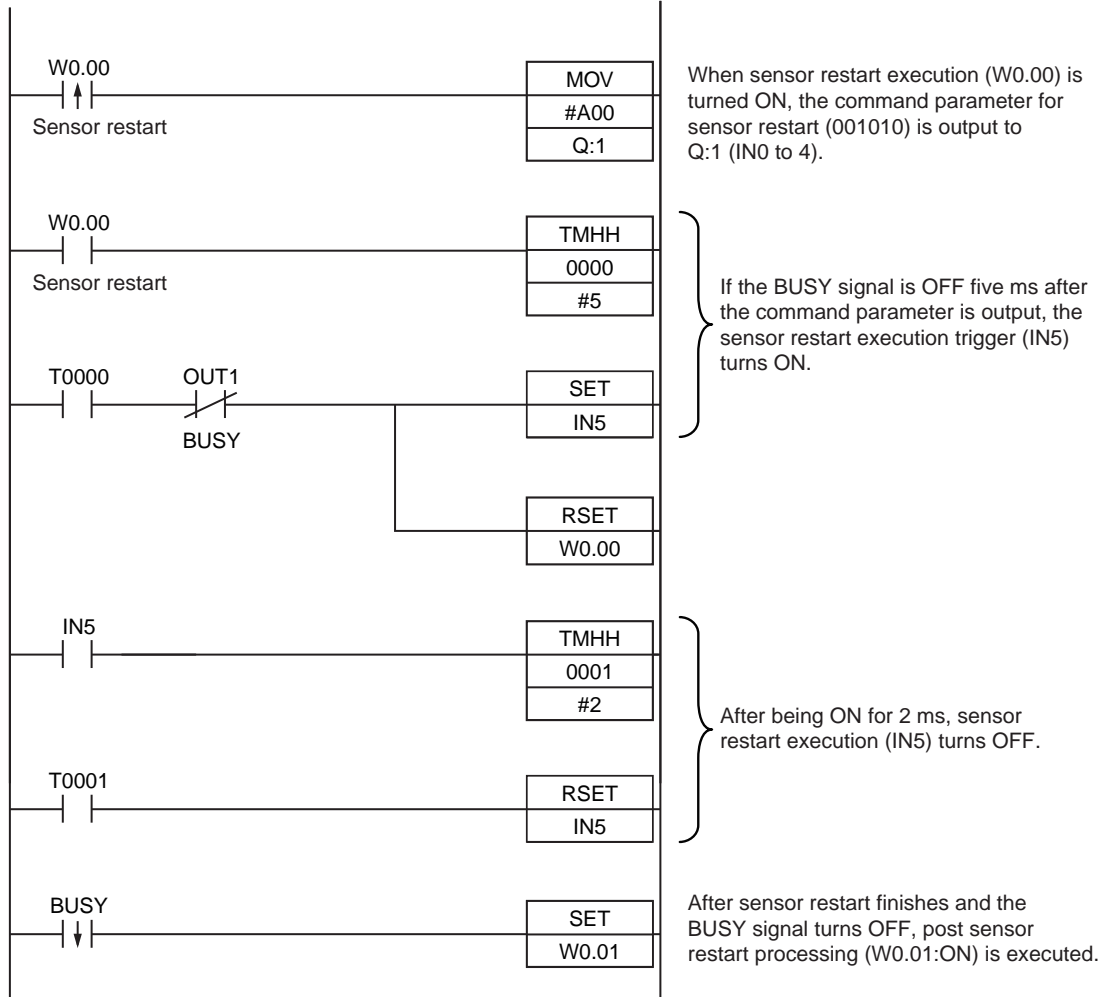
- 1 IN0, 2 and 4 are turned OFF, IN1 and 3 are turned ON.
- 2 IN5 is turned OFF > ON with the BUSY signal OFF. The BUSY signal does not turn ON while the restart command is being received.
- 3 When the initialization process starts, the BUSY signal turns ON.
For the initialization process, refer to the following:



Operation with Default Configuration
p.96

Sample Ladder Program

This sample program inputs IN5 to restart the sensor.
Trigger retry is executed at W0.00 ON.



• I/O Signal Allocations

| Signal type | Address | |
|---------------|--------------------|----------|
| Output signal | OUT1 (BUSY signal) | CIO 0.01 |
| Input signals | IN0 | CIO 1.08 |
| | IN1 | CIO 1.09 |
| | IN2 | CIO 1.10 |
| | IN3 | CIO 1.11 |
| | IN4 | CIO 1.12 |
| | IN5 | CIO 1.15 |

Note

The time the BUSY signal is ON is the sensor initialization process execution time.

Important

It may happen that the PLC is unable to recognize BUSY signal ON because the cycle time is slow or otherwise. In this event, have W0.00 turn OFF at a suitable time.

Executing teach

Teach is executed as explained below.

Note

This function can only be used in Run mode.

Settings

To use this function, the I/O input mode must be set to "Expanded mode".

► [In/Out] – [I/O setting] – [I/O terminals] – [Input] – [Input mode]

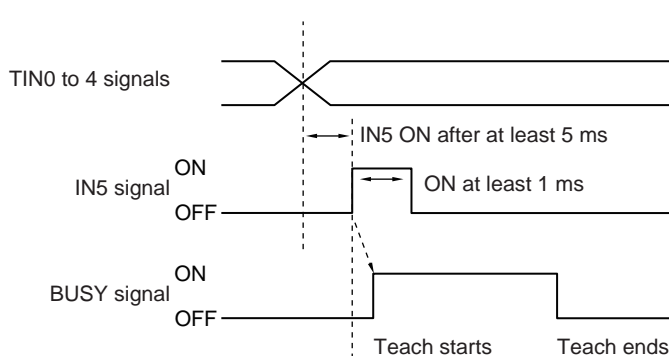
Wiring

| Color | Signal | State | Description |
|--------|-------------|-------|--|
| Gray | IN0 | OFF | Command parameters for teach execution |
| Green | IN1 | ON | |
| Red | IN2 | OFF | |
| White | IN3 | OFF | |
| Purple | IN4 | OFF | |
| Yellow | IN5 | ON | Command input for teach execution |
| Orange | OUT1 (BUSY) | -- | Busy (default) |

The signals at left are used.
For the wiring of each signal, refer to the following:



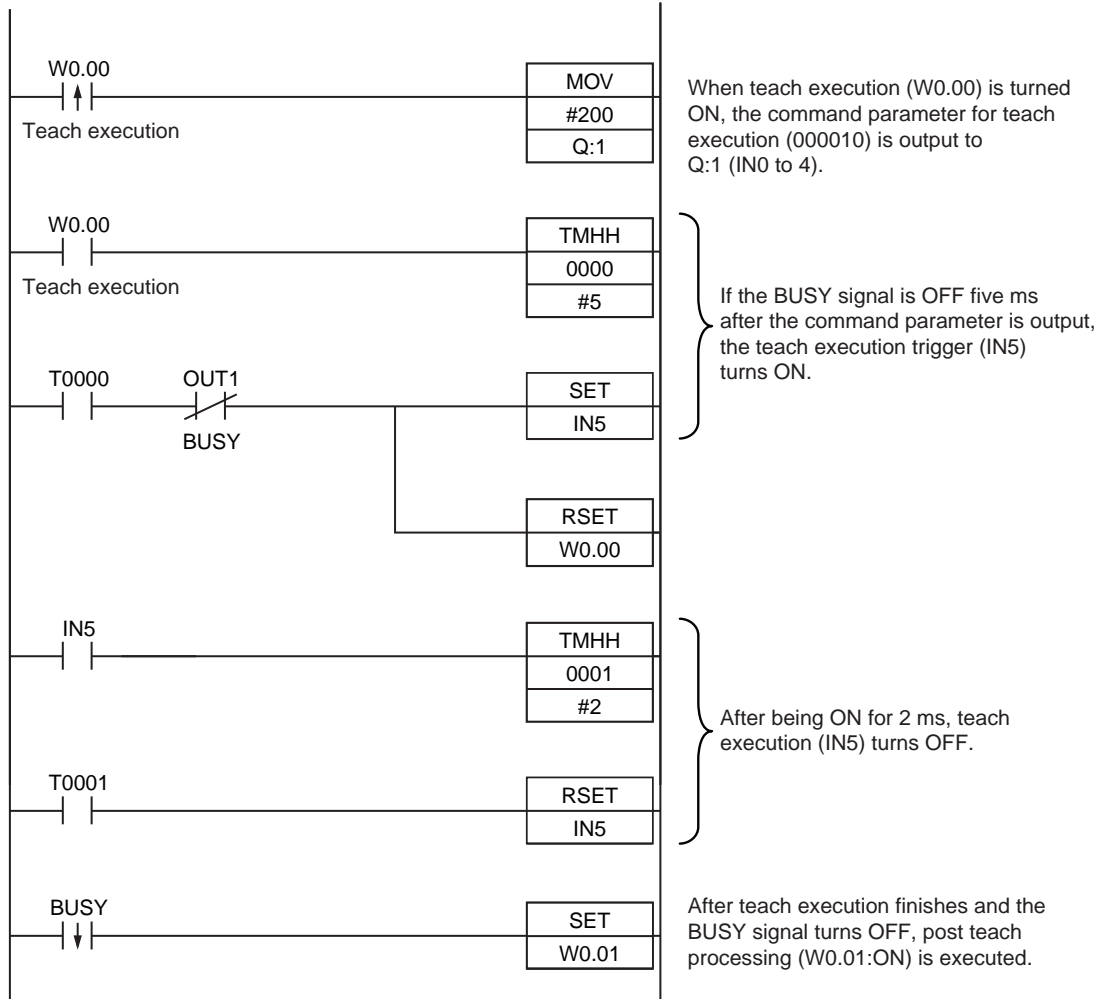
2-4 Wiring: p. 26



- 1 IN0, 1, 3 and 4 are turned OFF, IN1 is turned ON.
- 2 IN5 is turned OFF > ON with the BUSY signal OFF.
- 3 When teach starts, the BUSY signal turns ON.
- 4 When teach ends, the BUSY signal turns OFF.

Sample Ladder Program

This sample program inputs IN5 to execute teach.



• I/O Signal Allocations

| Signal type | Address | |
|---------------|--------------------|----------|
| Output signal | OUT1 (BUSY signal) | CIO 0.01 |
| Input signals | IN0 | CIO 1.08 |
| | IN1 | CIO 1.09 |
| | IN2 | CIO 1.10 |
| | IN3 | CIO 1.11 |
| | IN4 | CIO 1.12 |
| | IN5 | CIO 1.15 |

Note

The time the BUSY signal is ON is the teach execution time.

Important

It may happen that the PLC is unable to recognize BUSY signal ON because the cycle time is slow or otherwise. In this event, have W0.00 turn OFF at a suitable time.

8-2 Outputting/Controlling with Ethernet

Data can be input and output to external devices via Ethernet. The two methods are described below.

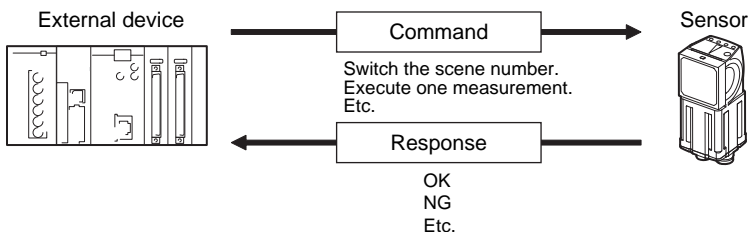
- No-protocol Data Output

Data that is already specified for output is automatically output from the Sensor to Ethernet when an overall judgement result is output. Up to 32 data can be output in the specified format (ASCII format or binary format).



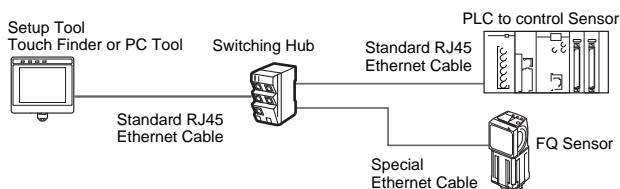
- No-protocol Command/Response Method

The external device sends a command to the Sensor and receives a response from the Sensor.



Connections

Connect the Switching Hub and PLC using an FQ-WN□□ Special Ethernet Cable.



Important

When connecting more than one Sensor, set the IP addresses so that the same IP address is not used for more than one Sensor.

Set the Basic Settings of the Ethernet

Use the following procedure to turn OFF automatic settings for Ethernet, and enter the IP address and subnet mask.

► [Sensor settings] – [Network] – [Ethernet]

- 1** Press [Auto connection].
- 2** Press [OFF] to select it.
You can now set the IP address manually.
- 3** Enter the IP address and subnet mask.

| Item | Purpose | Setting range |
|-------------|-------------------------------------|--|
| IP address | Enter the IP address of the Sensor. | 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) |
| Subnet mask | Enter the subnet mask. | 0.0.0.0 to 255.255.255.255 (Default: 255.255.255.0) |

Note

The port number is always 9876.

Setting the Data to Output via Ethernet

Allocate the data to output via Ethernet according to the output method for the Ethernet as shown below.

- No-protocol Command/Response Method

When executing one-shot measurements and continuous measurements with commands (MEASURE or M, MEASURE/C or M/C), set the data to output via Ethernet as a response.

- No-protocol Data Output

Set in advance the data to output via Ethernet after the measurements (32 max.).

Data That Can Be Output

Up to 32 data can be output (data 0 to data 31).

Allocating Output Data

Allocate Ethernet output data to data 0 to 31. Data that can be assigned are the judgment, number of detected characters, cell recognition rate, contrast, and focus.

The settings for outputting the [0.2D-code] judgment JG to data 0 are explained below.

► [In/Out] – [I/O setting] – [Ethernet] – [Output data set]

1 Press [0. Data 0].

2 Press [Settings].



3 Press [0.2D-code].



4 Press [Judgement JG].



This process is repeated to register data 1 or higher.

Outputting the Scan Result

You can specify whether the scanned text string is output.

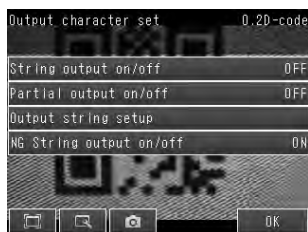
The procedure for setting output of the scanned text string of a [0.2D-code] is explained below.

► [In/Out] – [I/O setting] – [Ethernet] – [Output character set]

1 Press [0.2D-code] in "Output character set".



2 Set [String output on/off], [Partial output on/off], [Output string setup], and [NG String output on/off].



| Parameter | Settings | Description |
|-------------------------|---|---|
| String output on/off | OFF (default), ON | Sets whether the scan result is output by Ethernet. |
| Partial output on/off | OFF (default), ON | When "String output on/off" is ON, selects whether a range of the scanned data is specified for output. |
| Output string setup | 1 to 1024 (Default setting - starting character: 1, ending character: 1024) | Sets the starting character and ending character of output. If the set character does not exist in the scanned text string, an error output code is output. |
| NG String output on/off | OFF (default), ON | Sets whether an NG result (?E000, ?E100, ?E200, ?E300) is output by Ethernet. |

Repeat the above to output scan results of Inspection Items following [0.2D-code].

Note

- Output order

When scan results and data are output by Ethernet, data is output first followed by the scan result (text string).

Example - Scan result: ABC

When

[Data output] - [Data 0]: 0 (judgment OK)

[Data output] - [Data 2]: 100 (cell recognition rate)

output is in the following order:

0 (field separator) 100 (record separator) ABC (record separator) CR

- Code conversion

The following character codes are converted before output:

| Character code | Before conversion | After conversion |
|----------------|-------------------|------------------|
| Comma | &h2c | &h8540 |
| Tab | &h09 | &h8541 |
| Space | &h20 | &h8542 |
| CR | &h00 | &h8543 |
| LF | &h0A | &h8544 |

Outputting Data to an External Device Using No-protocol Communications

Setting the Data To Output Automatically

 Refer to *Setting the Data to Output via Ethernet*.

Setting the Data Format

▶ [In/Out] – [I/O setting] – [Ethernet]

- 1 Press [Output form].
- 2 Set the output format to ASCII or binary.
- 3 Set the data format.



- When Output Format Is ASCII

Set the parameters for integer digits, decimal digits, negative numbers, 0 suppression, the field separator, and the record separator.

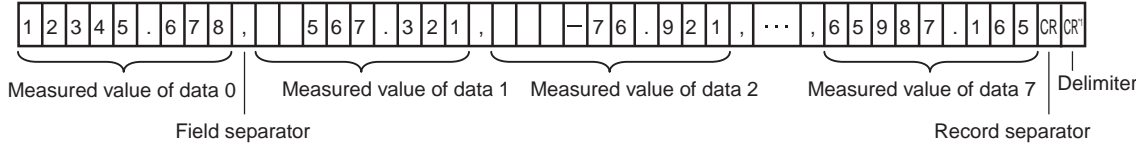
• **Output Format**

| | | | | | | |
|--------------------------|---|--------------------------|---|-----|--------------------------|----|
| Measured value of data 0 | , | Measured value of data 1 | , | ... | Measured value of data 7 | CR |
|--------------------------|---|--------------------------|---|-----|--------------------------|----|

Note

The data output method, digits, and data separators can be changed as needed.

Example: Integer digits: 5, decimal digits: 3, negative number expression: -, field separator: comma, record separator: CR



*1 Because the record separator is set to CR, only one record is output for each measurement. A blank line (CR: delimiter) will therefore be entered after the record separator. If you do not want a blank line, set the record separator to None.

Note

The field separator is not output unless the data continues.

The following range of values can be output.

$$-999,999,999.9999 \leq \text{Measured value} \leq 999,999,999.9999$$

If the measured value is lower than -999,999,999.9999, then -999,999,999.9999 is output.

If the measured value is higher than 999,999,999.9999, then 999,999,999.9999 is output.

The following values are output if JG (Judge) is set.

OK: 0

NG: -1

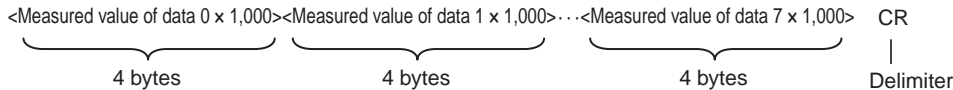
Note

Data that is output after measurement is output until the last data even after the measurement is finished. Data output is not interrupted midway.

• **When Output Format Is Binary**

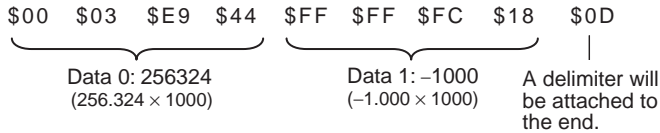
- Set the numerical expression.
- Select either fixed decimal or floating-point decimal.

• **Output Format**



The measurement data multiplied by 1,000 is output continuously at 4 bytes per data. Negative numbers are output as two's complements.

Example: When Data 0 is 256.324 and Data 1 is -1.000.



Note

Binary output does not use data separators, i.e., field separators or record separators. These separators are used only for ASCII output.

The following range of values can be output.

$-2,147,483.648 \leq \text{Measured value} \leq 2,147,483.647$

If the measured value is lower than $-2,147,483.648$, then $-2,147,483.648$ is output.

If the measured value is higher than $2,147,483.648$, then $2,147,483.648$ is output.

The following values are output if JG (Judge) is set.

OK: 0 (0×1000)

NG: -1000 (-1×1000)

Note

Data that is output after measurement is output until the last data even after the measurement is finished. Data output is not interrupted midway.

Command Format

This section describes the command format for no-protocol communications.

Commands defined in the command list can be used.

Set commands and parameters in ASCII.

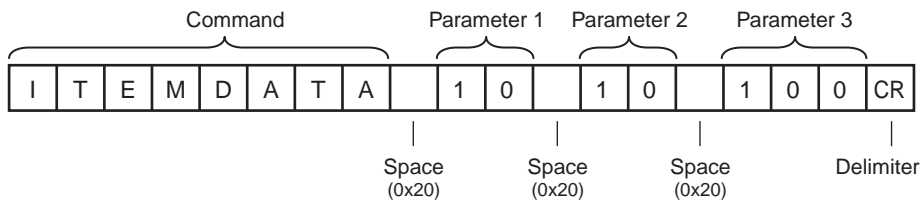
If the command has an argument parameter, set the parameter after inserting a space (0x20).

If it has multiple parameters, insert a space before each parameter.

Place a delimiter at the end of the command. No space is required before the delimiter.

The delimiter is always CR.

<Command Format>



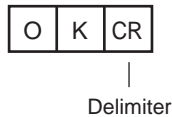
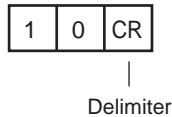
<Response Format>

If a parameter is attached, the parameter and delimiter are output when the command is processed normally, and the command execution result is OK. A delimiter is inserted at the end of the response.

The delimiter is always CR.

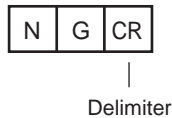
Command Execution Result

Parameter



If the command is not processed normally, the command execution result is NG.

Command Execution Result



An error occurs in the following cases.

- A non-existent command was specified.
- The number of parameters is incorrect.
- The parameter range is incorrect.
- The parameter content is incorrect.
- Operation could not be performed normally for the operation command.

Command List

The following table lists the no-protocol commands.

Commands that can be used in no-protocol Ethernet communications are listed below.

| Type of command | Command | Abbreviation | Function | Reference |
|-----------------------------------|--|--|--|-----------|
| Scene control commands | SCENE | S or SN | Acquires the current scene number. | p. 127 |
| | SCENE <i>Scene_number</i> | S <i>Scene_number</i> or SN <i>Scene_number</i> | Changes the scene number being used. | p. 128 |
| Measurement control commands | MEASURE | M | Executes one measurement. | p. 129 |
| | MEASURE/C | M/C or GC | Starts continuous measurements. | p. 130 |
| | MEASURE/E | M/E or SC | Ends continuous measurements. | p. 131 |
| | TEACH | FT | Executes 2D code teaching. | p. 132 |
| Data acquisition/setting commands | LASERTIME | LT | Acquires the shutter time. | p. 133 |
| | LASERTIME <i>Set_value</i> | LT <i>Set_value</i> | Sets the shutter time. | p. 134 |
| | GAIN | GN | Acquires the gain. | p. 135 |
| | GAIN <i>Set_value</i> | GN <i>Set_value</i> | Sets the gain. | p. 136 |
| | BRIGHTNESS | BN | Acquires the brightness. | p. 137 |
| | BRIGHTNESS <i>Set_value</i> | BN <i>Set_value</i> | Sets the brightness. | p. 138 |
| | FILTERDATA <i>External_reference_data_number</i> | FD <i>External_reference_data_number</i> | Acquires filter setting information. | p. 139 |
| | FILTERDATA <i>External_reference_data_number</i> <i>Set_value</i> | FD <i>External_reference_data_number</i> <i>Set_value</i> | Sets filter setting information. | p. 140 |
| | ITEMDATA <i>Inspection_item_number</i> <i>External_reference_data_number</i> | ID <i>Inspection_item_number</i> <i>External_reference_data_number</i> | Acquires the inspection item data. | p. 141 |
| | ITEMDATA <i>Inspection_item_number</i> <i>External_reference_data_number</i> <i>Set_value</i> | ID <i>Inspection_item_number</i> <i>External_reference_data_number</i> <i>Set_value</i> | Sets the inspection item data. | p. 142 |
| Setting acquisition command | VERGET/S | VR | Acquires the version information of the Sensor software. | p. 144 |
| | VERGET/H | None | Acquires the Sensor model information. | p. 145 |
| | ERRGET | None | Acquires the latest error code of the Sensor. | p. 146 |
| | SAVEALLDATA | SV | Saves all sensor information. | p. 147 |
| Utility commands | CLRMEAS | None | Clears the measurement values. | p. 148 |
| | CLRERR | None | Clears the error output status (error signal and error indicator). | p. 149 |
| | RESET | None | Restarts the Sensor. | p. 150 |

Command Details

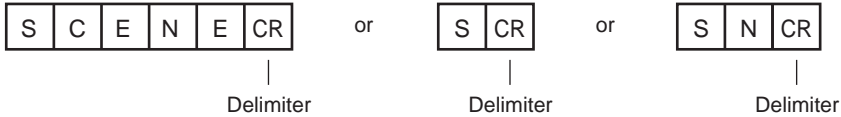
Scene Control Commands

● SCENE or S or SN

Acquire Scene Number

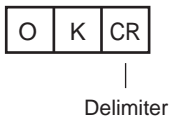
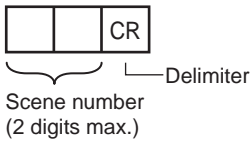
This command acquires the scene number currently being used.

<Command Format>

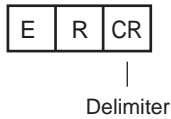


<Response Format>

When the Command Is Processed Normally



When the Command Is Not Processed Normally



<Parameter Descriptions>

| | |
|--------------|--|
| Scene number | The acquired scene number (currently used scene number) is returned. |
|--------------|--|

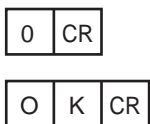
Example:

When Scene 0 Is Being Used

<Command>



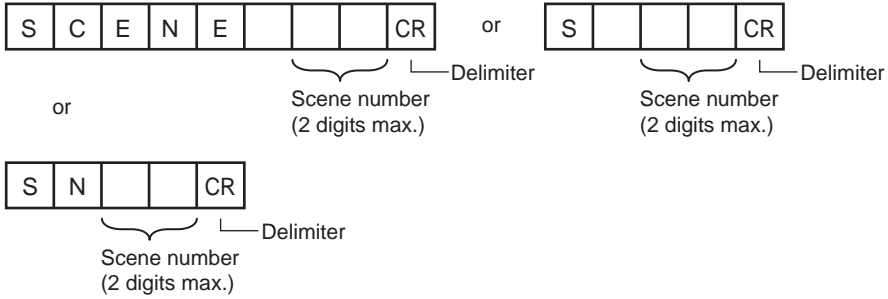
<Response>



Change Scene Number

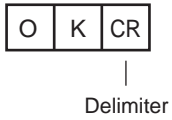
This command changes the scene number to use.

<Command Format>

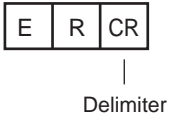


<Response Format>

When the Command Is Processed Normally



When the Command Is Not Processed Normally



<Parameter Descriptions>

| | |
|--------------|--|
| Scene number | Specifies the scene number (0 to 31) to change to. |
|--------------|--|

Measurement Control and Measurement Acquisition Commands

- MEASURE or M or GL/GC/SC

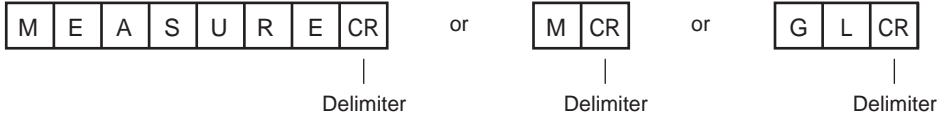
Execute Measurement

This command executes one measurement.

If Ethernet output is not set, only the measurement is performed.

If Ethernet output is set, the measurement is performed and the result is returned as response data.

<Command Format>



<Response Format>

When the Command Is Processed Normally

| | | |
|---|---|----|
| O | K | CR |
|---|---|----|

| | |
|-----------------------|----|
| Measurement result | CR |
|-----------------------|----|

|
Delimiter

When the Command Is Not Processed Normally

| | | |
|---|---|----|
| E | R | CR |
|---|---|----|

|
Delimiter

<Parameter Descriptions>

| | |
|--------------------|--|
| Measurement result | <p>The measurement result is output as the response when Ethernet output is set. The measurement result is not output when Ethernet output is not set.</p> <p> Reference: <i>Setting the Data to Output via Ethernet</i> (p. 120)</p> |
|--------------------|--|

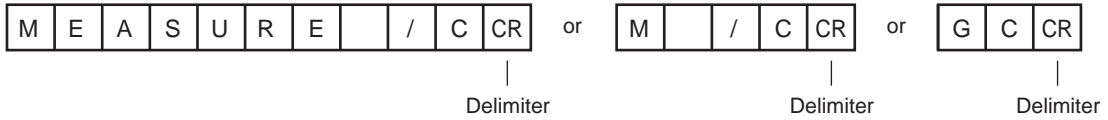
Start Continuous Measurements

This command starts continuous measurements.

If Ethernet output is not set, only continuous measurement is performed.

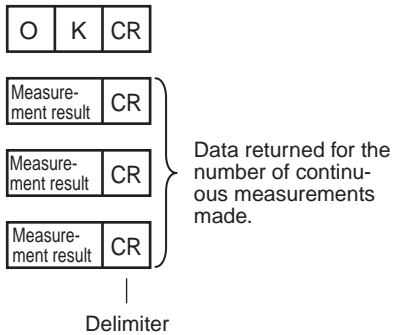
If Ethernet output is set, continuous measurement is performed and the results corresponding to the number of measurements made are returned as response data.

<Command Format>

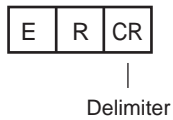


<Response Format>


When the Command Is Processed Normally



When the Command Is Not Processed Normally



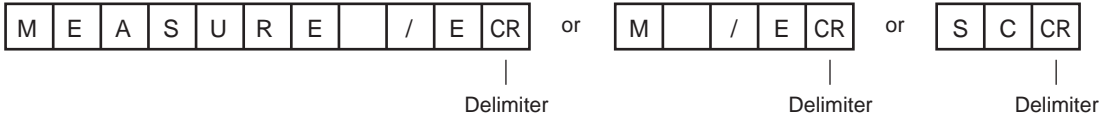
<Parameter Descriptions>

| | |
|--------------------|---|
| Measurement result | The measurement results corresponding to the number of measurements made are output when Ethernet output is set. The measurement result is not output when Ethernet output is not set.  Reference: <i>Setting the Data to Output via Ethernet</i> (p. 120) |
|--------------------|---|

End Continuous Measurements

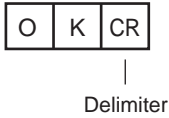
The command ends continuous measurements.

<Command Format>

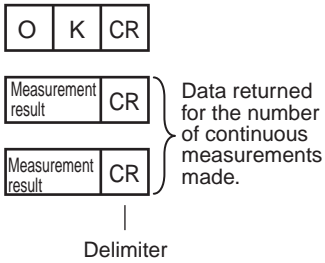


<Response Format>

When the Command Is Processed Normally



When the Command Is Not Processed Normally



Note

Set the Ethernet output to output measurement results.
If Ethernet output is not set, only the command response is output.

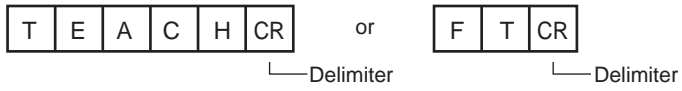
 Reference: *Setting the Data to Output via Ethernet* (p. 120)

● TEACH

Execute Teaching

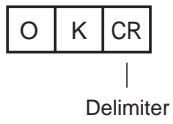
This command executes 2D code teaching.

<Command Format>

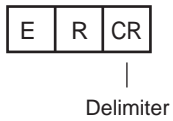


<Response Format>

When scanning is successful



When scanning fails



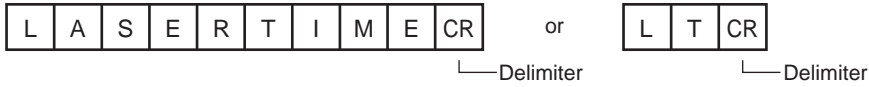
Acquire Shutter Time

This command acquires the shutter time.

This command is only valid when the HDR function is OFF.

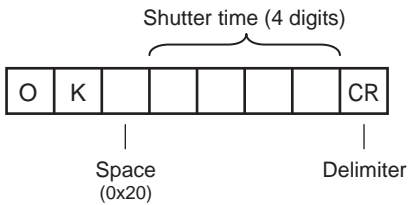
● LASERTIME or LT

<Command Format>

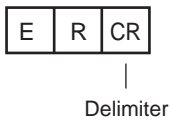


<Response Format>

When the command is processed normally



When the command is not processed normally



<Parameter Description>

| | |
|---------------|---|
| Exposure time | The exposure time is output as a 4 digit value in units of 1/100 ms. Example: When the exposure time is 5.47 ms OK 0547 |
|---------------|---|

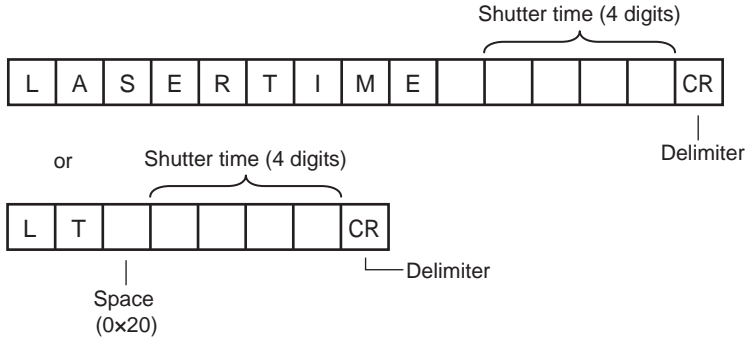
Set Shutter Time

This command sets the shutter time.

This command is only valid when the HDR function is OFF.

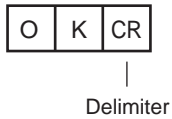
● LASERTIME or LT

<Command Format>

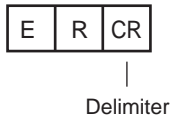


<Response Format>

When the command is processed normally



When the command is not processed normally



<Parameter Description>

| | |
|--------------|--|
| Shutter time | Sets the exposure time in units of 0.01 ms. Enter a 4-digit value. |
|--------------|--|

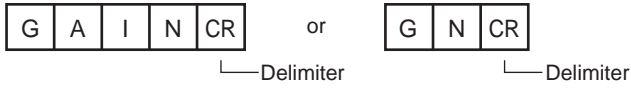
Acquire gain

This command acquires the sensor gain.

This command is valid when the HDR function is OFF.

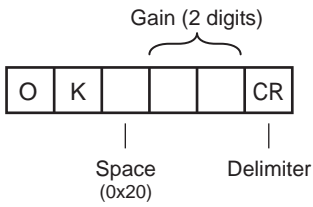
● GAIN or GN

<Command Format>

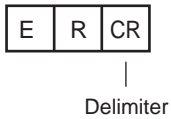


<Response Format>

When the command is processed normally



When the command is not processed normally



<Parameter Description>

| | |
|------|--|
| Gain | The gain is output as a value from 16 to 64. |
|------|--|

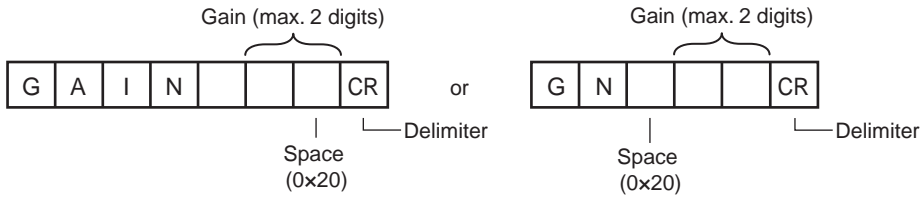
Set Gain

Sets the sensor gain.

This command is only valid when the HDR function is OFF.

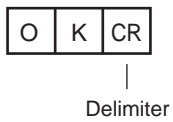
● GAIN or GN

<Command Format>

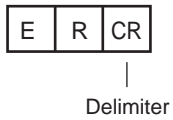


<Response Format>

When the command is processed normally



When the command is not processed normally



<Parameter Description>

| | |
|------|---|
| Gain | Specifies the gain within the range 16 to 64. |
|------|---|

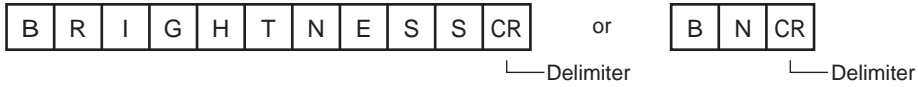
Acquire Brightness

This command acquires the sensor brightness.

This command is only valid when the HDR function is ON.

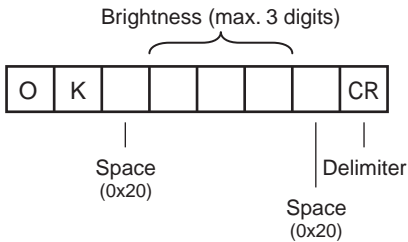
● BRIGHTNESS or BN

<Command Format>

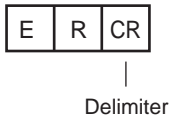


<Response Format>

When the command is processed normally



When the command is not processed normally



<Parameter Description>

| | |
|------------|--|
| Brightness | The brightness is output as a value from 1 to 100. |
|------------|--|

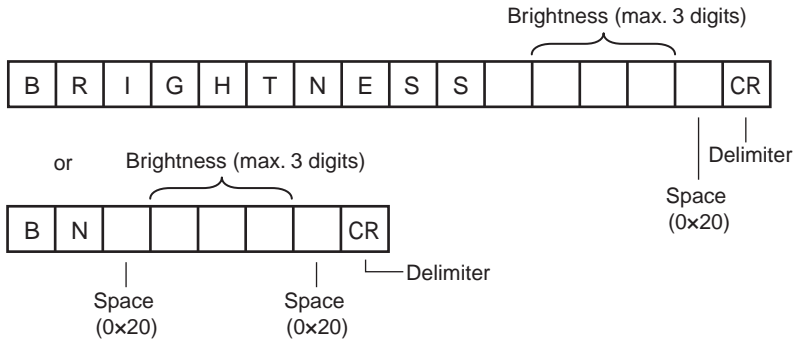
Set Brightness

This command sets the sensor brightness.

This command is only valid when the HDR function is ON.

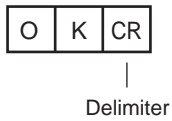
● BRIGHTNESS or BN

<Command Format>

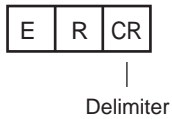


<Response Format>

When the command is processed normally



When the command is not processed normally



<Parameter Description>

| | |
|------------|---|
| Brightness | Sets the brightness as a value from 1 to 100. |
|------------|---|

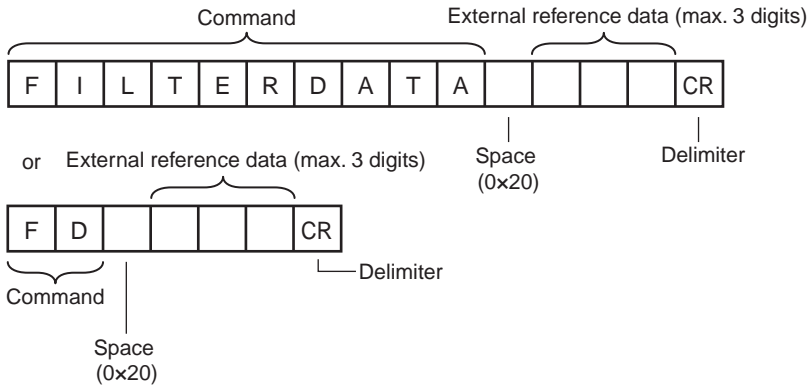
Data Acquisition/Setting Commands

● FILTERDATA or FD

Acquire Filter Setting Information

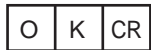
This command acquires the filter type and filter size

<Command Format>



<Response Format>

When the Command Is Processed Normally



Delimiter

When the Command Is Not Processed Normally



Delimiter

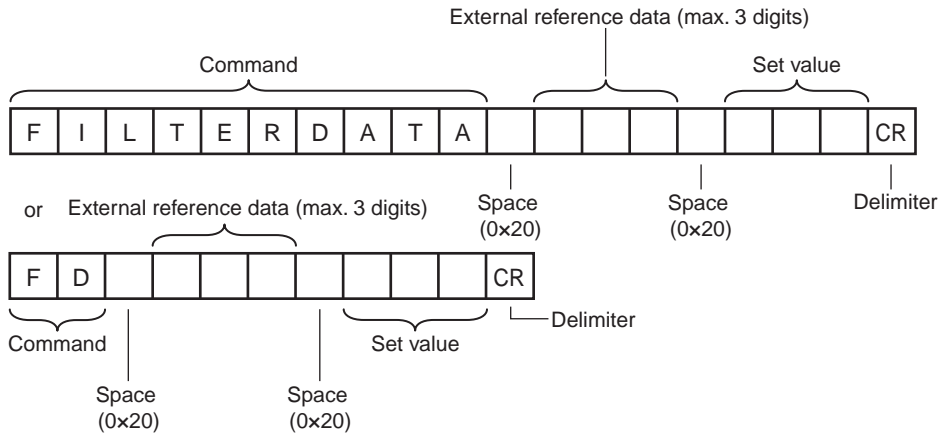
<Parameter Descriptions>

| | |
|-------------------------|---|
| External reference data | Specifies the external reference data number Refer to 10-2 External Reference Parameters (p. 168) for details. |
| Acquired value | Responds with specified filter setting. Refer to 10-2 External Reference Parameters (p. 168) for details. |

Set Filter Information

This command sets the filter type and filter size.

<Command Format>



<Response Format>

When the Command Is Processed Normally



Delimiter

When the Command Is Not Processed Normally



Delimiter

<Parameter Descriptions>

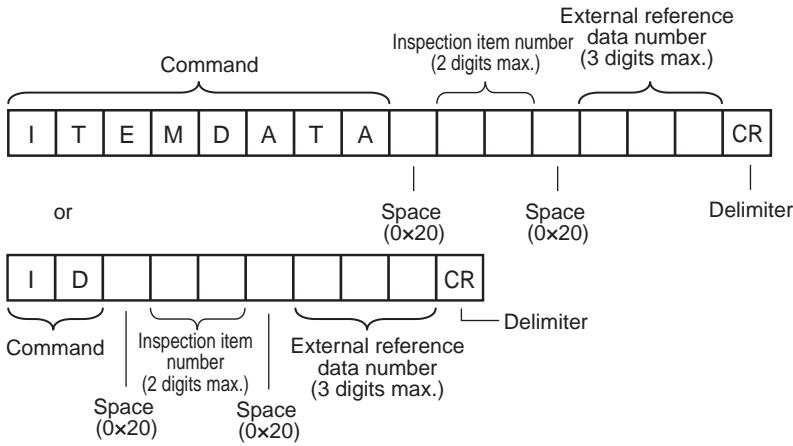
| | |
|--------------------------------|--|
| External reference data number | Specifies the external reference data number. Refer to 10-2 External Reference Parameters (p. 168) for details. |
| Setting | Specifies the set value. Refer to 10-2 External Reference Parameters (p. 168) for details. |

● ITEMDATA or ID

Acquire Inspection Item Data

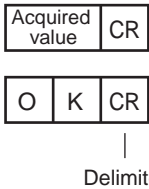
This command acquires the parameters and measurement values of the specified inspection item.

<Command Format>

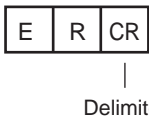


<Response Format>

When the Command Is Processed Normally



When the Command Is Not Processed Normally



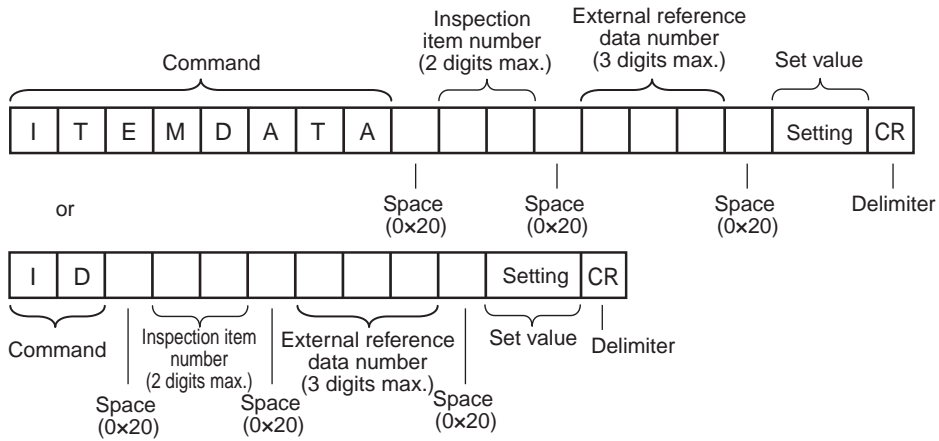
<Parameter Descriptions>

| | |
|--------------------------------|---|
| Inspection item number | Specifies the inspection item number. (0 to 31) |
| External reference data number | Specifies the external reference data number. (0 to 999) Refer to 10-2 External Reference Parameters (p. 168) for details. |
| Acquired value | Returns the data for the specified inspection item. Refer to 10-2 External Reference Parameters (p. 168) for details. |

Set Inspection Item Data

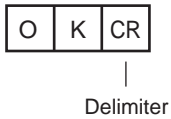
This command sets the parameters and measurement values of the specified inspection item.

<Command Format>

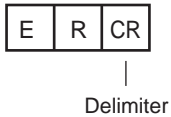


<Response Format>



When the Command Is Processed Normally



When the Command Is Not Processed Normally



<Parameter Descriptions>

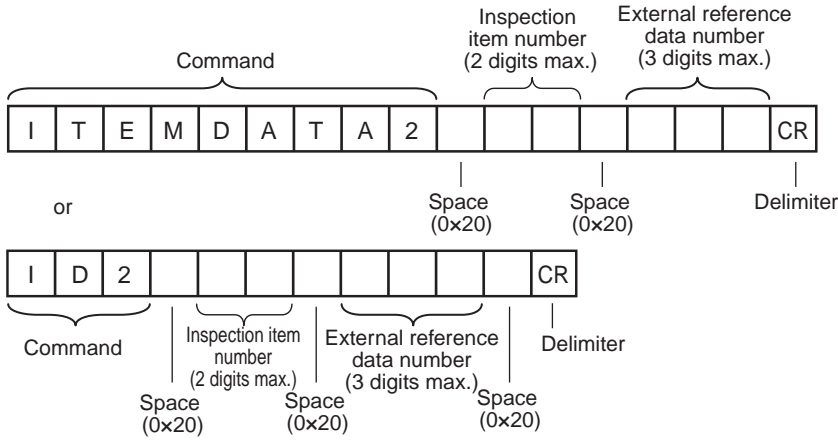
| | |
|--------------------------------|--|
| Inspection item number | Specifies the inspection item number. (0 to 31) |
| External reference data number | Specifies the external reference data number. (0 to 999)  Refer to <i>10-2 External Reference Parameters</i> (p. 168) for details. |
| Acquired value | Returns the data for the specified inspection item.  Refer to <i>10-2 External Reference Parameters</i> (p. 168) for details. |

● ITEMDATA2 Command or ID2

Acquire Inspection Item Text String Data

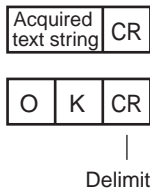
This command acquires the text string data of the specified Inspection Item.

<Command Format>



<Response Format>



When the Command Is Processed Normally



When the Command Is Not Processed Normally



<Parameter Descriptions>

| | |
|--------------------------------|--|
| Inspection Item number | Specifies the Inspection Item number. (0 to 31) |
| External reference data number | Specifies the external reference data number. (0 to 999)  Refer to <i>10-2 External Reference Parameters</i> (p. 168) for details. |
| Acquired text string | Responds with the text string data of the specified Inspection Item.  Refer to <i>10-2 External Reference Parameters</i> (p. 168) for details. |

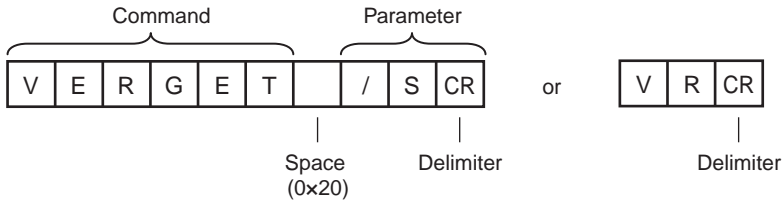
Setting Acquisition Commands

● VERGET

Acquire Software Version

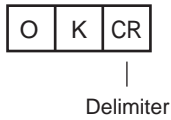
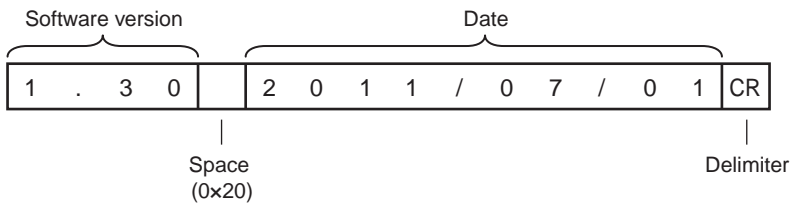
This command acquires the version information of the Sensor software.

<Command Format>

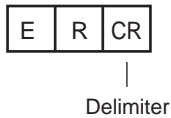


<Response Format>

When the Command Is Processed Normally



When the Command Is Not Processed Normally



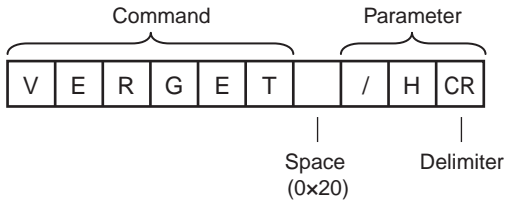
<Parameter Descriptions>

| | |
|------------------|--|
| Software version | Returns the software version. Example: When the software version is 1.30, the response is 1.30. |
| Date | Returns the date. Example: When the date is 01 July 2011, the response is 2011/07/01. |

Acquire Sensor Model

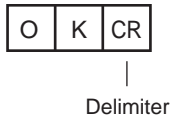
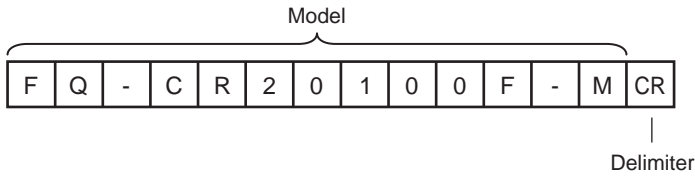
This command acquires the Sensor model.

<Command Format>

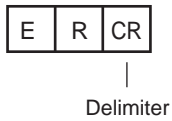


<Response Format>

When the Command Is Processed Normally



When the Command Is Not Processed Normally



<Parameter Descriptions>

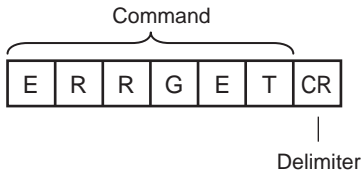
| | |
|-------|--|
| Model | Returns the model. Example: When the model is FQ-CR20100F-M, the response is FQ-CR20100F-M. |
|-------|--|

● ERRGET

Acquire Error Information

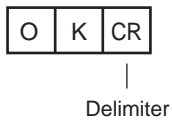
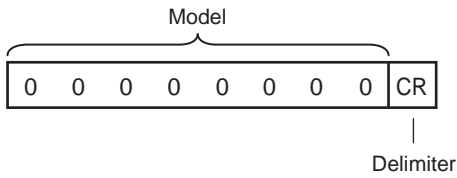
This command acquires the latest error code from the Sensor.

<Command Format>

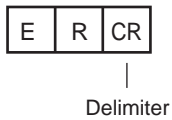


<Response Format>


When the Command Is Processed Normally



When the Command Is Not Processed Normally



<Parameter Descriptions>

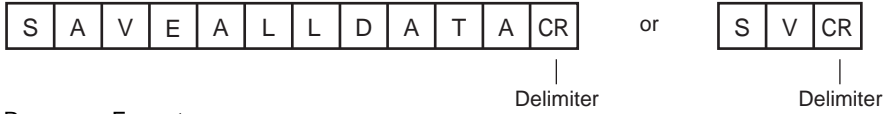
| | |
|------------|--|
| Error code | Returns the latest error code. If there is no error history, the response is 00000000.  Refer to 9-1 Error Table (p. 154) for details. |
|------------|--|

Save All Sensor Information

This command saves all sensor information, including scene data and system data in the flash memory inside the sensor.

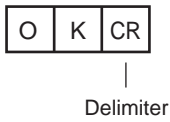
- SAVEALLDATA or SV

<Command Format>

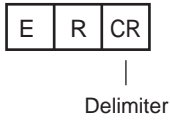


<Response Format>

When the Command Is Processed Normally



When the Command Is Not Processed Normally



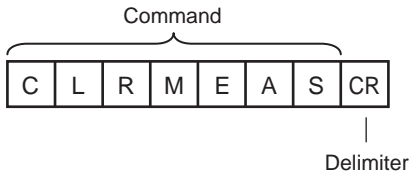
Utility Commands

● CLRMEAS

Clear Measurement Values

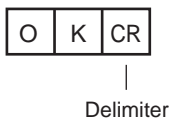
This command clears the measurement values.

<Command Format>

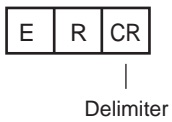


<Response Format>

When the Command Is Processed Normally



When the Command Is Not Processed Normally

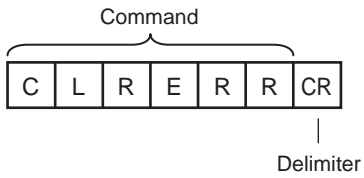


● CLRERR

Clear Errors

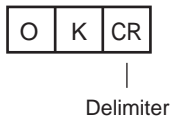
This command clears the error output status (error output and error indicator).

<Command Format>

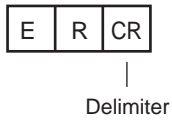


<Response Format>

When the Command Is Processed Normally



When the Command Is Not Processed Normally

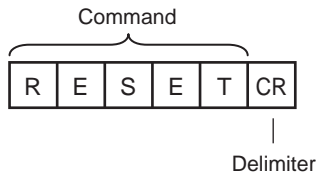


● RESET

Restarts the Sensor.

This command restarts the Sensor.

<Command Format>

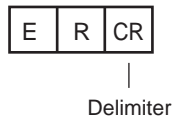


<Response Format>

When the Command Is Processed Normally

If process is completed normally, the Sensor is restarted. There is therefore no response.

When the Command Is Not Processed Normally



Communications Example

An example of the communications log when a computer is connected and communications is performed with a no-protocol command from a terminal application is shown below.

Example 1: Changing Scenes (Scene number 1 is specified.)

```
S_1
  |
  +----- Space
OK
```

Example 2: Acquiring inspection item data (Acquires the judgement result for a 2D-code registered to inspection item 10.)

```
ITEMDATA_10_0
  |
  +----- Space
0
OK
```

Example 3: Measurement when Ethernet Output Is Not Set

```
M
OK
```

Example 4: Measurement when Ethernet Output Is Set

```
M
OK
    1.0000    0.0000    0.0000    306.0000
M
OK
    2.0000    0.0000    0.0000    0.0000
```


Troubleshooting

| | |
|---------------------------------|-----|
| 9-1 Error Table | 154 |
| 9-2 Basic Troubleshooting | 156 |




9-1 Error Table


Error History

Up to 10 errors will be stored in the error history in the Sensor or Touch Finder.

This section describes the causes of and measures for errors that are stored in the error history.

Errors Stored in the Error History

| Error in error history | Cause | Points to check | Measures to perform |
|--|--|---|--|
| TRIG input error  ERR (Error code: 01040302) | The TRIG signal was input while the BUSY signal was ON. | <ul style="list-style-type: none"> • Check the program in the PLC or other host to see if an interlock or similar measure has been implemented. • If a relay or other device with contacts is being used as the input device, see if chattering has occurred. | <ul style="list-style-type: none"> • Program interlocks to control the TRIG and IN5 input signals so that they do not turn ON while the BUSY signal is ON. • Switch from a device with contacts (e.g., relay) to a device without contacts (e.g., SSR or PLC transistor output). |
| IN input error  ERR (Error code: 11020900) | The IN5 signal was input while the BUSY signal was ON. | | |
| Scene data error  ERR (Error code: 01030800) | The scene could not be switched for an input signal from an external device. | --- | The scene data to be switched to is corrupted. Reset the scene data from the beginning. |
| Logging error (Error code: 02160702, 02160703) | All of the data was not saved when logging data to a file. | Check to see if the BUSY output parameter is set to <i>Measurement</i> . | Set the BUSY output parameter to <i>Data logging</i> or <i>Image logging</i> . |
| SD card output error (Error code: None) | A write to the SD card failed. | Check to see if the SD card is locked. Check to see if there is sufficient space available on the SD card. | Unlock the SD card. Delete unnecessary files from the SD card. |

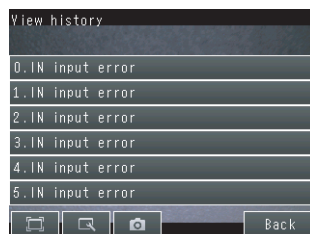
 ERR If an error that is indicated by this icon occurs, the ERROR operation indicator will light and the ERROR signal will turn ON.

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.



• 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]

Note

Refer to the following information for the measures to take when errors occur.

 Errors Stored in the Error History: p. 154

Checking the Latest Error Information (for No-protocol Connection to Ethernet)

The error code of the latest error can be acquired as a response using the error information acquisition command (ERRGET).

- Error Codes: p. 154
- Error Information Acquisition Command (ERRGET): p. 146

Error Messages

If an error occurs while making settings on 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.

9-2 Basic Troubleshooting

| Problem | Measures to perform | Reference |
|--|--|-----------|
| The Sensor or Touch Finder will not start. | Check the power supply capacity to see if it is sufficient. | --- |
| The Sensor cannot be detected. | 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. 31 |
| | Check if there are any Sensors that were not detected by the Sensor connection check. | p. 165 |
| | 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.) | --- |
| The results display is not updated. | Check to see if the TRIG signal is being correctly input to the Sensor. | p. 75 |
| | Check to see if the most recent NG result is being displayed. | p. 14 |
| Updating the results display is slow. | If other devices are connected to the same network as the Sensor, disconnect the other devices from the network and check the update speed. If the update speed returns to normal, check the specifications of the disconnected devices and take suitable measures. | --- |
| | 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 logged properly. | Check to see if the logging setting in the Sensor are correct. | p. 76 |
| | 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. 84 |
| The ERROR indicator lights. | Check the error history to see what error has occurred and take suitable measures. | p. 154 |
| The image brightness does not stabilize. | 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. 39 |

Appendices


| | |
|--|------------|
| 10-1 Menu Tables..... | 158 |
| 10-2 External Reference Parameters | 168 |
| 10-3 Specifications and Dimensions..... | 170 |
| 10-4 Updating the Software..... | 180 |
| 10-5 LED Safety | 181 |
| 10-6 Requirements from Regulations and Standards..... | 182 |

10-1 Menu Tables

Image Tab Page

| Menu command | | Description | Setting range | Data | Reference | | |
|---------------|---------------|---|---|-----------------------------------|-----------------------|-------|--|
| Camera setup | Focus | The value shown here is used as a reference when adjusting the focus with the focus adjustment screw. | --- | --- | p. 35 | | |
| | HDR OFF | Shutter speed | Sets the shutter speed of the sensor. | 1/10 to 1/32258, Default: 1/10 | Scene | | |
| | | Brightness correction | Use to stabilize the brightness. | ON, OFF (default) | Scene | | |
| | | Gain | | Sets the sensor gain. | 16 to 64, Default: 16 | Scene | |
| | | | Brightness correction | Use to stabilize the brightness. | ON, OFF (default) | Scene | |
| | | HDR | Reduces reflected light and bright/dark contrast. | OFF (default), Level 1 to Level 4 | Scene | | |
| | | Partial input | Reduces the image scanning range. | 752 × 8 to 752 × 480 | Scene | | |
| | | Lighting control | Turns sensor lighting on or off. | ON (default), OFF | Scene | | |
| | HDR ON | Brightness | Adjusts the brightness of the image. | AUTO, 1 to 100 | Scene | | |
| | | HDR | Reduces reflected light and bright/dark contrast. | OFF (default), Level 1 to Level 4 | Scene | | |
| | | Brightness correction | Use to stabilize the brightness. | ON, OFF (default) | Scene | | |
| | | Partial input | Reduces the image scanning range. | 752 × 8 to 752 × 480 | Scene | | |
| | | Lighting control | Turns sensor lighting on or off. | ON (default), OFF | Scene | | |
| | Trigger setup | Trigger delay | Adjusts the time until the Camera shutter opens after the trigger signal is received. | 0 to 163 ms (default: 0) | System | p. 41 | |
| | Filter Setup | Filter Setup | | Sets the filter region and type. | | | |
| Filter region | | Sets the filter region. | --- | Scene | | | |
| Select Filter | | Sets the filter. | Filter 1 to Filter 3 | Scene | | | |
| Filter Type | | Sets the filter type. | Smooth, Dilate, Erosion, Median, None (default) | Scene | | | |
| Filter Size | | Sets the filter size | 3 × 3 (default), 5 × 5 | Scene | | | |

Inspect Tab Page


| Menu command | | Description | Setting range | Data | Reference | |
|---------------|---|----------------------------------|--|--|-------------------------------------|-------|
| Inspection | Item selected | Add item | Used to add, modify, delete, copy, or change the name of an inspection item. | 2D code | --- | p. 47 |
| | | Modify | | --- | --- | p. 48 |
| | | Delete | | --- | --- | p. 48 |
| | | Copy | | --- | --- | |
| | | Rename | | 15 alphanumeric characters | --- | |
| Settings | Teach  | Insp. region | Changes the inspection region. | --- | Scene | |
| | | Details | Code type | Selects the type of code that is scanned. | DataMatrix, QR Code, Auto (default) | Scene |
| | | Auto length | Sets whether the code length is automatically acquired. | OFF, ON (default) | Scene | |
| | | Reverse | Sets Normal/Reverse. | Normal, Reverse, Auto (default) | Scene | |
| | | Code color | Sets the code color. | Black, White, Auto (default) | Scene | |
| | | Fast mode | Specifies whether fast mode is set. When fast mode is set, the scanning time is shorter. | OFF (default), ON | Scene | |
| | | Shape (Data Matrix) | Sets the code shape. | Square, Rectangle, Auto (default) | Scene | |
| | | QR Code Model (QR Code) | Sets the QR code model. | Model 1, Model 2, Auto (default) | Scene | |
| | | Error Correction Level (QR Code) | Sets the error correction level (ECC level). | L (7%), M (15%), Q (25%), H (30%), Auto (default) | Scene | |
| | | Cell | Sets the number of cells of the code. | QR Code 21 × 21, 25 × 25, 29 × 29, 33 × 33, 37 × 37, 41 × 41, 45 × 45, 49 × 49, 53 × 53, 57 × 57, Auto DataMatrix (Square) 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, Auto DataMatrix (Rectangle) 8 × 18, 8 × 32, 12 × 26, 12 × 36, 16 × 36, 16 × 48, Auto | Scene | |
| Retry details | | Max Count (Normal retry) | Sets the number of retries. | 0 to 8, Default: 4 | Scene | |
| | | Interval (Normal retry) | Sets the retry interval (msec). | 0 to 8, Default: 100 | Scene | |
| | | Brightness step (Exposure retry) | Sets the exposure time step (msec). | Brightness step: 1 to 20, Default 2 shutter speed step: 0.01 to 1.00 (Default: 1.00) | Scene | |
| | | Increment count (Exposure retry) | Sets the increment count for the brightness (shutter speed) step. | 0 to 10, 2 (default) | Scene | |
| | | Decrement count (Exposure retry) | Sets the decrement count for the brightness (shutter speed) step. | 0 to 10, 2 (default) | Scene | |

In/Out Tab Page

| Menu command | | Description | Setting range | Data | Reference | | |
|--------------|------------------|--|---|--|---|--------|--------|
| Log setting | Statistical data | Sets whether to record the number of measurements and the number of NG overall judgements. | ON (default) or OFF | System | p. 80 | | |
| | Image logging | Sets the parameter to log measurement image data. | All, Only NG, or None (default) | System | p. 76 p. 80 | | |
| | Data logging | Sets the parameter to log measurement data from inspection items. | All (default), Only NG, or None (default) | System | | | |
| | Delete Log | Resets the log data without turning OFF the power supply. | --- | --- | p. 80 | | |
| I/O setting | I/O terminals | Output | OUT0 | Used to assign output signals to OUT0, OUT1, and OUT2. OR (Total judgement) (default) or OR0 (Item0 judgement) to OR31 (Item31 judgement) | System | p. 102 | |
| | | | OUT1 | | BUSY (default) or OR0 (Item0 judgement) to OR31 (Item31 judgement) | | System |
| | | | OUT2 | | ERROR (default) or OR0 (Item0 judgement) to OR31 (Item31 judgement) | | System |
| | | Output polarity | Sets the ON condition for the OR signal. | OK: ON or NG: ON (default) | System | p. 106 | |
| | | Output mode | Sets the output timing for the judgement result. | One-shot output or Level output (default) | System | p. 104 | |
| | | 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 | | |
| | | Output time | When one-shot output mode is selected, this parameter sets the time that the OR signal is ON. | 0 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, or Result display | System | p. 78 | |
| | | BUSY polarity | Sets the ON condition for the BUSY signal output. | BUSY: ON (default), READY: ON | System | p. 106 | |
| | | Output trigger error | Sets whether an error is output if a trigger is received while BUSY. | ON (default), OFF | System | p. 107 | |
| | | Input | Input mode | Specifies whether to use functions other than scene switching for external parallel commands. | Standard mode (default) or Expanded mode | System | p. 107 |

| Menu command | | Description | Setting range | Data | Reference | |
|----------------------|------------------------------|---|--|--|-----------|--------|
| I/O setting | Ethernet [MENU] | Output data set | --- | Data 0 to data 31 | Scene | p. 120 |
| | | Settings | Sets data to output to selected data number. | Text strings of the set inspection items. | Scene | |
| | | Rename | Changes the name of the selected data number. | The name can be changed to a name with up to 15 alphanumeric characters. | --- | |
| | | Copy | Copies the contents registered in the selected data number to another data number. | --- | --- | |
| | | Delete | Clears the content of the selected data number. | --- | --- | |
| | Output character set | | --- | Inspection Items 0 to 31 | Scene | |
| | String output on/off | Selects whether the scanned string is output by Ethernet. | ON, OFF (default) | Scene | | |
| | Partial output on/off | Selects whether an output range is specified. | ON, OFF (default) | Scene | | |
| | Output string setup | Sets the starting and ending digits of output. | 1 to 1024 | Scene | | |
| | NG String output on/off | Selects whether an NG scan result is output by Ethernet. | ON, OFF (default) | Scene | | |
| | Output form | | --- | --- | --- | p. 122 |
| | Output form | | Selects the format of the data to be output. | ASCII (default) or Binary | Scene | |
| | When output format is ASCII | Digits of integer | Sets the digits of the integer part, including the sign. However, + is not output for positive numbers. Example: Setting 4-digit data: -5963 is output as -999. | 1 to 10 (Default: 6) | Scene | |
| | | Digits of decimal | 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 | |
| | | Minus | Selects what to display as the sign when the number is negative. | - (Default) or 8 | Scene | |
| 0 suppress | | Selects the method to adjust unused digits on the left in output data. ON: Zeros are inserted for unused digits. OFF: Spaces are inserted for unused digits. 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 indicates a space.) | ON or OFF (default) | Scene | | |
| Output form is ASCII | When Output Format Is ASCII | Field separator | Selects the separator to use between output data. | None (default), comma, tab, space, CR, LF, or CR+LF | Scene | p. 130 |
| | | Record separator | Selects the separator to use between sets of output data. | None (default), comma, tab, space, CR, LF, or CR+LF | Scene | p. 122 |
| | When output format is Binary | Decimal output form | Selects the numerical expression for binary output. Fixed-decimal-point data is multiplied by 1,000 and the result is output. | Floating-point decimal or fixed decimal (default) | Scene | p. 123 |
| I/O monitor | I/O monitor | Used to check I/O connections. | --- | --- | p. 75 | |

Test Tab Page

| Menu command | Description | Setting range | Data | Reference |
|---|---|---------------|------|-----------|
| Continuous test | Used to check the individual judgement results for the inspection items and to adjust the judgement parameters. | --- | --- | p. 54 |
| Graphic | Displays the input image. | | | |
| Graphics + Details | Displays the inspection item individual judgement results and measurement values. | | | |
| All results/Region | Displays the inspection item individual judgement results for all inspection items. | | | p. 57 |
| Trend Monitor | Displays the individual judgement results saved in the Sensor in a trend monitor. | | | p. 54 |
| Histogram | Displays the individual judgement results saved in the Sensor in a histogram. | | | |
|  Auto display (trend monitor and histogram only) | Same as the trend monitor and histogram for [Run] Mode. | | --- | p. 64 |
| Display range (trend monitor and histogram only) | | | | p. 65 |
| Number of data (trend monitor only) | | | | p. 64 |
| Number of data (histogram only) | | | | p. 65 |
| Save data | Saves scene data and system data. | --- | --- | p. 58 |


Run Tab Page (from Setup Display)

| Menu command | Description | Setting range | Data | Reference |
|--------------------|-----------------------|---------------|------|-----------|
| Switch to Run mode | Switches to Run Mode. | --- | --- | p. 60 |

Tool

Setup Mode



| Menu command | Description | Setting range | Data | Reference |
|--------------|--|----------------------------|------|-----------|
| Select scene | | --- | --- | p. 70 |
| Select | Switches to a registered scene. | --- | | |
| Rename | Used to delete, copy, or change the name of a scene. | 15 alphanumeric characters | | |
| Copy | | --- | | |
| Clear | | | | |

| Menu command | | Description | Setting range | Data | Reference | | | | |
|-----------------|---|--|---|--------|-----------|--------|---------------------------------|-----|-------|
| Save to file | Setting | Scene data | Saves scene data with an SCN file name extension. | --- | --- | p. 83 | | | |
| | | Scene group data | Saves all scene data with an SGP file name extension. | | | | | | |
| | | Sensor system data | Saves system data with an SYD file name extension. | | | | | | |
| | | All Sensor data | Saves all Sensor data with a BKD file name extension. | | | | | | |
| | | Touch Finder data | Saves Touch Finder data with an MSD file name extension. | | | | | | |
| Logging | Statistical data | Saves statistical data with a CSV file name extension. | --- | --- | p. 76 | | | | |
| | Logging image | Saves image data with an IFZ file name extension. | | | | | | | |
| | Logging data | Saves measurement data with a CSV file name extension. | | | | | | | |
| Load from file | Scene data | Loads scene data. | --- | --- | p. 83 | | | | |
| | Scene group data | Loads scene group data. | | | | | | | |
| | Sensor system data | Loads system data. | | | | | | | |
| | All Sensor data | Loads all Sensor data. | | | | | | | |
| | Touch Finder data | Loads Touch Finder data. | | | | | | | |
| Sensor settings | Information | | Used to check the Sensor information. | --- | --- | p. 90 | | | |
| | Model | | Used to check the model and software version of the connected Sensor. | | | | System | | |
| | Version | | | | | | | | |
| | Name | | Displays the name of the connected Sensor. | | | | | | |
| | MAC address | | 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. 90 |
| | | Memory state | Used to check the status of Sensor memory. | | | | --- | --- | p. 90 |
| Error history | View history | Displays a history of errors that have occurred in the Sensor. | --- | System | p. 154 | | | | |
| | Delete history | Deletes the error history. | | --- | --- | p. 155 | | | |







| Menu command | | Description | Setting range | Data | Reference | | |
|------------------|-------------------|--|--|--|--|--------|-------|
| Sensor settings | Startup settings | Startup mode | Sets whether the startup scene number is set manually. | ON or OFF (Scene number when settings were saved is startup scene number.) | System | p. 71 | |
| | | Startup scene | Set the scene number to use at startup. | Standard models: 0 to 31, Single-function models: 0 to 7, Default: 0 | System | | |
| | Password settings | Password ON/OFF | Enables (ON) or disables (OFF) the password. | OFF (default) or ON | System | p. 86 | |
| | | Enter password | Sets a password. | 15 characters max. | System | | |
| | Timeout | | Sets the timeout time for inspection (msec). | 100 to 9999 | System | | |
| | Retry details | | Sets the inspection retry type. | Normal retry, Exposure retry, Scene retry, Trigger retry, None (default) | System | | |
| | Network settings | Ethernet | | | | | p. 31 |
| | | Auto | | Selects whether to use the automatic IP address setting method. | ON (default) or OFF | System | |
| | | IP address | | Enter the IP address of the Sensor. (Enabled when automatic setting is OFF.) | 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. 31 |
| | | Subnet mask | | Inputs the subnet mask. (Enabled when automatic setting is OFF.) | 0.0.0.0 to 255.255.255.255 (Default: 255.255.255.0) | System | p. 31 |
| Initialize | | Initializes the Sensor settings and saved data. | --- | --- | p. 89 | | |
| Restart | | Restarts the Sensor | --- | --- | | | |
| Update | | Updates the Sensor system to the most recent data. | --- | --- | p. 180 | | |
| TF settings | Information | | Used to check the Touch Finder information. | --- | System | p. 90 | |
| | Model | | Used to check the Touch Finder model. | --- | --- | --- | |
| | Version | | Used to check the software version of the Touch Finder. | --- | --- | p. 90 | |
| | MAC address | | Used to check the MAC address of the Touch Finder. | --- | --- | | |
| | Memory state | | Used to check the Touch Finder memory state. | --- | --- | p. 90 | |
| | Error history | View history | Displays a history of errors that have occurred in the Touch Finder. | --- | System | p. 154 | |
| | | Delete history | Deletes the error history. | --- | --- | | |
| | Battery level | | Used to check the battery level. | --- | --- | p. 90 | |
| | File format | | Used to set the output format for output log data to a file. | --- | --- | p. 77 | |
| | Field separator | | | None, Comma (default), Tab, Space, Colon, Semicolon, CR, or CR+LF | --- | | |
| Decimal symbol | | | None, Point (default), or Comma | --- | | | |
| Record separator | | | None, Comma, Tab, Space, Colon, Semicolon, CR, or CR+LF (default) | --- | | | |

| Menu command | | Description | Setting range | Data | Reference | |
|--------------|--------------------|--|---|--|-----------|-------|
| TF settings | SD card | SD card information | Displays the capacity and remaining memory in the SD card. | --- | --- | p. 85 |
| | | Format | Formats an SD card. | --- | --- | p. 85 |
| | Startup display | Display pattern | Sets the display to use in Run Mode. | Graphic, Graphics + Details, All results/Region, Statistical data, Trend monitor, Histogram | System | p. 62 |
| | | Display update mode | Sets the image to update in Run Mode. | Latest image, Last NG image | | |
| | LCD back-light | Brightness | Sets the brightness. | 0 to 5 | System | p. 74 |
| | | ECO mode | Enables (ON) or disables (OFF) ECO Mode. | ON, OFF | System | p. 74 |
| | Ethernet | | | --- | System | p. 31 |
| | | IP address | Inputs the IP address of the Touch Finder. | a.b.c.d a:1 to 223 b: 0 to 255 c: 0 to 255 d: 0 to 255 (Default: 10.5.5.100) | System | p. 31 |
| | | Subnet mask | Inputs the subnet mask. | 0.0.0.0 to 255.255.255.255 (Default: 255.255.255.0) | | p. 31 |
| | | Search unreachable sensors | Displays the IP address if the same IP address is used for more than one Sensor or if there is Sensor that is not in the subnet. You can change this IP address and subnet mask. This setting is valid only when automatic setting of the Sensor's IP address is OFF. | --- | --- | --- |
| | Language | | Changes the language to display on the Touch Finder. | English, German, French, Italian, Spanish, Traditional Chinese, Simplified Chinese, Korean, or Japanese (The default language is selected at startup.) | System | p. 89 |
| | Time settings | | Used to set the current date and time. | Default: Selected at startup. | System | p. 89 |
| | Touch screen calib | | Used when there is an offset between the touch screen positions and pointers. | --- | --- | p. 90 |
| | Initialize | | Initializes the Touch Finder settings. | --- | --- | p. 89 |
| Restart | | Restarts the Touch Finder. | --- | --- | p. 89 | |
| Update | | Updates the Touch Finder system to the most recent data. | --- | --- | p. 180 | |

Run Mode

| Menu command | | Description | Setting range | Data | Reference | |
|---|---|--|-----------------------------------|---|--------------|-------|
| Select display | Graphic | Displays the input image. | --- | --- | p. 62 | |
| | Graphics + Details | Displays the inspection item individual judgement results and measurement values. | | --- | | |
| | Statistical data | Displays the total number of measurements and the total number of NG overall judgements and the NG ratio from when the power supply was turned ON. | | --- | | |
| | All results/Region | Displays the inspection item individual judgement results for all inspection items. | | --- | | |
| | Trend Monitor | Displays the individual judgement results saved in the Sensor in a trend monitor. | | --- | | p. 64 |
| | Histogram | Displays the individual judgement results saved in the Sensor in a histogram. | | --- | | p. 65 |
|  | Auto display (trend monitor and histogram only) | Automatically sets the display range according to the measurement results. | OFF or ON (default) | --- | p. 64, p. 65 | |
| | Display range (trend monitor and histogram only) | Changes the display range of measurement values. | -999,999,999 to 999,999,999 | --- | p. 64, p. 65 | |
| | Number of data (trend monitor only) | Changes the number of displayed measurement values. | 200, 400, or 1,000 (default: 200) | --- | p. 64 | |
| | Number of data (histogram only) | Changes the number of displayed measurement values (i.e., the vertical display range of the histogram). | 5 to 1,000 | --- | p. 65 | |
| | Clear results (graphic or graphic + details list) | Clears the measurement results of the inspection items. | --- | --- | --- | |
| | Delete status (total data) | Clears the total results of the inspection items. | --- | --- | --- | |
| Logging | Image logging | Starts and stops logging in external memory. | ON: Start or OFF: Stop | --- | p. 76 | |
| | Data logging | | ON: Start or OFF: Stop | --- | | |
| TF settings | | 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. | --- | --- | p. 89 | |
| Sensor setting | | Switches to Setup Mode. | --- | --- | p. 60 | |
| Sensor monitor | Multi sensor | Simultaneously displays the images for multiple connected Sensors. | --- | --- | p. 62 | |
| | NG sensor | From multiple connected Sensors, displays the image of only the Sensors with NG results. | --- | --- | | |
| Switch sensor | Select | Switches to the selected Sensor. | --- | --- | --- | |
| | Connections | | | Displays the name of the Sensor detected by the Touch Finder and the connection status. | | |
| |  | Auto connect | | Automatically detects and connects the Sensors that are connected. | | |

Common Menu Commands

| Menu command | Description | Setting range | Data | Reference |
|---|---|-------------------------------------|--|-----------|
|  Only-image Button | Hides text and displays only the image. | --- | --- | p. 74 |
| Display Button |  Zoom-in Button | Enlarges the image display. | --- | p. 72 |
| |  Zoom-out Button | Reduces the image display. | | |
| |  FIT Button | Fits the image to the display size. | | |
| | Display Button  | Changes the image display method. | Setup Mode: Camera (Live, Freeze) Log, or File Run Mode: Latest image or Last NG image | --- |
|  Capture Button | Used to capture the current display and save it in external memory, e.g., an SD card. | --- | --- | p. 87 |

10-2 External Reference Parameters

2D Codes

| External reference number | Data name | Set/acquired | Data range | Default | Text string assigned to Ethernet output setting | Logged |
|---------------------------|-----------------------------|---------------|--|---------|---|--------|
| 0 | Judgment | Acquired only | -2: No judgment (not inspected) 0: Judgment result OK -1: Judgment result NG -13: Teaching not executed error -14: Figure not registered error -15: Outside region error -16: Inspection timeout error | -2 | JG | --- |
| 5 | Num. of char. | Acquired only | 0 to 1024 | 0 | N | --- |
| 6 ^{*1} | Characters | Acquired only | Text string | --- | --- | --- |
| 8 | Cell Recog. Rate | Acquired only | 0 to 100 | 0 | E | Logged |
| 9 | Contrast | Acquired only | 0 to 100 | 0 | C | --- |
| 10 | Focus | Acquired only | 0 to 100 | 0 | F | --- |
| 120 | Code type | Set/acquired | 0: Auto 1: DataMatrix 2: QR Code | 0 | --- | --- |
| 121 | Code color | Set/acquired | 0: Auto 1: Black 2: White | 0 | --- | --- |
| 122 | Cell (DataMatrix Square) | Set/acquired | 0: Auto 1: 10 × 10 2: 12 × 12 ... 16: 64 × 64 | 0 | --- | --- |
| 123 | Cell (DataMatrix Rectangle) | Set/acquired | 0: Auto 1: 8 × 18 2: 8 × 32 ... 16: 16 × 64 | 0 | --- | --- |
| 124 | Cell (QR Code) | Set/acquired | 0: Auto 1: 21 × 21 2: 25 × 25 ... 10: 57 × 57 | 0 | --- | --- |
| 127 | Size | Set/acquired | 50 to 480 | 480 | --- | --- |
| 128 | Reverse | Set/acquired | 0: Auto 1: Normal 2: Reverse | 0 | --- | --- |
| 129 | QR Code Model | Set/acquired | 0: Auto 1: Model 1 2: Model 2 | 0 | --- | --- |
| 130 | Error Correction Level | Set/acquired | 0: Auto 1: M (15%) 2: L (7%) 3: H (30%) 4: Q (25%) | 0 | --- | --- |
| 132 | Fast mode | Set/acquired | 0: OFF 1: ON | 0 | --- | --- |
| 133 | String output on/off | Set/acquired | 0: OFF 1: ON | 0 | --- | --- |
| 134 | Partial output on/off | Set/acquired | 0: OFF 1: ON | 0 | --- | --- |

| External reference number | Data name | Set/acquired | Data range | Default | Text string assigned to Ethernet output setting | Logged |
|---------------------------|-------------------------------|--------------|--------------|---------|---|--------|
| 135 | Output end digit???.ntlp | Set/acquired | 1 to 1024 | 1024 | --- | --- |
| 136 | Output starting digit???.ntlp | Set/acquired | 1 to 1024 | 1 | --- | --- |
| 137 | Auto length | Set/acquired | 0: OFF 1: ON | 1 | --- | --- |
| 138 | NG String output on/off | Set/acquired | 0: OFF 1: ON | 0 | --- | --- |

*1 To acquire the detected text string, use the ITEMDATA2 command.

Filter

| External reference number | Data name | Set/acquired | Data range | Default | Text string assigned to Ethernet output setting | Logged |
|---------------------------|-----------------|---------------|---|---------|---|--------|
| 0 | Judgment | Acquired only | -2: No judgment (not inspected) 0: Judgment result OK -1: Judgment result NG -13: Teaching not executed error -14: Figure not registered error -15: Outside region error | -2 | --- | --- |
| 120 | 1st Filter Type | Set/acquired | 0: None 1: Smooth 2: Dilate 3: Erosion 4: Median | 0 | --- | --- |
| 121 | 1st Filter Size | Set/acquired | 1: 3 × 3 2: 5 × 5 | 1 | --- | --- |
| 123 | 2nd Filter Type | Set/acquired | 0: None 1: Smooth 2: Dilate 3: Erosion 4: Median | 0 | --- | --- |
| 124 | 2nd Filter Size | Set/acquired | 1: 3 × 3 2: 5 × 5 | 1 | --- | --- |
| 126 | 3rd Filter Type | Set/acquired | 0: None 1: Smooth 2: Dilate 3: Erosion 4: Median | 0 | --- | --- |
| 127 | 3rd Filter Size | Set/acquired | 1: 3 × 3 2: 5 × 5 | 1 | --- | --- |

10-3 Specifications and Dimensions

Sensor

Specifications

| Item | | Fixed Mount 2D Code Reader |
|-----------------------|-------------------------------------|---|
| Model | NPN | FQ-CR20□□□□-M |
| | PNP | FQ-CR25□□□□-M |
| Field of view | | Refer to Table 1. |
| Installation distance | | Refer to Table 1. |
| Minimum resolution | | FQ-CR2□□010F-M: 0.040 mm FQ-CR2□□050F-M: 0.070 mm FQ-CR2□□100F-M: 0.282 mm FQ-CR2□□100N-M: 0.155 mm |
| Main functions | Inspection items | 2D codes (DataMatrix (EC200), QR codes) |
| | Number of simultaneous measurements | 32 |
| | Number of registered scenes | 32 |
| Image input | Image filter | High dynamic range (HDR), polarizing filter (attachment), Smooth, Dilate, Erosion, Median |
| | Image elements | 1/3-inch monochromatic CMOS |
| | Shutter | 1/250 to 1/32,258 |
| | Processing resolution | 752 × 480 |
| 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.) |
| Measurement trigger | | External trigger (single or continuous) |
| I/O specifications | Input signals | 7 signals <ul style="list-style-type: none"> • Single measurement input (TRIG) • Control command input (IN0 to IN5) |
| | Output signals | 3 signals <ul style="list-style-type: none"> • Control output (BUSY) • Overall judgement output (OR) • Error output (ERROR) Note: The three output signals can be allocated for the judgements of individual inspection items. |
| | Ethernet specifications | 100Base-TX/10Base-T Numerical outputs and control commands are supported with no-protocol communications. |
| | Input specifications | Refer to Table 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□□□□) |

| | | |
|------------------------|------------------------------------|--|
| Item | | Fixed Mount 2D Code Reader |
| Indications | | Judgement results indicator (color: orange), ERROR indicator (color: red), and BUSY indicator (color: green) |
| Ratings | Power supply voltage | 20.4 to 26.4 VDC (including ripple) |
| | Insulation resistance | Between all lead wires and case: 0.5 MΩ (at 250 V) |
| | Current consumption | 2.4 A max. |
| Environmental immunity | Ambient temperature range | Operating: 0 to 50°C Storage: -25 to 65°C (with no icing or condensation) |
| | Ambient humidity range | Operating and storage: 35% to 85% (with no condensation) |
| | Ambient atmosphere | No corrosive gas |
| | 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.) |
| 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. |
| Accessories | | Mounting Bracket (FQ-XL)(1) Polarizing Filter Attachment (FQ-XF1) (1) Instruction Manual Quick Startup Guide Member Registration Sheet Warning Label |
| LED class*2 | | Class 2 |

Table 1

| NPN | PNP | Field of view (H×V) *1 | Installation distance | Number of LEDs | Weight |
|---------------|---------------|--------------------------|-----------------------|----------------|------------|
| FQ-CR20010F-M | FQ-CR25010F-M | 7.5 × 4.7 to 13 × 8.2 mm | 38 to 57 mm | 4 | 200 g max. |
| FQ-CR20050F-M | FQ-CR25050F-M | 13 × 8.2 to 53 × 33 mm | 56 to 215 mm | 4 | |
| FQ-CR20100F-M | FQ-CR25100F-M | 53 × 33 to 240 × 153 mm | 220 to 970 mm | 8 | |
| FQ-CR20100N-M | FQ-CR25100N-M | 29 × 18 to 300 × 191 mm | 32 to 380 mm | 8 | |

*1: Tolerance: ±10% max.

*2: Applicable standards: JIS C 6802:2005

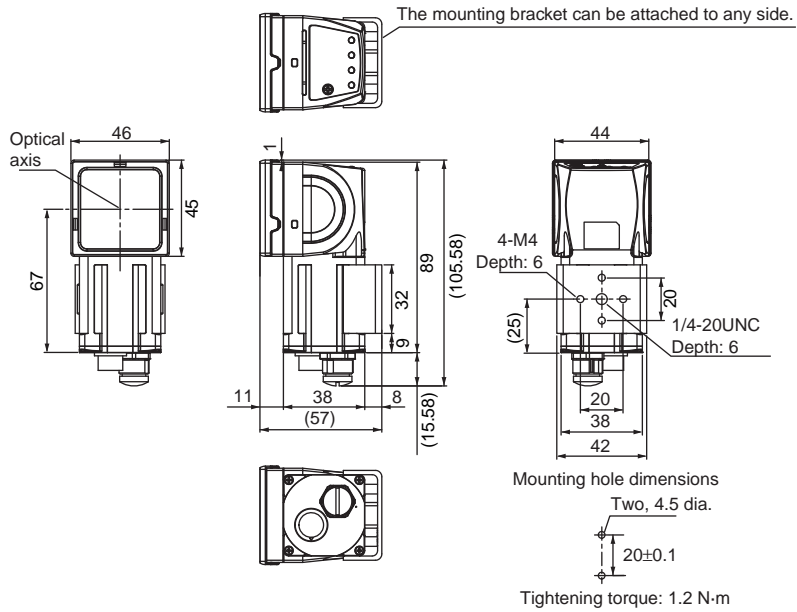
Table 2

| Item | NPN | PNP |
|-----------------------|---|--|
| Input specifications | 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 voltage -1.5 V max. OFF: Open (leakage current: 0.1 mA max.) |
| Output specifications | 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. |

Dimensions

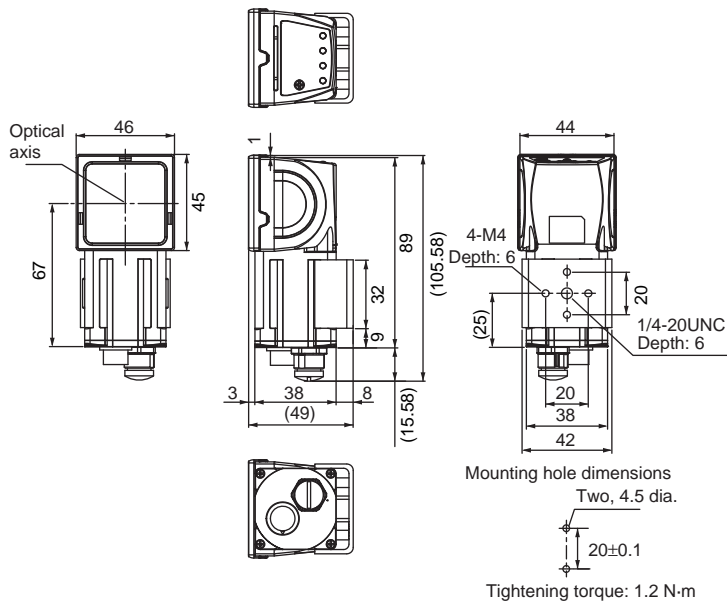
FQ-CR20010F-M/-CR20050F-M
 FQ-CR25010F-M/-CR25050F-M

(Unit: mm)



FQ-CR20100F-M/-CR20100N-M
 FQ-CR25100F-M/-CR25100N-M

(Unit: mm)



Touch Finder

Specifications

| Item | | Model with DC power supply | | Model with AC/DC/battery power supply | | |
|-------------------------------|--|------------------------------|---|---|--|--|
| | | FQ-D30 | | FQ-D31 | | |
| Number of connectable Sensors | | 8 max. | | | | |
| Main functions | Types of measurement displays | | Last result display, last NG display, trend monitor, histograms | | | |
| | Types of display images | | Through, frozen, zoom-in, and zoom-out images | | | |
| | Data logging | | Measurement results, measured images | | | |
| | Menu language | | English, German, French, Italian, Spanish, Traditional Chinese, Simplified Chinese, Korean, or Japanese | | | |
| Indications | LCD | Display device | 3.5-inch TFT color LCD | | | |
| | | Pixels | 320 × 240 | | | |
| | | Display colors | 16,777,216 | | | |
| | Backlight | Life expectancy 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 | | |
| Operation interface | Touch screen | Method | Resistance film | | | |
| | | Life expectancy ² | 1,000,000 operations | | | |
| External interface | Ethernet | | 100BASE-TX/10BASE-T | | | |
| | SD card | | SDHC-compliant, Class 4 or higher recommended | | | |
| Ratings | Power supply voltage | | DC power connection: 20.4 to 26.4 VDC (including ripple) | DC power connection: 20.4 to 26.4 VDC (including ripple) AC adapter (manufactured by Sino-American Japan Co., Ltd) connection: 100 to 240 VAC, 50/60 Hz Battery connection: FQ-BAT1 Battery (1 cell, 3.7 V) | | |
| | Continuous operation on Battery ³ | | --- | 1.5 h | | |
| | Current consumption | | DC power connection: 0.2 A | DC power connection: 0.2 A, Charging battery: 0.4 A | | |
| | 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 supply |
|------------------------|------------------------------------|---|--|
| | | FQ-D30 | FQ-D31 |
| Environmental immunity | Ambient temperature range | Operating: 0 to 50°C Storage: -25 to 65°C (with no icing or condensation) | Operating: 0 to 50°C when mounted to DIN Track or panel 0 to 40°C when operated on a Battery 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 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 | |

*1 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 higher temperatures.

*2 This value is only a guideline. No guarantee is implied. The value will be affected by operating conditions.

*3 This value is only a guideline. No guarantee is implied. The value will be affected by the operating environment and operating conditions.

• Battery Specifications

| Item | FQ-BAT1 |
|-----------------------------------|--|
| Battery type | Secondary lithium ion battery |
| Nominal capacity | 1,800 mAh |
| Rated voltage | 3.7 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 (FQ-D31). |
| Charging time ^{*1} | 2 h |
| Usage time ^{*1} | 1.5 h |
| Battery backup life ^{*2} | 300 charging cycles |
| Weight | 50 g max. |

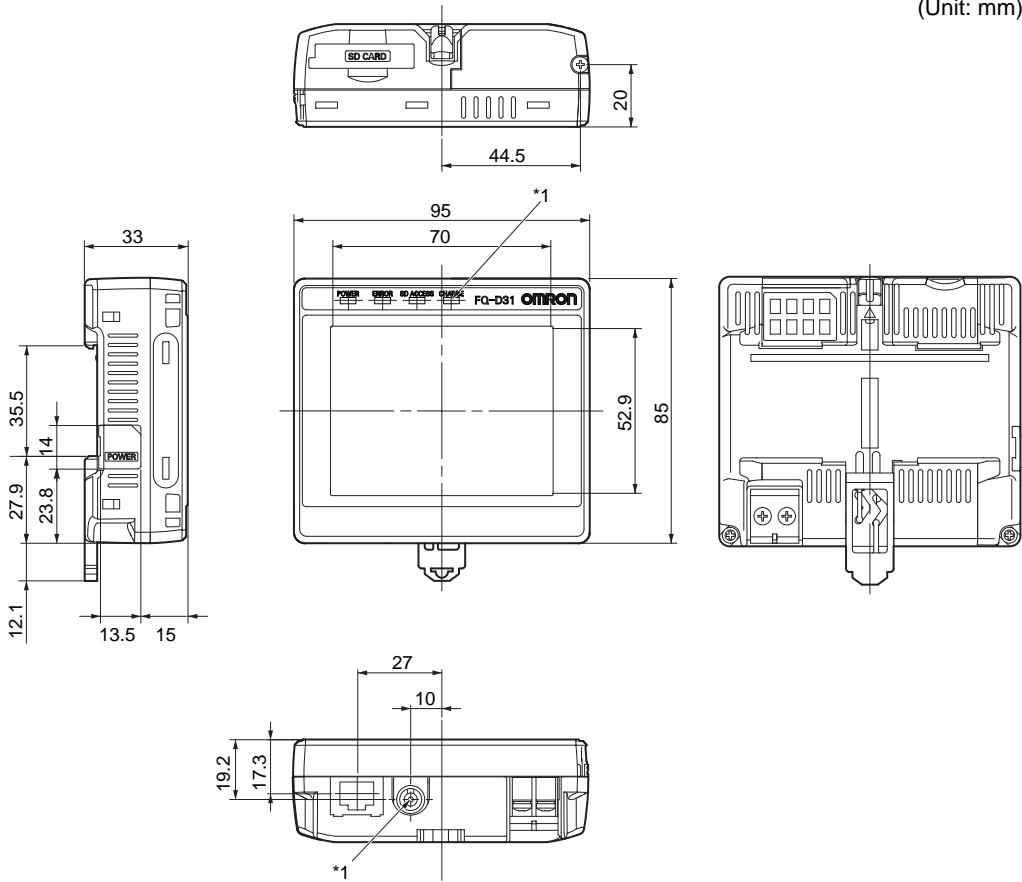
*1 This value is only a guideline. No guarantee is implied. The value will be affected by operating conditions

*2 This is a guideline for the time required for the capacity of the Battery to be reduced to 60% of the initial capacity. No guarantee is implied. The value will be affected by the operating environment and operating conditions.

Dimensions

- FQ-D30/-D31

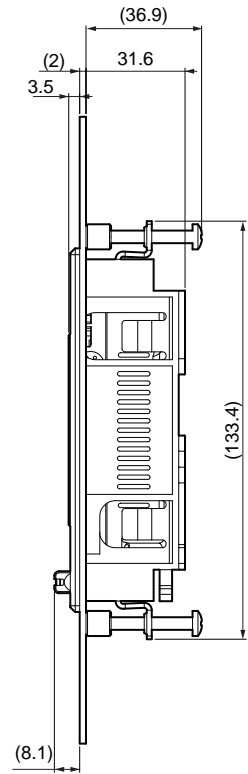
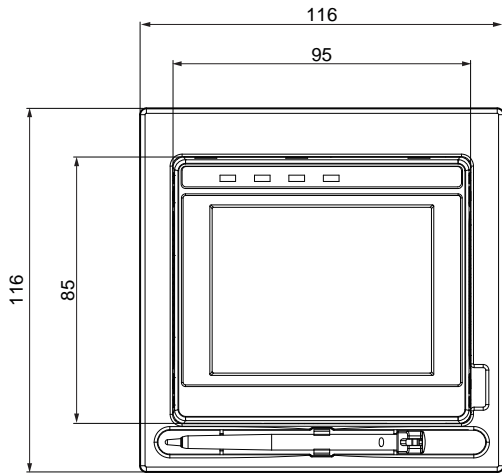
(Unit: mm)



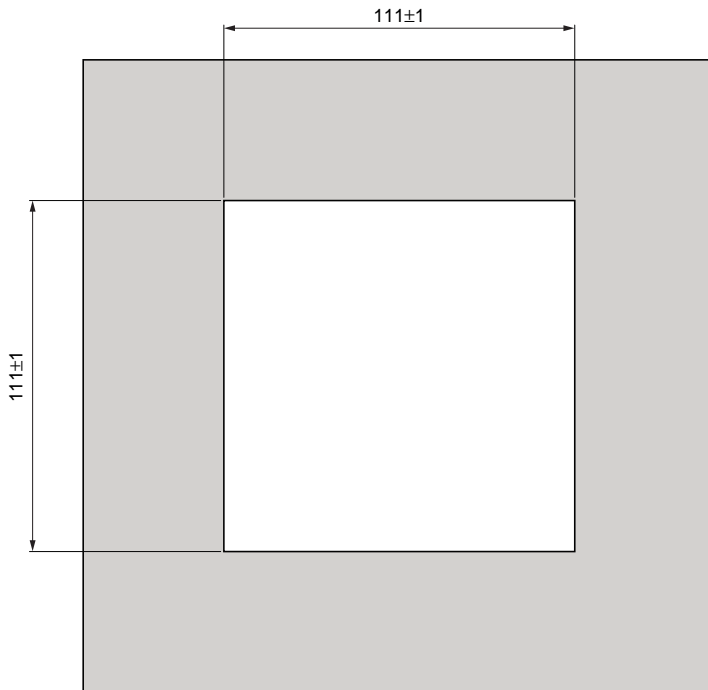
*1: Provided on the FQ-D31 only.

- Panel Mounting Adapter (FQ-XPM)

(Unit: mm)



- Panel cutout dimensions



System Requirements for PC Tool for FQ

The system requirements for the PC Tool are given in the following table.

| Item | Requirement |
|----------|---|
| OS | <ul style="list-style-type: none"> Microsoft Windows XP Home Edition/Professional SP2 or higher^{*1} Microsoft Windows 7 Home Premium or higher^{*1} |
| Hardware | <ul style="list-style-type: none"> CPU: Core 2 Duo 1.06 GHz or the equivalent or higher RAM: 1 GB min. HDD: 500 MB min. available space^{*2} Monitor: 1,024 x 768 dots min. |

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

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

Options

Specifications

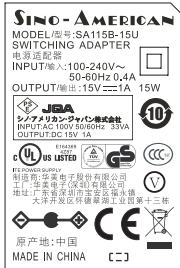
• I/O Cables

| Item | Model | FQ-WD002 | FQ-WD010 | FQ-WD020 |
|------------------------|-------------|-------------|----------------|----------|
| Cable length | | 2 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 | 500 g | 1500 g |

• FQ Ethernet Cable

| Item | Model | FQ-WN002 | FQ-WN010 | FQ-WN020 |
|------------------------|-------|-------------|----------|----------|
| Cable length | | 2 m | 10 m | 20 m |
| Cable type | | Robot cable | | |
| Minimum bending radius | | 40 mm | | |
| Weight | | 125 g | 620 g | 1780 g |

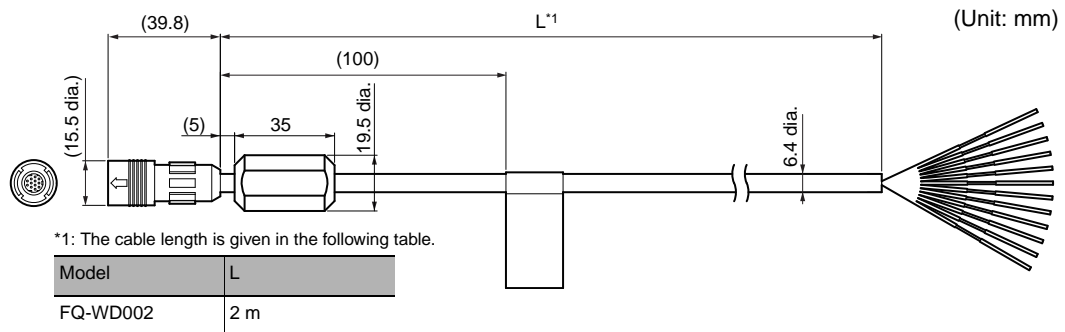
• AC Adapter

| Item | Model | FQ-AC1 | FQ-AC2 | FQ-AC3 | FQ-AC4 | FQ-AC5 | FQ-AC6 |
|---------------------------------|-------|---|--------|----------|--------|--------|--------|
| Plug type | | A | A | A | C | BF | O |
| Certified standards | | 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 temperature range | | 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 × 50 × 30 mm (without power cable) | | | | | |
| Weight | | Approx. 270 g | | | | | |
| Contents of label on AC Adapter | |  <p>SINO-AMERICAN MODEL/型号: SA115B-15U SWITCHING ADAPTER 电源适配器 INPUT/输入: 100-240V~ 50-60Hz 0.4A OUTPUT/输出: 15V=1A 15W</p> <p>JSA シノアメリカン・ジャパン株式会社 INPUT: AC 100V 50/60Hz 0.4A OUTPUT: DC 15V 1A</p> <p>UL LISTED 原産国: 中国 MADE IN CHINA</p> | | | | | |

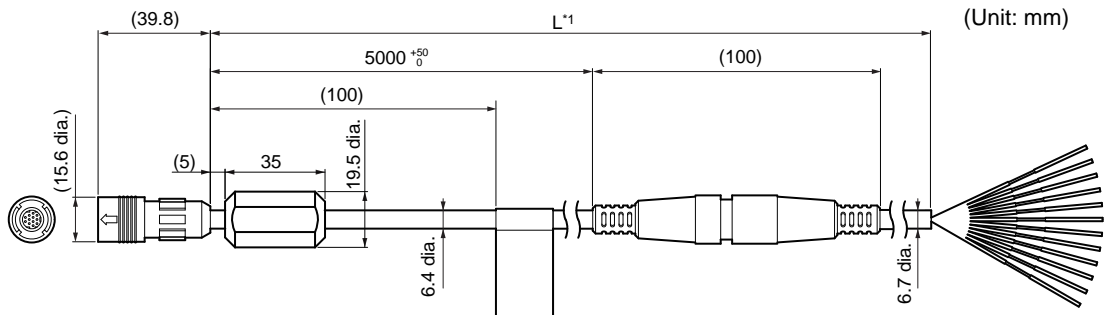
Dimensions

• I/O Cables

FQ-WD002



FQ-WD010/WD020

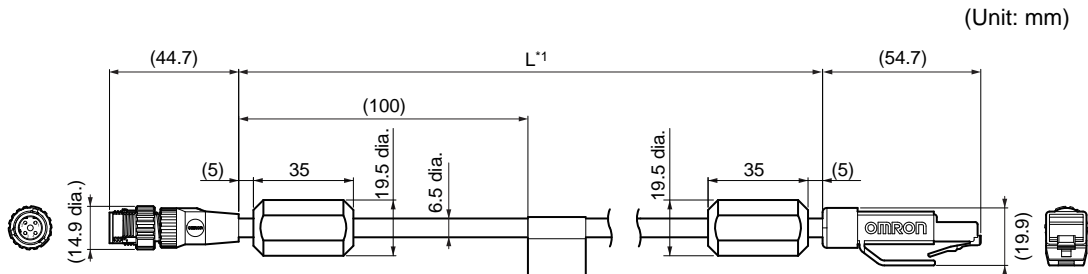


*1: The cable length is given in the following table.

| Model | L |
|----------|------|
| FQ-WD010 | 10 m |
| FQ-WD020 | 20 m |

• FQ Ethernet Cable

FQ-WN002/WN010/WN020

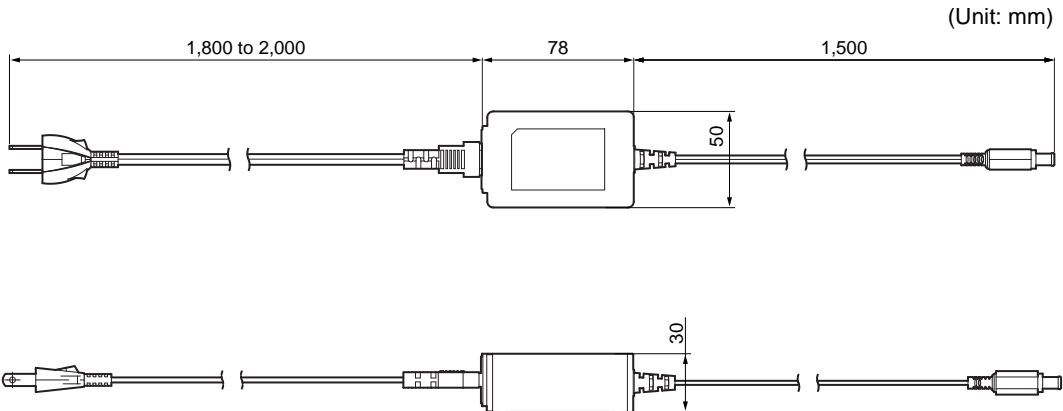


*1: The cable lengths are given in the following table.

| Model | L |
|----------|------|
| FQ-WN002 | 2 m |
| FQ-WN010 | 10 m |
| FQ-WN020 | 20 m |

• AC Adapter

FQ-AC□



10-4 Updating the Software

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.



http://www.omron-cxone.com/vision_sys

After you download the software, use the following procedure to update.

- 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].
- 4** To update the software in the Touch Finder, press  (Setup Mode) - [TF settings] - [Update].

The software will be updated automatically.

Important

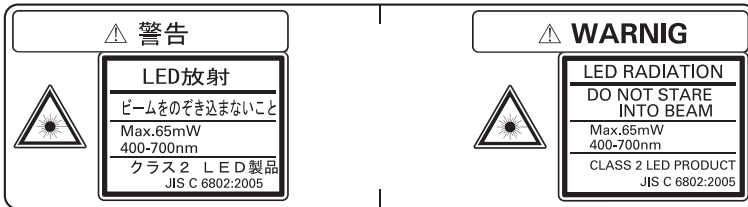
Do not turn OFF the power supply until updating the software has been completed.
The Sensor or Touch Finder may not start normally if power is turned OFF during the update.

10-5 LED Safety

For LED devices, class classification to indicate dangerous level and safety standards are stipulated in respective countries. Take necessary safety preventive measures according to the standards.

Warning Label

Warning labels are supplied as accessories with products that comply with the Class 2 Laser Product Classification. Attach them to appropriate positions near the Sensor where they can be easily noticed.



10-6 Requirements from Regulations and Standards

Summary of Requirements to Manufactures

For Europe

EN 60825-1 "Safety of Laser Products, Equipment Classification, Requirements and User's Guide"
Summary of Manufacturer's Requirements

| Requirements subclause | Classification | | | | | | |
|--|---|---|---|--|--|---|--|
| | Class 1 | Class 1M | Class 2 | Class 2M | Class 3R | Class 3B | Class 4 |
| Description of hazard class | Safe under reasonably foreseeable conditions | As for Class 1 except may be hazardous if user employs optics | Low power; eye protection normally afforded by aversion responses | As for Class 2 except may be more hazardous if user employs optics | Direct intra-beam viewing may be hazardous | Direct intra-beam viewing normally hazardous | High power; diffuse reflections may be hazardous |
| Protective housing | Required for each laser product; limits access necessary for performance of functions of the products | | | | | | |
| Safety interlock in protective housing | Designed to prevent removal of the panel until accessible emission values are below that for Class 3R | | | | Designed to prevent removal of the panel until accessible emission values are below that for Class 3B | | |
| Remote control | Not required | | | | | Permits easy addition of external interlock in laser installation | |
| Key control | Not required | | | | | Laser inoperative when key is removed | |
| Emission warning device | Not required | | | | Give audible or visible warning when laser is switched on or if capacitor bank of pulsed laser is being charged. For Class 3R only, applies invisible radiation is emitted | | |
| Attenuator | Not required | | | | | Give means beside the On/Off switch to temporarily block beam | |
| Location controls | Not required | | | | Controls so located that there is no danger of exposure to AEL above Classes 1 or 2 when adjustments are made | | |
| Viewing optics | Not required | Emission from all viewing systems must be below Class 1M AEL | | | | | |
| Scanning | Scan failure shall not cause product to exceed its classification | | | | | | |
| Class label | Required wording | | Figures A required wording | | | | |
| Aperture label | Not required | | | | Specified wording required | | |
| Service entry label | Required as appropriate to the class of accessible radiation | | | | | | |
| Override interlock label | Required under certain conditions as appropriate to the class of laser used | | | | | | |
| Wavelength range label | Required for certain wavelength ranges | | | | | | |

| Requirements subclause | Classification | | | | | | |
|------------------------------------|--|----------|---------|----------|----------|----------|---------|
| | Class 1 | Class 1M | Class 2 | Class 2M | Class 3R | Class 3B | Class 4 |
| LED label | Make required word substitutions for LED products | | | | | | |
| User information | Operation manuals must contain instructions for safe use. Additional requirement apply for Class 1M and Class 2M | | | | | | |
| Purchasing and service information | Promotion brochures must specify product classification; service manuals must contain safety information | | | | | | |

- Note:** 1. This table is intended to provide a convenient summary of requirements. See text of this standard for complete requirements.
2. For the safety medical laser products, IEC 60601-2-22 applies.
3. AEL: Accessible Emission Limit
The maximum accessible emission level permitted within a particular class. For your reference, see ANSI Z136.1-1993, Section 2.

Symbol and border: black
Background: yellow



Figure A Warning label - Hazard symbol

Summary of Requirements to User

For Europe

EN 60825-1

| Requirements subclause | Classification | | | | | | |
|---------------------------|---|---------------------------------------|-----------------|---------------------------------------|--|--|-----------------------|
| | Class 1 | Class 1M | Class 2 | Class 2M | Class 3R | Class 3B | Class 4 |
| Laser safety officer | Not required but recommended for applications that involve direct viewing of the laser beam | | | | Not required for visible emission Required for non-visible emission | Required | |
| Remote interlock | Not required | | | | | Connect to room or door circuits | |
| Key control | Not required | | | | | Remove key when not in use | |
| Beam attenuator | Not required | | | | | When in use prevents inadvertent exposure | |
| Emission indicator device | Not required | | | | Indicates laser is energized for non-visible wavelengths | Indicates laser is energized | |
| Warning signs | Not required | | | | | Follow precautions on warning signs | |
| Beam path | Not required | Class 1M as for Class 3B (see note 2) | Not required | Class 2M as for Class 3B (see note 3) | Terminate beam at end of useful length | | |
| Specular reflection | No requirements | Class 1M as for Class 3B (see note 2) | No requirements | Class 2M as for Class 3B (see note 3) | Prevent unintentional reflections | | |
| Eye protection | No requirements | | | | Not required for visible emission Required for non-visible emission | Required if engineering and administrative procedures not practicable and MPE exceeded | |
| Protective clothing | No requirements | | | | | Sometimes required | Specific requirements |
| Training | No requirements | Class 1M as for Class 3R (see note 2) | No requirements | Class 2M as for Class 3R (see note 3) | Required for all operator and maintenance personnel | | |

Note: 1. This table is intended to provide a convenient summary of requirements. See text of this standard for complete precautions.

2. Class 1M laser products that failed condition 1 of table 10 of the standard. Not required for Class 1M laser products that failed condition 2 of table 10 of the standard. See the text for details.

3. Class 2M laser products that failed condition 1 of table 10 of the standard. Not required for Class 2M laser products that failed condition 2 of table 10 of the standard. See the text for details.

Definitions of Laser Classification

For Europe

Laser Product Classifications

EN

| Class | Description |
|----------|--|
| Class 1 | Laser that are safe under reasonably foreseeable conditions of operation, including the use of optical instruments for intrabeam viewing. |
| Class 1M | Laser emitting in the wavelength range from 302.5 nm to 4000 nm which are safe under reasonably foreseeable conditions of operation, but may be hazardous if the user employs optics within the beam. |
| Class 2 | Laser that emit visible radiation in the wavelength range from 400 nm to 700 nm where eye protection is normally afforded by aversion responses, including the blink reflex. This reaction may be expected to provide adequate protection under reasonably foreseeable conditions of operation including the use of optical instruments for intrabeam viewing. |
| Class 2M | Laser that emit visible radiation in the wavelength range from 400 nm to 700 nm where eye protection is normally afforded by aversion responses, including the blink reflex. However, viewing of the output may be more hazardous if the user employs optics within the beam. |
| Class 3R | Laser that emit in the wavelength range from 302.5 nm to 10 ⁶ nm where direct intrabeam viewing is potentially hazardous but the risk is lower than for Class 3B lasers, and fewer manufacturing requirements and control measures for the user apply than for Class 3B lasers. The accessible emission limit is within five times the AEL of Class 2 in the wavelength range from 400 nm to 700 nm and within five times the AEL of Class 1 for other wavelengths. |
| Class 3B | Lasers that are normally hazardous when direct intrabeam exposure occurs (i.e. within the NOHD). Viewing diffuse reflections is normally safe (see also note). |
| Class 4 | Lasers which are also capable of producing hazardous diffuse reflections. They may cause skin injuries and could also constitute a fire hazard. Their use requires extreme caution. |

Note: Conditions for safe viewing of diffuse reflections for Class 3B visible lasers are: minimum viewing distance of 13 cm between screen and cornea and a maximum viewing time of 10 s. Other viewing conditions require a comparison of the diffuse reflection exposure with the MPE.

Index

| | | | |
|-------------------------------------|------|-----|--|
| Numerics | | | |
| 2D Codes | | 49 | |
| <hr/> | | | |
| A | | | |
| AC Adapter | | 178 | |
| AC power supply connector | | | |
| Touch Finder | | 20 | |
| auto connect | | 14 | |
| Auto length | | 51 | |
| <hr/> | | | |
| B | | | |
| backing up data | | 83 | |
| backlight | | 74 | |
| Battery | | 29 | |
| specifications | | 174 | |
| battery level | | 90 | |
| brightness | | 74 | |
| Brightness step | | 93 | |
| BUSY output | | 78 | |
| BUSY polarity | | 106 | |
| BUSY: ON | | 106 | |
| READY: ON | | 106 | |
| BUSY signal | | 96 | |
| <hr/> | | | |
| C | | | |
| camera input | | 63 | |
| camera setup | | 35 | |
| capturing | | 87 | |
| Cell | | 51 | |
| Cell Recog. Rate | | 168 | |
| changing line process | | | |
| using scenes | | 70 | |
| Characters | | 168 | |
| Code color | | 51 | |
| Code type | | 51 | |
| configuration | | 47 | |
| connection | | | |
| automatic | | 14 | |
| Contrast | | 168 | |
| CSV | | 78 | |
| <hr/> | | | |
| D | | | |
| data | | | |
| backup | | 83 | |
| saving | 58, | 83 | |
| saving to file | | 83 | |
| DC power supply connector | | | |
| Touch Finder | | 20 | |
| decimal symbol | | 78 | |
| Decrement count | | 93 | |
| Definitions of Laser Classification | | 185 | |
| deleting log | | 80 | |
| Dilate | | 44 | |
| display elements | | 15 | |
| display language | | 89 | |
| display patterns | | 63 | |
| <hr/> | | | |
| display types | | | |
| Graphics | | 62 | |
| Graphics + Details | | 62 | |
| Statistical data | | 62 | |
| displaying image data | | 88 | |
| <hr/> | | | |
| E | | | |
| ECO mode | | 74 | |
| Erosion | | 44 | |
| Error Correction Level | | 51 | |
| error history | 154, | 155 | |
| deleting | | 155 | |
| viewing | | 155 | |
| ERROR signal | | 110 | |
| errors | | | |
| clearing | | 107 | |
| messages | | 155 | |
| Ethernet | | 31 | |
| Ethernet cable | | 177 | |
| connector | | 19 | |
| Ethernet port | | | |
| Touch Finder | | 20 | |
| exposure retry | | 92 | |
| external trigger | | 97 | |
| <hr/> | | | |
| F | | | |
| Fast mode | | 51 | |
| field separator | | 78 | |
| file format | | 78 | |
| files | | | |
| logging | | 76 | |
| Filter Type | | 44 | |
| Focus | | 168 | |
| focus | | 35 | |
| adjustment screw | | 35 | |
| formatting SD cards | | 85 | |
| FQ Ethernet Cable | | 177 | |
| frozen images | | 72 | |
| <hr/> | | | |
| G | | | |
| GUI | | | |
| language | | 89 | |
| <hr/> | | | |
| H | | | |
| hiding menus | | 74 | |
| histograms | | 65 | |
| auto display | | 65 | |
| display range | | | |
| class | | 65 | |
| number of data | | 65 | |
| <hr/> | | | |
| I | | | |
| I/O Cable | | 26 | |
| connector | | 19 | |
| I/O Cables | | 177 | |
| I/O monitor | | 75 | |
| If Scanning Fails | | 67 | |

| | | | |
|-----------------------------|----------|--|--|
| image data | | | |
| logging | 76 | | |
| image input | | | |
| increasing speed | 56 | | |
| partial input | 56 | | |
| images | | | |
| displaying last NG image | 73 | | |
| displaying saved images | 73 | | |
| frozen | 72 | | |
| live | 72 | | |
| updating | 73 | | |
| zooming in | 72 | | |
| zooming out | 72 | | |
| zooming to fit display | 72 | | |
| Increment count | 93 | | |
| individual judgements | 102 | | |
| initialize | 89 | | |
| initializing | | | |
| Sensor and Touch Finder | 89 | | |
| input mode | 160 | | |
| inputs | | | |
| IN0 to IN5 | 26 | | |
| TRIG | 26 | | |
| inspection items | | | |
| copying | 48 | | |
| deleting | 48 | | |
| renaming | 48 | | |
| integrated Sensor lighting | 89 | | |
| Interval | 92 | | |
| IP address | 32 | | |
| <hr/> | | | |
| J | | | |
| judgements | | | |
| all results/region | 57 | | |
| individual | 102 | | |
| overall | 101 | | |
| <hr/> | | | |
| L | | | |
| language | 89 | | |
| LCD backlight | 74 | | |
| level output | 105 | | |
| lighting | 89 | | |
| control | 89 | | |
| live images | 72 | | |
| loading data from files | 83 | | |
| logging | 76, 77 | | |
| deleting log | 80 | | |
| recent results | 79 | | |
| selecting data to be logged | 76 | | |
| settings | 76 | | |
| starting and stopping | 77 | | |
| <hr/> | | | |
| M | | | |
| MAC address | 163, 164 | | |
| Max count | 92 | | |
| measurement data | | | |
| logging | 76 | | |
| measurement time | 56 | | |
| <hr/> | | | |
| measurements | | | |
| continuous | 99, 107 | | |
| takt time | 56 | | |
| Median | 44 | | |
| Memory State | 90 | | |
| menus | | | |
| hiding | 74 | | |
| mounting | | | |
| control panel | 23 | | |
| DIN Track | 23 | | |
| Mounting Bracket | 19 | | |
| mutual interference | | | |
| preventing | 43 | | |
| <hr/> | | | |
| N | | | |
| NG String output | 121 | | |
| normal retry | 92 | | |
| NPN | 27 | | |
| Num. of char. | 168 | | |
| <hr/> | | | |
| O | | | |
| one-shot output | 105 | | |
| operation | 59 | | |
| operation indicators | | | |
| BUSY | 19 | | |
| CHARGE | 20 | | |
| ERROR | 19, 20 | | |
| ETN | 19 | | |
| OR | 19 | | |
| POWER | 20 | | |
| SD ACCESS | 20 | | |
| Sensor | 19 | | |
| Touch Finder | 20 | | |
| optical charts | 21 | | |
| OR signal | 96 | | |
| output delay | 105 | | |
| Output end digit | 169 | | |
| output mode | 105 | | |
| output polarity | 106 | | |
| NG: ON | 106 | | |
| OK: ON | 106 | | |
| Output starting digit | 169 | | |
| output time | 105 | | |
| outputs | | | |
| BUSY | 26 | | |
| ERROR | 26 | | |
| OR | 26 | | |
| OUT0 | 26 | | |
| OUT1 | 26 | | |
| OUT2 | 26 | | |
| Outputting the Scan Result | 121 | | |
| overall judgements | 101 | | |
| <hr/> | | | |
| P | | | |
| Panel Mounting Adapter | 23, 176 | | |
| Partial output | 121 | | |
| password | 86 | | |
| PC Tool | 18, 177 | | |
| PNP | 27 | | |

| | |
|---|--------|
| Polarizing Filter using | 40 |
| power supply switch | |
| Touch Finder | 20 |
| Preventing Mutual Interference of Multiple Sensors | 43 |
| <hr/> | |
| Q | |
| QR Code Model | 51 |
| <hr/> | |
| R | |
| record separator | 78 |
| remaining Sensor | 90 |
| re-measuring | 54 |
| restart | 89 |
| restarting | |
| Sensor and Touch Finder | 89 |
| Retry Function | 91 |
| Reverse | 51 |
| Run Mode | 15, 60 |
| <hr/> | |
| S | |
| saved images | |
| displaying | 73 |
| saving data | 58, 83 |
| saving data to files | 83 |
| saving image data | 88 |
| scene data | |
| saving | 83 |
| scene group data | |
| saving | 83 |
| scene retry | 93 |
| scenes | |
| changing | 70 |
| changing names | 71 |
| copying | 71 |
| deleting | 71 |
| switching | 107 |
| SD card | |
| available space | 85 |
| formatting | 85 |
| information | 85 |
| operations | 84 |
| slot | 20 |
| Sensor data | |
| saving all Sensor data | 83 |
| Sensor information | 90 |
| Sensor monitor | 62 |
| Sensor system data | |
| saving | 83 |
| Sensors | |
| renaming | 90 |
| specifications | 170 |
| switching | 34 |
| Setting 2D Code Inspection Conditions | 49 |
| Setting How the Image is Processed After Scanning | 44 |
| Setting the Inspection Timeout Time | 90 |
| Setting the Retry Function | 91 |

| | |
|--|--------|
| Setup Mode | 15 |
| returning to Setup Mode | 61 |
| Shape | 51 |
| Shutter speed | 36 |
| Size | 168 |
| Smooth | 44 |
| startup display | 63 |
| startup mode | 71 |
| startup scene | 71 |
| startup settings | 71 |
| statistical data | |
| logging | 80 |
| straps | 24 |
| String output | 121 |
| subnet mask | 32 |
| Summary of Requirements to Manufactures | 182 |
| Summary of Requirements to User | 184 |
| Switch Sensor | 34 |
| Switching Hub | 18 |
| system configuration | 18 |
| <hr/> | |
| T | |
| test measurements | |
| continuous test | 54 |
| performing | 54 |
| Test Tab Page | 54 |
| time | |
| Touch Finder | 89 |
| Touch Finder | 173 |
| information | 90 |
| model with AC/DC/battery power supply | 173 |
| model with DC power supply | 173 |
| time settings | 89 |
| Touch Finder data | |
| saving | 83 |
| trend monitor | 64 |
| Auto display | 64 |
| Display range | 64 |
| Number of data | 64 |
| TRIG signal | 96 |
| trigger delay | 41, 43 |
| trigger retry | 94 |
| <hr/> | |
| U | |
| updating | |
| software version | 180 |
| <hr/> | |
| V | |
| versions | 90 |
| <hr/> | |
| W | |
| wiring | 26 |
| Sensor | 26 |
| Touch Finder | 28 |
| <hr/> | |
| Z | |
| zooming | 72 |

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