Cat. No. Z136-E1-1

# V530-R150

## 2-Dimensional Code Reader

# OPERATION MANUAL

OMRON

# V530-R150
# 2-Dimensional Code Reader

## Operation Manual

*Produced July 1999*

# Notice:

OMRON products are manufactured for use according to proper procedures by a qualified operator and only for the purposes described in this manual.

The following conventions are used to indicate and classify precautions in this manual. Always heed the information provided with them. Failure to heed precautions can result in injury to people or damage to property.

⚠ **DANGER** Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

⚠ **WARNING** Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

⚠ **Caution** Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury, or property damage.

# Visual Aids

The following headings will help you locate different types of information.

**Note** Indicates information of particular interest for efficient and convenient operation of the product.

→ Indicates pages where additional information can be found.

**1** Indicates a procedure. The step numbers in the procedure correspond to the numbers in any related illustrations.

# Notation

## Model Name

This product comes in two different models: V530-R150E (input/output type: NPN) and V530-R150EP (input/output type: PNP). In this manual, both models are referred to under the model number “V530-R150.”

## Screen Messages

In this manual, screen messages are given in bold/italic.
E.g.: ***Register***

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No patent liability is assumed with respect to the use of the information contained herein. Moreover, because OMRON is constantly striving to improve its high-quality products, the information contained in this manual is subject to change without notice. Every precaution has been taken in the preparation of this manual. Nevertheless, OMRON assumes no responsibility for errors or omissions. Neither is any liability assumed for damages resulting from the use of the information contained in this publication.

# TABLE OF CONTENTS

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# About this Manual:

This manual describes the features, specifications and operation of the V530-R150 2-Dimensional Code Reader and includes the following sections.

***Section 1*** gives an overview of the features, applications and basic configurations for the V530-R150 2-Dimensional Code Reader.

***Section 2*** describes the different parts of the V530-R150 2-Dimensional Code Reader, and details the connections and other procedures necessary for installation.

***Section 3*** describes the specifications, procedures,inputs and outputs used when operating the V530-R150 2-Dimensional Code Reader via terminal blocks.

***Section 4*** describes the specifications, procedures, inputs and outputs used when operating the V530-R150 2-Dimensional Code Reader via RS-232C.

***Section 5*** gives an overview of menu operations for the V530-R150 2-Dimensional Code Reader and explains the procedures required to perform basic operations.

***Section 6*** gives details of the functions and operations possible with the V530-R150 2-Dimensional Code Reader, including the procedures necessary for communications with external devices.

***Section 7*** gives basic maintenance procedures and inspection items for the V530-R150 2-Dimensional Code Reader.

***Section 8*** gives specifications and dimensions for the component parts of the V530-R150 2-Dimensional Code Reader.

***Section 9*** details errors that may occur with the V530-R150 2-Dimensional Code Reader and gives procedures for dealing with those errors.

The ***Appendices*** provide ASCII codes, examples of FCS check programs, and data capacity tables.

> ⚠ **WARNING** Failure to read and understand the information provided in this manual may result in personal injury or death, damage to the product, or product failure. Please read each section in its entirety and be sure you understand the information provided in the section and related sections before attempting any of the procedures or operations given.

# PRECAUTIONS

This section provides general precautions for using the V530-R150 2-Dimensional Code Reader.

**The information contained in this section is important for the safe and reliable application of the V530-R150 2-Dimensional Code Reader. You must read this section and understand the information contained before attempting to set up or operate a V530-R150 2-Dimensional Code Reader.**

# 1 Safety Precautions

**⚠ WARNING** Cover the terminal blocks with the Terminal Block Protection covers. Uncovered terminal blocks can result in electric shock.

**⚠ WARNING** Use DC power supplies with safe extra low-voltage circuits on the secondary side for the main V530-R150 power supply and power supplies for the terminal blocks. Excessively high voltages can result in electric shock.

**⚠ Caution** Do not touch fluorescent or halogen light while the power in ON or immediately after the power is turned OFF. These lights generate heat and can cause burns.

The following must be followed to ensure the safety.

**⚠ Caution** Do not use the V530-R150 in environments with flammable or explosive gases.

**⚠ Caution** Install the V530-R150 away from high-voltage equipment or motors to ensure safety during operation and maintenance.

**⚠ Caution** Use the power supply cables and crimp terminals of specified sizes.

**⚠ Caution** Use at the power supply voltages specified in this manual.

**⚠ Caution** Be sure to securely tighten the screws when mounting V530-R150 components.

**⚠ Caution** Do not dismantle, repair or modify any V530-R150 components.

**Caution** Dispose of V530-R150 components as industrial waste.

**Caution** To prevent damage from static electricity, use a wrist strap or another device for preventing electrostatic charges when touching terminals or signal line.

**Caution** Do not turn OFF the power while a message is being displayed indicating that processing is being performed. Data in memory will be destroyed, and the V530-R150 may not operate correctly the next time it is started. Please note that the V530-R150 can not restart if the power is turned OFF while the start up message is on a screen.

# 2 General Precautions

The user must operate the product according to the performance specifications described in the operation manuals.

Before using the product under conditions which are not described in the manual or applying the product to unclear control systems, railroad systems, aviation systems, vehicles, combustion systems, medical equipment, amusement machines, safety equipment, and other systems, machines, and equipment that may have a serious influence on lives and properly if used improperly, consult your OMRON representative.

Make sure that the ratings and performance characteristics of the product are sufficient for the systems, machines, and equipment, and be sure to provide the systems, machines, and equipment with double safety mechanisms.

# 3 Installation Precautions

The V530-R150 is highly reliable and resistant to most environmental factors. The following guidelines, however, must be followed to ensure reliability and optimum use of the V530-R150.

## Components

Be sure to use the Camera, Camera Cable, and Console designed for the V530-R150.

- Camera (F150-S1)
- Camera Cable (F150-VS)
- Camera Console (F150-KP)

## Installation Site

Do not install the V530-R150 in locations subject to the following conditions.

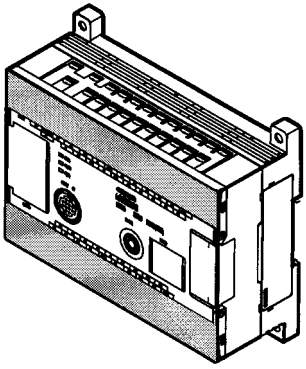
- Ambient temperatures outside of 0 to +40°C for the F300-M09 Video Monitor (recommended monitor) or outside of +50°C for all other V530-R150 components.
- Condensation due to rapid temperature fluctuations
- Relative humidities outside 35 to 85%
- Corrosive or flammable gases
- Dust, salt, or iron particles
- Direct vibration or shock
- Direct sunlight
- Water, oil, or chemical fumes or spray

## Installation

### Orientation of Controller

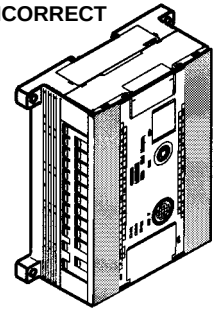
To improve heat dissipation, install the controller in the following orientation only:

**CORRECT**

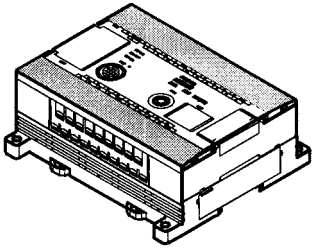


Do not install the controller in the orientations shown in the following diagram.

**INCORRECT**

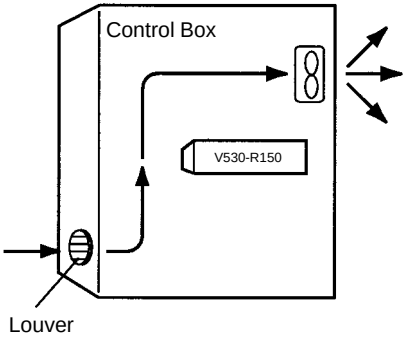


**INCORRECT**



**Ambient Temperature**

- Maintain a minimum clearance of 50mm above and below V530-R150 components to improve air circulation.
- Do not install V530-R150 components immediately above strong heat sources, such as heaters, transformers, or large-capacity resistors.
- Do not let the ambient operating temperature exceed 50°C.
- Provide a forced-air fan or air conditioning if the ambient temperature might exceed 50°C.

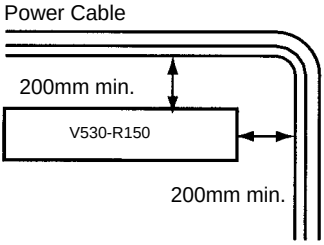



**Noise Resistance**

Use the following measures to help increase noise resistance.

- Do not install V530-R150 components in a cabinet containing high-voltage equipment.

- Do not install V530-R150 components within 200 mm of power cables.




## Cables

Always turn OFF the power before connecting or disconnecting cables.

## Cameras

The camera's case is connected to the 0V line in the internal circuits.
Heed the following precautions to prevent noise interference.

- Do not ground the camera.
- Do not remove the base attached to the camera.
- Do not remove the core attached to the F150-VS camera cable.

## Video Monitor

(When using the recommended F300-M09)

Heed the following precautions to prevent noise interference if the video monitor case is metallic, because it is connected to the 0V line in the internal circuits.

- Do not ground the video monitor.
- Do not ground the metallic part of the connector.
- Secure the video monitor with plastic screws if it is being mounted to a metallic surface.

## 2-Dimensional Code

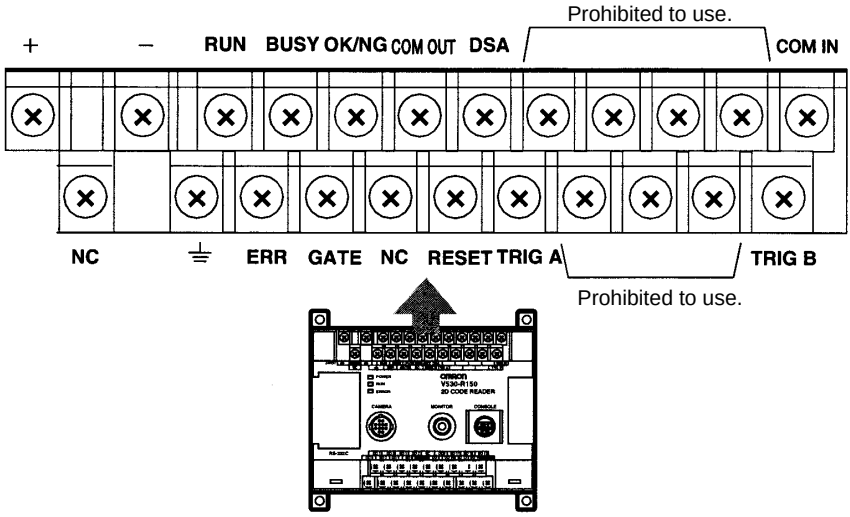
- The blank margin (quiet zone) is necessary around 2-dimensional codes. 4 cells are required for QR Codes and Data Matrix.
- Adjust the only one reading code to be within the field of vision. Reading can not be performed correctly if more than one code are on a screen.
- Adjust the field of vision of a camera for the 2-dimensional code to be at least 5 pixels per cell.

## RESET Terminal

Do not use RESET input immediately after power is turned ON. When using RESET input to synchronize execution timing, wait at least 1 s after turning ON the V530-R150 power supply before turning ON the RESET terminal.

## Terminals

Do not connect anything to the terminals with no names.




# 4 Package Contents

### Confirming Package Contents

Check the contents of the package as soon as you receive the V530-R150.

Contact the nearest OMRON representative if any of the following items are missing.

- V530-R150 2-Dimensional Code Reader Controller
- Operation Manual (this manual)

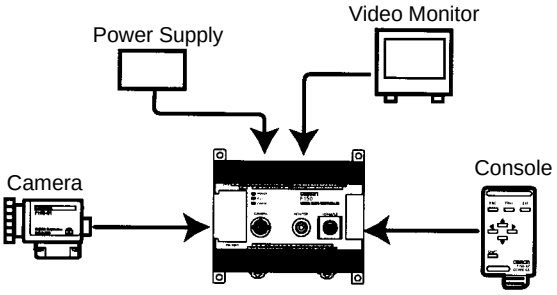
# SECTION 1
# Features

This section gives an overview of the features, applications and basic configurations for the V530-R150 2-Dimensional Code Reader.

# 1-1 Overview of V530-R150 Application

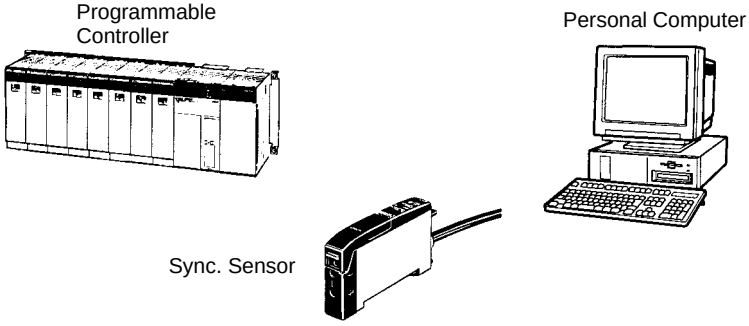
The following illustrations show configurations and typical applications for the V530-R150.

**Unit Connections and Wiring**




Refer to *Section 2 Installation* for detailed descriptions.

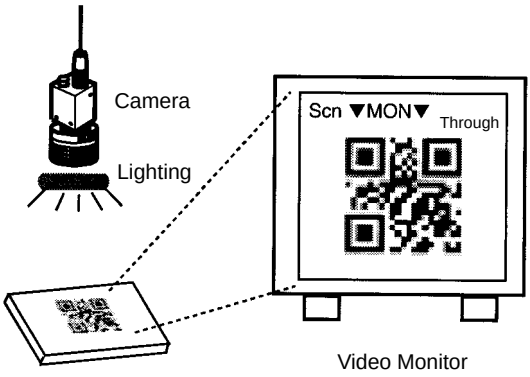
**Connections for Peripheral Devices**




Refer to *Section 3 Terminal Blocks* and *Section 4 RS-232C* for detailed descriptions.

### Displaying Images

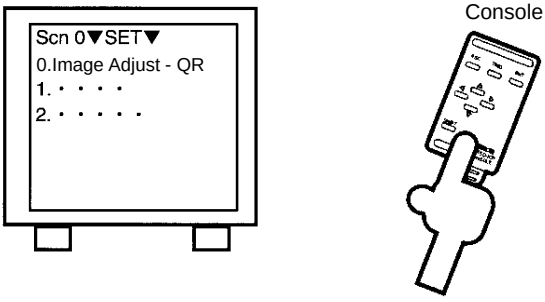
Switch to through image and adjust the focus, camera setting distance, and lighting.




Refer to *Sections 2.4 Camera, 2.5 CCTV Lens*, and *2-6 Lighting* for detailed descriptions.

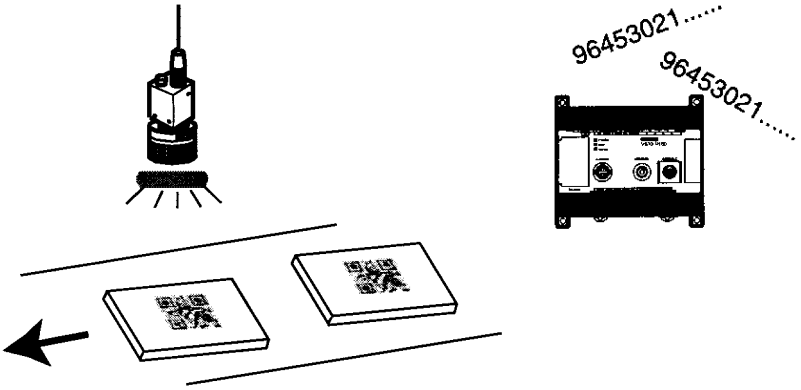
### Setting Reading Conditions

Operate the Console while checking menus on the video monitor.



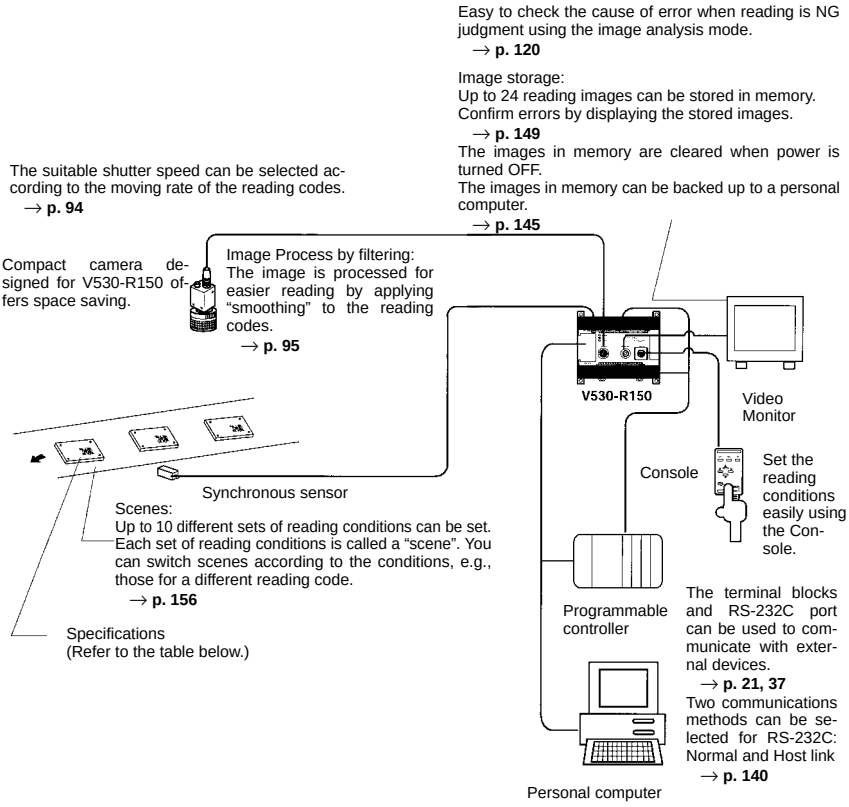

Refer to *Section 5 Operations* and *Section 6 Functions and Operations* for detailed descriptions.

**Performing Reading**




Refer to *Sections 6.3 MON (Monitor) Mode* and *6.4 RUN Mode* for detailed descriptions.

# 1-2 Functions




### Specifications

| | | |
|---|---|---|
| Reading code | QR Code (model 1, 2) | Data Matrix (ECC200) |
| Matrix size | 21 x 21 cell to 41 x 41 cell (Version 1 to 6) | 10 x 10 cell to 26 x 26 cell |
| Readable direction | 360 degrees (All directions) | |
| Resolution | Varies according to magnification and features of the lens to be used. (See note.) | |
| Reading region | | |
| Reading depth | | |

**Note** Adjust the field of vision to be at least five pixels per cell. Pixel number is measured by ***SET/Image Analysis/Measure Length***.
→ **p. 127**

# 1-3 Trigger Inputs and Outputs

**Trigger Inputs**

- Trigger inputs from terminal blocks: → **p. 25**
  Enter input signals to perform one shot reading, continuous reading and level trigger.
- Trigger inputs from RS-232C: → **p. 46, 52**
  Enter input signals to perform one shot reading and continuous reading.
  Select normal or host link as communications method.
- Trigger inputs from Console:
  Press the TRIG Key to perform one reading.

**Reading Judgment Outputs**

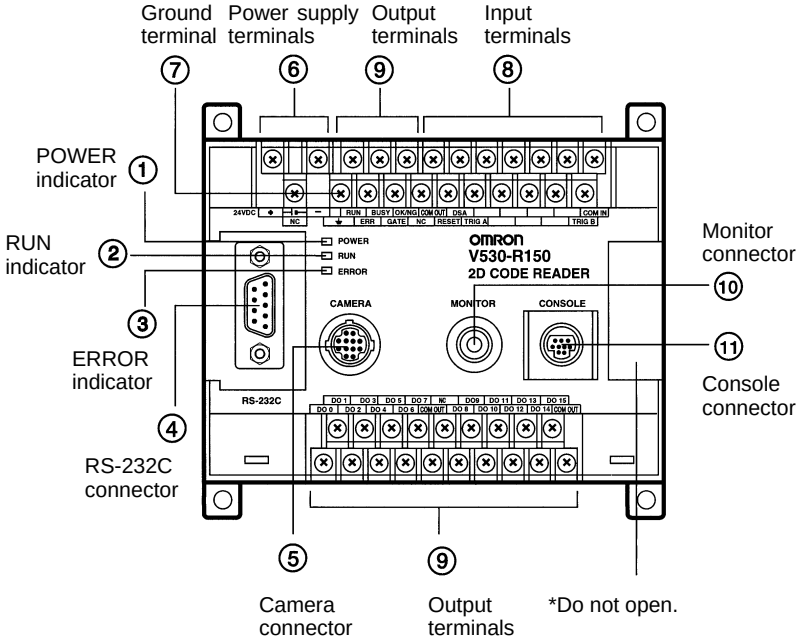
- To terminal blocks: → **p. 25**
  Judgment is output to the OK/NG terminal.
  Judgment is output to terminals DO0 to DO3 by using the coincidence judgment function.
- To RS-232C → **p. 46, 52**
  Reading judgment and data are output.
  Select normal or host link as communications method.

# SECTION 2
# Installation

This section describes the different parts of the V530-R150 2-Dimensional Code Reader, and details the connections and other procedures necessary for installation.

# 2-1 Component Names and Functions

The following diagram shows the terminals, connectors, and indicators on the V530-R150 2-Dimensional Code Reader.




① Lit while power is ON.

② Lit in RUN mode.

③ Lit when an error occurs.

④ Connects the V530-R150 to a computer, Programmable Controller, or other external device.

⑤ Connects to the Camera.

⑥ Wired to the power supply.

⑦ Wired to a ground.

⑧ Wired to external devices, such as synchronous sensors or inputs from a Programmable Controller.

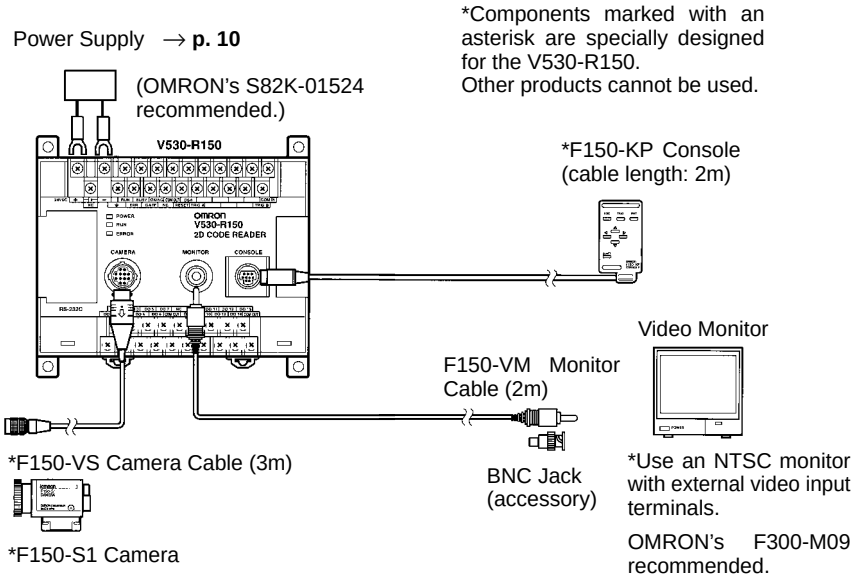
⑨ Wired to external devices, outputs to a Programmable Controller.

⑩ Connects to the video monitor.

⑪ Connects to the Console.

# 2-2 Connections

Connect the basic component as shown in the following diagram. Details are provided later in this section.




**Note** Turn OFF the power to the Controller before connecting or disconnecting cables. Connecting or disconnecting cables with power turned ON can damage peripheral devices.

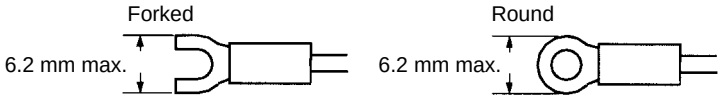
# 2-3 Power Supply and Ground

Wire the power supply and the ground to the top terminal block, and tighten the screws to a torque of between 0.5 and 0.6 N•m. After wiring, check to make sure that the wiring is correct.

⚠ **WARNING** Cover the terminal blocks with the Terminal Block Protection Covers. Uncovered terminal blocks can result in electric shock.

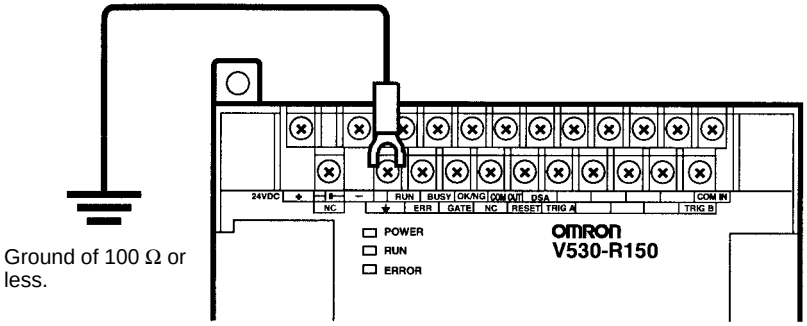
## 2-3-1 Crimp Terminals and Cables

The terminal block uses M3 terminal screws. Use appropriate crimp terminals for M3 screws, as shown below.




Applicable wire size: Insulated wire, 1.31 to 1.65 $mm^2$ (AWG16 to AWG15)

## 2-3-2 Protective Conductor (Earth) Wiring




**Note**

1. Use an appropriate ground. An insufficient ground can affect V530-R150 operation or result in damage to V530-R150 components.
2. To avoid damage to the equipment, do not share the protective conductor wiring with any other devices nor wire the protective conductor terminal to the girder. Be sure to wire the protective conductor of the equipment independently.
3. Keep the ground line as short as possible.

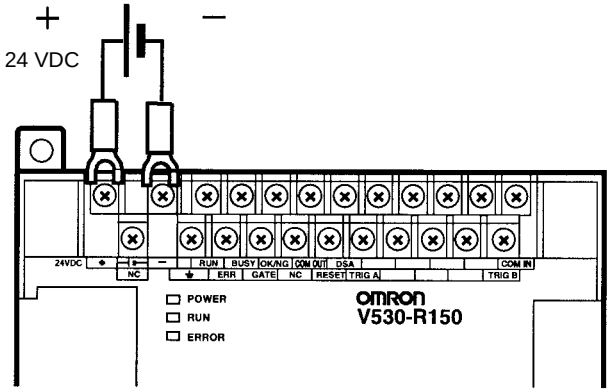
## 2-3-3 Wiring the Power Supply

**⚠ WARNING** Use a DC power supply with safe extra low-voltage circuits on the secondary side. Excessively high voltages can result in electric shock.

**Power supply**

Use a power supply with the following specifications. We recommend using OMRON's S82K-01524 Power Supply.

| | |
|---|---|
| Output current | 0.6 A min. |
| Power supply voltage | 24 VDC+10%, –15% |




**Note**

1. Wire the Power Supply Unit independently of other devices. In particular, keep the power supply wired separately from inductive loads.
2. Keep the power supply cable as short as possible.
3. If UL recognition is required, use a UL class II power supply.

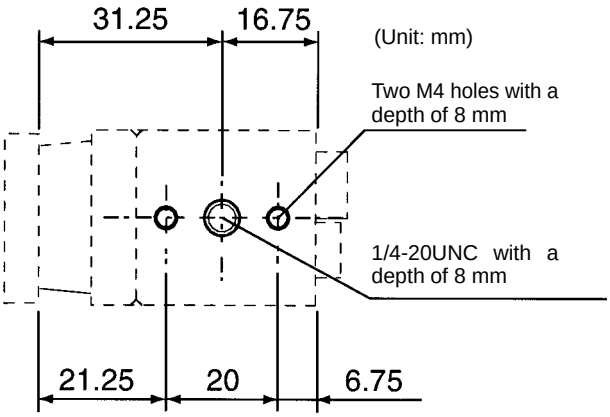
# 2-4 Camera

The camera is designed for the V530-R150.

**Mounting the Camera**

The specified camera distance is only an approximation. Mount the Camera so that it can be adjusted within a range containing the specified distance from the reading object.

- Camera

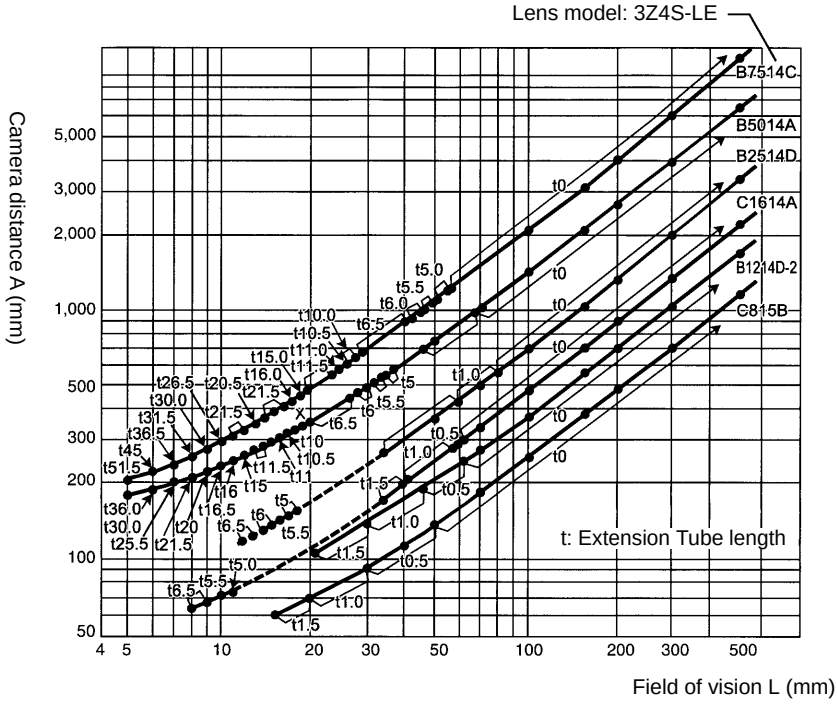


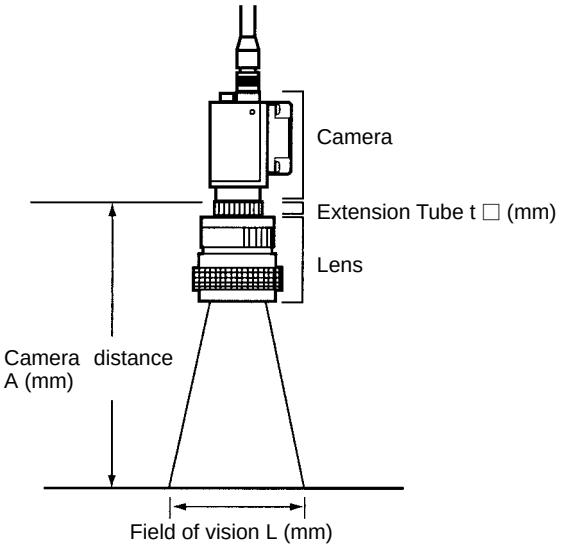
# 2-5 CCTV Lens

When using a F150-S1 Camera, refer to the following graph to select the appropriate Lens end Extension Tube. The lens required will differ depending on the size of the reading object and the distance from the Camera. Adjust the field of vision of the Camera so that a 2-dimensional code is at least 5 pixels per cell.

### Optical Chart

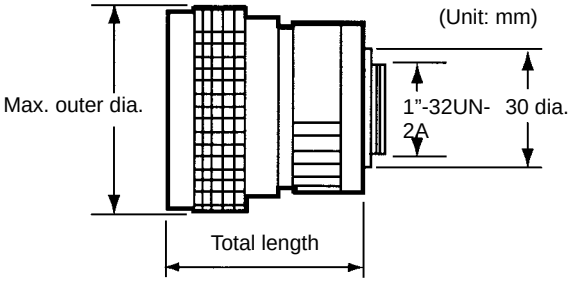
The X axis of the graph shows field of vision L (mm), and the Y axis shows the camera distance A (mm). The curves on the graph indicate different lenses, and the "t" values indicates the lengths of the Extension Tubes. The values in the following chart are approximations, and the Camera must be adjusted after it is mounted.





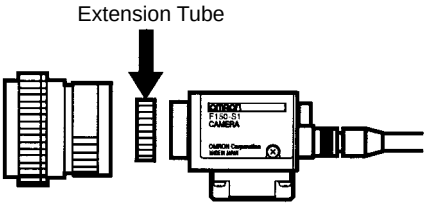

## Lens

| | Focal length | Brightness | Max. outer diameter | Total length | Filter size |
|---|---|---|---|---|---|
| 3Z4S-LE C418DX | 4.8 mm | F1.8 | 40.5 mm dia. | 35.5 mm | --- |
| 3Z4S-LE B618CX-2 | 6.5 mm | F1.8 | 48 mm dia. | 42 mm | |
| 3Z4S-LE C815B | 8.5 mm | F1.5 | 42 mm dia. | 40 mm | M40.5 × P0.5 |
| 3Z4S-LE B1214D-2 | 12.5 mm | F1.4 | 42 mm dia. | 50 mm | |
| 3Z4S-LE C1614A | 16.0 mm | F1.4 | 30 mm dia. | 33 mm | M27 × P0.5 |
| 3Z4S-LE B2514D | 25.0 mm | F1.4 | 30 mm dia. | 37.3 mm | |
| 3Z4S-LE B5014A | 50.0 mm | F1.4 | 48 mm dia. | 48 mm | M46 × P0.75 |
| 3Z4S-LE B7514C | 75.0 mm | F1.4 | 62 mm dia. | 79 mm | M58 × P0.75 |

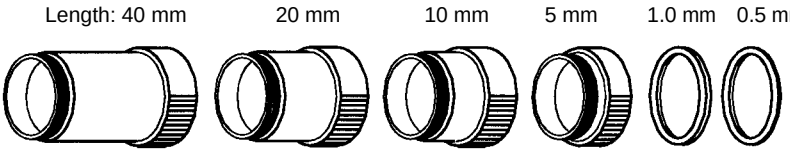


### Extension Tubes

One or more Extension Tubes are inserted between the lens and the Camera to focus the Camera image. Use a combination of one or more of the six sizes of tube to achieve the required length.




| Model | Max. outer diameter | Length |
|---|---|---|
| 3Z4S-LE EX-C6 | 31 mm dia. | Set of 6 tubes<br>0.5 mm, 1 mm, 5 mm, 10 mm, 20 mm, and 40 mm |




**Note**

1. Do not use the 0.5-mm and 1.0-mm Extension Tubes attached to each other. Since these Extension Tubes are placed over the threaded section of the Lens or other Extension Tubes the connection may loosen when more than one 0.5-mm or 1.0-mm Extension Tube are used together.
2. Reinforcement may be required for a combination of Extension Tubes exceeding 30 mm if the Camera is subject to vibration.

# 2-6 Lighting

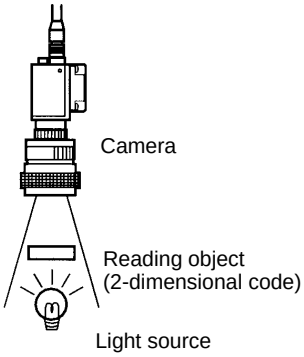
A stable image must be obtained to ensure accurate inspection. Use appropriate lighting for the application and the reading object.

## Lighting Methods

### Back Lighting

A stable, high-contrast image can be obtained using back lighting.

Applications: Transparent objects such as LCD glass

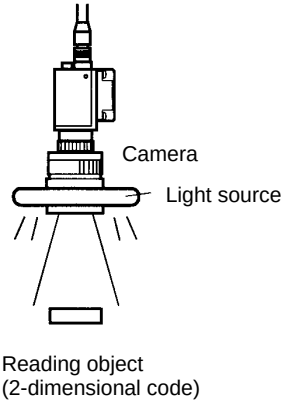



### Reflected Lighting

#### Ring Lights

Light is shone uniformly on the reading object. The difference in reflection factors of the background and the marking enable stable detection.

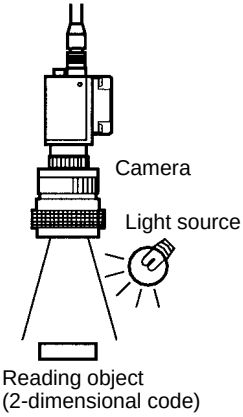
Applications: Paper labels and corrugated cardboard



**Oblique Lighting**

Detection is made by distinguishing regular and diffuse reflected light.

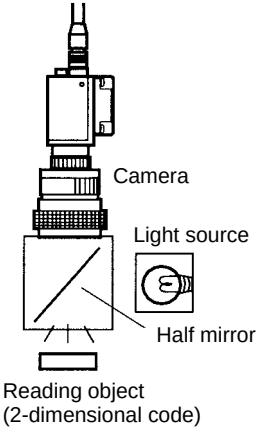
Applications: PCBs and electronic parts




**Coaxial Lighting**

A stable image with few shadows can be obtained of a reading object with an uneven surface by detecting only regular reflected light.

Applications: Mirror-like objects such as wafers

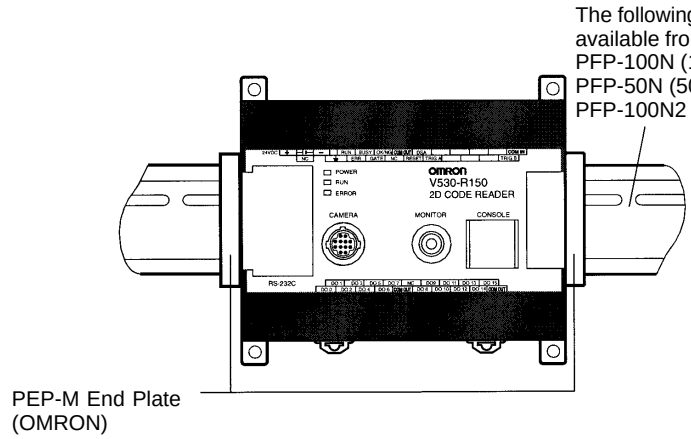


# 2-7 Mounting the Controller

The V530-R150 2-Dimensional Code Reader can be mounted to DIN Track or a flat surface.

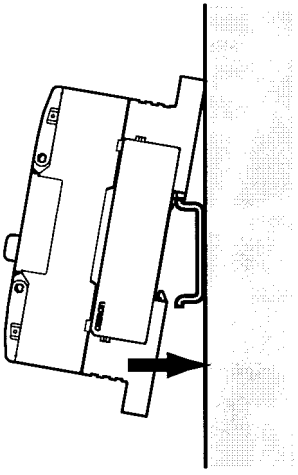
## 2-7-1 Mounting to DIN Track

The 2-Dimensional Code Reader can be easily mounted to or removed from 35-mm DIN Track.



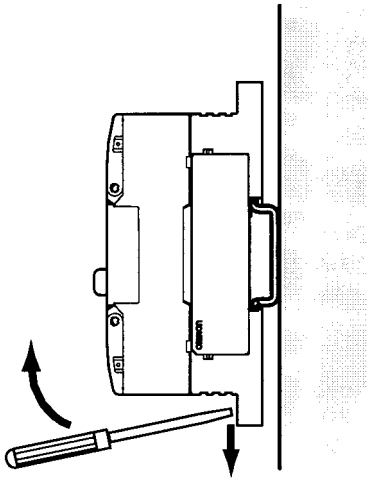

**Mounting the Controller**

Hook the Controller into the DIN Track as shown in the diagram and then press in at the bottom until the Controller locks into place.

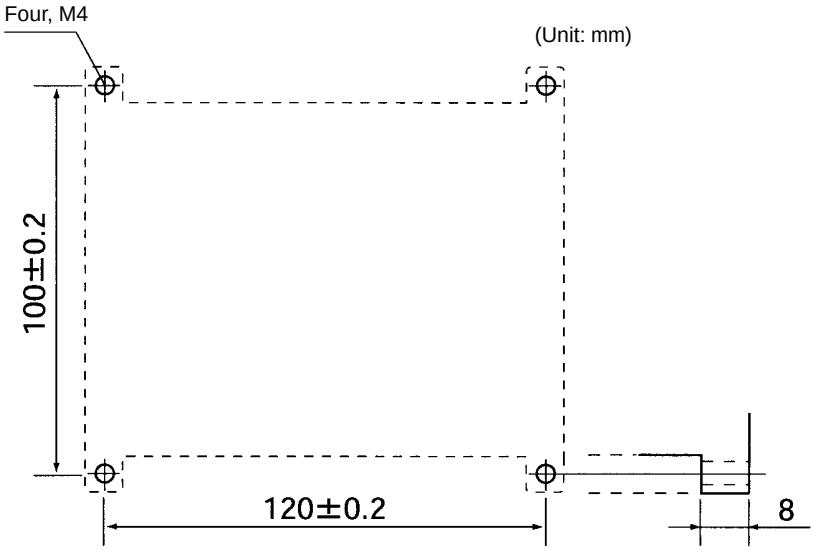


**Removing the Controller**

Use a screwdriver to pull the hook down and then pull out the Controller from the bottom.



## 2-7-2 Mounting on a Flat Surface



# SECTION 3
# Terminal Blocks

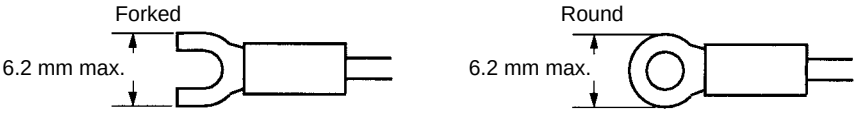
This section describes the specifications, procedures,inputs and outputs used when operating the V530-R150 2-Dimensional Code Reader via terminal blocks.

# 3-1 Specifications

## 3-1-1 Crimp Terminals and Cables

The terminal block uses M3 terminal screws. Use appropriate crimp terminals for M3 screws, as shown below. Tighten the screws to a torque of between 0.5 and 0.6 N•m. After wiring, check to make sure that the wiring is correct.

**⚠ WARNING** Cover the terminal blocks with the Terminal Block Protection Covers. Uncovered terminal blocks can result in electric shock.

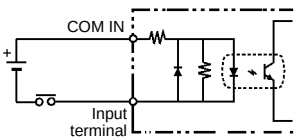
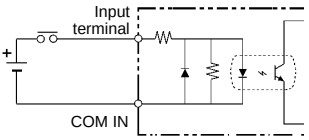



Applicable wire size: Insulated wire, 1.31 to 1.65 $mm^2$ (AWG16 to AWG15)

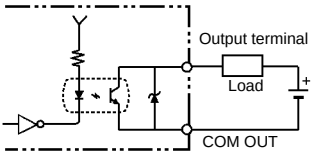
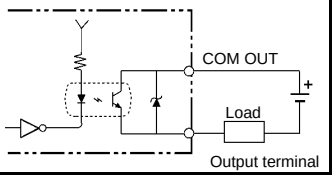
## 3-1-2 Specifications

**⚠ WARNING** Use a DC power supply with safe extra low-voltage circuits on the secondary side. Excessively high voltage can result in electric shock.

**Input Specifications**

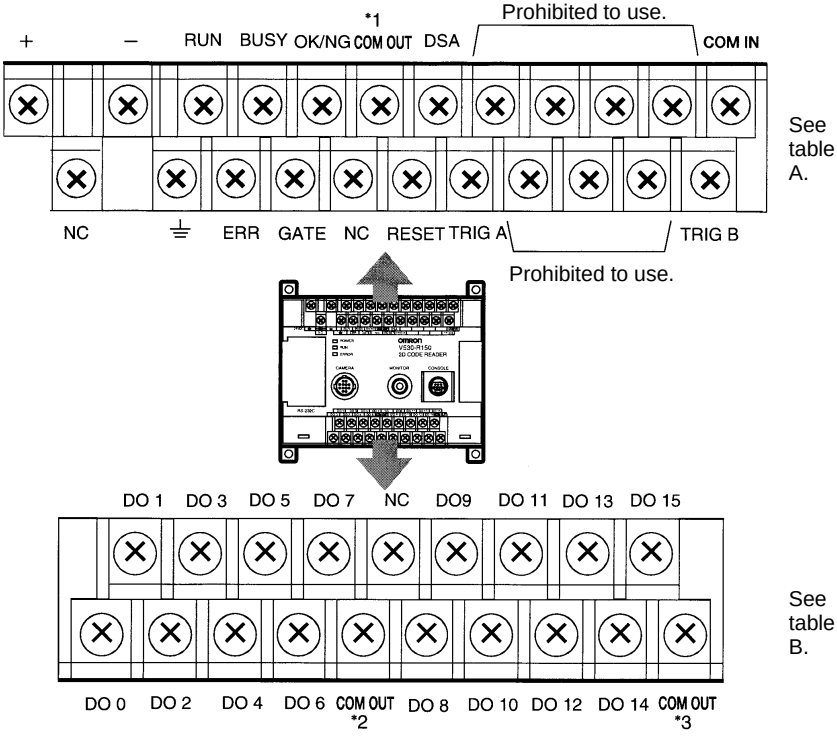
| Item | V530-R150E (NPN model) | V530-R150EP (PNP model) |
|---|---|---|
| Input voltage | 12 to 24 VDC ±10% | |
| ON current | 3 to 15 mA | |
| ON voltage | 8.8 V max. | |
| OFF current | 0.1 mA max. | |
| OFF voltage | 4.5 V min. | |
| ON delay | RESET input: 10 ms max.<br>Others: 0.5 ms max. | |
| OFF delay | RESET input: 15 ms max.<br>Others: 0.7 ms max. | |
| Internal circuits |  |  |

**Output Specifications**

| Item | V530-R150E (NPN model) | V530-R150EP (PNP model) |
|---|---|---|
| Output voltage | 12 to 24 VDC ±10% | |
| Load current | 45 mA max. | |
| ON residual voltage | 2 V max. | |
| OFF leakage current | 0.1 mA max. | |
| Internal circuits |  |  |

**Note** If UL recognition is required, use a UL class II power supply.

## 3-1-3 Terminals



There are 3 kinds of COM OUT (*1 to *3) for each output terminal. Connect with reference to the following table.

**A**

| Top | | Bottom | |
|---|---|---|---|
| + | Power supply | NC | Not connected |
| – | | ⏚ | Appropriate ground |
| RUN | Control output | ERR | Error output |
| BUSY | | GATE | Control output |
| OK/NG | Judgment output | NC | Not connected |
| COM OUT (*1) | For RUN, ERR, BUSY, GATE, and OK/NG | RESET | Restart |
| DSA | Prohibited to use | TRIG A | Trigger input (One shot mode) |
| COM IN | | TRIG B | Trigger input (Continuous or Level Trigger mode) |

**B**

| Top | | Bottom | |
|---|---|---|---|
| DO 1 | Coincidence output | DO 0 | Coincidence output |
| DO 3 | | DO 2 | |
| DO 5 | Prohibited to use | DO 4 | Prohibited to use |
| DO 7 | | DO 6 | |
| NC | Not connected | COM OUT (*2) | For DO 0 to DO7 |
| DO 9 | Prohibited to use | DO 8 | Prohibited to use |
| DO 11 | | DO 10 | |
| DO 13 | | DO 12 | |
| DO 15 | | DO 14 | |
| | | COM OUT (*3) | For DO 8 to DO15 |

**Note**

1. Do not reverse the connections of the signal terminals and COM terminals.
2. Do not use RESET input immediately after power is turned ON.
   When using RESET input to synchronize execution timing, wait at least 1 s after turning ON the V530-R150 power supply before turning ON the RESET terminal.

# 3-2 Trigger Input and Output Format

## 3-2-1 Trigger Input

Reading is performed by inputting a signal to the TRIG A or B terminals when in MON (monitor) or RUN mode.

**TRIG A Terminal (One shot mode)**

One reading is performed on the rising edge (OFF to ON) of TRIG A signal.

Correct Reading: Reading ends, then reading judgment is output.
Incorrect Reading: Reading continues to be performed for the number of retries specified in the setting conditions.

How to set the number of retries. → **p. 97, 113**

As the TRIG A signal is synchronous with the shutter input of the Camera, an accurate image of the moving object can be obtained.

**TRIG B Terminal (Continuous mode / Level trigger mode)**

Changed by setting of communications specifications.
→ **p. 143**

| Trigger Mode | Detail |
|---|---|
| Continuous mode (Default setting) | Performs continuous reading while the TRIG B terminal is ON. |
| Level trigger mode | Repeats reading while the TRIG B terminal is ON until reading judgement is OK (readable). |

## 3-2-2 Output Format

Signals are output in RUN mode but not in MON (monitor) mode.

**OK/NG Terminal**

Output OK/NG judgment.

| Judgment | Detail |
|---|---|
| OK | OK when 2-dimensional codes are read successfully.<br>The reading data will be output to RS-232C. |
| NG | NG when 2-dimensional codes are not read successfully.<br>The error code will be output to RS-232C.<br>NG when coincidence judgment is set to ON and the reading data is not coincident with the registered data 0 to 3.<br>The reading data will be output to RS-232C. |

OK: ON or NG: ON (i.e.: whether output turns ON for an OK judgment or an NG judgment) can be selected in the communications

specifications settings.
The default setting is NG: ON. → **p. 143**

**DO0 to DO3 Terminals**

While the coincidence judgment function is ON, the signals are as follows:

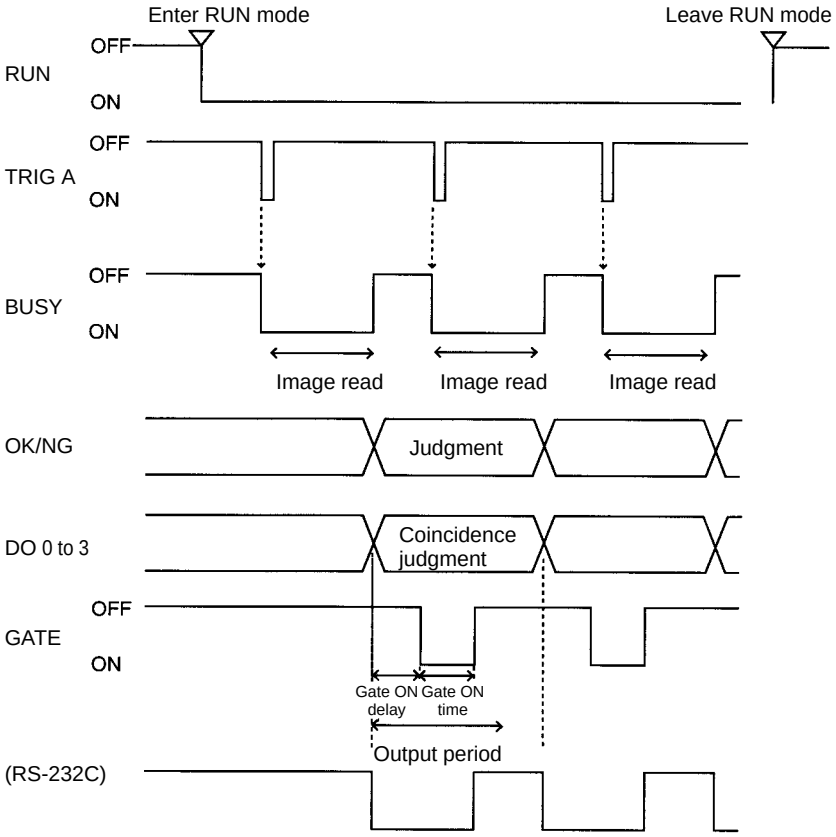
How to set coincidence judgment function → **p. 102, 118**

Coincident with registered data 0: DO0 terminal turns ON.
Coincident with registered data 1: DO1 terminal turns ON.
Coincident with registered data 2: DO2 terminal turns ON.
Coincident with registered data 3: DO3 terminal turns ON.

**Note** The initial status of the output terminals is OFF. The terminals, however, may turn ON for approximately 0.5 s when the power is turned ON. Be sure to allow for this when connecting to an external device.

# 3-3 Timing Chart

## 3-3-1 One Shot Mode




**Note** The output time to RS-232C changes depending on the data volume or baud rate.

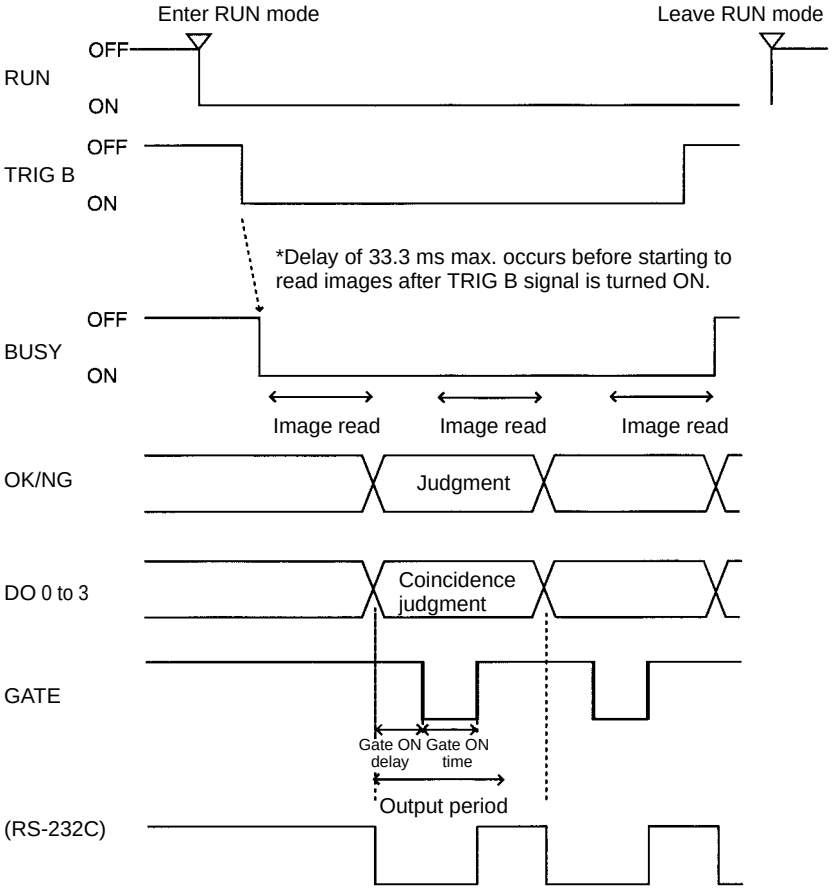
### Output Terminals

| Terminal | Function |
|---|---|
| RUN | Turns ON during RUN mode. |
| BUSY | Shows that the V530-R150 is reading an image, changing settings, etc. Do not input the next command while the BUSY signal is ON. Otherwise, commands may not be properly executed. |
| OK/NG | Outputs the judgment under the set reading conditions. (Can be set to turn ON for either OK or NG judgment.) |
| GATE | Used to control the timing with which the reading judgment is read at the external device. The duration for which the GATE terminal is turned ON can be set as required for the external device to correctly read the reading judgment. Make the output cycle shorter than the duration of the reading (TRIG A input). If the cycle is longer, the output timing falls behind as readings are repeated. Gate ON delay, Gate ON time and Output period are set under the set communications conditions. → **p. 143** |

### Input Terminals

| Terminal | Function |
|---|---|
| TRIG A | Inputs a reading trigger from a photoelectric sensor or other external device. One reading is taken on the rising edge of the TRIG A signal. Turn ON for at least 0.5ms. The duration of TRIG A signal input depends on reading time. While reading is being performed, BUSY terminal turns ON and does not accept input signals. Refer to *3-4 System Examination* for the standard reading time. |

## 3-3-2 Continuous Mode




**Note** The output time to RS-232C changes according to the data volume and baud rate.

### Output Terminals

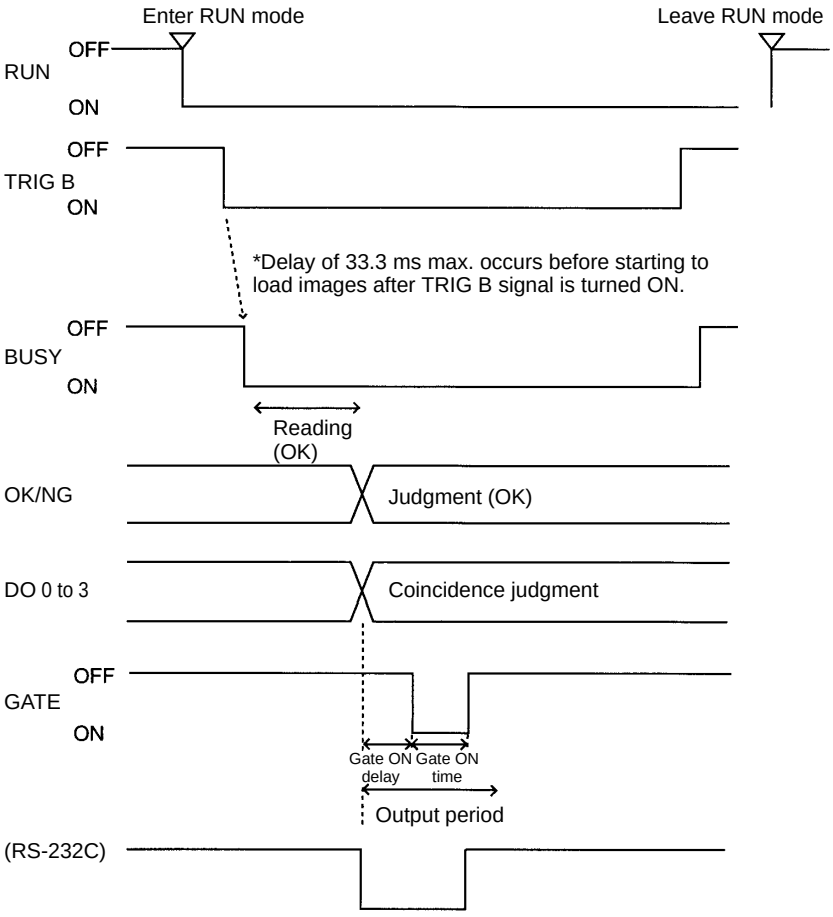
| Terminal | Function |
|---|---|
| RUN | Turns ON during RUN mode. |
| BUSY | Shows that the V530-R150 is reading an image, changing settings, etc.<br>Do not input the next command while the BUSY signal is ON.<br>Otherwise, commands may not be properly executed. |
| OK/NG | Outputs the judgment under the set reading conditions.<br>(Can be set to turn ON for either OK or NG judgment.) |
| GATE | Used to control the timing with which the reading judgment is read at the external device.<br>The duration for which the GATE terminal is turned ON can be set as required for the external device to correctly read the reading judgment.<br>Make the output cycle shorter than the duration of the reading.<br>If the cycle is longer, the output timing falls behind as readings are repeated.<br>Gate ON delay, Gate ON time and Output period are set under the set communications conditions. → **p. 143** |

### Input Terminals

| Terminal | Function |
|---|---|
| TRIG B | Continuous reading is performed when TRIG B signal is turned ON. |

## 3-3-3 Reading Level Trigger (when trigger mode is "Level Trigger")

**OK judgment (Readable)**




**Note** The output time to RS-232C changes according to the data volume and baud rate.

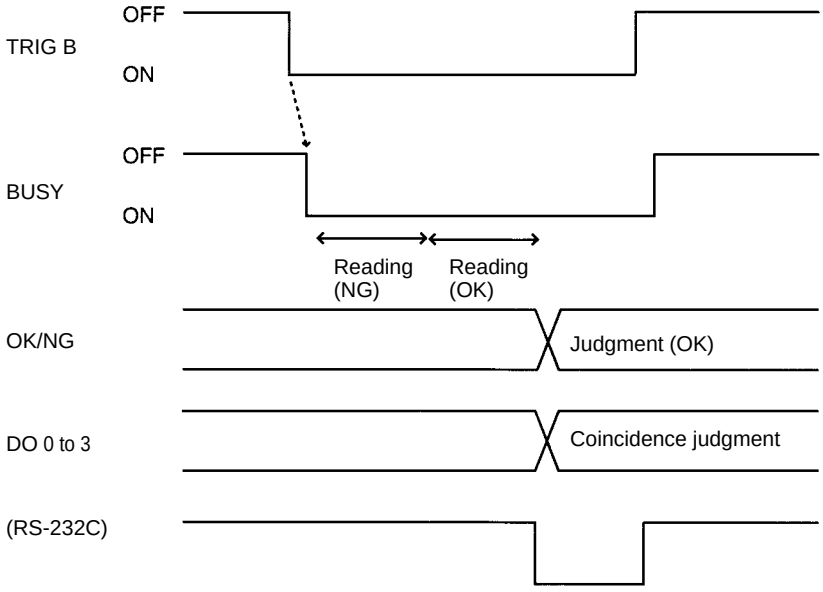
**Output Terminals**

The same as continuous mode.

**Input Terminals**

| Terminal | Function |
|---|---|
| TRIG B | Continuous reading is performed while TRIG B signal is turned ON until OK (readable) reading judgment is output. |

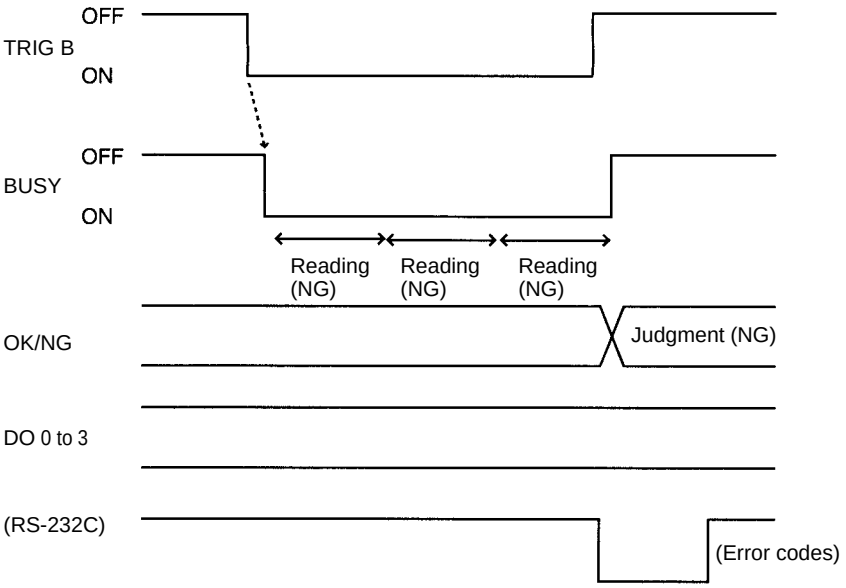
**OK judgment obtained after repeated reading:**




**Note** The output time to RS-232C will vary according to the data volume and baud rate.

**NG judgment after repeated reading:**

NG is output when TRIG B is turned OFF.




**Note** The output time to RS-232C will vary according to the data volume and baud rate.

# 3-4 System Examination

### Processing Time Calculation

Processing time (reading time) is calculated as follows:

Processing time = Shutter time of camera + Delay of loading image (see note) + Loading image time (33.3 ms fixed)

\+ Decode time + Display time

**Note** A delay will occur before starting to load video monitor images if through images are displayed. A delay may also occur depending on the trigger input method.

### Reading Moving Objects

Please note the following to prevent delay when loading images.

- Use the TRIG A signal for timing input.
  As the TRIG A signal is synchronous with the shutter input of the Camera, an accurate image of the moving object can be obtained.
- Set the image to be displayed on the video monitor to “Freeze”.
  When through images are displayed, a delay of 33.3 ms max. occurs before loading images after the TRIG A signal input.

**Line Speed**

If the object moves while the image is being loaded after the shutter is released, the image will be blurred. Set the line speed according to the shutter speed (using V530-R150 menu), the cell size of objects, and the field of vision of the Camera.

**Tact Time**

A certain interval is necessary between reading objects during which the next trigger signal is not input. This interval (time) is called “Tact Time”.

(e.g.) Processing time for reading: 500 ms; Line speed: 30 m/min

$$\frac{30}{60} \times 0.5 = 0.25$$

The distance moved in 500 ms is 0.25 m. Therefore, an interval allowing 0.25 m min. of movement is necessary.

**Number of Retries**

If reading is NG, reading continues to be performed for the number of retries specified by the setting conditions. When reading moving objects, reading may continue after the object has left the field of vision. Set the number of retries so that reading is performed while the object is still within the field of vision, or set to 0.

**Continuous Reading**

Regardless of the displayed image (through/freeze), a 33.3 ms max. delay occurs before loading the image after the TRIG B signal is input.

**Standard Processing Time (values for OMRON's standard codes)**

**QR Code**

| Matrix size | Processing time |
|---|---|
| 21 X 21 (Version 1) | 160 ms |
| 29 X 29 (Version 3) | 200 ms |
| 41 X 41 (Version 6) | 260 ms |

**Data Matrix**

| Matrix size | Processing time |
|---|---|
| 10 X 10 | 180 ms |
| 14 X 14 | 190 ms |
| 26 X 26 | 250 ms |

**Note** The data here are standard values. When installing, calculate the processing time according to the actual specifications and confirm the value in the actual operating environment. The processing time is displayed in the upper-right corner of the screen when reading is performed in MON (monitor) or RUN mode.

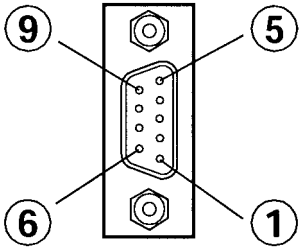
# SECTION 4
# RS-232C

This section describes the specifications, procedures, inputs and outputs used when operating the V530-R150 2-Dimensional Code Reader via RS-232C.

# 4-1 Specifications

## 4-1-1 Connector

The V530-R150 uses 9-pin D-SUB female connectors. The pin numbers and names are shown below.




**Recommended OMRON Connector**

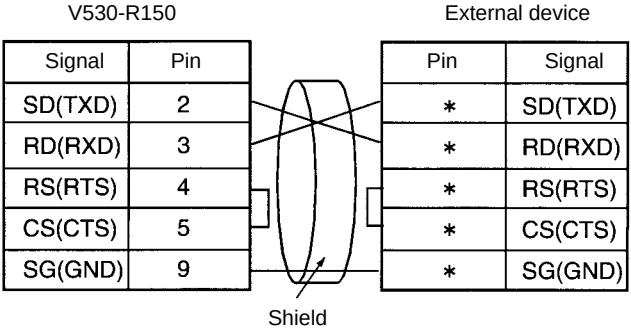
| Model | Model No. |
|---|---|
| Plug | XM2A-0901 |
| Hood | XM2S-0911 |

| Pin | Signal | Name |
|---|---|---|
| 1 | FG (GND) | Frame ground |
| 2 | SD (TXD) | Send Data |
| 3 | RD (RXD) | Receive Data |
| 4 | RS (RTS) | Request to Send |
| 5 | CS (CTS) | Clear to Send |
| 6 | NC | Not connected |
| 7 | NC | Not connected |
| 8 | NC | Not connected |
| 9 | SG (GND) | Signal ground |

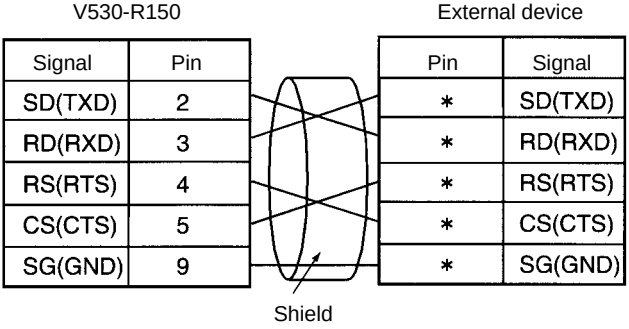
## 4-1-2 Wiring

Only use a shielded RS-232C cable.

**Standard Connections**



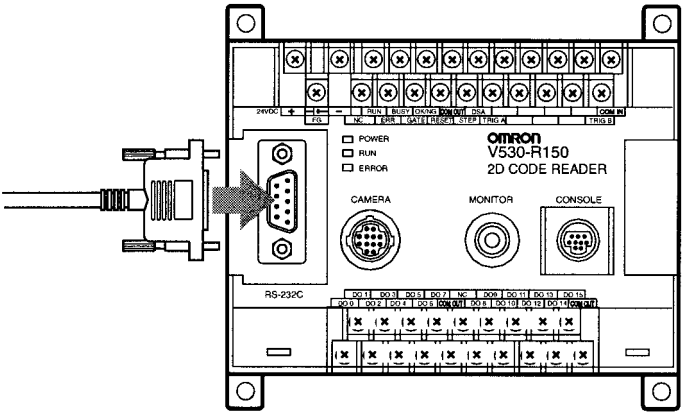

**Connections for RS/CS Control**




**Note** Pin numbers will depend on the external device being connected.
Refer to the manual for the external device.

## 4-1-3 Connection

Align the connector with the socket and press the connector straight into place. Tighten the two screws on the edges of the connector.




**Note**

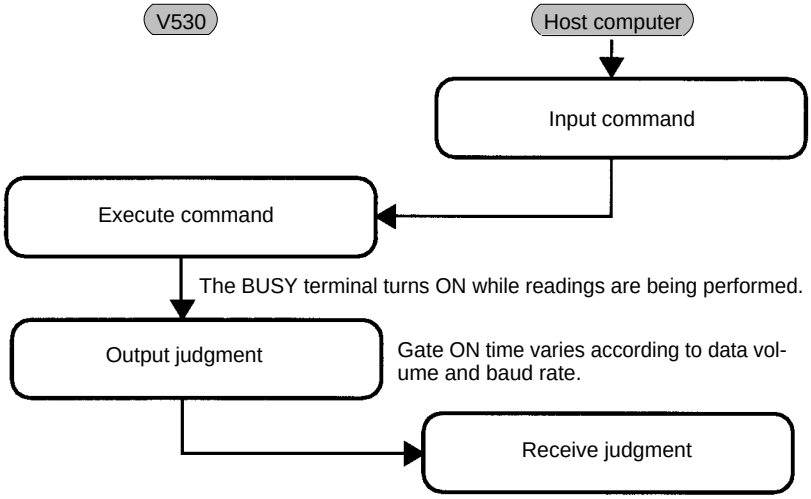
1. Always turn OFF the power supply before connecting or disconnecting cables. Peripheral devices can be damaged if connected or disconnected with the power supply turned ON.
2. Always tighten the connector screws.

# 4-2 Communication Settings

## 4-2-1 Normal Communications Mode

If the Normal communications mode is selected, data can be output in normal format to an external device via the RS-232C port.
Communications method setting menu → **p. 140**

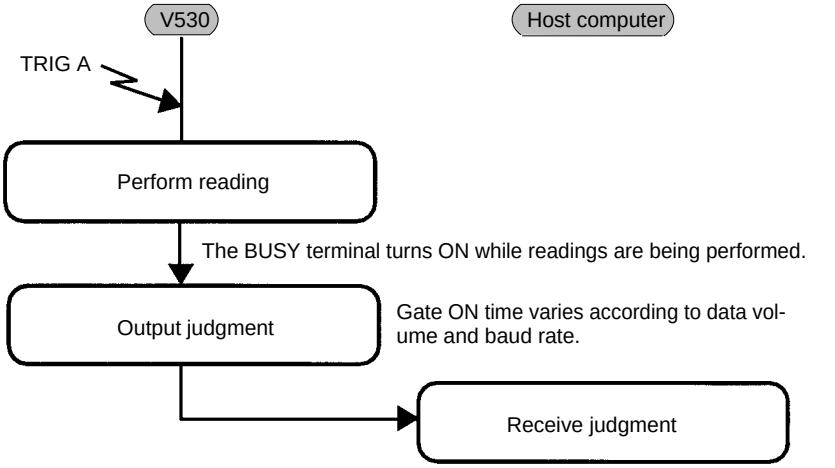
**I/O via the RS-232C Port**




A timeout error occurs if there is no response from the host computer within the set time when RS/CS or Xon/off is selected for flow control. An ERR (error) message appears on the screen, and the error terminal turns ON.

Program example → **p. 63**

**TRIG A Signal as Reading Trigger**




A timeout error occurs if there is no response from the host computer within the set time when RS/CS or Xon/off is selected for flow control. An error message appears on the screen, and the ERR (error) terminal turns ON.

Program example → **p. 58**

## 4-2-2 Host Link

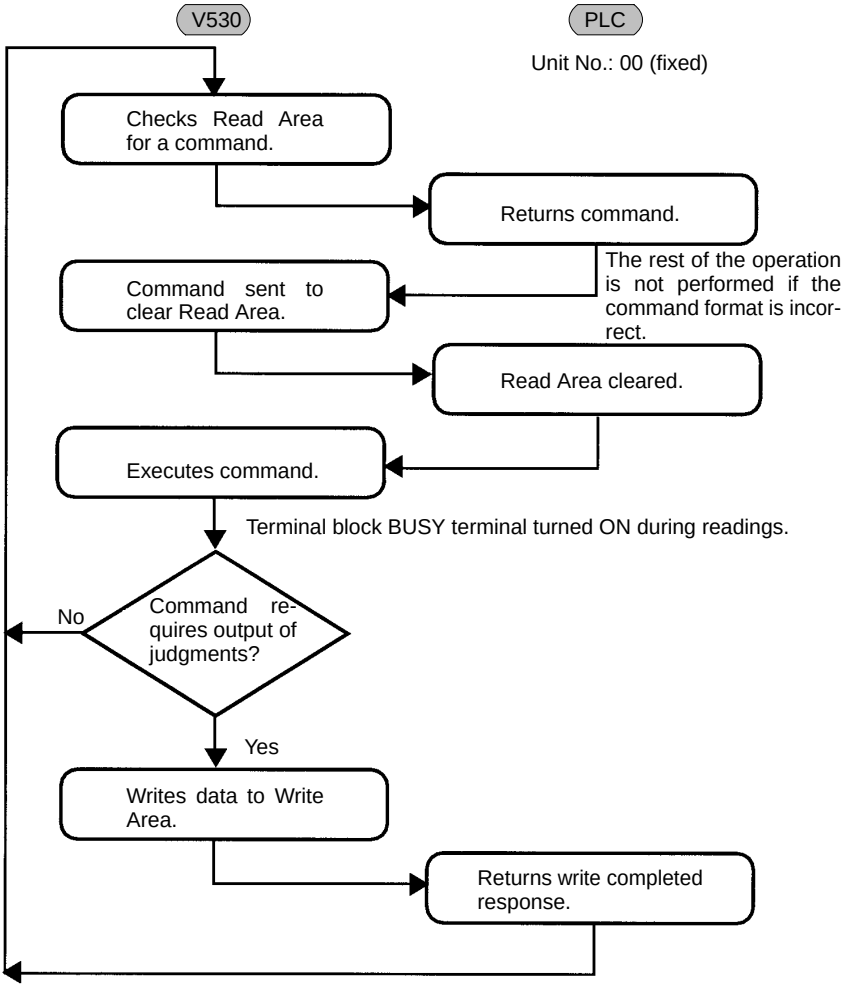
Select Host Link for the communications mode to communicate in Host Link format with a Programmable Controller or other host device via the RS-232C port.

Communications method setting menu → **p. 140**

**I/O via the RS-232C Port**

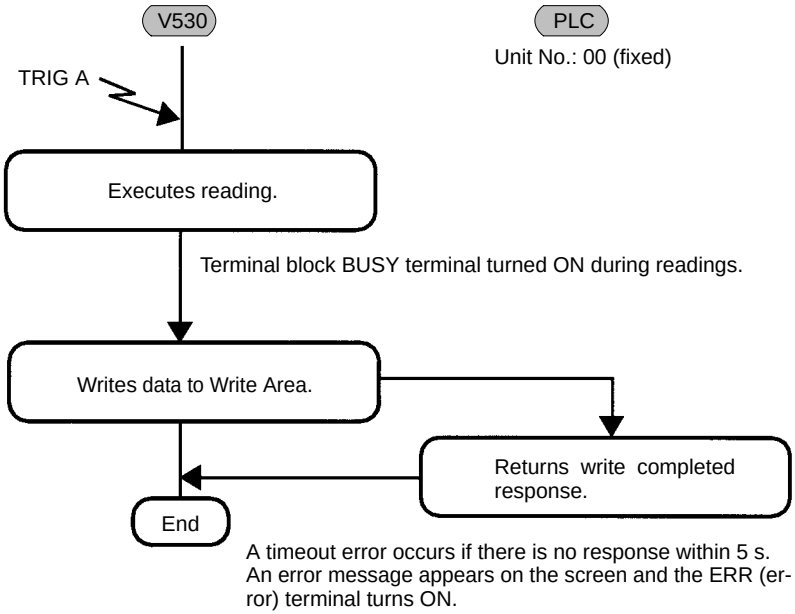
Commands for the V530-R150 are written to the Read Area in the Programmable Controller.

The V530-R150 automatically reads these commands, executes them, and writes any judgments to the Write Area.



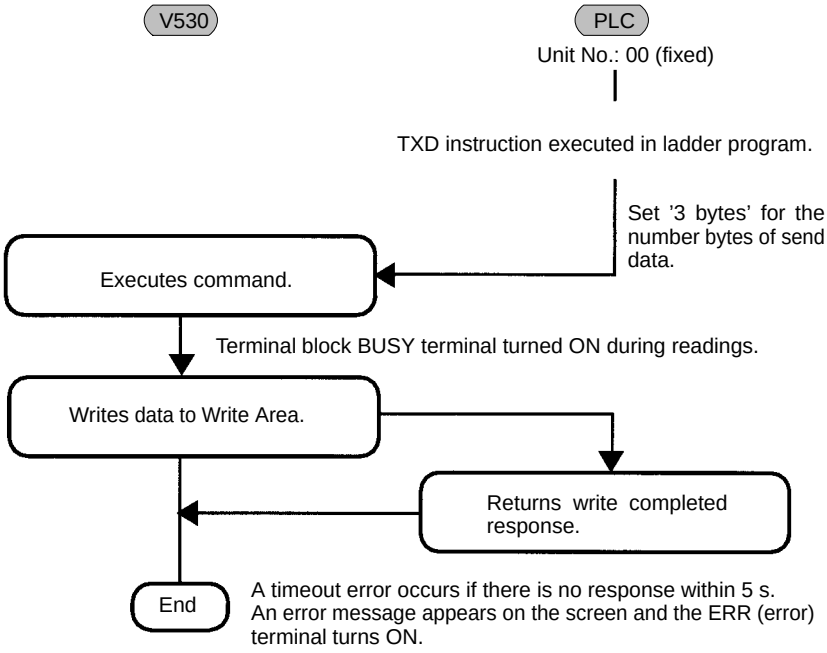
**TRIG A Signal as Reading Trigger**

Set the Read Area to “None.”



### Using TXD Instructions

Commands are sent from the Programmable Controller to the V530-R150 using TXD instructions in the Programmable Controller's ladder program instead of the Read Area. If TXD instructions are to be used to send commands, set the Read Area to "None."




Program example → **p. 61**

# 4-3 Trigger Inputs and Output Format

## 4-3-1 Normal

### Command

| Connection | Function | Command |
|---|---|---|
| 1:1 | One shot reading | @GL |
| | Start continuous reading | @GC |
| | Stop continuous reading | @SC |
| | Request to resend reading data | @RS |
| | Read the scene number currently displayed | @SN |
| | Switch the scene | @SN␣Scene No. |
| 1:N (Multi drop) | One shot reading | @GL␣unit No. |
| | Polling | @RD␣Unit No. |
| | Read the scene number currently displayed | @MS␣Unit No. |
| | Switch the scene | @MS␣Unit No.␣ Scene No. |

**Note** "␣" in the above commands means space.

### Error Code

The following error codes are output according to the cause of error when the reading is NG. (FP = Finder Pattern.)
Refer to *9-2 Error Codes and Remedies* for details.

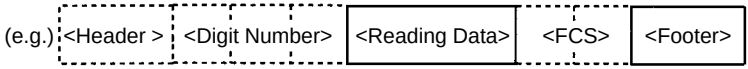
**QR Code**

| Error Code | Description |
|---|---|
| E000 | No FP |
| E001 | Missing 2 FPs |
| E002 | Missing 1 FP |
| E003 | 3 FPs in wrong position |
| E004 | More than 4 FPs |
| E010 | Decode error |
| E011 | |
| E012 | |
| E013 | |
| E020 | |
| E030 | Pattern search NG |

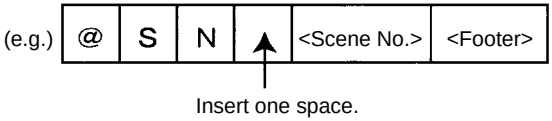
**Data Code**

| Error Code | Description |
|---|---|
| E100 | No candidate for FP |
| E110 | No FP |
| E111 | Error 1 FP |
| E112 | FP in wrong position |
| E120 | Decode error |
| E121 | |
| E122 | |
| E123 | |
| E150 | |

- The items in dotted boxes can be selected to be added or not in the communication setting menu. → **p. 140**




- Insert one space in the blank box.



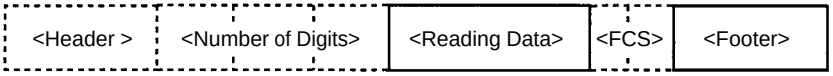

## One Shot Reading (@GL ) 1:1 Connection

Reading ends and the judgments are output when the reading is correctly performed. When the reading is not correctly performed reading continues to be performed for the number of retries specified in the setting conditions.

**Send**

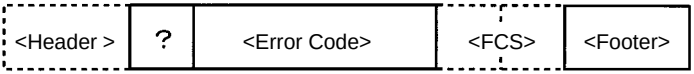

**Receive**

Correct reading:

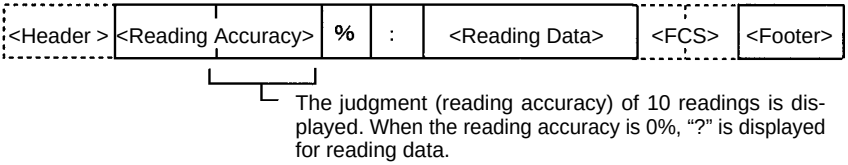


Incorrect reading:

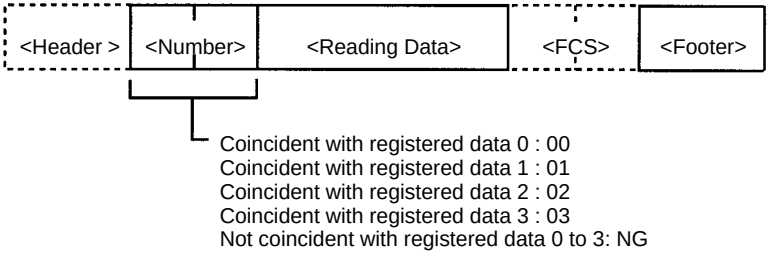
Reading continues to be performed for the number of retries specified in the setting conditions. An error code is output when an error occurs.




When Reading Accuracy is ON:




When Coincidence Judgment is ON:

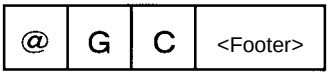



## Continuous Reading (@GC, @SC) 1:1 Connection

Performs continuous reading until the stop command (@SC ) is sent.

**Send**

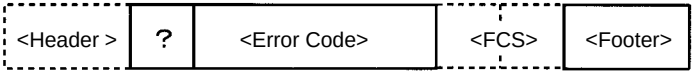
Starts reading.



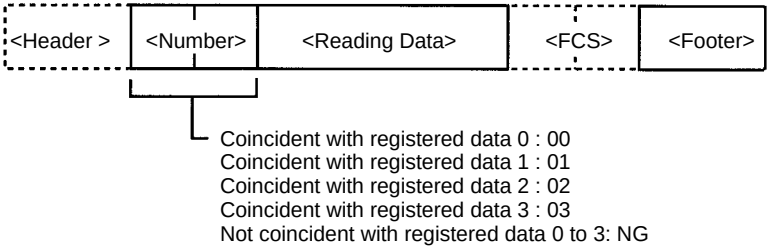

**Receive**

Correct reading:

Incorrect reading:

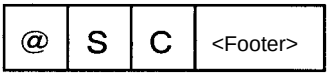



When Coincidence Judgment is ON:




**Send**

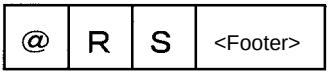
Stops continuous reading.




## Request to Resend Scene Data (@RS) 1:1 Connection

Resends the last reading data.
If the command is input while reading is performed, the data will be resent after the reading is completed.

**Send**



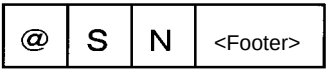

**Receive**

Last reading data

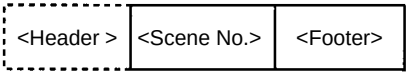
## Read the Scene Number Currently Displayed (@SN) 1:1 Connection

The displayed scene number (0 to 9) is output.

**Send**



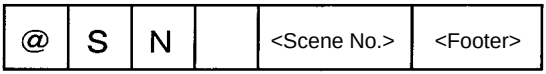
**Receive**




## Switch the Scene (@SN Scene No.) 1:1 Connection

Switches the scene number to be displayed.

**Send**

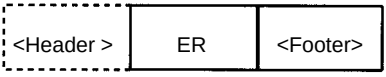



Specify 0 to 9 for the scene no.

**Receive**

Correctly switched:

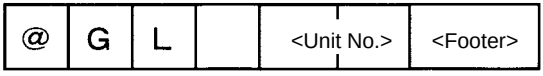

Incorrectly switched:




## One Shot Reading (@GL Unit No., @RD Unit No.) 1:N Connection

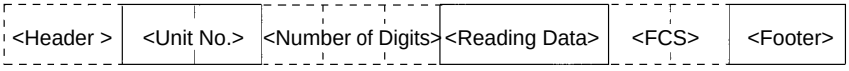
Reading ends if the reading is performed correctly. If the reading is not performed correctly, reading continues to be performed for the number of retries specified in the setting conditions. Reading data is not output until polling commands are given.

**Send**

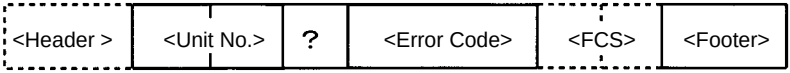



**Receive**

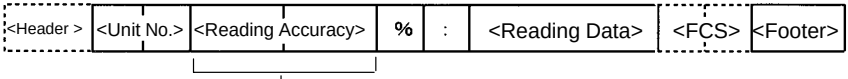
Correct reading:



Incorrect reading:

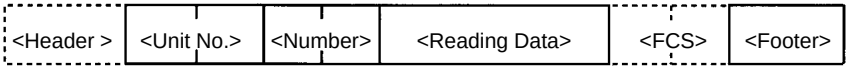



When Reading Accuracy is ON:




The judgment (reading accuracy) of 10 readings is displayed. When the reading accuracy is 0%, "?" is displayed for reading data.

When coincidence judgment is ON:




Coincident with registered data 0: 00
Coincident with registered data 1: 01
Coincident with registered data 2: 02
Coincident with registered data 3: 03
Not coincident with registered data 0 to 3: NG

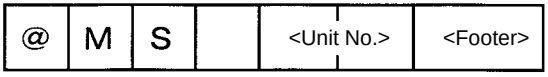
**Send**

Polling


## Read the Scene Number Currently Displayed (@MS Unit No.) 1:N Connection

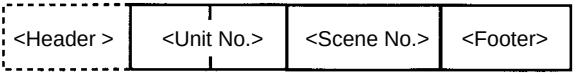
The displayed scene number (0 to 9) is output.

**Send**




**Receive**

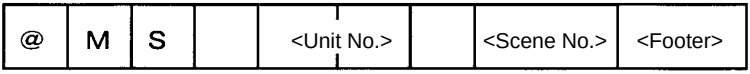
Data is output from the V530-R150 without polling commands.



## Switch the Scene (@MS Unit No. Scene No.) 1:N Connection

Switches the scene number to be displayed.

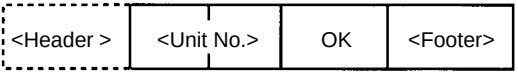
**Send**



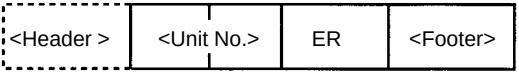

**Receive**

Data is output from the V530-R150 without polling commands.

Correctly switched:




Incorrectly switched:




## 4-3-2 Communications Mode: Host Link

**Command Table**

| Command Code | Function |
|---|---|
| 10 | One shot reading |
| 11 | Start continuous reading |
| 12 | Stop continuous reading |
| 20 | Switch to a specified scene number |
| 21 | Increase the displayed scene number by one |
| 22 | Decrease the current scene number by one |
| 23 | Read the scene number currently displayed |

**Error Code Table**

Following error codes are output according to the cause of errors when NG reading judgment is output. (FP = Finder Pattern)
Refer to *9-2 Error Codes and Remedies* for details.

**QR Code**

| Error Code | Description |
|---|---|
| E000 | No FP |
| E001 | Missing 2 FPs |
| E002 | Missing 1 FP |
| E003 | 3 FPs in wrong position |
| E004 | More than 4 FPs |
| E010 | Decode error |
| E011 | |
| E012 | |
| E013 | |
| E020 | |
| E030 | Pattern search NG |

**DataMatrix**

| Error Code | Description |
|---|---|
| E100 | No candidate for FP |
| E110 | No FP |
| E111 | Error 1 FP |
| E112 | FP in wrong position |
| E120 | Decode error |
| E121 | |
| E122 | |
| E123 | |
| E150 | |

## One Shot Reading (10) 1:1 Connection

Reading ends and the judgments are output when the reading is correctly performed. When the reading is not correctly performed, reading continues to be performed for the number of retries specified in the setting conditions. The reading judgments are output to a write word.

**Read**

| Begin read word | Bit | | | | Setting |
|---|---|---|---|---|---|
| | 15 to 12 | 11 to 8 | 7 to 4 | 3 to 0 | |
| +0 | 0 0 0 0 | 0 0 0 0 | 0 0 0 1 | 0 0 0 0 | Command code |

## Continuous Reading (11, 12) 1:1 Connection

Starts continuous reading

Continuous reading is performed.
The reading judgment is output to a write word.

**Read**

| Begin read word | Bit | | | | Setting |
|---|---|---|---|---|---|
| | 15 to 12 | 11 to 8 | 7 to 4 | 3 to 0 | |
| +0 | 0 0 0 0 | 0 0 0 0 | 0 0 0 1 | 0 0 0 1 | Command code |

Stops continuous reading.

**Read**

| Begin read word | Bit | | | | Setting |
|---|---|---|---|---|---|
| | 15 to 12 | 11 to 8 | 7 to 4 | 3 to 0 | |
| +0 | 0 0 0 0 | 0 0 0 0 | 0 0 0 1 | 0 0 1 0 | Command code |

**Reading Judgment**

**Write**

| Begin write word | Bit | | | |
|---|---|---|---|---|
| | 15 to 12 | 11 to 8 | 7 to 4 | 3 to 0 |
| +0 | Write flag | 0 0 0 0 | 0 0 0 0 | 0 0 0 0 |
| +1 | Reading data 1st byte | | Reading data 2nd byte | |
| +2 | Reading data 3rd byte | | Reading data 4th byte | |
| to | to | | to | |
| +27 | Reading data 53th byte | | Reading data 54th byte | |
| +28 | Reading data 55th byte | | Reading data 56th byte | |

- Reading data is stored with ASCII codes.
- Write flag switches between [0 0 0 0] ←→ [1 1 1 1] each time data is output. Monitor the flag to see whether reading judgment has been written.
- The data capacity (max.) of codes is as follows.
  Letters and numbers: 56 letters
  The reading data after 56th letter are ignored.
- When reading is NG, error codes are output to word +1.
- When the byte of reading data is an odd number, a space (ASCII code 20) is inserted in 0 to 7th byte.

## Switch the Scene (20) 1:1 Connection

Specify the scene number to be switched.

**Read**

| Begin read word | Bit | | | | Setting |
|---|---|---|---|---|---|
| | 15 to 12 | 11 to 8 | 7 to 4 | 3 to 0 | |
| +0 | 0 0 0 0 | 0 0 0 0 | 0 0 1 0 | 0 0 0 0 | Command code |
| +1 | – – – – | – – – – | – – – – | Scene No. | Scene number (0 to 9) |

Either 0 or 1 can be set for "–."

## Switch the Scene Number +1 (21) 1:1 Connection

Increases the scene number by one.
When the current scene number is 9, the scene number will switch to 0.

**Read**

| Begin read word | Bit | | | | Setting |
|---|---|---|---|---|---|
| | 15 to 12 | 11 to 8 | 7 to 4 | 3 to 0 | |
| +0 | 0 0 0 0 | 0 0 0 0 | 0 0 1 0 | 0 0 0 1 | Command code |

## Switch the Scene Number –1 (22) 1:1 Connection

Decreases the scene number by one.
When the current scene number is 0, the scene number will switch to 9.

**Read**

| Begin read word | Bit | | | | Setting |
|---|---|---|---|---|---|
| | 15 to 12 | 11 to 8 | 7 to 4 | 3 to 0 | |
| +0 | 0 0 0 0 | 0 0 0 0 | 0 0 1 0 | 0 0 1 0 | Command code |

## Read the Scene Number Currently Displayed (23) 1:1 Connection

**Read**

| Begin read word | Bit | | | | Setting |
|---|---|---|---|---|---|
| | 15 to 12 | 11 to 8 | 7 to 4 | 3 to 0 | |
| +0 | 0 0 0 0 | 0 0 0 0 | 0 0 1 0 | 0 0 1 1 | Command code |

**Write**

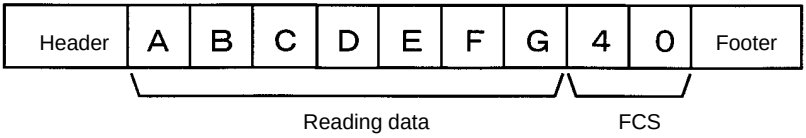
| Begin write word | Bit | | | | Setting |
|---|---|---|---|---|---|
| | 15 to 12 | 11 to 8 | 7 to 4 | 3 to 0 | |
| +0 | Write flag | 0 0 0 0 | 0 0 0 0 | 0 0 0 0 | Write flag |
| +1 | 0 0 0 0 | 0 0 0 0 | 0 0 0 0 | Scene No. | Scene number (0 to 9) |

Write flag switches between [0 0 0 0 ] ←→ [1 1 1 1] each time data is output. Monitor the flag to confirm whether reading judgment has been written.

# 4-4 FCS Calculation

FCS (Frame Check Sequence) can be attached to output data to improve communications. (For normal communications only). FCS is the result of taking the XOR for each byte between header and footer (8 bits) and converting to 2-character ASCII codes. Each time data is received, the host link calculates the FCS and checks it against the FCS attached to sending data so that sending data can be checked for errors. Refer to *Appendix B FCS Check Program Examples (BASIC).* → **p. 181**

(e.g.) Reading data:ABCDEFG
The sending data is as shown below.




Calculation

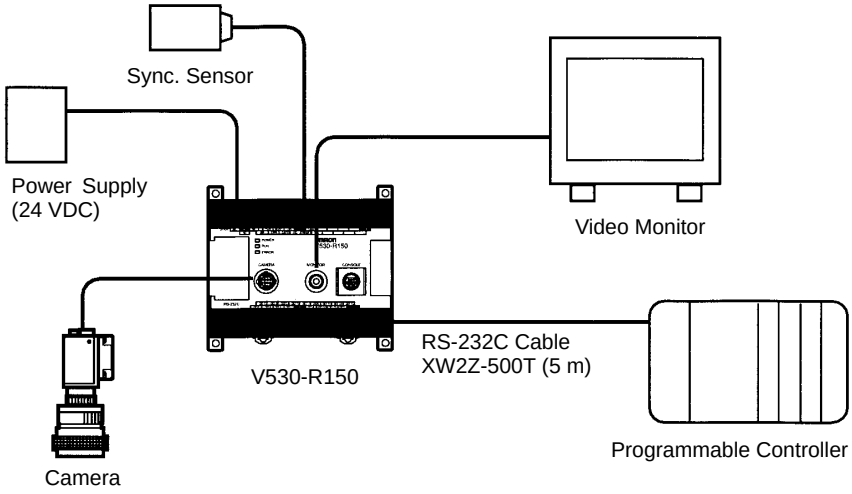
| | ASCII code | | |
|---|---|---|---|
| A | 41 | 0100 | 0001 |
| | | XOR | |
| B | 42 | 0100 | 0010 |
| | | XOR | |
| C | 43 | 0100 | 0011 |
| | | XOR | |
| D | 44 | 0100 | 0100 |
| | | XOR | |
| E | 45 | 0100 | 0101 |
| | | XOR | |
| F | 46 | 0100 | 0110 |
| | | XOR | |
| G | 47 | 0100 | 0111 |
| Result | | 0100 | 0000 |
| | | 4 | 0 |

Converted into hexadecimal and used as ASCII codes.

# 4-5 Connection Examples

## 4-5-1 Connection Examples for Programmable Controller (Normal)

**System Configuration**




Power Supply Unit: CQM1-PA**
CPU Unit: CQMI-CPU***

**Cable Wiring**

V530-R150

| Signal | Pin No. |
|---|---|
| SD(TXD) | 2 |
| RD(RXD) | 3 |
| RS(RTS) | 4 |
| CS(CTS) | 5 |
| SG(GND) | 9 |

Programmable Controller

| Pin No. | Signal |
|---|---|
| 2 | SD(TXD) |
| 3 | RD(RXD) |
| 4 | RS(RTS) |
| 5 | CS(CTS) |
| 9 | SG(GND) |

Shield

### Communication Settings

- V530-R150 → **p. 140**

| Item | Setting |
|---|---|
| Baud rate | 19200 bps |
| Data length | 8 bit |
| Parity bits | EVEN |
| Stop bits | 2 bit |
| Header | None |
| Footer | CR |
| Mode | Normal |

- Programmable Controller:
  Turn OFF the DIP switch of CQM1.
  Set DM6645 to [1001], DM6646 to [0904], DM6648 to [1000] and DM6649 to [0D00].
  Match communication settings with the V530-R150. Refer to the operation manual for CQM1 for the ways to change the setting.

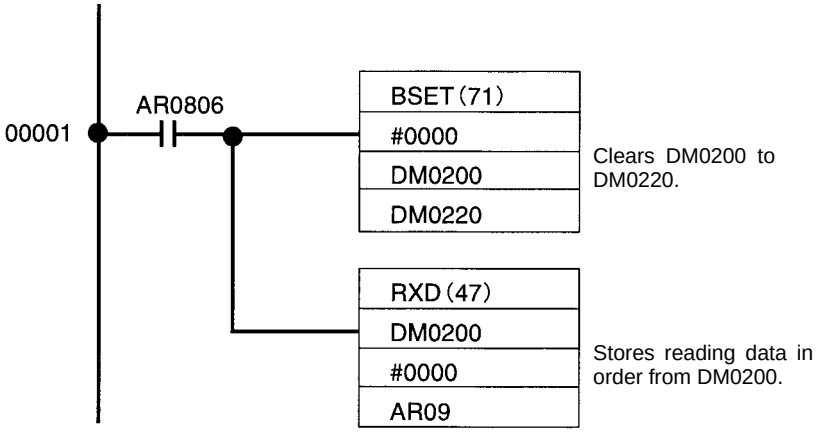
### Program Examples

This is an example of a program in which a Programmable Controller (CQM1) receives the data which is read at a V530-R150.

1 Set the reading conditions of the V530-R150 and set the reading mode to RUN mode.

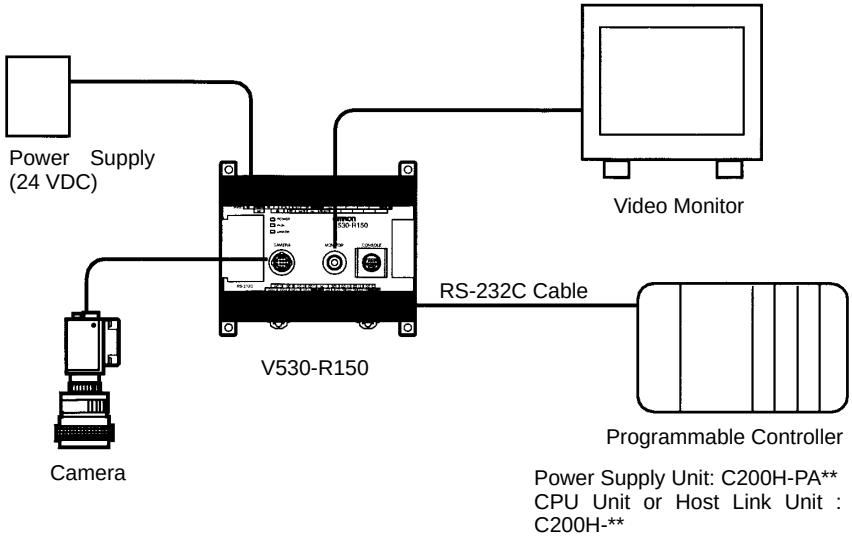
2 The synchronous sensor or trigger input of the console sends the reading trigger to the V530-R150.
→ The V530-R150 reads the code and outputs data.

3 The data received from the CQM1 is saved in order from the highest digit in DM0200 from the first bit.

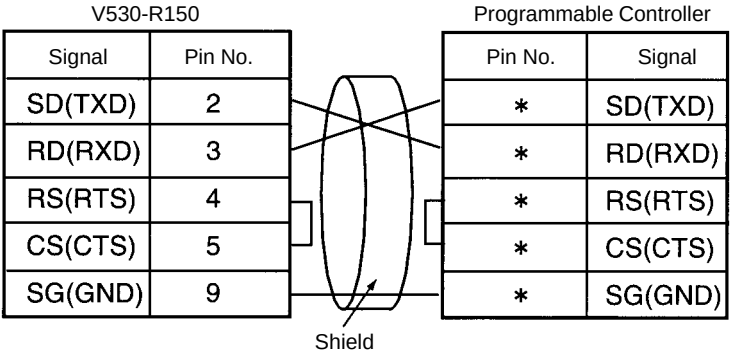



## 4-5-2 Connection Examples for Programmable Controller (Host Link)

**System Configuration**



### Cable Wiring




(*) Pin numbers will depend on the CPU unit or Host Link Unit being connected. Refer to the manual for the Programmable Controller being connected.

### Communication Settings

- V530-R150 → **p. 140**

| Item | | Setting |
|---|---|---|
| Communication setting | Baud rate | The same settings as those of the Programmable Controller. |
| | Data length | |
| | Parity bits | |
| | Stop bits | |
| | Mode | Host link |
| Host Link setting | Read area | None |
| | Begin read word | --- |
| | Write area | DM |
| | Begin write word | 0110 |

- Programmable Controller

| Item | Setting |
|---|---|
| Communications mode | SYSWAY (Host Link) |
| 1 : 1 / 1: N | 1 : N |
| Unit No. | 00 |
| Baud rate | Match the settings with a V530-R150 |
| Data length | |
| Parity bits | |
| Stop bits | |

Set DM0100 to [0010] in advance.

**Program Examples**

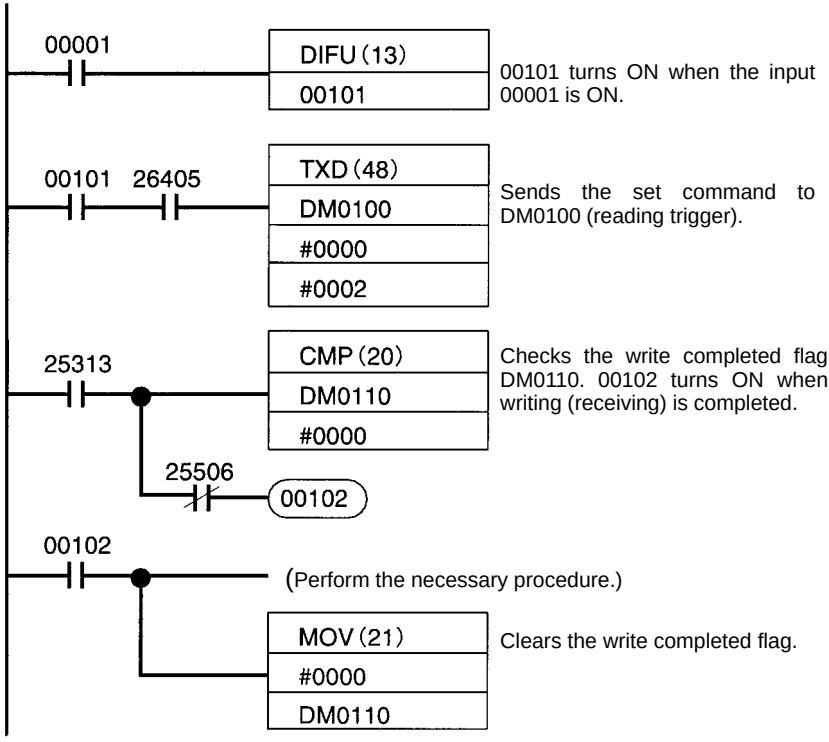
A command (reading trigger) is sent to the V530-R150 and the data received at the V530-R150 is written to the specified words of the Programmable Controller.

1 Set the reading conditions of the V530-R150 and set the reading mode to RUN mode.

2 Set the reading start command [0010] to DM0100.

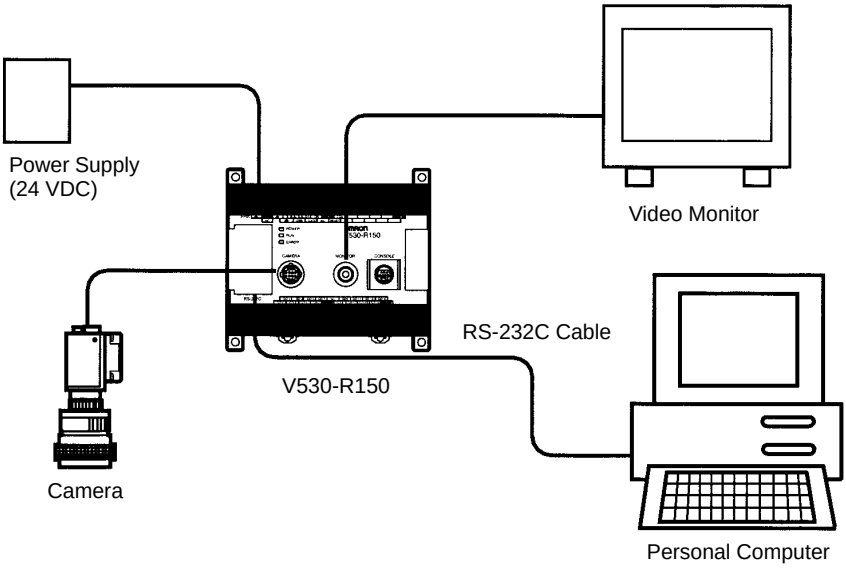
3 The Programmable Controller sends the reading start command.
→ The V530-R150 reads codes and writes to DM0111.

4 The Programmable Controller checks if the data has been written by checking the writing flag [DM0110].

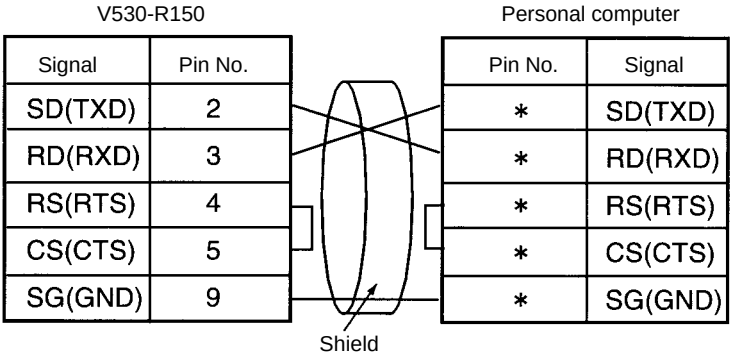


## 4-5-3 Connection Examples for Personal Computers (Normal)

### System Configuration




### Cable Wiring




(*) Pin numbers will depend on the type of personal computer connected. Refer to the manual of the personal computer.

### Communication Settings

Match the communication settings (baud rate, data length, parity bits, and stop bits) of the personal computer and V530-R150. Set the communications mode of the V530-R150 to ***Normal***.

→ **p. 140, 141**

**Program Example**

```
100 CLOSE #1
110 OPEN ”COM:E73NN” AS #1 (OPEN communications port)
120 PRINT #1,”@GL”+CHR(&H0D) (Send single reading com-
mand)
130 INPUT #1,RESDATA$ (Load data; footer code:CR)
140 PRINT ”READ DATA=”;RESDATA$ (Display reading data)
150 GOTO 120 (Repeat)
160 END
```

# SECTION 5
# Operations

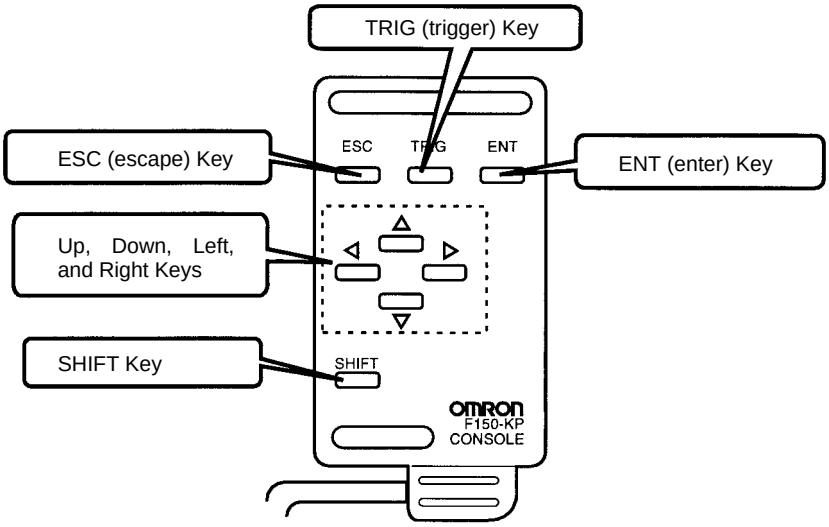
This section gives an overview of menu operations for the V530-R150 2-Dimensional Code Reader and explains the procedures required to perform basic operations.

For more details of operations on the V530-R150, refer to *Section 6 Functions and Operations*.

# 5-1 Menu Operations

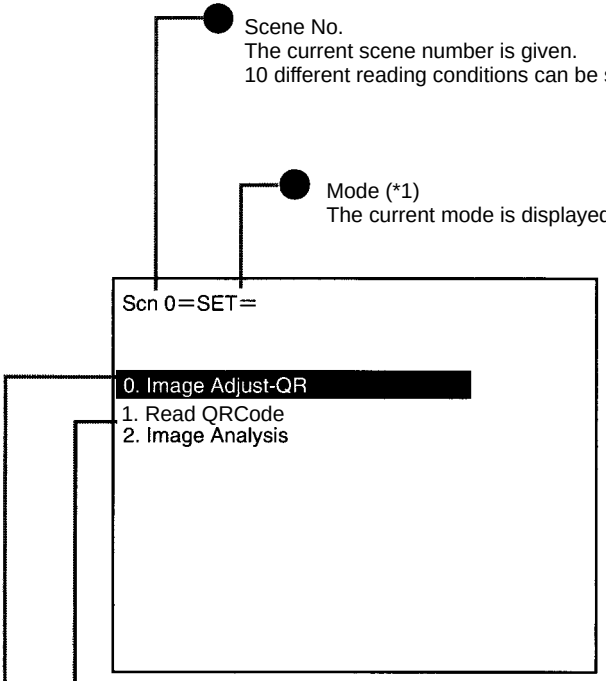
### Console

The Console is used to perform menu operations. Be sure to familiarize yourself with Console operations before actually using the menus.




| Key | Function |
|---|---|
| ESC | Interrupts processing and returns to the previous menu display. |
| TRIG | Starts code reading (One push → One reading) |
| ENT | Executes a function or sets a value. |
| / | Used to move the cursor up and down to select items. Also used to set values. The Up Key increases a value by 1 and the Down Key decreases a value by 1. Continue pressing the Up or Down Key to quickly increase or decrease a value. |
| □/ | Used to move the cursor left or right to select items. |
| SHIFT | Must be pressed in combination with another key to have any affect. Specific functions are assigned to Shift + another key for specific screens. |

**Screen Displays**

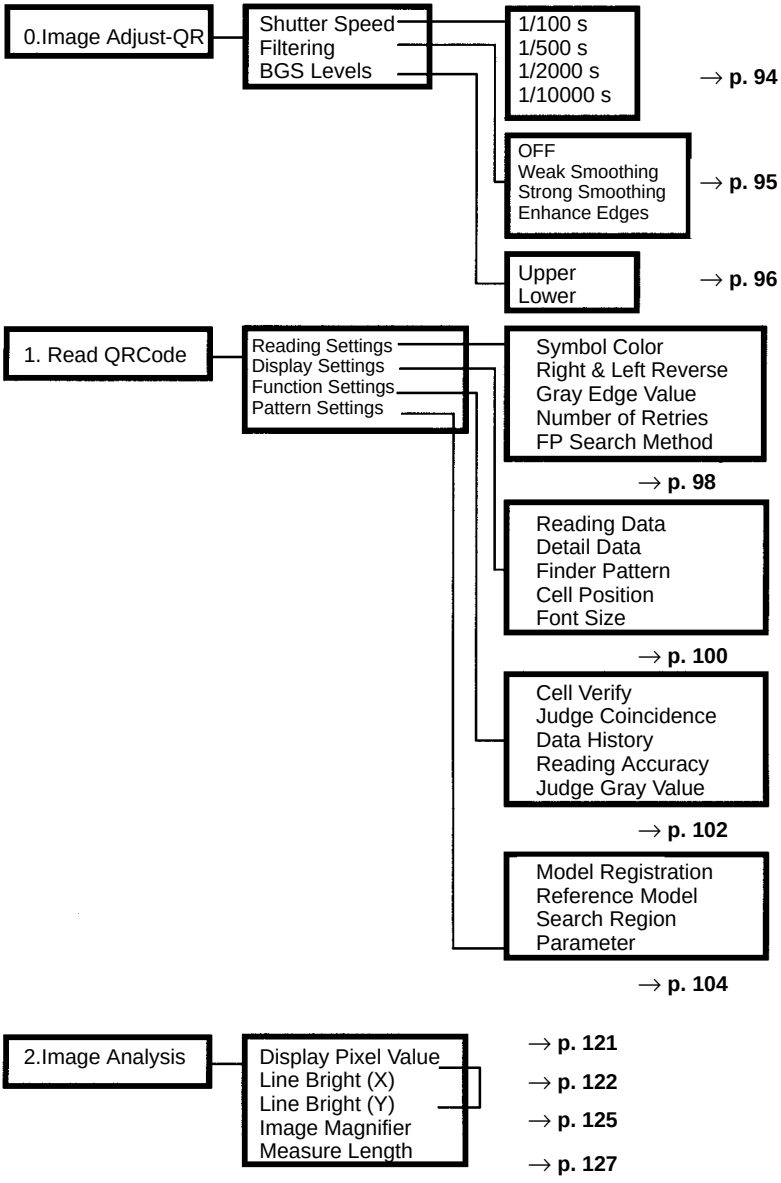


Mode (*1)

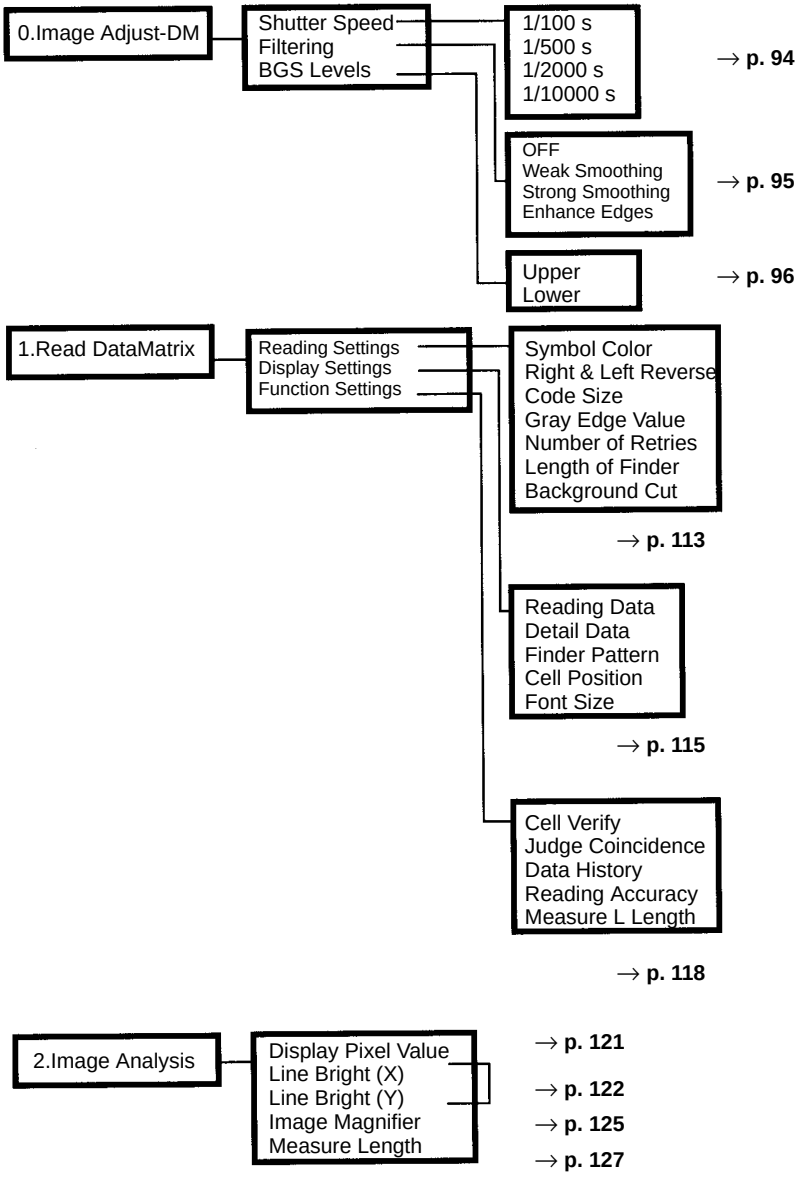
| Mode | Description |
|---|---|
| SET (Set) | Used to set reading conditions. |
| MON (Monitor) | Used to confirm the reading can be properly performed under the set conditions. Judgments are displayed on the video monitor and are not output to external devices. |
| RUN (Run) | Used to read codes. The judgment is output to external devices or RS-232C via the terminal blocks. |
| SYS (System) | Used to set system conditions such as communications specifications. |
| SAVE (Save) | Used to save setting data to flash memory. Be sure to save and turn OFF power to the V530-R150 after changing the settings. |

# 5-2 Menu Tree

**For QR Code Reading**



**For DataMatrix Code Reading**



# 5-3 STEP 1 Starting

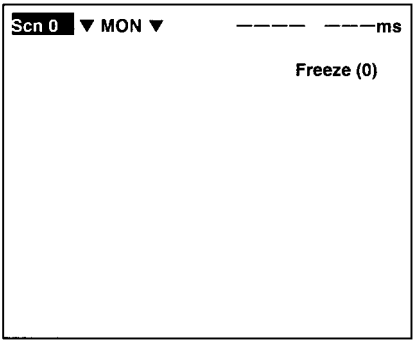
**Procedure**

1 Be sure that the basic V530-R150 components have been connected correctly. → **p. 9**

2 Turn ON the power supply on the monitor.

3 Turn ON the power supply on the V530-R150.

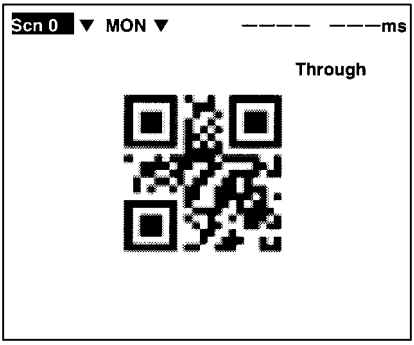
A startup message appears followed by a processing message. After a short pause, the initial screen appears. The following screen appears the first time power is turned ON.




**Note** Never input the reset signal or turn OFF the power when startup messages are displayed. Data may be lost, and the V530-R150 may not operate properly the next time it is started.

4 Be sure that the 2-dimensional code is correctly displayed within the field of vision on the monitor.

The through image is displayed by pressing the SHIFT + Down Keys. If not displayed correctly, adjust the focus, camera setting distance and lighting. → **p. 13, 16**




**Startup Mode**

Use the startup mode in order to make daily operation more efficient. → **p. 150**

# 5-4 STEP 2 Setting Reading Conditions

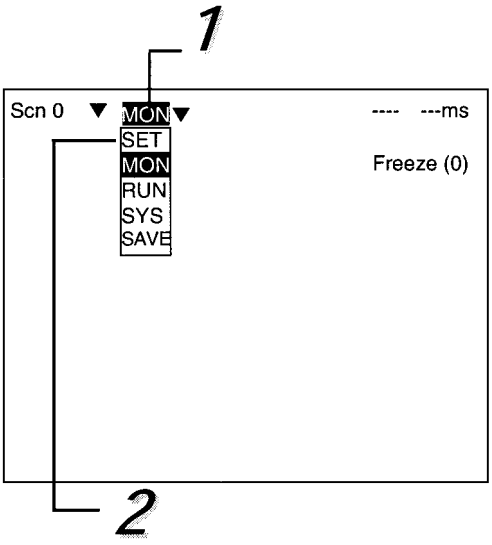
The default setting is for MON (monitor) mode to be displayed when the power is first turned ON.

**Note** This section only describes the necessary functions for basic operations. Other functions are described in *Section 6 Functions and Operations*.

**Procedure**

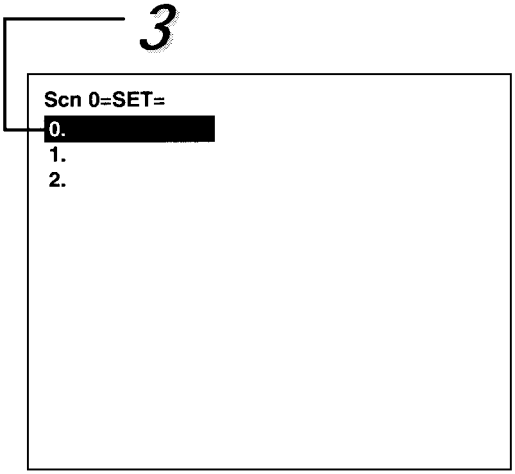
1 Move the Right Key to MON (monitor) and press the ENT Key.

The mode selections are displayed.



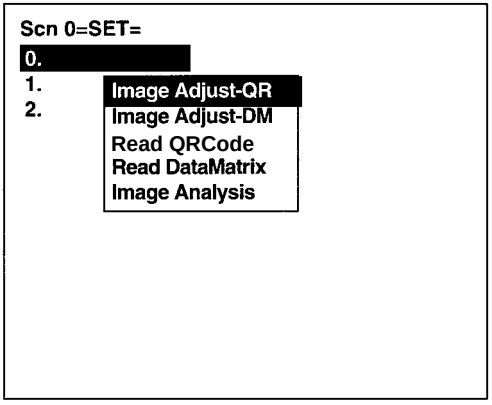

2 Move to SET using the Up Key and press the ENT Key.

The following screen is displayed. The screen is in setting mode.




3 Register menus in 0 to 3.

Press the ENT Key to display the selection of menus. When changing a registered menu, press the SHIFT+ESC Keys to display the selection of menus.

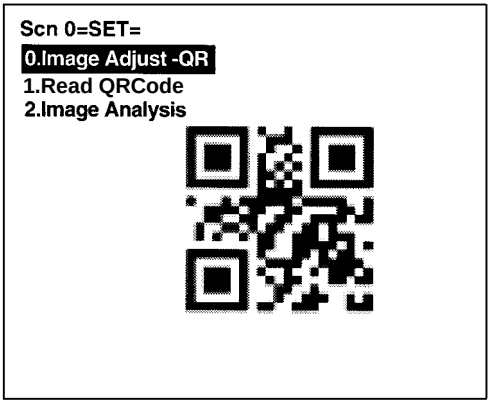



**QR Code Reading**

Set the following four items.

- Shutter Speed
- Symbol Color
- Right & Left Reverse ON/OFF
- Gray Edge Value

4 Register the menu as shown in the figure.

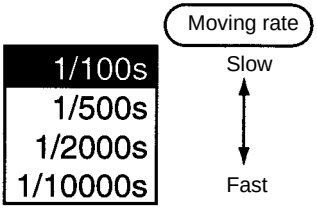



5 Select ***0.Image Adjust -QR***.

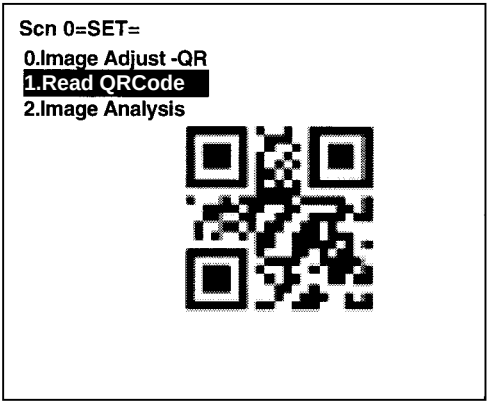
6 Select ***Shutter Speed***.


7 Select the shutter speed according to the movement of the reading object.

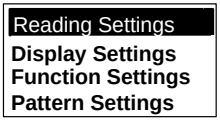
Press the ENT Key to set the shutter speed. The display will return to the window shown in step 6.
Press the ESC Key once to go back to the window shown in step 4.



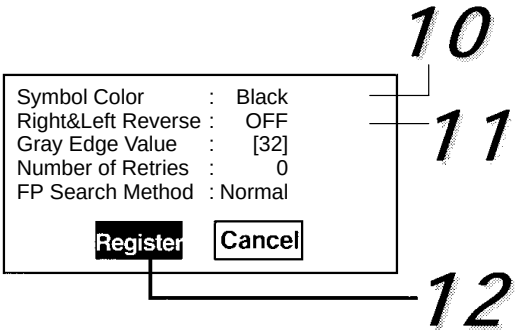
8 Select ***Read QRCode***.




9 Select ***Reading Settings***.

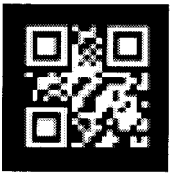



10 Select the color of symbol.




Black: Black symbol printed on white base.

White: White symbol printed on black base.

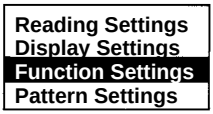


11 Select if Right & Left Reverse is necessary or not.

ON: Necessary
For reading an image after reflection, or through the back of a transparent material such as glass.
OFF: Unnecessary
For normal reading (from the front of the object).

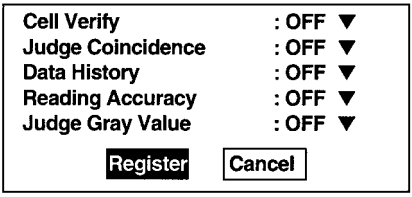
12 Select ***Register*** before leaving this screen.

13 Select ***Function Settings***.




14 Set ***Judge Gray Value*** to ON.

Turn ON this function and enter MON (monitor) or RUN mode. When the TRIG Key is pressed and one reading is performed, the ideal gray edge value is automatically set to ***Reading Settings/Judge Gray Value***. Turn OFF the function after setting.



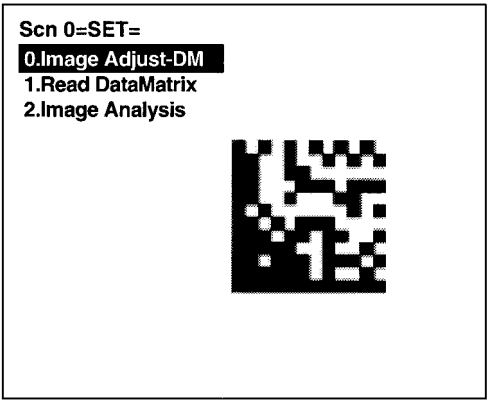

15 Select ***Register*** before leaving the screen.

**Data Matrix Reading**

Set the following five items.

- Shutter Speed
- Symbol Color
- Right & Left Reverse ON/OFF
- Matrix Size
- L Length

4 Register the menu as shown below.



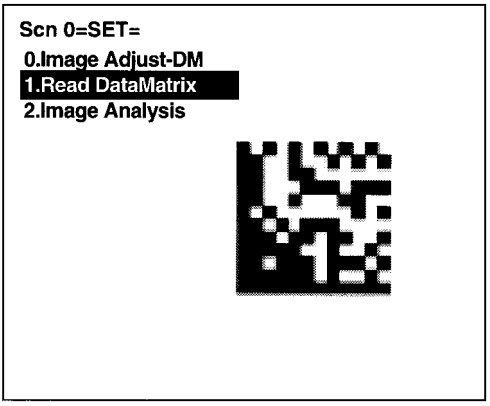

5 Select ***0. Image Adjust-DM***.

6 Select ***Shutter Speed***.

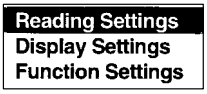

7 Select the shutter speed according to the movement of the reading object.

Press the ENT Key to set the shutter speed. The display will return to the window shown in step 6.
Press the ESC Key once to go back to the window shown in step 4.

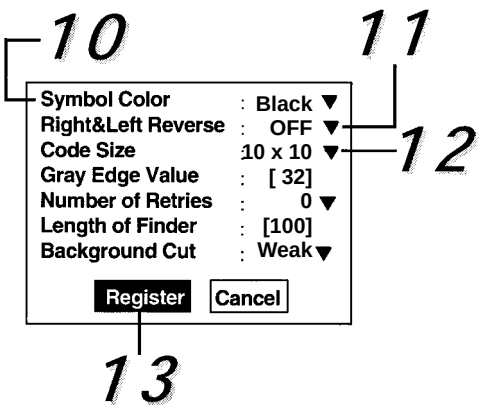
8 Select ***1. Read DataMatrix***.




9 Select ***Reading Settings***.

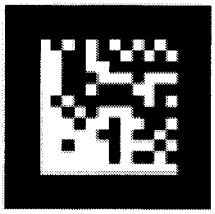


10 Select the color of symbol.




Black: Black symbol printed on white base.

White: White symbol printed on black base.



11 Select if Right & Left Reverse is necessary or not.

ON: Necessary
For reading an image after reflection, or through the back of a transparent material such as glass.
OFF: Unnecessary
For normal reading (from the front of the object).

12 Select the matrix size of codes.

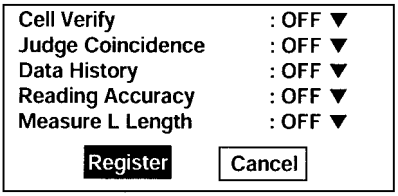
Range: 10 x 10 to 26 x 26

13 Select ***Register*** before leaving this screen.

14 Select ***Function Settings***.

15 Set ***Measure L Length*** to ON.

Turn ON this function and enter MON (monitor) or RUN mode. When the TRIG Key is pressed and one reading is performed, the L length is measured and the result will automatically be used in the ***Reading Settings/Length of Finder*** setting. Turn OFF the function after setting.



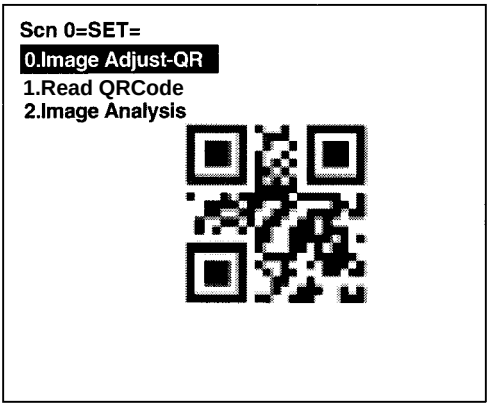

16 Select ***Register*** before leaving the screen.

# 5-5 STEP 3 Checking Reading

Confirm whether reading is performed correctly under the setting conditions. The reading is performed in MON (monitor) mode. Reading judgment is not output to terminal blocks or RS-232C but displayed on the monitor.

**Procedure**

1 Press the ESC Key from the basic screen of setting mode to enter MON (monitor) mode.




2 Press the TRIG Key on the Console.

One reading is performed. A trigger can be input via terminal blocks or RS-232C. Reading judgement is not output to the terminal blocks or RS-232C but displayed on the monitor.

3 Go back to setting mode and turn OFF ***Read QRCode/Function Settings/Judge Gray Value*** or ***Read DataMatrix/Function Settings/Measure L Length***.

**If Reading Not Performed**

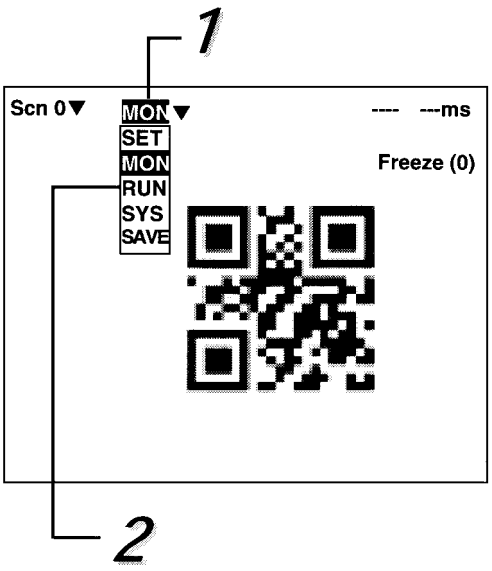
- Return to setting mode and set the conditions correctly. Adjust the lighting and focus.
- Adjust 2-dimensional codes to be at least 5 pixels per cell.
- Refer to the error codes on the screen and *9-2 Error Codes and Remedies*.

# 5-6 STEP 4 Starting Code Reading

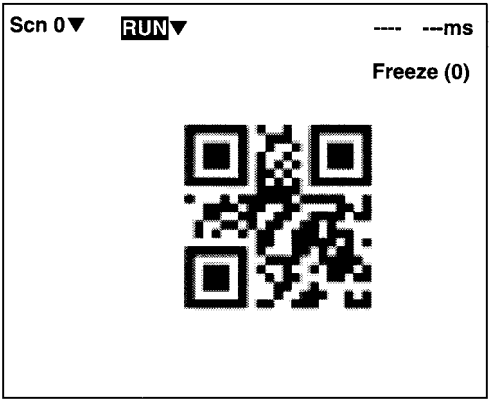
Enter RUN mode to perform readings. The reading judgment is output to external devices through terminal blocks or RS-232C.

**Procedure**

1 Move the cursor to ***MON*** (monitor) and press the ENT Key.
The mode selections are displayed.




2 Select ***RUN***.
The following screen is displayed.



3 Input reading trigger.

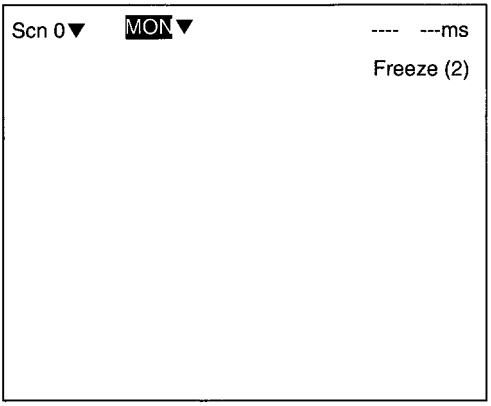
Reading is performed.

# 5-7 STEP 5 Quitting

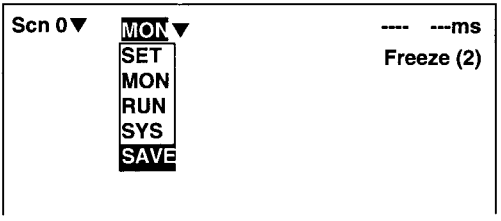
**Note** Be sure to save the revised setting data to flash memory before turning OFF.
As the V530-R150 loads data from flash memory at startup, any new data be will lost if it is not saved to flash memory. Also, images in RAM are cleared when power is turned OFF. It is recommended that images are backed up on a computer as they can not be saved to flash memory. → **p. 145**

**Procedure**

1 Basic screen is displayed.



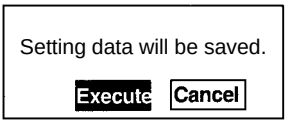

2 Select ***MON*** (monitor) and press the ENT Key.




3 Select ***SAVE***.

4 Select ***Execute*** after the confirmation message is displayed.

When saving has been completed, the screen from step 1 will be returned.




**Note** Never input the reset signal or turn OFF the power when processing messages are displayed. Data may be lost, and the V530-R150 may not operate properly the next time it is started.

5 Turn OFF the power for the V530-R150.

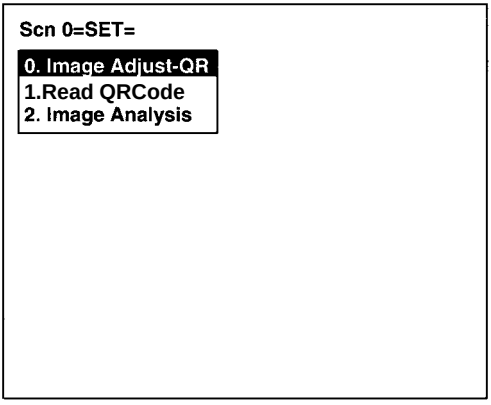
# SECTION 6
# Functions and Operations

This section gives details of the functions and operations possible with the V530-R150 2-Dimensional Code Reader, including the procedures necessary for communications with external devices.

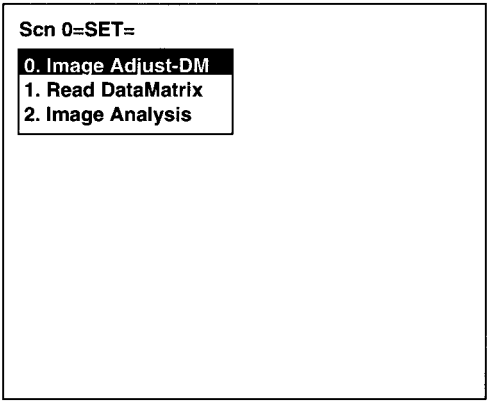
# 6-1 Menu Registration

The V530-R150 has the five menu items shown below. The combination of these items is different according to the reading codes (QR Code or Data Matrix). Register items according to the following combinations and order. Reading is not performed correctly if items are registered in different combinations or orders. The menu items are registered in scenes.

**Reading QR Code**

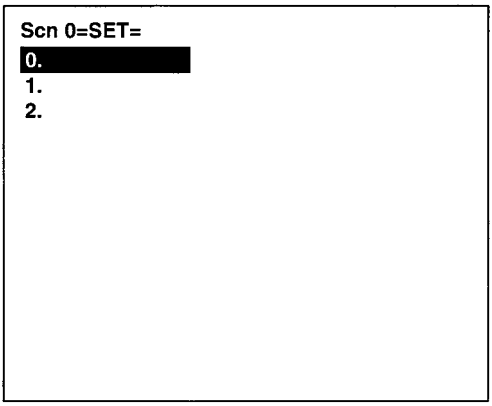



**Reading Data Matrix**



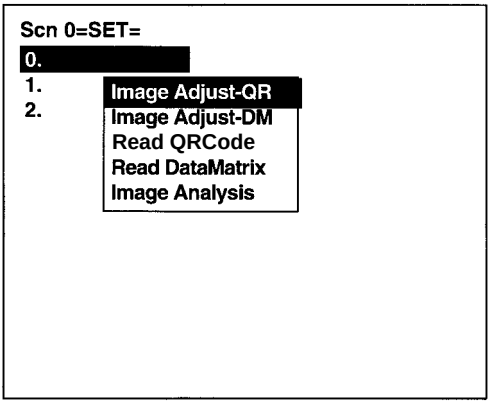
**Procedure**

1 Enter the ***SET*** mode.




2 Move the cursor to ***0.*** and press the ENT Key.

The selection of menus is displayed. When changing a registered menu, press the SHIFT + ESC Keys.



3 Move the cursor to the desired selection and press the ENT Key.

The menu is registered.


4 Register the menu items for ***1.*** and ***2.*** in the same way.

- If setting is made incorrectly, overwrite the setting with the correct one.
- Perform scene clear when you want to clear all three scenes at once. → **p. 158**

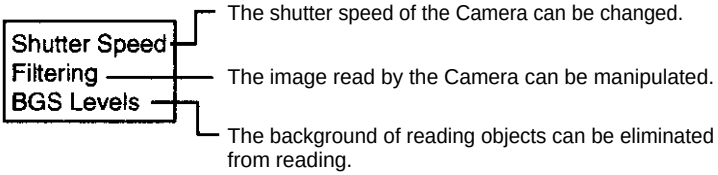
# 6-2 SET (Setting) Mode

## 6-2-1 Image Adjust-****

SET — Image Adjust-QR

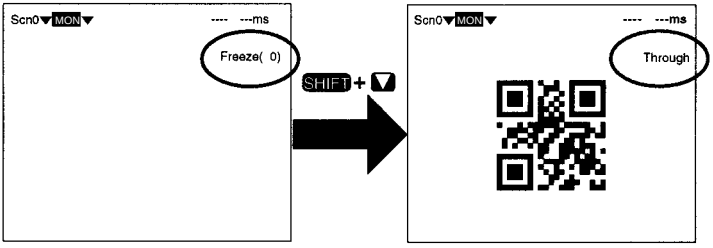
SET — Image Adjust-DM

Set the shutter speed, filtering, and background suppression for reading.




When adjusting the image on the monitor, change to a through image. The through images taken by the Camera are displayed so that the image can be adjusted while monitoring.

Enter MON or RUN mode.

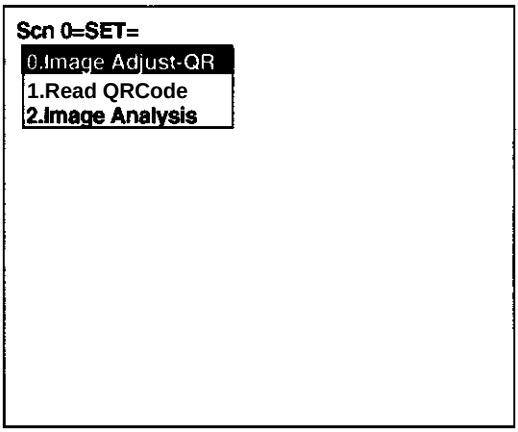


## Shutter Speed

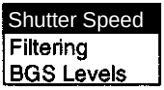
The shutter speed can be changed according to the movement of the reading object.


**Procedure**

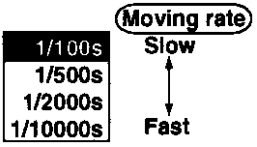
1 Select ***0.Image Adjust-****.




2 Select ***Shutter Speed***.




3 Select the appropriate shutter speed while monitoring the screen.



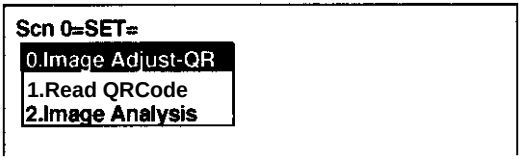

Press the ENT Key. The shutter speed at the cursor position will be set.

## Filtering

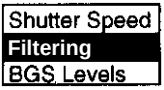
Manipulates the image read by the Camera.


**Procedure**

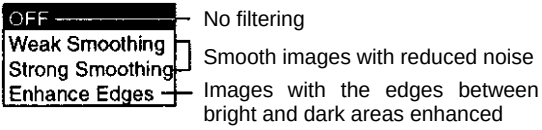
1 Select ***0.Image Adjust-****.




2 Select ***Filtering***.




3 Select the appropriate filtering method while monitoring the screen.




Press the ENT Key. The type of filtering at the cursor position will be saved.

## BGS Levels (Background Suppression)


Background suppression (BGS) changes image areas with densities below the lower limit to 0, and image areas with densities above the upper limit to 255 so that only images with densities between the lower and upper limits are measured.

Lower limit: 150 Upper limit: 255

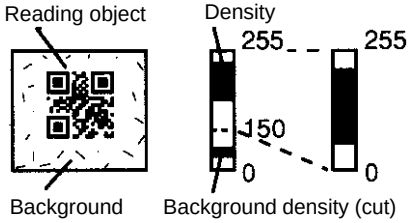
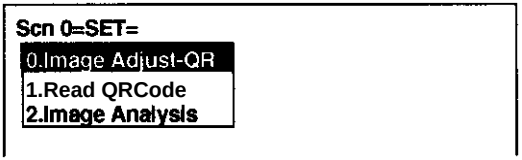



Image areas with densities of 149 or lower will not be read and the density will be changed to 0.

Only image areas with densities between 150 and 255 will be read. The whole image is graded from 0 to 255.

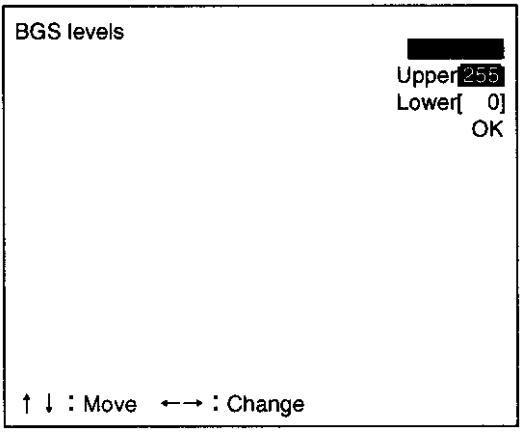
### Procedure

1 Select ***0.Image Adjust-*******.




2 Select ***BGS Levels***.

3 Press the Left or Right Key to change the numeric value.




4 Move the cursor to ***OK*** to enter the setting.

## 6-2-2 Read QRCode

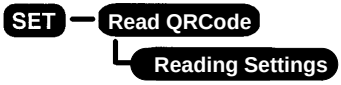
**SET** — **Read QRCode**

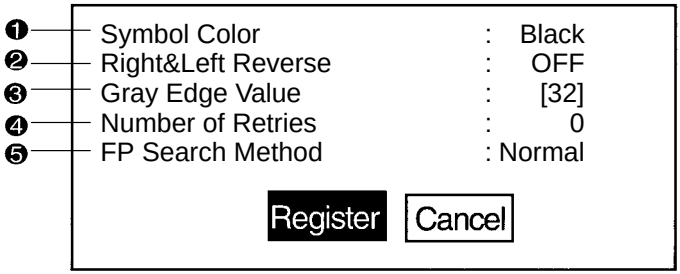
***Read QRCode*** has the following four setting items.

| | |
|---|---|
| Reading Settings | Sets the reading conditions for QR Codes. |
| Display Settings | Sets the items to be displayed on the screen in MON (monitor) and RUN modes. |
| Function Settings | Improves the accuracy of reading data. |
| Pattern Settings | Effective when ***Pattern Search*** is selected for FP search method. |

## Reading Settings

Sets the conditions for reading QR Codes.




**1** Select the color of symbol.

| | |
|---|---|
| Black | Black symbol printed on white base.  |
| White | White symbol printed on black base.<br>The image is black/white reversed and is input to image memory 0.  |

2 Select whether Right & Left Reverse of QR Codes is necessary.

| | |
|---|---|
| ON | Necessary<br>For reading an image after reflection, or through the back of a transparent material, such as glass. |
| OFF | Unnecessary<br>(Default setting)<br>For normal reading (from the front of the object) |

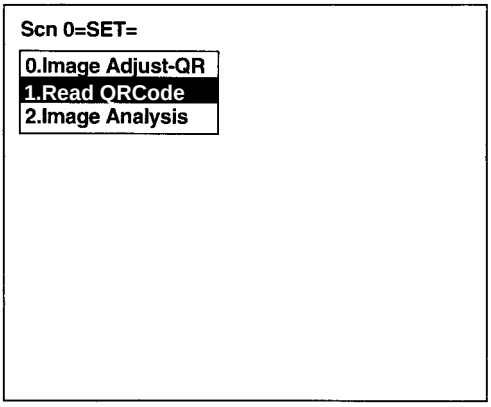
3 Set the black and white gray edge value. (Level: 1 to 127; Default setting: 32.) Set the gray edge value higher when the reflection ratio of black and white is high and set it lower when the ratio is low.
A function to calculate the ideal gray edge value automatically is available.
When setting reading conditions for the first time, be sure to use this function. → **p. 102**

4 Select the number of retries to be made if the reading is NG. (0 to 9; Default setting: 0.)

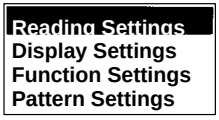
5 Select the FP search method.
(Normal Search/Pattern Search; Default Setting: Normal)
Select Normal under normal conditions. Select Pattern Search only under special conditions such as when the quality of printing (marking) of a 2-dimensional code is not good.

**Procedure**

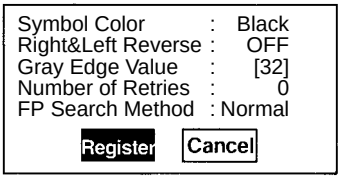
1 Select ***1.Read QRCode***.




2 Select ***Reading Settings***.



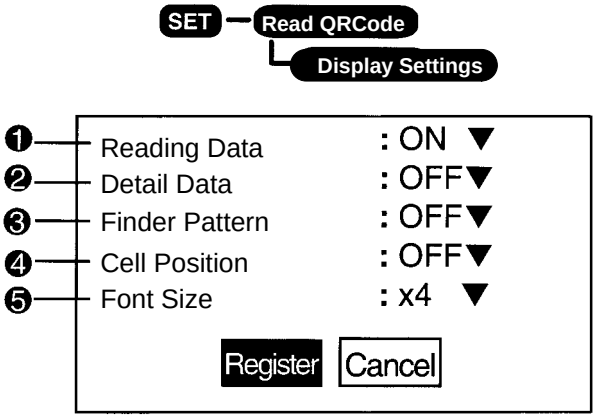

3 Set each item.




4 Select ***Register*** before leaving this screen.

## Display Settings

Sets the items to be displayed on the screen in MON (monitor) and RUN modes. The processing time becomes longer if more items are selected.




1 Select whether or not to display reading data for QR Codes on the screen. (The default setting is ON.)

2 Select whether or not to display detailed data of QR Codes on the screen. (The default setting is OFF.)
If turned ON, information such as detailed information about codes and pixels per cell, etc. is displayed.

3 Select whether or not to display finder pattern positions of QR Codes on the screen. (The default setting is OFF.)

4 Select whether or not to display cell recognition positions of QR Codes on the screen. (The default setting is OFF.)

**Note** When ***Read QRCode/Function Settings/Cell Verify*** is set to ON, this function is invalid.

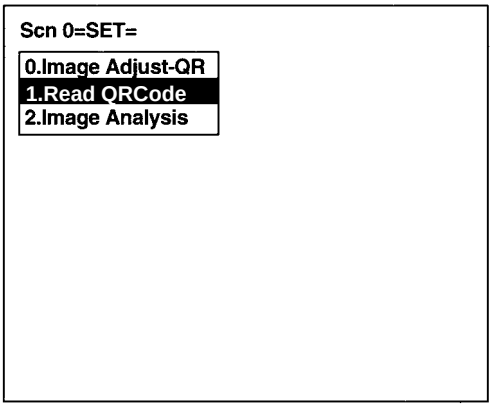
5 Select the font size of reading data to be displayed on the screen. (x1/x4; Default setting is x1.)
When the displayed data exceeds the number of letters given below, the font size is automatically set to x1.

- 64 or more letters
  (x4 when reading accuracy or data history function is ON.)

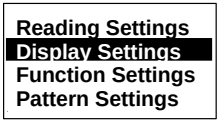
Data other than reading data (detailed data etc.) is displayed with x1 font size regardless of this setting.

**Procedure**

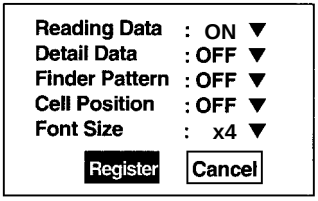
1 Select ***1.Read QRCode***.




2 Select ***Display Settings***.



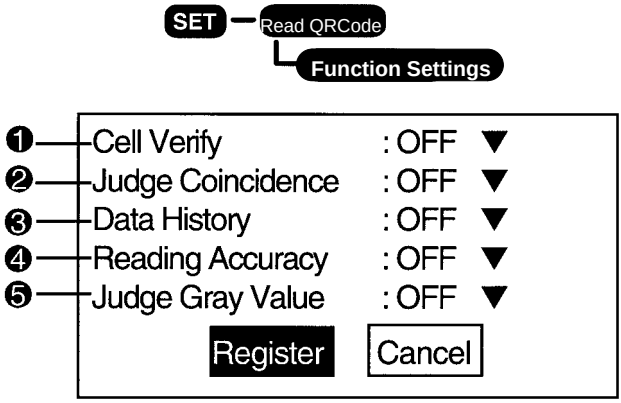

3 Set each item.




4 Select ***Register*** before leaving this screen.

## Function Settings

Functions to improve the accuracy of data are available. There are restrictions on the combination of functions used. Consider the priority of functions when making settings.




**Note** Cell Verify can be used together with Judge Coincidence, Data History, Reading Accuracy and Judge Gray Value, but no other combination can be used together.

1 Cell Verify is a function that performs verification judgment by registering black and white information of cells as standard data.
When reading the same code continuously, surface defects can be checked for.
Set to ***Register*** to register black and white recognition of each cell and then set to ***ON***.

OFF: No judgment is performed. (Default setting)

Register: Black and white recognition of each cell being read in the next trigger is registered as standard.

Verify: Every time reading is performed, the registered cell recognition is verified. If not verified, the section will be displayed on the screen.

Clr Data: Registered data is cleared.

**Note** When this function is used, the setting of ***Read QRCode/Reading Settings/Cell Position*** is invalid.

2 Judge Coincidence is a function that performs coincidence judgment of reading data.
Up to 4 standard data can be registered.

Select ***Data*** (0 to 3) to register the standard data and then set to ***ON***.

OFF: No judgment is performed. (Default setting)

Data 0 to 3: The data read in the next trigger is registered as the number of standard data.

Verify: Every time reading is performed, the registered standard data and reading data are verified.
The judgment result is output to terminal blocks (DO0 to 3) and RS-232C (Normal).

Clr Data: All registered data is cleared.

3 When Data History is turned ON, the following four items are counted and displayed on the screen.
The counted values are maintained even when the power is turned OFF if the data is saved to flash memory.
The values are cleared when OFF is selected. (The default setting is OFF.)

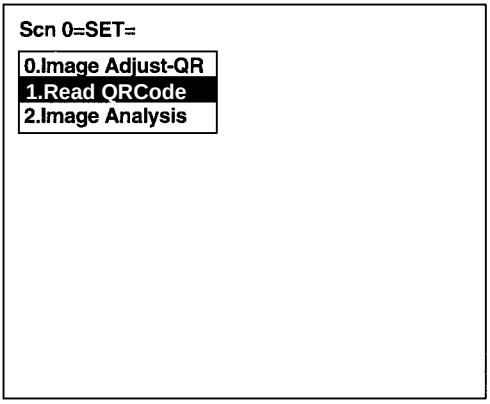
- Number of readings
- Number of OK readings
- Reading accuracy
  (Number of OK readings ÷ Number of readings × 100)
- Error codes

4 When Reading Accuracy is turned ON, one trigger performs ten readings.
The reading accuracy and the data from the 10th reading are displayed on a screen and output to RS-232C (Normal).
(The default setting is OFF.)

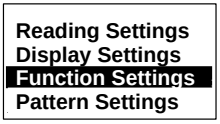
5 Judge Gray Value is a function that measures the suitable gray edge value automatically.
If this function is turned ON, press TRIG on the console when in MON (monitor) or RUN mode to measure the gray edge value. The gray edge value is measured and reflected in the ***Read QRCode/Reading Settings/Judge Gray Value*** setting.
When setting reading conditions, use this function to set the gray edge value.
Turn OFF after setting the gray edge value. (The default setting is OFF.)

**Procedure**

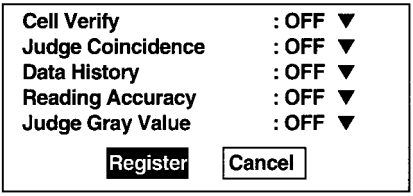
1 Select ***1.Read QRCode***.




2 Select ***Function Settings***.



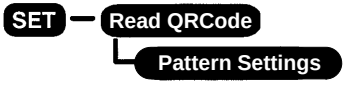

3 Set each item.




4 Select ***Register*** before leaving this screen.

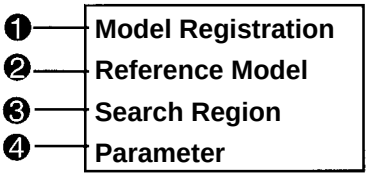
## Pattern Settings

Finder patterns may not be detected if the quality of the 2-dimensional code is bad or printed in dots.
If this is the case, select ***Pattern Search*** for FP search method. The position for the code can be detected by searching the most similar part to a registered finder pattern called a model.



Reading may not be performed correctly if the angle with respect to the model is more than +/– 10°. It should be in a range of approx. +/–10 °.

**Note** Set to ***Pattern Search*** for FP search method in ***Reading Settings*** to perform pattern search.




1 Register finder patterns as a model.

2 The registered model can be confirmed on the video monitor.
Confirm whether the model is registered correctly using Reference Model.

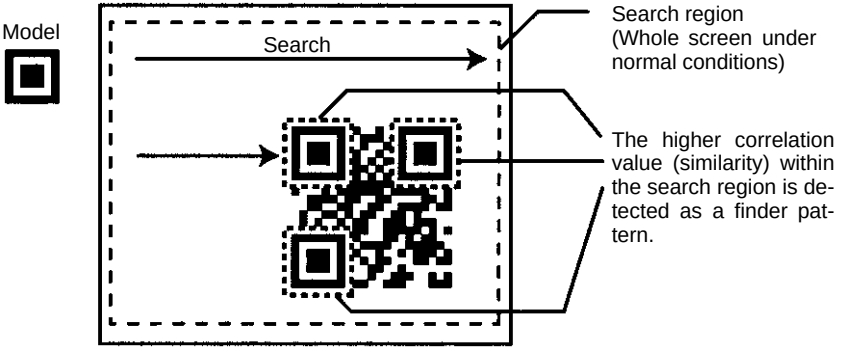
3 The region in which to search for the model can be specified.

4 Set the conditions for pattern search.

- Correlation values for the model, etc.
- Version information for the QR Code, etc.

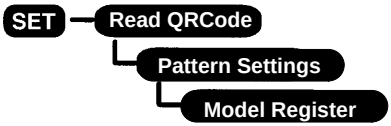
**What is "Pattern Search"?**

Pattern search is a method to detect a finder pattern using a registered finder pattern called a model. Since the image pattern is registered, the position of the code can be detected with higher accuracy than when in normal mode even if the quality of the marking is bad.



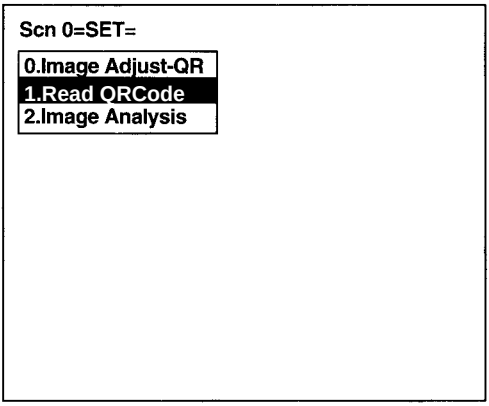
### Model Registration

Registers finder patterns as a model.

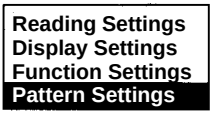



### Procedure

1 Select ***1.Read QRCode***.



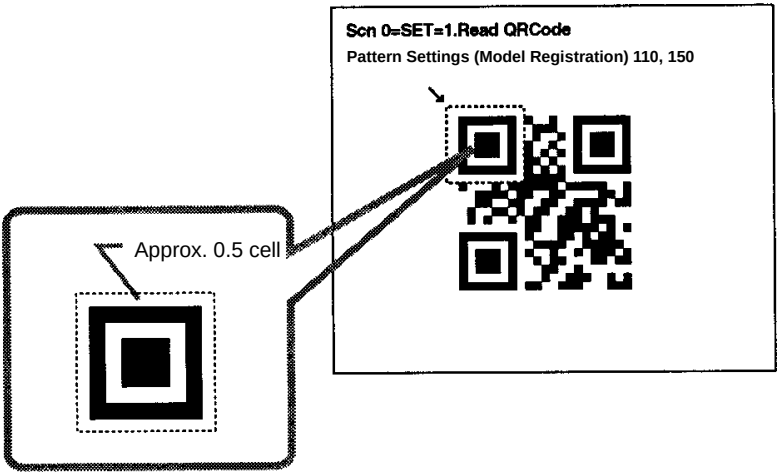

2 Select ***Pattern Settings***.




3 Select ***Model Registration***.


4 Draw a box as the area in which to search for the model.

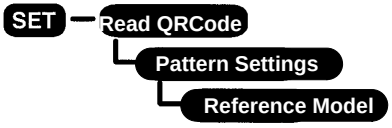
Specify the upper right and lower left coordinates.




Register a find pattern with a margin of approx. 0.5 cell.

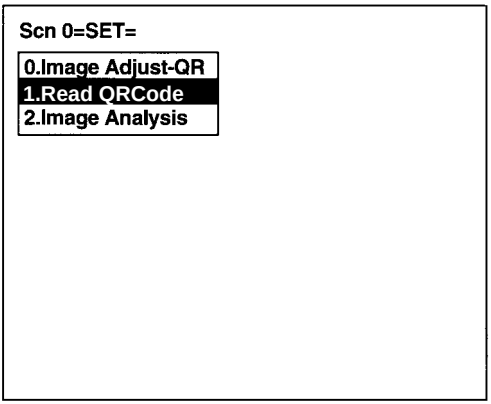
### Reference Model

The registered model images can be displayed on a screen. After model registration, confirm whether the model has been registered correctly by performing Model Reference.



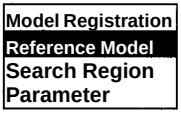
**Procedure**

1 Select ***1.Read QRCode***.

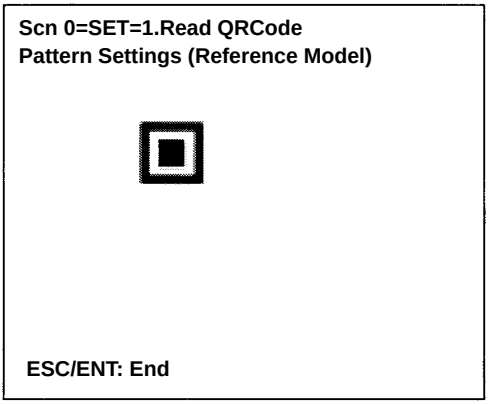



2 Select ***Pattern Settings***.


3 Select ***Reference Model***.

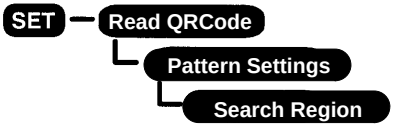


Model images will appear.



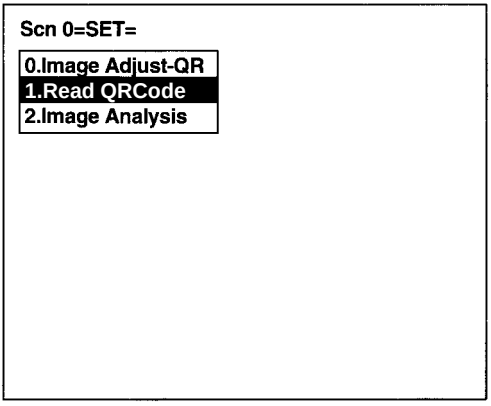

**Search Region**

Specify the region in which to search for models.




**Procedure**

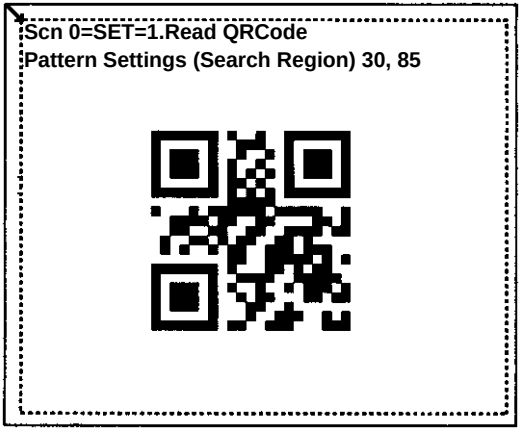
1 Select ***1.Read QRCode***.



2 Select ***Pattern Settings***.

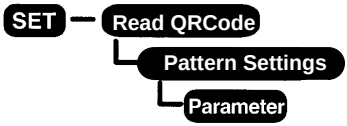

3 Select ***Search Region***.

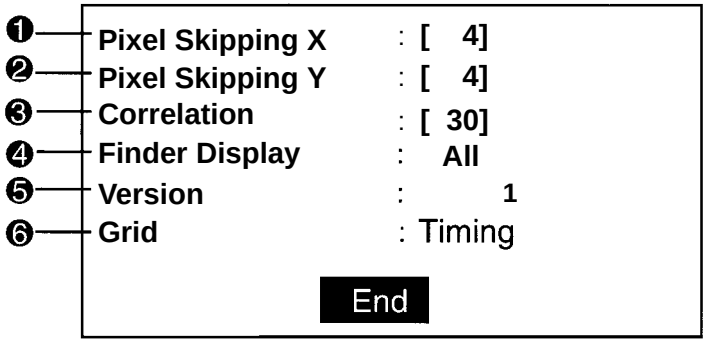

4 Draw a box as the region in which to search for the model. Specify the whole screen under normal conditions.



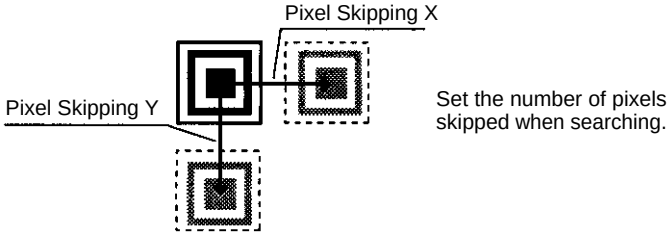
**Parameter**

Sets the detail settings for pattern search.




**1** Change the pixel skipping parameters used to search for a model. (1 to 20)
The processing time can be reduced if the pixel skipping parameters are set to larger values. However, depending on the image, the search may not be performed since the accuracy is reduced. After changing the setting, perform a search to confirm whether the search can be performed correctly.




2 Same as 1 above.

3 Set the correlation threshold value for detecting finder patterns.
Correlation values higher than the threshold are detected. (1 to 100)

4 Set the finder pattern display to all or one.

All: All finder patterns detected are displayed.

One: Only the finder pattern with the highest correlation value is displayed.

5 Set the version information for the QR Code to be read. (1 to 6)

**Note** If the wrong version information is set, the reading can not be performed correctly.

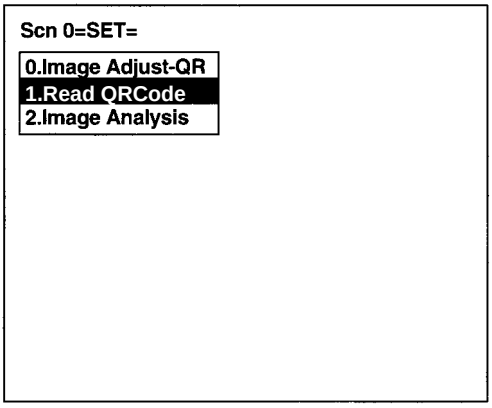
6 Set the method for cell recognition.

Timing: Cell recognition is performed using a timing pattern.

Cell: Cell recognition is performed using a registered model.

**Procedure**

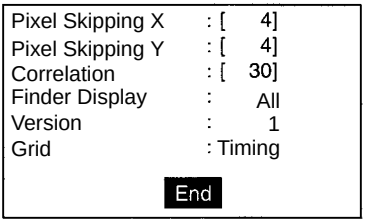
1 Select ***1.Read QRCode***.




2 Select ***Pattern Settings***.


3 Select ***Parameter***.

4 Set each item.




5 Select ***End*** before leaving this screen.

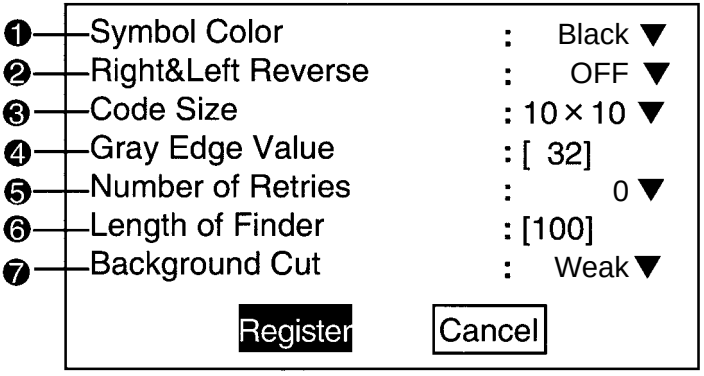
## 6-2-3 Read DataMatrix


Set the following three items under ***Read DataMatrix***.

| | |
|---|---|
| Reading Settings | Sets the conditions for reading Data Matrix codes. |
| Display Settings | Sets the items to be displayed on the screen in MON (monitor) and RUN modes. |
| Function Settings | Improves the accuracy of reading data. |

### Reading Settings

Sets the conditions for reading Data Matrix codes.

1 Select the symbol color.

| | |
|---|---|
| Black | Black symbol printed on white base.  |
| White | White symbol printed on black base.  |

2 Select whether Right & Left Reverse of Data Matrix codes is necessary.

| | |
|---|---|
| ON | Necessary<br>For reading an image after reflection, or through the back of a transparent material such as glass. |
| OFF | Unnecessary (Default setting)<br>For normal reading (from the front of the object). |

3 Select the matrix size of codes.
(10 x 10 to 26 x 26; Default setting:10 x 10)

4 Set the black and white density level. (Level: 1 to 127; Default setting: 32.) Set to 32 under normal conditions.
Set the density higher when the reflection ratio of black and white is high and set it lower when the ratio is low.

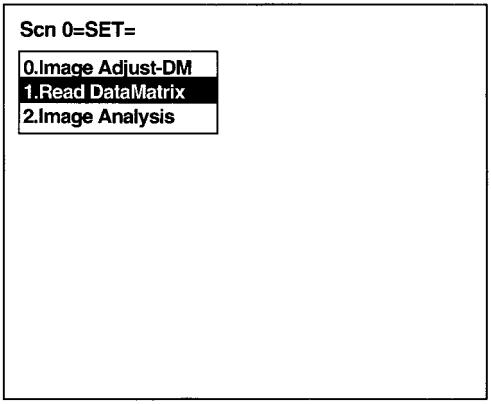
5 Select the number of retries to be made if the reading is NG.
(0 to 9; Default setting: 0.)

6 Input the length of finder patterns (L-shape) in pixels.
(50 to 480, Default setting: 100)
A function to measure L-shape length automatically is available.
When setting reading conditions for the first time, be sure to use this function. → **p. 115**

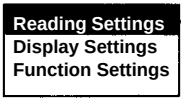
7 Select the BGS level to search for finder patterns (L-shape).
(Weak/Middle/Strong; Default setting:Weak)

**Procedure**

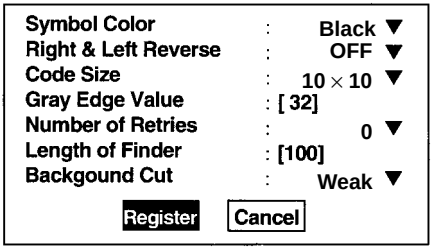
1 Select ***1.Read DataMatrix***.




2 Select ***Reading Settings***.



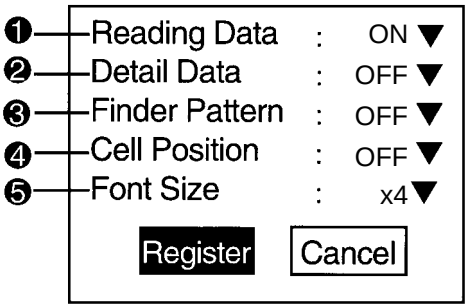

3 Set each item.




4 Select ***Register*** before leaving this screen.

## Display Settings

Sets the items to be displayed on the monitor in MON (monitor) and RUN modes.
The processing time becomes longer if more items are selected.




1 Select whether or not to display reading data for Data Matrix codes on the screen. (The default setting is ON.)

2 Select whether or not to display detailed data of Data Matrix codes on the screen. (The default setting is OFF.)
If turned ON, information such as detailed information about codes and pixels per cell, etc. is displayed.

3 Select whether or not to display finder pattern positions of Data Matrix codes on the screen. (The default setting is OFF.)

4 Select whether or not to display cell recognition positions of Data Matrix codes on the screen. (The default setting is OFF.)

**Note** When ***Read DataMatrix/Function Settings/Cell Verify*** is set to ON, this function is invalid.

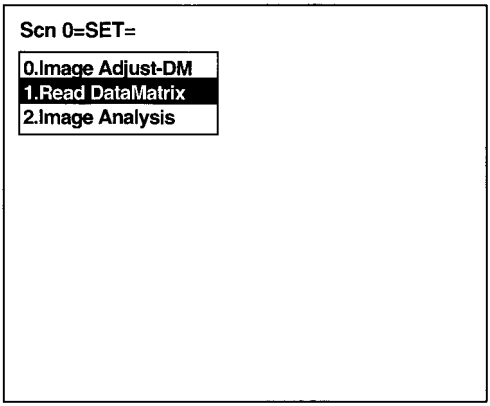
5 Select the font size of reading data to be displayed on the screen. (x1/x4; Default setting is x1.)
When the displayed data exceeds the number of letters given below, the font size is automatically set to x1.

- 64 or more letters
  (x4 when reading accuracy or data history function is ON.)

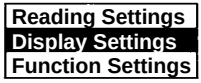
Data other than reading data (detailed data etc.) is displayed with x1 font size regardless of this setting.

**Procedure**

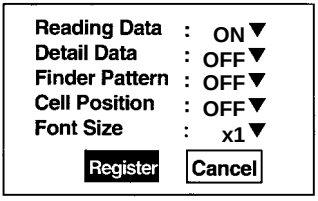
1 Select ***1.Read DataMatrix***.




2 Select ***Display Settings***.




3 Set each item.

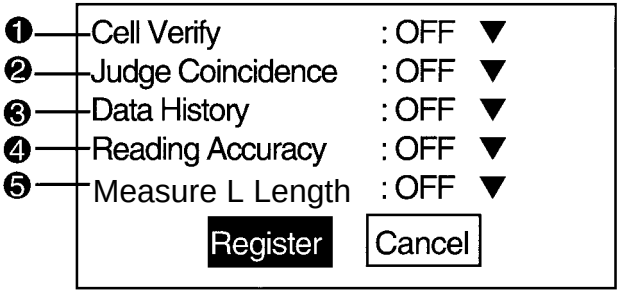



4 Select ***Register*** before leaving this screen.

## Function Settings

SET — Read DataMatrix — Function Settings

Functions to improve the accuracy of data are available. There are restrictions on the combination of functions used. Consider the priority of functions when making settings.




**Note** Cell Verify can be used together with Judge Coincidence, Data History, Reading Accuracy and Measure L Length, but no other combination can be used together.

1 Cell Verify is a function that performs verification judgment by registering black and white information of cells as standard data.
When reading the same code continuously, surface defects can be checked for.
Set to ***Register*** to register black and white recognition of each cell and then set to ***ON***.

OFF: No judgment is performed. (Default setting)

Register: Black and white recognition of each cell being read in the next trigger is registered as standard.

Verify: Every time reading is performed, the registered cell recognition is verified. If not verified, the section will be displayed on the screen.

Clr Data: Registered data is cleared.

**Note** When this function is used, the setting of ***Read DataMatrix/Reading Settings/Cell Position*** is invalid.

2 Judge Coincidence is a function that performs coincidence judgment of reading data.
Up to 4 standard data can be registered.

Select ***Data*** (0 to 3) to register the standard data and then set to ***ON***.

OFF: No judgment is performed. (Default setting)

Data 0 to 3: The data read in the next trigger is registered as the number of standard data.

Verify: Every time reading is performed, the registered standard data and reading data are verified.
The judgment result is output to terminal blocks (DO0 to 3) and RS-232C (Normal).

Clr Data: All registered data is cleared.

3 When Data History is turned ON, the following four items are counted and displayed on the screen.
The counted values are maintained even when the power is turned OFF if the data is saved in flash memory.
The values are cleared when OFF is selected. (The default setting is OFF.)

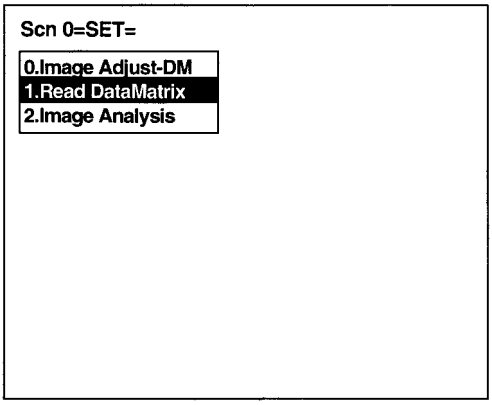
- Number of readings
- Number of OK readings
- Reading accuracy
  (Number of OK readings ÷ Number of readings × 100)
- Error codes

4 When Reading Accuracy is turned ON, one trigger performs ten readings.
The reading accuracy and the data from the 10th reading are displayed on a screen and output to RS-232C (Normal).
(The default setting is OFF.)

5 Measure L Length is a function that measures L length automatically.
If this function is turned ON, press TRIG on the console when in MON (monitor) or RUN mode to measure the L length. The L length is measured and reflected in the ***Read DataMatrix/Reading Settings/Length of Finder*** setting
When setting reading conditions, use this function to set the L length.
Turn OFF after setting the L length. (The default setting is OFF.)

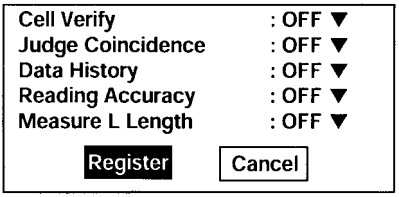
**Procedure**

1 Select ***1.Read DataMatrix***.




2 Select ***Function Settings***.


3 Set each item.




4 Select ***Register*** before leaving this screen.

## 6-2-4 Image Analysis

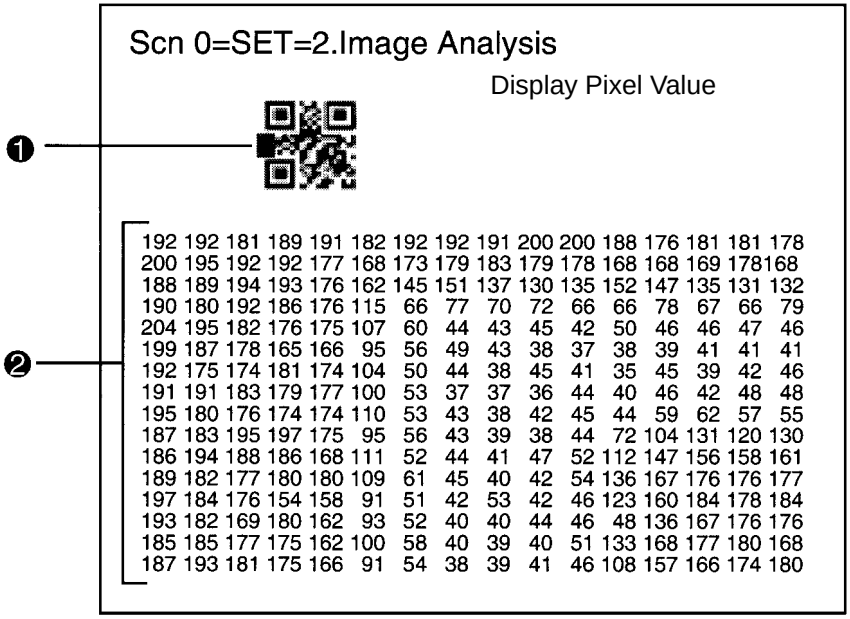
SET — Image Analysis

The following five functions are available for image analysis. Use these functions when analyzing finder patterns or checking pixel values for cell recognition.

| | |
|---|---|
| Display Pixel Value | Displays the density of a specific area in the range 0 to 255. |
| Line Bright X | The density distribution of a horizontal line is displayed in a graph. |
| Line Bright Y | The density distribution of a vertical line is displayed in a graph. |
| Image Magnifier | Magnifies the image in a specific area. |
| Measure Length | Measures the cell size in pixels. |

## Display Pixel Value

Displays the density information for a specific area.

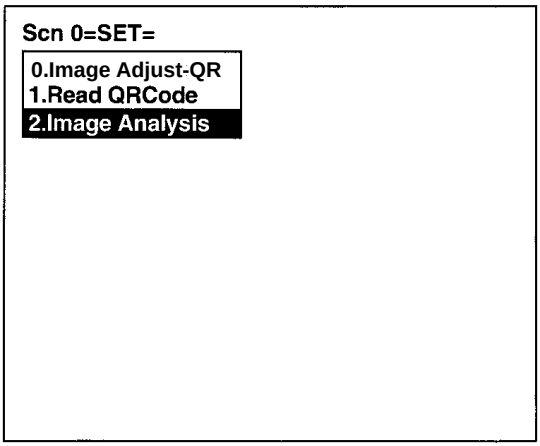




1 Specified area is 16 x 16 pixels.
Use Up/Down/Left/Right Keys to move to the position for which density information is required.
Press the SHIFT Key at the same time to move faster.

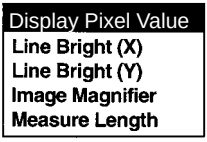
2 The density information for the specified area is displayed.

**Procedure**

1 Select ***2.Image Analysis***.




2 Select ***Display Pixel Value***.




3 Move to the required area by using Up/Down/Left/Right Keys.

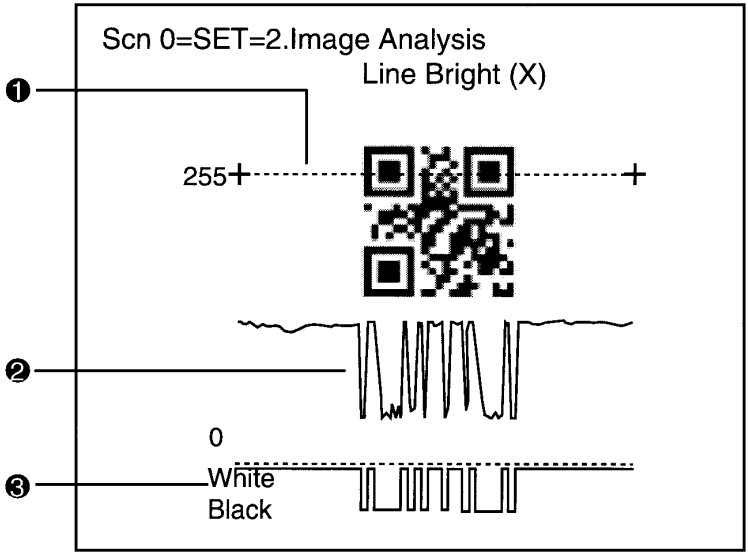
The density information will be displayed.
Press the SHIFT Key at the same time to move faster.

4 Press the ESC Key to leave this screen.

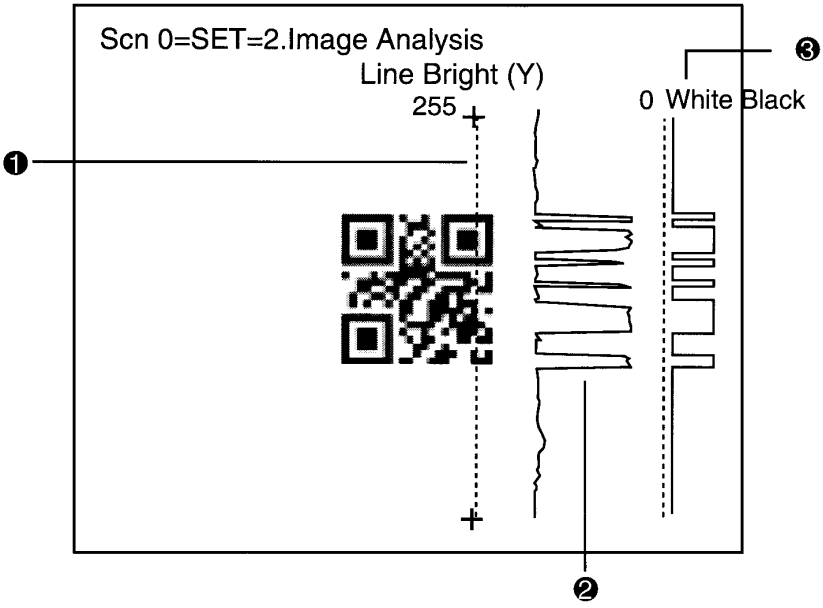
## Line Bright (X), Line Bright (Y)

A graph indicating density distribution in a horizontal or vertical line is called “Line Bright.”

- Line Bright X (fixed Y coordinate)




- Line Bright Y (fixed X coordinate)



1 Specify the beginning and end point of the line for which density distribution is to be displayed.

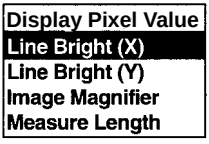
2 The density distribution is displayed.

3 The ratio of black and white with respect to the gray edge value is displayed.

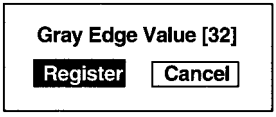
**Procedure**

1 Select ***2.Image Analysis***.


2 Select ***Line Bright***.




3 Set the gray edge value level for black and white judgment. (1 to 127)




4 Select ***Register***.

The Line Bright is displayed.

5 Specify the beginning and end points.

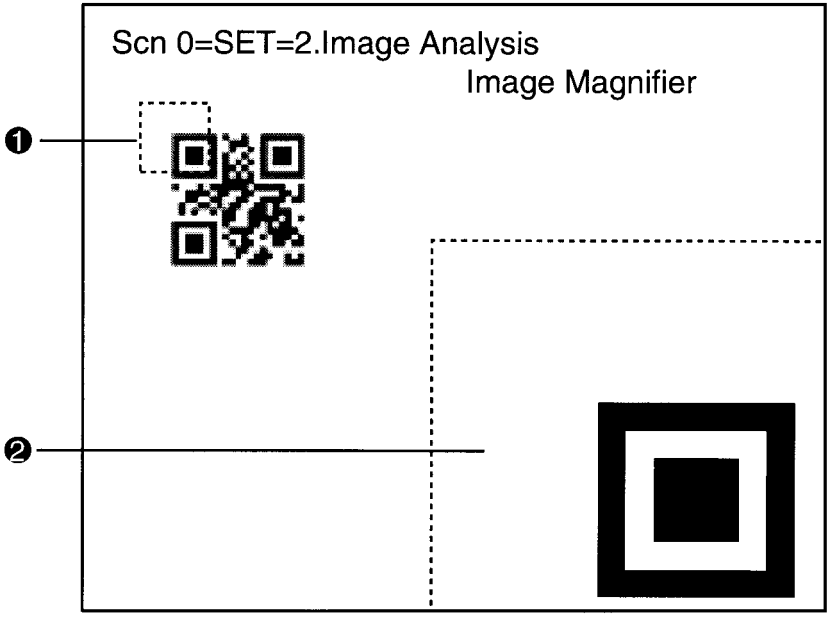
Move the cross cursor with Up/Down/Left/Right Keys and press the ENT Key.

6 To display a different area, repeat procedure 5 as required.

7 Press the ESC Key before leaving this screen.

## Image Magnifier

Magnifies the image in a specified area.

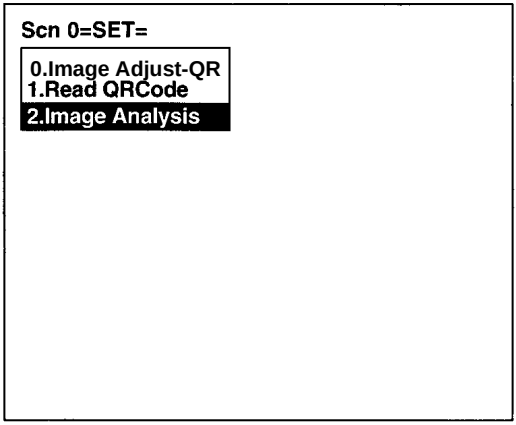




1 The specified area is 32 x 32 pixels (fixed).
Use Up/Down/Left/Right Keys to move to the position to be magnified.
Press the SHIFT Key at the same time to move faster.

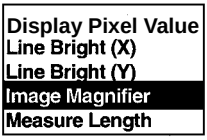
2 The image in the specified area is magnified.

**Procedure**

1 Select ***2.Image Analysis***.




2 Select ***Image Magnifier***.

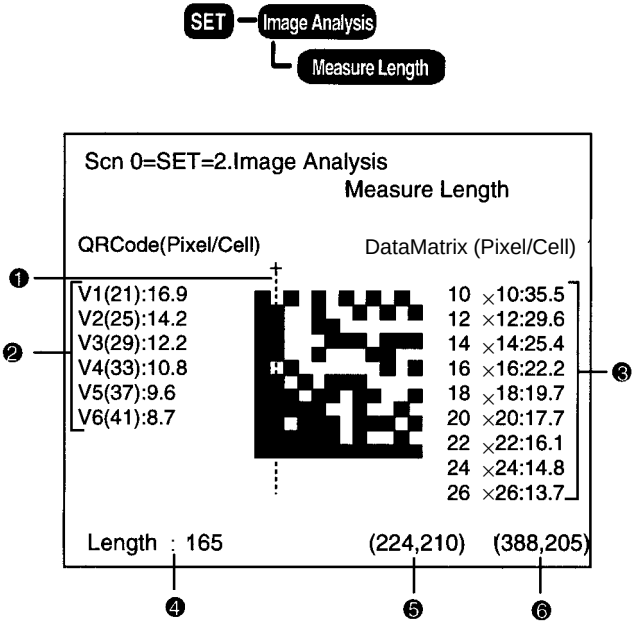



3 Move to the specified area using Up/Down/Left/Right Keys.
Press the SHIFT Key at the same time to move faster.

4 Press the ENT Key.
A magnified image is displayed within a dotted frame.

## Measure Length

Measures the size of cells in pixels.
For stable reading, adjust the field of vision to be at least five pixels per cell.




1 Specify the beginning and end point of the line to be measured.

2 Pixels per cell in the QR Code is displayed.

3 Pixels per cell in the DataMatrix code is displayed.

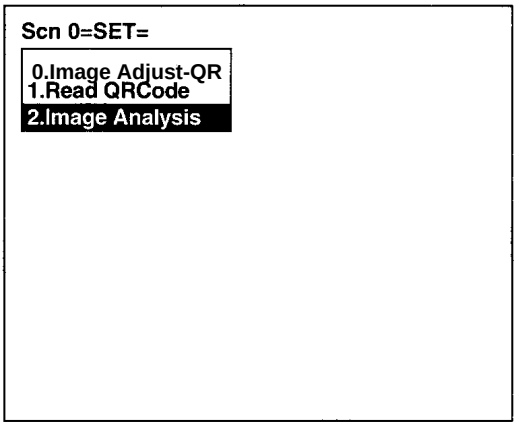
4 The length of the dotted line in pixels is displayed.

5 The coordinates of the beginning point are displayed.

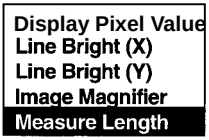
6 The coordinates of the end point are displayed.

**Procedure**

1 Select ***2.Image Analysis***.




2 Select ***Measure Length***.




3 Move the cross cursor to the beginning point using Up/Down/Left/Right Keys and press the ENT Key.

Press the SHIFT Key at the same time to move faster.

4 Specify the end point in the same way.

The length of the straight line is measured.

5 Press the ESC Key to leave this screen.

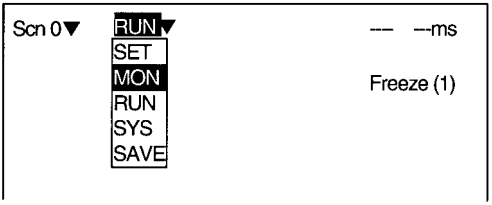
# 6-3 MON (Monitor) Mode

Confirms whether the reading can be correctly performed with the set conditions.
The reading judgment and data are not output to the terminal blocks or RS-232C but displayed on a monitor.

**Procedure**

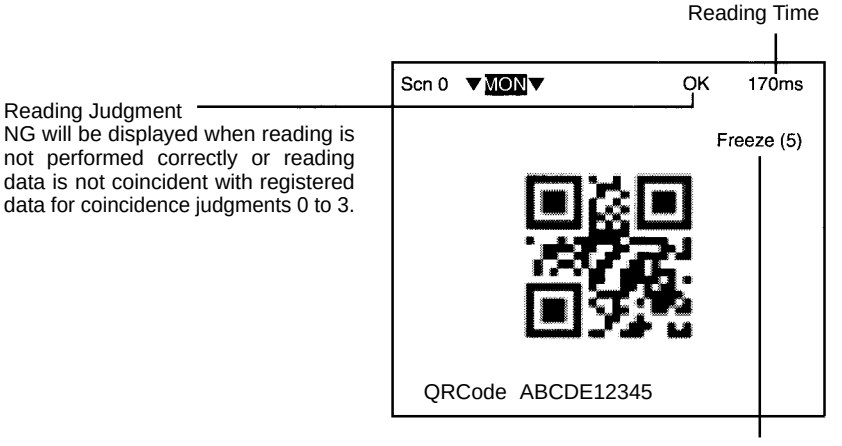
1 Enter MON (Monitor) mode.

MON (monitor) mode automatically moved to after leaving SET mode.

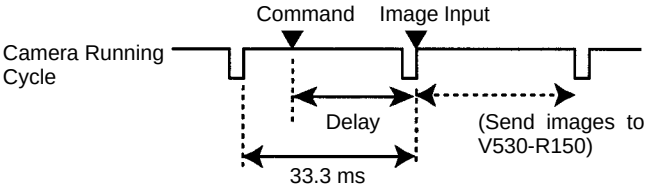



2 Input reading trigger.

- Console
  One reading is performed when the TRIG Key is pressed once.
- Terminal Block → **p. 25**
- RS-232C → **p. 46, 52**



### Types of Displayed Image

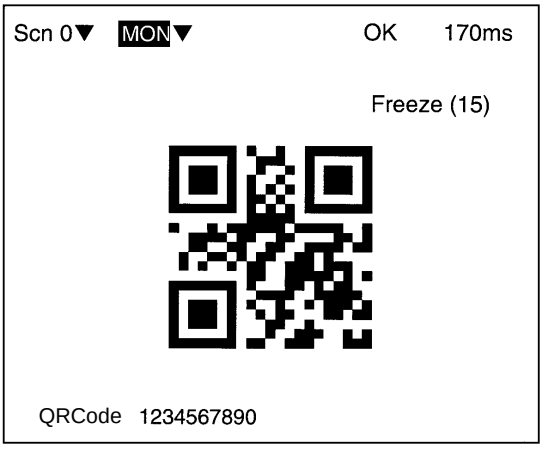
| | |
|---|---|
| Freeze (□) | A still image immediately after measurement. The memory number (0 to 23) under which the image is stored is displayed in □. When reading moving objects, display freeze images. |
| Through | A live image from the Camera. When reading is performed on through images, a delay of 33.3 ms max. (depending on timing of command inputs) will occur before starting to load images.<br>  |
| Memory □ | A reading image stored in the past.<br>The reading images which are coincident with image storage conditions are stored in memory 0 to 23.<br>How to set storage conditions of images. → **p. 149** |
| Image 0 | An image after filtering according to the settings in ***Setting/Image Adjust***.<br>Reading is performed on the image after filtering. |
| Image 1 | An edge detection image for Data Matrix processing. (For a scene in which conditions are set for QR Codes, this will be same as the Image 0.) |

## Differences in Displayed Screens According to Settings in *Reading****/Display Settings*

**When *Reading Data* is ON:**

OK: Reading data are displayed.
NG: Error codes are displayed.

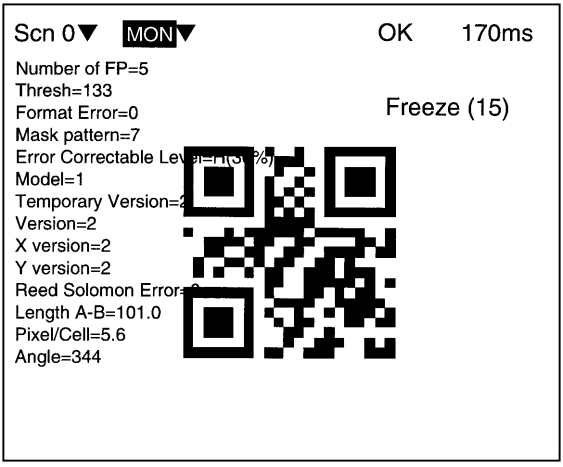
(e.g.) Reading OK




**When *Detail Data* is ON:**

Detailed data of reading codes are displayed.

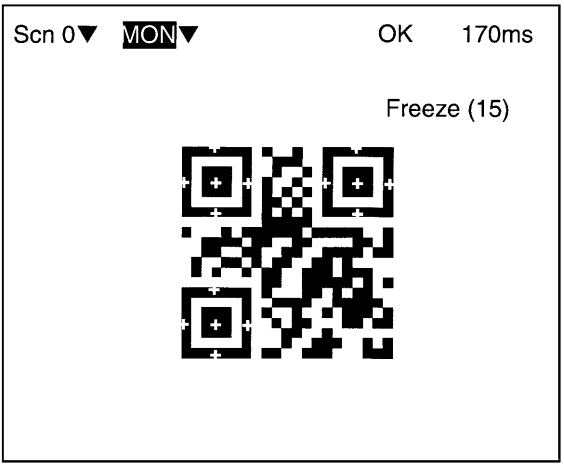
(e.g.)



**When *Finder Pattern* is ON:**

A cross cursor will appear at the position recognized as a finder pattern.

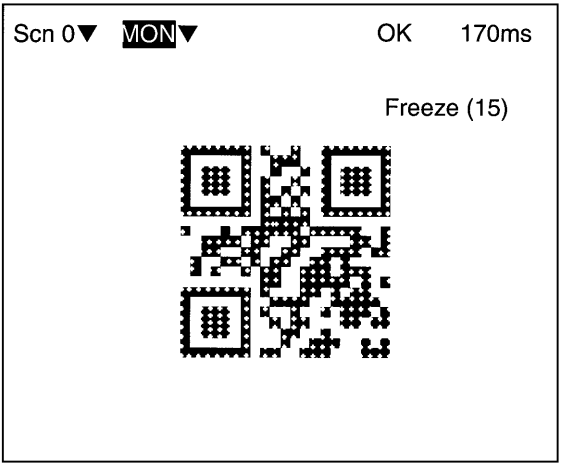
(e.g.)




**When *Cell Position* is ON:**

A cross cursor will appear at the position recognized as a cell. However, when ***Read QRCode/Function Settings/Cell Verify*** is Verify, the cell recognition position is not displayed.

(e.g.)

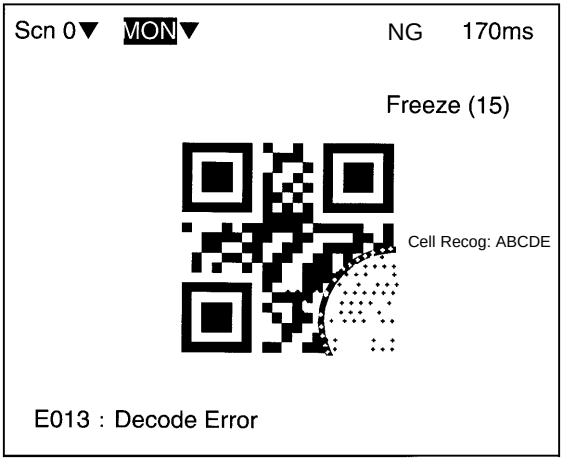


## Differences in Displayed Screens According to Settings in *Reading****/Function Settings*

**When *Cell Verify* is Verify:**

A cross cursor will appear at the position not identified when verified with standard data. Even when ***Read QRCode/Display Settings/Cell Position*** is ON, the result of cell recognition verification is displayed.

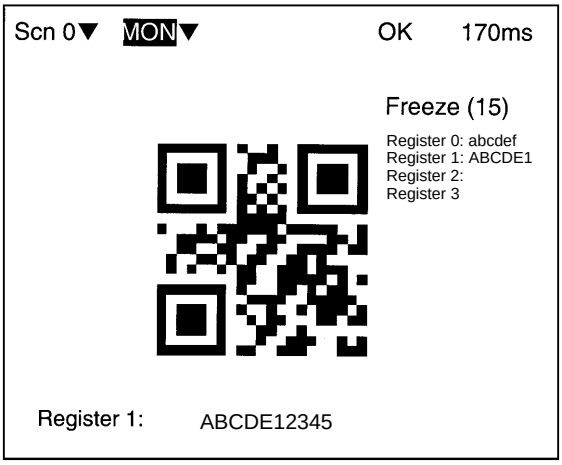
(e.g.)



**When *Judge Coincidence* is ON:**

Performs coincidence judgment and the result is displayed. Turn OFF Data History, Reading Accuracy, Judge Gray Value and Measure L Length functions since they cannot be used together with Judge Coincidence.

(e.g.) Coincident with registered data 1 (Reading OK)



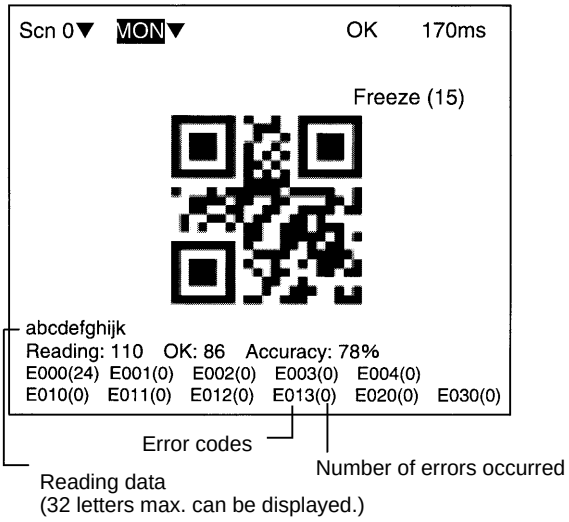

If not coincident with registered data 0 to 3, “NG: (Reading Data)” is displayed.

**When *Data History* is ON:**

The number of readings, OK readings, Reading Accuracy and the result of error counts are displayed. The count values are cleared when turned OFF.

Turn OFF the Judge Coincidence, Reading Accuracy, Judge Gray Value, and Measure L Length functions as they cannot be used together with the Data History function.

(e.g.)



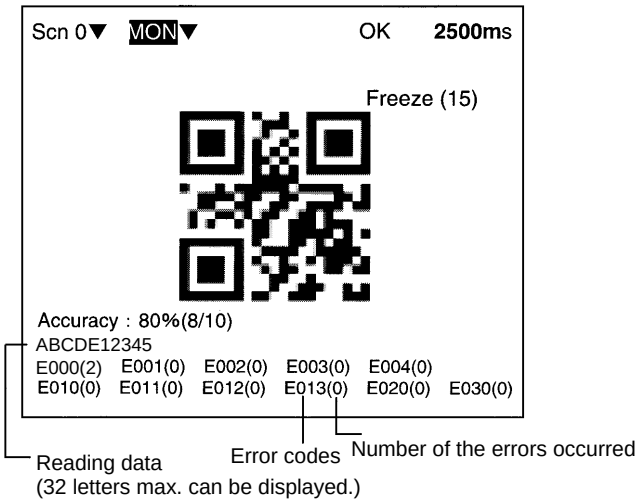
**When *Reading Accuracy* is ON:**

Ten readings are performed with one trigger and the result is displayed.

The reading accuracy cannot be counted for the continuous reading commands.

Turn OFF the Judge Coincidence, Data History, Judge Gray Value, and Measure L Length functions as they cannot be used together with the Reading Accuracy function.

(e.g.)

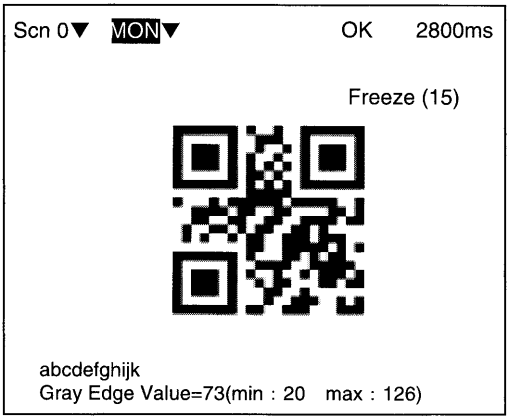


**When *Judge Gray Value* is ON: (Read QRCode only)**

A suitable gray edge value is measured by pressing the TRIG Key on the Console. The gray edge value is automatically entered in the setting for ***Gray Edge Value*** in ***Read QRCode/ Reading Settings***.

Turn OFF the Judge Coincidence, Data History, and Reading Accuracy functions as they cannot be used together with the Judge Gray Value function.

(e.g.)



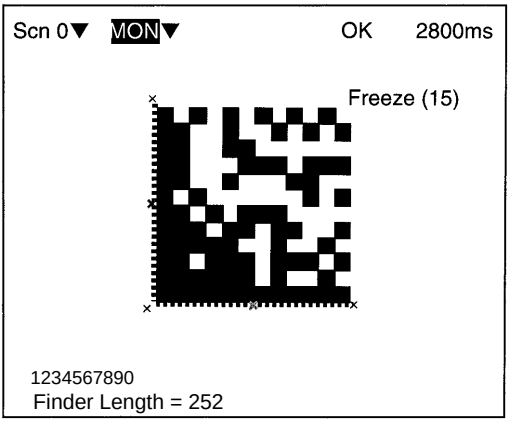
**When *Measure L Length* is ON: (Read DataMatrix only)**

The length of L-shape is measured by pressing the TRIG Key on the Console.

The measurement value is automatically entered in the setting for ***Length of Finder*** in ***Read DataMatrix/Reading Settings***.

Turn OFF the Judge Coincidence, Data History, and Reading Accuracy functions as they can not used along with Measure L Length.

(e.g.)

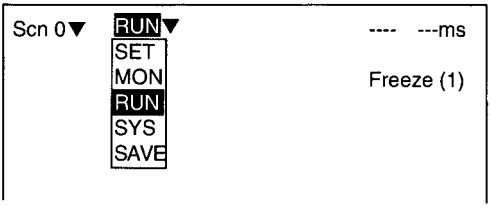


# 6-4 RUN Mode

Reading is performed under the setting conditions for the scene displayed.
Reading judgement and data are output to external devices. For details regarding the display items, refer to *6-3 MON (Monitor) Mode*. → **p. 129**

**Procedure**

1 Select RUN Mode.




2 Input reading trigger.

**Commands**

- Console
  One reading is performed by pressing the TRIG Key once.
- Terminal Block → **p. 25**
- RS-232C → **p. 46, 52**

**Output Format**

- Terminal Block → **p. 25**
- RS-232C → **p. 46, 52**

# 6-5 System

## 6-5-1 Communications Method

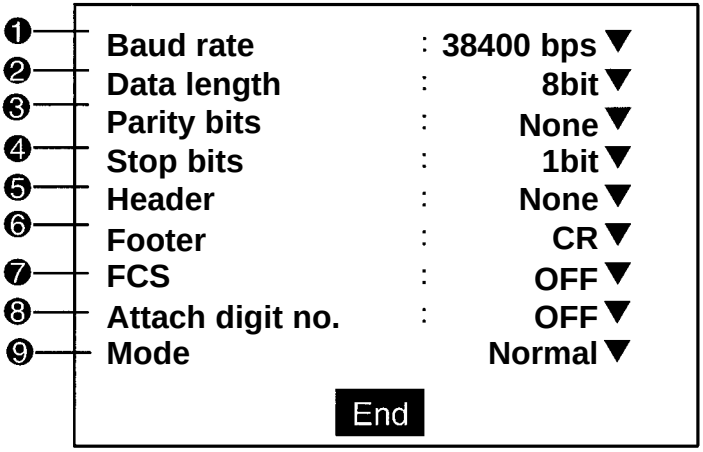
SYS — Communications

Sets communications methods when communicating to external devices via terminal blocks or RS-232C.

- When communicating in normal format via RS-232C:
  Set the communications method for ***RS-232C*** and ***Normal***.
- When communicating with host link via RS-232C:
  Set the communication method for ***RS-232C*** and ***Host link***.
- When inputting trigger or outputting reading results (OK/NG) to the OK/NG terminals on terminal blocks:
  Set the communications method for ***Terminal block***.

**RS-232C**

SYS — Communications — RS-232C




1 Select 2400, 4800, 9600, 19200, or 38400 (bps). (Default setting: 38400)

2 Select 7 or 8 (bits). (Default setting: 8)

3 Select None, Odd, or Even. (Default setting: None)

4 Select 1 or 2 (bits). (Default setting:1)

5 Select None, STX, or ESC. (Default setting: None)

6 Select CR, LF, or CR+LF. (Default setting: CR)

7 Select OFF or ON. (Default setting: OFF)

8 Select OFF or ON. (Default setting: OFF)
The number of digits are shown in bytes. A letter or a number is 1 digit.

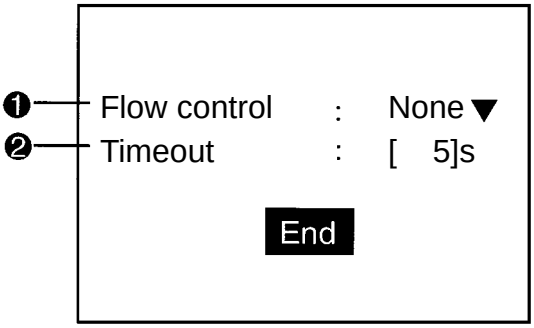
9 Select Normal or Host link (Default setting: Normal)

## Normal

If ***Normal*** is selected for the communications mode, it is possible to communicate with host devices such as personal computers with normal format via RS-232C.


**MON (Monitor) Mode**
Receives command inputs, but the reading results are not output.

**RUN Mode**
Possible to input commands and output the reading results.




1 None: No flow control. (Default setting)

RS/CS: The hardware performs flow control. Use a cable that connects the RS and CS signals of the V530-R150 and external device. Data is transferred when the CS signal from the external device is ON.

Xon/off: The software performs flow control. Data is transferred according to the Xon/off codes from the external device.

Multi Drop: Select when using with multi drop. Turns on RS signals when data are transmitted.

**Note** When multi drop is selected, ***SYS/Multi drop*** is automatically set to ON.

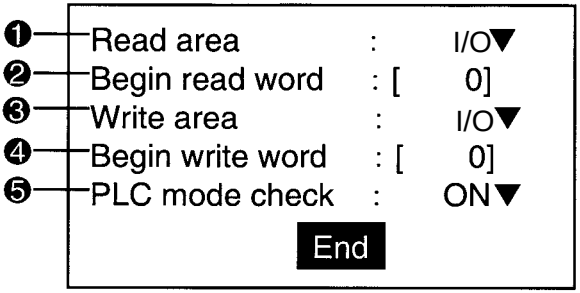
2 Set the number of seconds (1 to 120 s) before a timeout error occurs. (Default setting: 5 s)

## Host Link

When ***Host link*** is selected for the communications mode, it is possible to communicate with host devices such as Programmable Controller with host link format via RS-232C.


**MON (Monitor) Mode**
Receives command inputs, but the reading results are not output.

**RUN Mode**
Possible to input commands and output the reading results.




1 Select I/O, HR (holding relay), LR (link relay), DM (data memory), or None. If no read area is set, commands will not be automatically read from the Programmable Controller by executing the TXD instruction in the ladder program. (The default setting is I/O.)

2 Set the first word to read in area specified above (0 to 9995). (Default setting: 0)

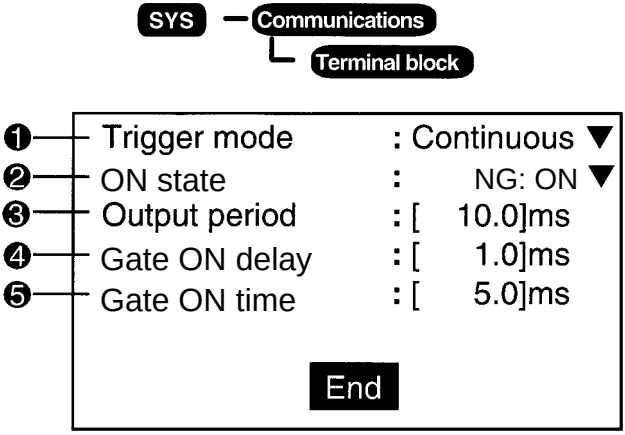
3 Set the write area where the V530-R150 writes the result. Select I/O, HR (holding relay), LR (link relay), DM (data memory), or None (No writing). (The default setting is I/O.)

4 Set the first word to write in the area specified (0 to 9996). (Default setting: 0)

5 ON: Checks the mode of the Programmable Controller in MON (monitor) and RUN modes. Reading starts with MON (monitor) mode.
(Error messages are displayed.)

OFF: Sends the command to switch mode to the Programmable Controller in MON (monitor) and RUN modes and switch the mode to MON (monitor) mode forcibly.

## Terminal Block




1 Select a trigger mode for TRIG B.

| | |
|---|---|
| Continuous (Default) | Performs continuous reading while the TRIG B terminal is turned ON. In this mode, the settings for reading accuracy and the number of retries are invalid with TRIG input. |
| Level trig (trigger) | Repeats reading until an OK (readable) reading judgment is output while the TRIG B terminal is ON. In the case of an NG (not readable) reading, the NG signal is output when the TRIG B is turned OFF. |

2 Select whether the OK/NG terminal is turned ON for an OK reading or an NG reading. (The default is ON for NG.)

3 Set the output period for reading judgment. Set a value between 2.0 and 10,000.0 ms that is greater than the rising time + output time, and less than the reading interval. If the cycle is longer than the reading interval, the output timing will fall behind as the readings are repeated.
(The default setting is 10.0 ms.)

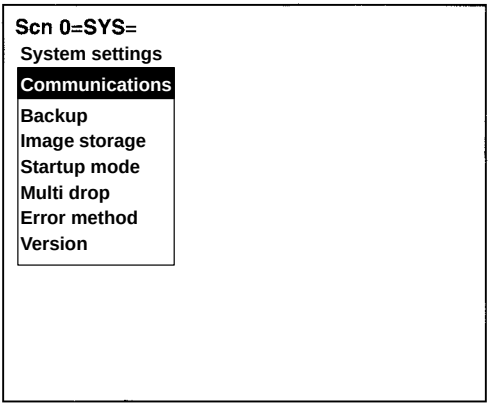
4 Set the time from when the result is output to the terminal block to when the GATE signal is turned ON. This time is used to wait until the data output becomes stable. Set a time between 1.0 and 1000.0 ms that is longer than the delay time for the external device.
(The default setting is 1.0 ms.)

5 Set the time during which the GATE signal is ON. Set a value between 1.0 and 1000.0 ms so that the external device can read the reading judgment. (The default setting is 5.0 ms.)

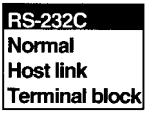
### Operational Procedures for RS-232C, Normal, Host Link and Terminal Block

#### Procedure

1 Select ***Communications***.




2 Select ***RS-232C***, ***Normal***, ***Host link***, or ***Terminal block***.



3 Set each item.

(e.g.) RS-232C

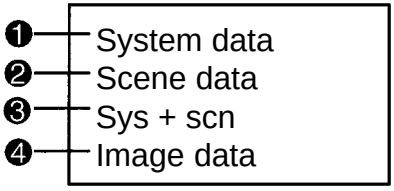
| | | |
|---|---|---|
| Baud rate | : | 38400 bps ▼ |
| Data length | : | 8bit ▼ |
| Parity bits | : | None ▼ |
| Stop bits | : | 1bit ▼ |
| Header | : | None ▼ |
| Footer | : | CR ▼ |
| FCS | : | OFF ▼ |
| Attach digit no. | : | OFF ▼ |
| ↑↓ | | |
| End | | |

4 Select ***End*** before leaving this screen.

## 6-5-2 Backup

SYS — Backup

The following four setting data can be backed up to personal computers. This is a useful function for setting other devices with the same data. Backing up the setting data is recommended as a precaution against loss due to data damage or device malfunctions.



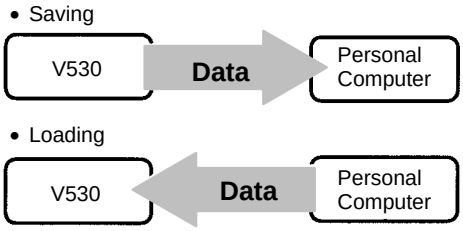

1 Back up the setting items of ***Communications***, ***Image Storage***, ***Startup mode***, ***Multi drop***, and ***Error method*** under ***System Settings*** to a personal computer.

2 Back up the setting items of ***Image Input (**)***, ***Read (****)***, and ***Image Analysis*** of each scene to a personal computer.

3 Back up system data and scene data 0 to 9 to a personal computer.

4 Back up memory images to personal computers with BMP format (*.BMP).The images can be displayed on most per-

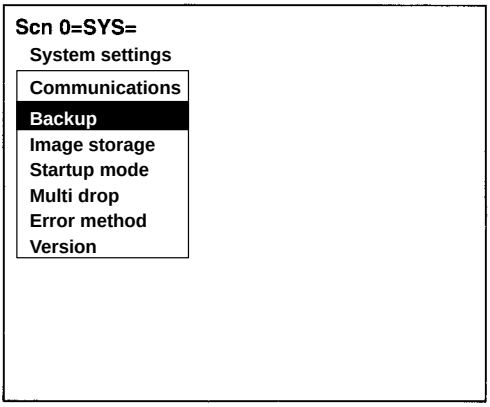
sonal computers as BMP is a common image format for Windows.



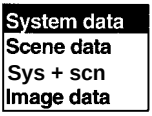

**Note** Never input the reset signal or turn OFF the power while saving or loading. Data may be lost, and the V530-R150 may not operate properly the next time it is started.

**Procedure**

1 Select ***Backup***.



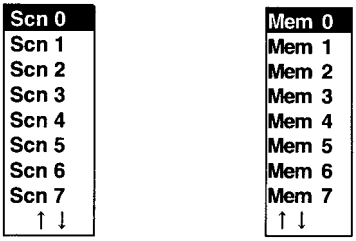

2 Select the data to be loaded or saved.




3 Select ***Load*** or ***Save***.

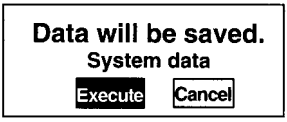
4 Select the number for scene data and image data.

- Scene No. (0 to 9)
- Image Data (Memory 0 to 23, Image 0 to 1)




5 Select ***Execute*** when the confirmation message is displayed.

(e.g.) When saving system data:




## Operation Examples for Personal Computers

This section describes data transfer using the Hyper Terminal provided on Windows95/98 and Windows NT4.0 computers. In this example, a RS-232C cable is connected to the COM1 port of the computer. Alter the example to suit your communications software or COM port number.
Data transfer is performed with XMODEM (-CRC or -SUM) protocol method.

**Note** Do not turn OFF the power while a message is being displayed in any saving or loading operations. Data in memory may be destroyed, and the V530-R150 may not operate correctly the next time it is started.

### Saving Data to a Personal Computer (V530-R150 → Personal Computer)

**Procedure**

1 Connect the COM1 port on the computer and the V530-R150 using an RS-232 cable.

2 Make the V530-R150 communication settings.

The default communication settings are as shown in the following table. These settings can be normally used.

| Item | Setting |
|---|---|
| Baud rate | 38400 (bps) |
| Data length | 8 (bit) |
| Parity bits | None |
| Stop bits | 1 (bit) |
| Footer | CR |

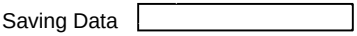
3 Start the Hyper Terminal program on the computer and make the following communication settings.

The same communication settings must be used on both the V530-R150 and the modem on the computer.

| Item | Setting |
|---|---|
| Baud rate (B) | 38400 (bps) |
| Data length (D) | 8 (bit) |
| Parity bits | None |
| Stop bits | 1 (bit) |
| Flow control | None (XMODEM protocol is used.) |

4 Save data from the V530-R150.

The data transfer screen will be displayed.




5 Select ***Transfer/Receive File*** from the Hyper Terminal menu.

- Specify where the file is to be saved.
- Set the protocol to ***Xmodem***.

6 Select ***Receive*** and input the file name.

The data will be transferred from the V530-R150 to the computer.
The V530-R150 generates a timeout error if no response is received from the external device within 30 seconds. An error message will be displayed, and the error terminal will turn ON.

**Loading Data From the Computer (V530-R150 ← Personal Computer)**

**Procedure**

1 Follow steps 1 to 3 in the above procedure to connect the V530-R150 and the computer.

2 Select ***Transfer/Send File*** from the Hyper Terminal menu.

- Select the file to be loaded.
- Set the protocol to ***Xmodem***.

3 Select ***Send***.

The data transfer screen will be displayed.

4 Load data with V530-R150.

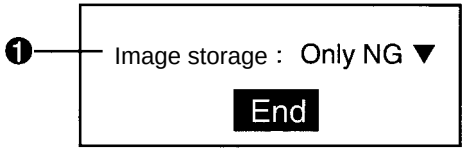
Data will be transferred from the computer to the V530-R150.
The V530-R150 generates a timeout error if no response is received from the external device within 30 seconds. An error message will be displayed, and the error terminal will turn ON.

## 6-5-3 Image Storage

SYS — Image storage

Selects whether to store the reading image or not. A maximum of 24 images can be stored.

**Note** The stored images are cleared when the power is turned OFF. Back up to a personal computer to keep the image data. → **p. 145**

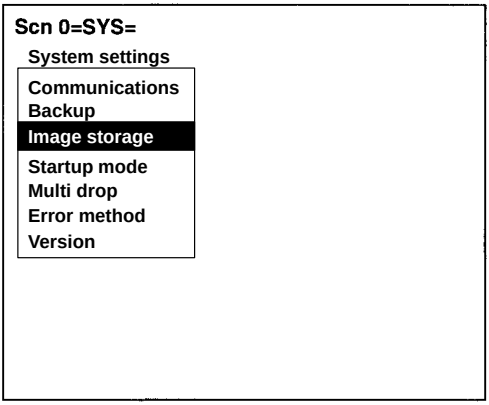



1 Select the conditions to store reading images.

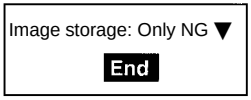
| | |
|---|---|
| None | No images are stored. |
| Only NG | Only NG (unreadable) images are stored. |
| All | All images are stored regardless of readable or unreadable. |

**Procedure**

1 Select ***Image Storage***.




2 Select the conditions.



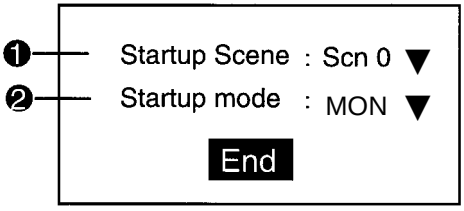

3 Select ***End*** before leaving this screen.

## 6-5-4 Startup Mode

SYS — Startup mode

Sets the scene number and mode to be displayed when the power is turned ON.
If the V530-R150 is set to start in RUN mode for the scene where the desired reading conditions are registered, reading can be started by simply turning the power ON. The default setting is as follows.

- Startup Scene: 0
- Startup Mode : MON

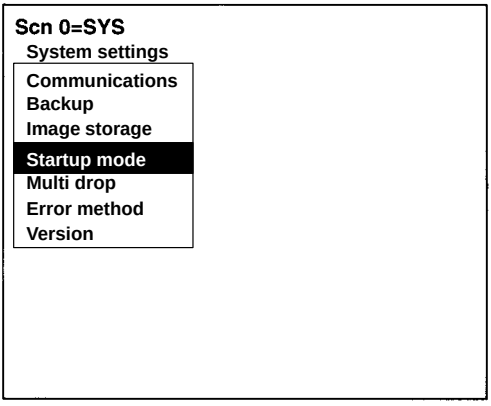


1 Select the startup scene number. (0 to 9)

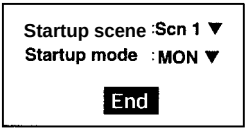
2 Select the startup mode. (SET, MON, or RUN)

**Procedure**

1 Select ***Startup mode***.




2 Select the startup scene number and startup mode.

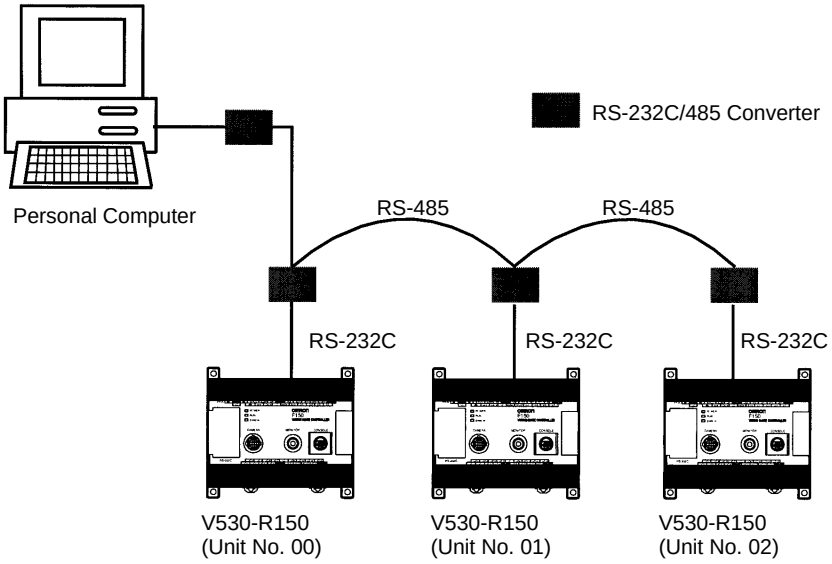



3 Select ***End*** before leaving this screen.

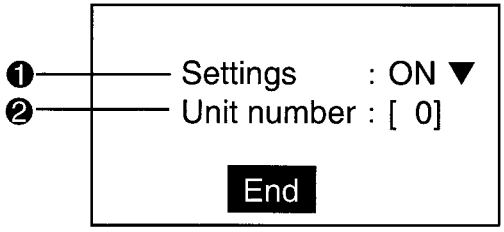
## 6-5-5 Multi Drop


One host (personal computer or Programmable Controller) can communicate with more than one V530-R150 by connecting the RS-232C/RS-485 converter.
The unit number is attached to the prefix of all communication data so, set a different unit number for each V530-R150.

The multi drop function is used only when the communications method is normal.




**Note** Refer to the manual of the converter for the number of V530-R150 that can be connected.
The number is different depending on the converter.



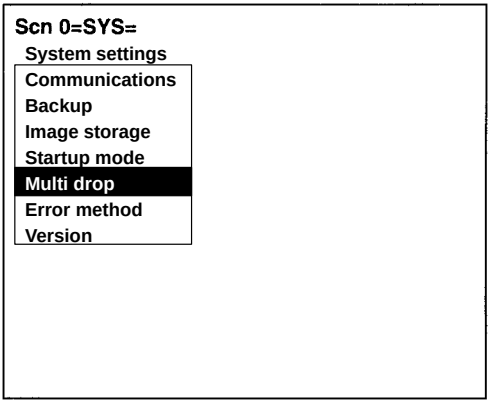

1 Select if connecting multi drop.
If ON is selected, the reading result is not output to RS232C even when reading is performed.
When the host sends polling commands, the result will be output.
(The default setting is OFF.)

**Note** When this function is turned ON, the flow control in ***SYS/Communications/Normal*** is automatically set to ***Multi drop***.

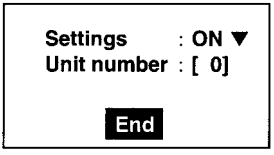
2 Set the Unit No. (0 to 31)

**Procedure**

1 Select ***Multi drop***.




2 Set each item.



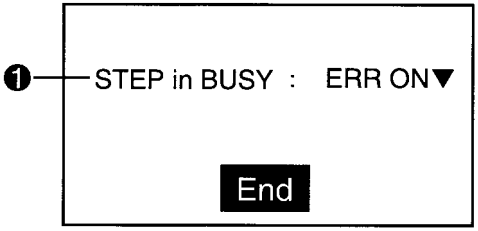

3 Select ***End*** before leaving this screen.

## 6-5-6 Error Method

SYS — Error method

A V530-R150 does not perform reading while the BUSY terminal is ON even when TRIG A is input. Set whether or not to turn ON the ERR terminal if a trigger signal is sent while the BUSY termi-

nal is ON to inform the external device that the trigger has not been accepted.

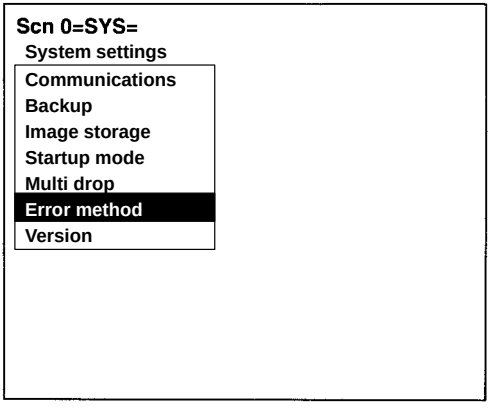



1 ERR ON (Default setting)
Reading is not performed while the BUSY terminal is ON regardless of TRIG A input.
When TRIG A is input with the correct timing, the ERR terminal turns OFF.

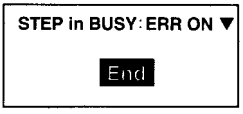
OFF
ERR terminal does not turn ON when TRIG A is input while BUSY terminal is ON. Reading is not performed.

**Procedure**

1 Select ***Error method***.




2 Select the error system.

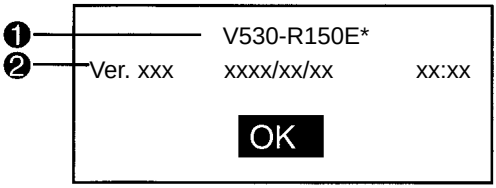



3 Select ***End*** before leaving this screen.

## 6-5-7 Version

SYS — Version

The model of the controller and the version of the software can be displayed.



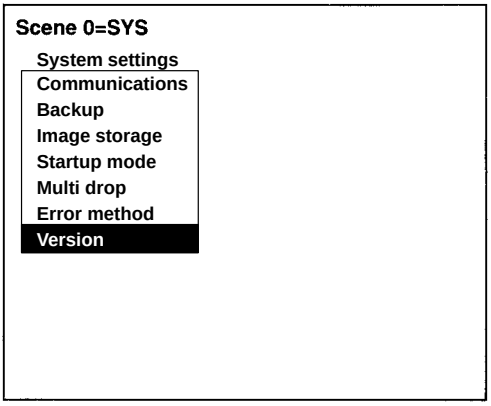

1 The model is displayed.

2 The version and production date of the software are displayed.

**Procedure**

1 Select ***Version***.

The version information is displayed.



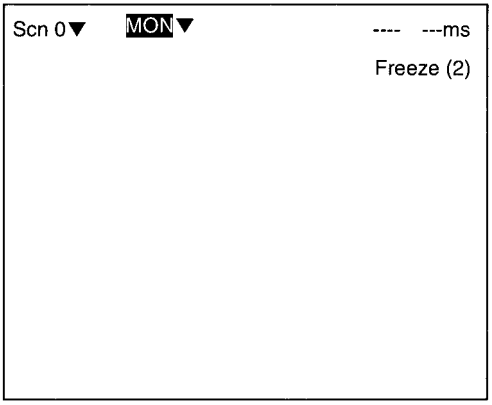

2 Select ***OK*** before leaving this screen.

# 6-6 Scenes

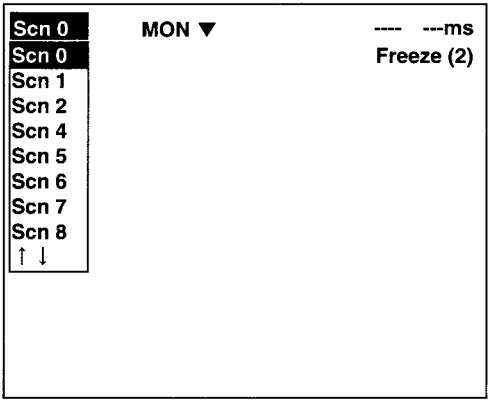
The V530-R150 has 10 scenes.
Set different reading conditions for each scene.

**Procedure**

1 Display the basic screen.




2 Move the cursor to ***Scn 0*** and press the ENT Key.



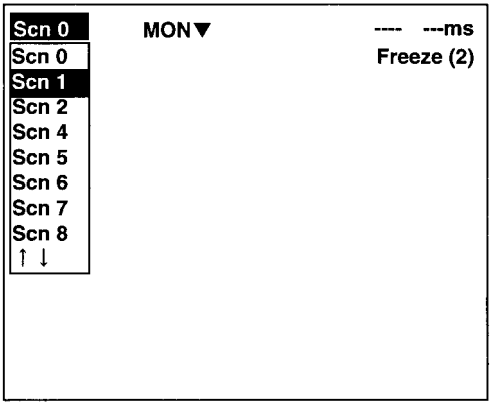

3 Move the cursor to ***Scn 1*** and press the ENT Key.

Scene 1 appears.
The mode is maintained after changing the scene.
(In this case, MON mode.)

## Copying Scene Data

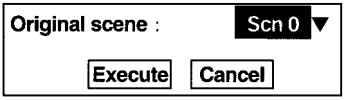
### Procedure

1 Move the cursor to the desired scene number and press the SHIFT+ ESC Keys.




2 Select ***Copy***.

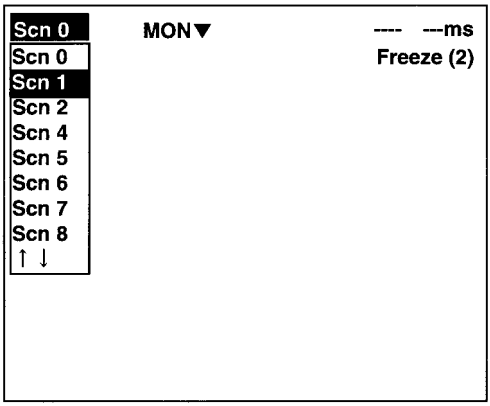

3 Move the cursor to the original scene number and select ***Execute***.



## Clearing Scene Data

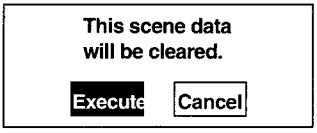
### Procedure

1 Move the cursor to the scene number to be cleared and press the SHIFT + ESC Keys.




2 Select ***Clear***.
The confirmation message is displayed.


3 Select ***Execute***.

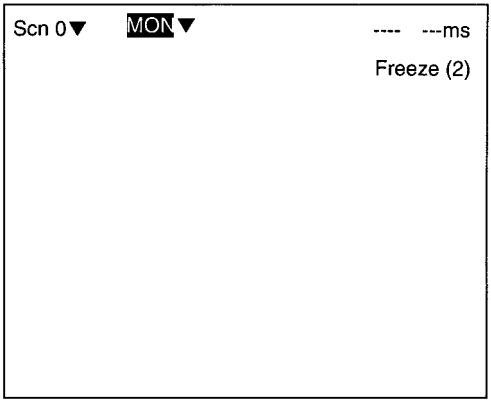


# 6-7 Saving to Flash Memory

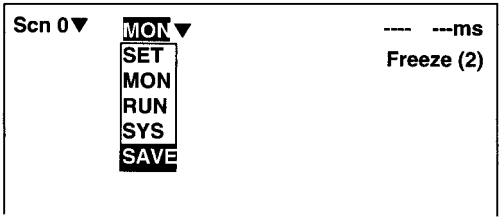
Be sure to save revised setting data to flash memory before power is turned OFF.
As the V530-R150 loads data from flash memory at startup, any new data be will lost if it is not saved to flash memory. Also, images in RAM are cleared when power is turned OFF.

**Procedure**

1 Display the basic screen.



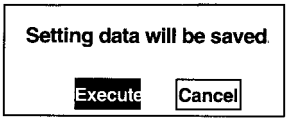

2 Move the cursor to ***MON*** (monitor) and press ENT.




3 Select ***SAVE***.

4 Select ***Execute*** when the confirmation message is displayed.

When saving is completed, the screen in step 1 appears.



**Note** Never input the reset signal or turn OFF the power when processing messages are displayed. Data may be lost, and the V530-R150 may not operate properly the next time it is started.

# SECTION 7
# Regular Inspections

This section gives basic maintenance procedures and inspection items for the V530-R150 2-Dimensional Code Reader.

To maintain the V530-R150 in the best condition, perform the following regularly.

- Lightly wipe off dirt with a soft cloth.
- Clean the lens and indicators with a cloth for a lens or air brush.

| Inspection Items | Details | Required Tools |
|---|---|---|
| Power Supply | The voltage measured at the power supply terminals on the terminal block must be 24 VDC (+10%, –15%). | Circuit Tester |
| Ambient Temperature | The operating ambient temperature inside the cabinet must be between 0 to +50°C. | Thermometer |
| Ambient Humidity | The operating ambient humidity inside the cabinet must be between 35 to +85%. | Hygrometer |
| Installation | Each cable connector must be correctly inserted and locked.<br>The cameras must be firmly secured.<br>The camera lens mounts must be firmly secured. | Phillips screw driver |

**Note**

1. Turn OFF the power and take safety precautions before conducting inspections.
2. Do not use thinners or benzene.

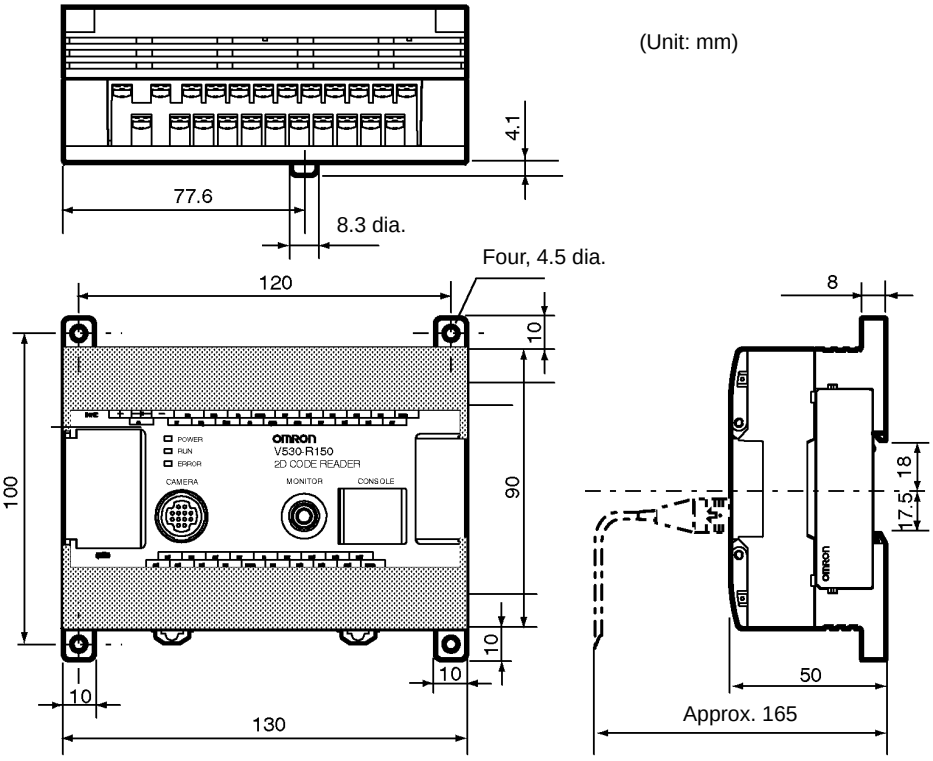
# SECTION 8
# Specifications/Dimensions

This section gives specifications and dimensions for the component parts of the V530-R150 2-Dimensional Code Reader.

# 8-1 V530-R150 2-Dimensional Code Reader Controller

## V530-R150E
## V530-R150EP

(Unit: mm)



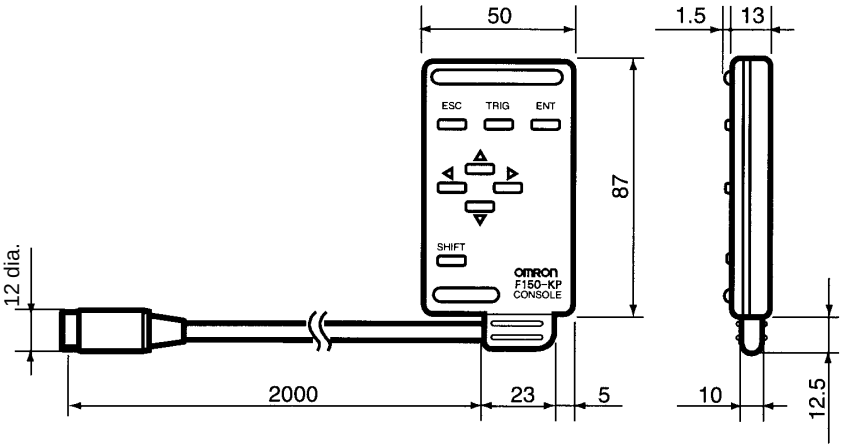
## Specifications

| | V530-R150E | V530-R150EP |
|---|---|---|
| Input/output type | NPN | PNP |
| Supply voltage | 24 VDC (+10%, –15%) | |
| Current consumption | Approx. 0.5 A | |
| Insulation consumption | 20 MΩ min. between all DC external terminals and GR terminal (at 100 VDC, with internal surge absorber removed.) | |
| Dielectric strength | 1,000 VAC, 50/60 Hz between all DC external terminals and GR terminal (with internal surge absorber removed.) | |
| Leakage current | 10 mA max. | |
| Noise resistance (common mode) | 1500 Vp-p; pulse width: 0.1 μs/1 μs; rising time: 1ns pulse | |
| Vibration resistance | 10 Hz to 150 Hz; single amplitude: 0.5 mm; maximum acceleration 70 $m/s^2$ 4 times for 8 minutes each in 3 directions | |
| Shock resistance | 200$m/s^2$ 3 times each in 6 directions | |
| Ambient temperature | 0°C to +50°C | |
| Ambient humidity | 35% to 85% (with no condensation) | |
| Ambient environment | No corrosive gases | |
| Storage temperature | –25°C to +65°C | |
| Protection class | Class I (with protective conductor terminal) | |
| Degree of protection | IEC60529 IP20 (in-panel) | |
| Weight | Approx. 390 g (without cable) | |

# 8-2 Console

## F150-KP

(Unit: mm)

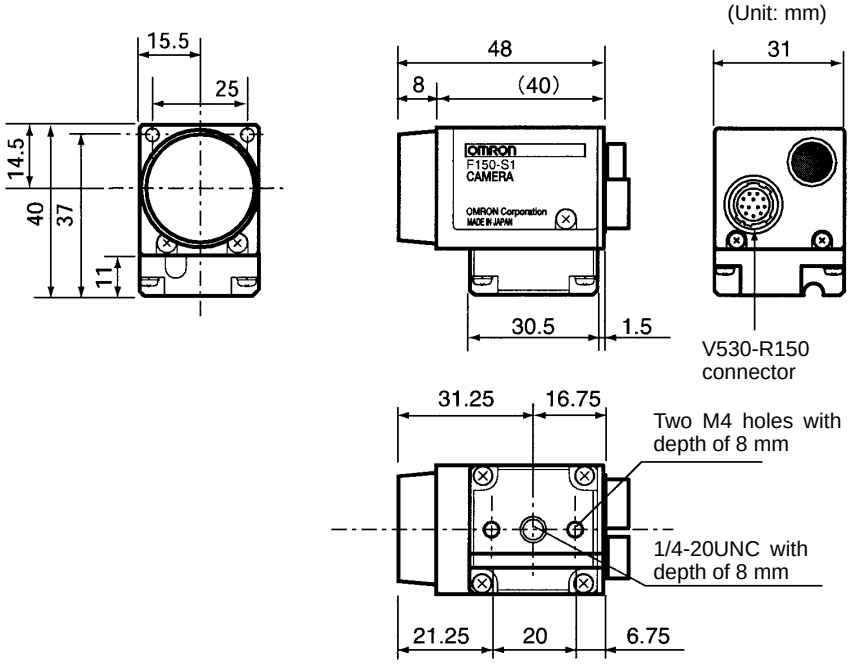



### Specifications

| | |
|---|---|
| Vibration resistance | 10Hz to 150 Hz; single amplitude: 0.15 mm |
| Shock resistance | 196 $m/s^2$ |
| Ambient temperature | 0°C to +50°C |
| Ambient humidity | 35% to 85% (with no condensation) |
| Ambient environment | No corrosive gases |
| Shortage temperature | –25°C to +65°C |
| Degree of protection | IEC60529 IP20 (in-panel) |
| Length | 2 m |
| Minimum bending radius | 75 mm |
| Weight | Approx. 135 g |

# 8-3 Camera

## F150-S1




### Specifications

| | |
|---|---|
| Supply voltage | 12 VDC |
| Current consumption | Approx. 160 mA |
| Vibration resistance | 10 Hz to 150 Hz; single amplitude: 0.5 mm (Max. acceleration: 70 m/s$^2$) 4 times for 8 min. in each 3 directions |
| Shock resistance | 200m/s$^2$ 3 times each in 6 directions |
| Ambient temperature | 0°C to +50°C |
| Ambient humidity | 35% to 85% (with no condensation) |
| Ambient environment | No corrosive gases |
| Storage temperature | –25°C to +60°C |
| Weight | Approx. 70 g |

**Performance**

| | |
|---|---|
| Picture element | 1/3” interline CCD (reading all pixels) |
| Effective pixels | 659 x 494 (H x V) |
| Synchronization | External sync. via horizontal sync signal |
| Shutter speed | Electronic shutter: 1/100, 1/500, 1/2000, 1/10000 sec |
| Lens mounting | C mount |

# 8-4 Cables

## F150-VS Camera Cable

**Specifications**

| | |
|---|---|
| Vibration resistance | 10Hz to 150 Hz; single amplitude: 0.15 mm<br>4 times for 8 min. in 3 directions |
| Shock resistance | 196m/s$^2$ 3 times each in 6 directions |
| Ambient temperature | 0°C to +50°C |
| Ambient humidity | 35% to 85% (with no condensation) |
| Ambient environment | No corrosive gases |
| Storage temperature | –25°C to +65°C |
| Length | 3 m |
| Minimum bending radius | 75 mm |

## F150-VM Monitor Cable

**Specifications**

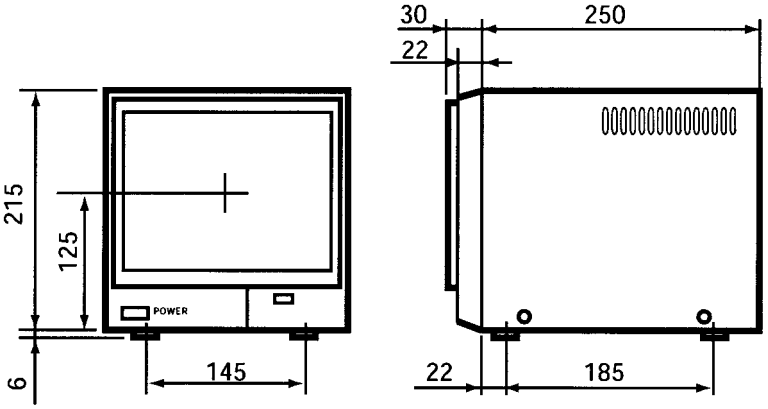
| | |
|---|---|
| Vibration resistance | 10 to 150 Hz; single amplitude: 0.15 mm<br>4 times for 8 min. each in 3 directions |
| Shock resistance | 196m/s$^2$ 3 times each in 6 directions |
| Ambient temperature | 0°C to +50°C |
| Ambient humidity | 35% to 85% (with no condensation) |
| Ambient environment | No corrosive gases |
| Storage temperature | –25°C to +65°C |
| Length | 2 m |
| Minimum bending radius | 50 mm |

# 8-5 Video Monitor

This is the recommended monitor and is available from OMRON.

## F300-M09 (OMRON)

(Unit: mm)




### Specifications

| | |
|---|---|
| Supply voltage | 100 VAC |
| Current consumption | Approx. 300 mA |
| Vibration resistance | 10 Hz to 150 Hz; single amplitude: 0.15 mm<br>4 times for 8 min. each in 3 directions |
| Shock resistance | 196m/s$^2$ 3 times each in 6 directions |
| Ambient temperature | 0°C to +40°C |
| Ambient humidity | 10% to 90% (with no condensation) |
| Ambient environment | No corrosive gases |
| Storage temperature | –25°C to +65°C |
| Weight | Approx. 5.8 kg |

### Performance

| | |
|---|---|
| System | Number of scanning lines: 525<br>Horizontal frequency: 15.75 kHz<br>Field frequency: 60 Hz |
| I/O impedance | 75 Ω, high impedance (selectable) |
| I/O level and polarity | Image: 0.7 Vp-p, positive<br>Synchronization: 0.3 Vp-p, negative |
| Screen size | 123 mm (H) x 164 mm (W) , monochrome (light-holding) |
| Resolution | 700 TV lines min. (at center) |

# SECTION 9
# Troubleshooting

This section details errors that may occur with the V530-R150 2-Dimensional Code Reader and gives procedures for dealing with those errors.

# 9-1 Troubleshooting

## Connection Errors

**The power indicator is not lit.**

- The power supply is not connected properly.
- The supply voltage is not 24VDC+10%/–15%.

**The video monitor is blank.**

- The power of the video monitor is not ON.
- The monitor cable is not connected properly.
- The video monitor is malfunctioning.

**Cannot make key inputs from the Console.**

- The Console cable is not correctly connected.

**Camera images do not appear on the screen.**

- The lens cap has not been removed.
- The camera cable is not properly connected.
- The lens diaphragm is opened or closed too far.
- The shutter speed is not suitable.
- The lighting method is not suitable.

**The images on the video monitor are not clear.**

- There is electrical noise entering from the power supply or cables.
- The monitor cable is not correctly connected.

**The images on the video monitor are hard to read.**

- Refer to the entry for the error code in *9-2 Error Codes and Remedies*. Change the setting conditions and adjust the camera and lighting.
- Confirm the image after filtering (noise cut etc.) in “Image 0.” → **p. 130**

## Errors During Menu Operation

**The reading results are not displayed on the video monitor.**

- The V530-R150 is not in MON (monitor) or RUN mode.

## Terminal Block Errors

**Trigger signals (input signals) are not received.**

- The cables are not correctly wired.
- The signal line is disconnected.
- The V530-R150 is not in MON (monitor) or RUN mode.

**Signals cannot be output externally.**

- The trigger signal has not been input.
- The cables are not correctly wired.
- The signal line is disconnected.
- The V530-R150 is not in RUN mode.

## RS-232C Communications Errors

**No communications are possible.**

- The cables are not correctly wired.
- The communications specifications do not match those of the external device.
- The communications mode was not selected under ***SYS/Communications/RS-232C***.
- The V530-R150 is not RUN mode.

**The Unit operates well initially, but after a while there is no response from the V530-R150.**

- The reception buffer on the external device (e.g. computer) is full. Check that settings allow the data to be properly received.

# 9-2 Error Codes and Remedies

## 9-2-1 QR Code Reading

| Error Code | Description | Remedy |
|---|---|---|
| E000 | No finder patterns detected | No finder patterns were detected.<br>• Make sure that the image is displayed on the screen correctly.<br>• Check the printing of the reading code. Three finder patterns in a corner may be stained or damaged. |
| E001 | Finder pattern detection error (Two patterns were not detected.) | Only one finder pattern was detected.(The other two patterns were not detected.)<br>Check the printing of the reading code. Two finder patterns may be stained or damaged.<br>The position of finder patterns can be confirmed on the video monitor when ***Display Settings/Finder Pattern*** is turned ON. |
| E002 | Finder pattern detection error (One pattern was not detected.) | Only two finder patterns were detected. (One pattern was not detected.)<br>One finder pattern may be stained or damaged.<br>The position of finder patterns can be confirmed on the video monitor when ***Display Settings/Finder Pattern*** is turned ON. |

| Error Code | Description | Remedy |
|---|---|---|
| E003 | Finder pattern detection error (The relative positioning is incorrect.) | Three finder patterns were detected. However, the relative positioning of the three finder patterns is incorrect. The code may be bent or part of the finder patterns may be stained or damaged. The position of finder patterns can be confirmed on the video monitor when ***Display Settings/Finder Pattern*** is turned ON. |
| E004 | Finder pattern detection error (4 or more finder patterns were detected.) | Too many finder patterns (4 or more) were detected. Some of the finder patterns may be stained or damaged. The position of finder patterns can be confirmed on the video monitor when ***Display Settings/Finder Pattern*** is turned ON. |
| E010 | Decode error (Tentative version calculation error) | Finder patterns may be bent. Make sure that the image is loaded and at least 5 pixels per cell are displayed. The number of pixels of any section on a screen can be checked under ***Image Analysis/Measure Length***. |
| E011 | Decode error (Format information error) | "Format information" in QR Codes may be stained or damaged. (Refer to the figure below.) |
| E012 | Decode error | "Version information" in QR Codes is not correct. |
| E013 | Decode error (Cell recognition error) | Codes were restored to correct errors, but not decoded correctly. Data of QR Codes may be stained or damaged. |
| E020 | Decode error (No definition error) | The printing is in a special format and not defined for the V530-R150 (connection mode, etc.). Change the printing format. |
| E030 | Pattern search NG | As a result of the pattern search, 32 or more proposed finder patterns were found. Make sure the image is displayed on the monitor correctly and check the registered mode. |

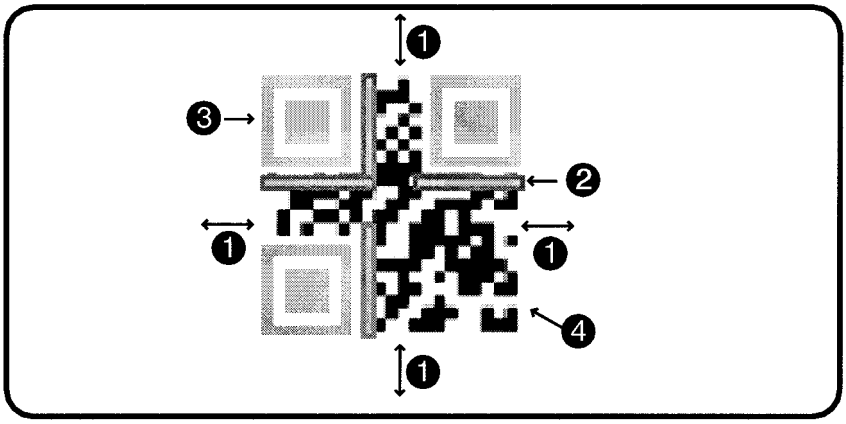
**Common Check Items for Error Codes E000 to E004**

- When FP search method is ***Normal***:
  Make sure that the gray edge value settings are correct.
  A suitable gray edge value will be set when ***Read QRCode/Function Settings/Judge Gray Value*** is turned ON.
- When FP search method is ***Pattern Search***:
  Make sure that the registered model is correct.
  Make sure that the version of the code being set is correct.

**Confirming Pixels Per Cell**

When ***Display Settings/Detail Data*** is turned ON, the number of pixels per cell is displayed together with detail information if reading is OK. When reading is NG, confirm the number of pixels per cell under ***2. Image Analysis/Measure Length***.

**QR Codes**




1 A margin of 4 or more cells around the code is required.

2 Format information of the code. ( There are four.)

3 Finder patterns (Symbols in three corners)

4 Parts other than 1 to 3 are data.

## 9-2-2 Data Matrix Reading

| Error Code | Description | Remedy |
|---|---|---|
| E100 | Finder pattern detection error (No candidate finder patterns) | No finder patterns were detected.<br>Make sure that the image is displayed on the monitor correctly.<br>Check the printing of the reading code. The finder patterns, especially the L-shaped ones, may be stained or damaged. |
| E110 | Finder pattern detection error (No finder patterns were detected.) | No finder patterns were detected.<br>Make sure that the image is displayed on the monitor correctly.<br>Check the printing of the reading code. The finder patterns, especially the L-shaped ones, may be stained or damaged. |

| Error Code | Description | Remedy |
|---|---|---|
| E111 | Finder pattern detection error (Only one finder pattern was detected.) | Only one line of finder patterns was detected. Make sure the image is displayed on the monitor correctly. Check the printing of the reading code.<br>One of the L-shaped finder patterns may be stained or damaged. The position of finder patterns can be confirmed on the video monitor when ***Display Settings/Finder Pattern*** is turned ON. |
| E112 | Finder pattern detection error (The relative positioning is incorrect.) | Two finder patterns (two lines) were detected.<br>However, the relative positioning of the patterns is incorrect.<br>The codes may be bent or part of the finder patterns may be stained or damaged. The L length (the length of finder patterns) set may be too long. The L length can be checked when ***Function Settings/Measure L Length*** is turned ON. |
| E120 | Decode error (Timing pattern detection error) | Check the printing of the reading codes.<br>The timing patterns in the X or Y directions may be stained or damaged. The matrix size may not be set correctly.<br>The L length (the length of finder patterns) set may be too short. The L length can be checked when ***Function Settings/Measure L Length*** is turned ON. |
| E121 | Decode error (Timing pattern detection error in X direction) | Check the printing of the reading code. The timing pattern in the X direction may be stained or damaged. Codes may be bent. |
| E122 | Decode error (Timing pattern detection error in Y direction) | Check the printing of the reading code. The timing pattern in the Y direction may be stained or damaged. Codes may be bent. |
| E123 | Decode error<br>(Cell recognition error) | Codes were restored to correct errors, but not decoded correctly. Part of the codes may be stained or damaged. |
| E150 | Decode error<br>(No definition error) | The printing is in a special format and not defined for the V530-R150. Change the printing format. The codes may be bent, stained, or damaged. |

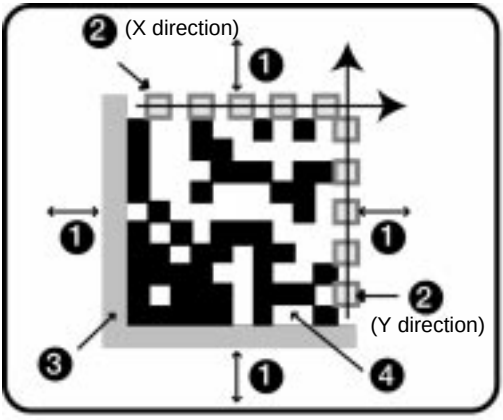
### Common Check Items for Error Codes E120 to E122

Check the gray edge value in ***Reading Settings***.
Refer to ***Image Analysis/Line Bright*** for whether the value is correct.

**Confirming Pixels Per Cell**

When ***Display Settings/Detail Data*** is turned ON, the number of pixels per cell is displayed together with detail information in MON (monitor) or RUN mode. When reading is NG, confirm the number of pixels per cell under ***2. Image Analysis/Measure Length***.

**Data Matrix**




1 A margin of 4 or more cells around the code is required.

2 Timing patterns (The cross point between black and white.)

3 The L-shapes in the corners are finder patterns.

4 Parts other than 1 to 3 are data.

# Appendix A
## ASCII Codes

| Character | Data (Hex-adecimal No.) | Character | Data (Hex-adecimal No.) | Character | Data (Hex-adecimal No.) | Character | Data (Hex-adecimal No.) |
|---|---|---|---|---|---|---|---|
| NUL | 00 | SP | 20 | @ | 40 | ‘ | 60 |
| SOH | 01 | ! | 21 | A | 41 | a | 61 |
| STX | 02 | ” | 22 | B | 42 | b | 62 |
| ETX | 03 | # | 23 | C | 43 | c | 63 |
| EOT | 04 | $ | 24 | D | 44 | d | 64 |
| ENQ | 05 | % | 25 | E | 45 | e | 65 |
| ACK | 06 | & | 26 | F | 46 | f | 66 |
| BEL | 07 | ’ | 27 | G | 47 | g | 67 |
| BS | 08 | ( | 28 | H | 48 | h | 68 |
| HT | 09 | ) | 29 | I | 49 | i | 69 |
| LF | 0A | * | 2A | J | 4A | j | 6A |
| VT | 0B | + | 2B | K | 4B | k | 6B |
| FF | 0C | , | 2C | L | 4C | l | 6C |
| CR | 0D | – | 2D | M | 4D | m | 6D |
| S0 | 0E | . | 2E | N | 4E | n | 6E |
| S1 | 0F | / | 2F | O | 4F | o | 6F |
| DLE | 10 | 0 | 30 | P | 50 | p | 70 |
| DC1 | 11 | 1 | 31 | Q | 51 | q | 71 |
| DC2 | 12 | 2 | 32 | R | 52 | r | 72 |
| DC3 | 13 | 3 | 33 | S | 53 | s | 73 |
| DC4 | 14 | 4 | 34 | T | 54 | t | 74 |
| NAK | 15 | 5 | 35 | Y | 55 | u | 75 |
| SYN | 16 | 6 | 36 | V | 56 | v | 76 |
| ETB | 17 | 7 | 37 | W | 57 | w | 77 |
| CAN | 18 | 8 | 38 | X | 58 | x | 78 |
| EM | 19 | 9 | 39 | Y | 59 | y | 79 |
| SUB | 1A | : | 3A | Z | 5A | z | 7A |
| ESC | 1B | ; | 3B | [ | 5B | { | 7B |
| FS | 1C | < | 3C | \ | 5C | \| | 7C |
| GS | 1D | = | 3D | ] | 5D | } | 7D |
| RS | 1E | > | 3E | ^ | 5E | (~) | 7E |
| US | 1F | ? | 3F | - | 5F | DEL | 7F |

# Appendix B
## FCS Check Program Examples (BASIC)

## Calculation Examples for Sending FCS

| | |
|---|---|
| DATA$ | Sample Data Line |
| L | Data Length |
| CODE$ | Data Character |
| A | Exclusive Operation |

```
100 '*****CALCULATE FCS*****
110 '*FCSSET
120 L=LEN(DATA$)
130 A=0
140 FOR J=1 TO L
150 CODE$=MID$(DATA$,J,1)
160 A=ASC(CODE$)XOR A
170 NEXT J
180 FCS$=HEX$(A)
190 IF LEN(FCS$)=1 THEN FCS$=”0”+FCS$
200 RETURN
```

## FCS Check Sub Routine Examples for Received Data

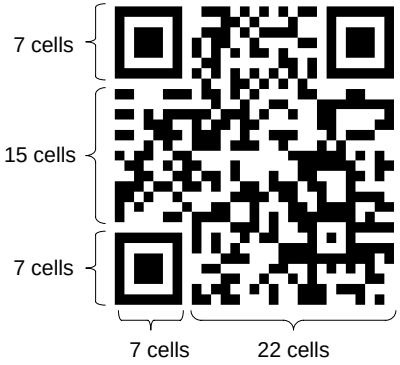
```
1000 '*****FCSHECK*****
1010 '*FCSHECK
1020 Q=0:FCSCK$=”OK”
1030 PRINT RESPONSE $
1040 LENGS=LEN(RESPONSE$)–3
1050 FCSP$=MID$(RESPONSE$,LENGS+1,2) .....Response Data of FCS
1060 FOR J=1 TO LENGS .....Calculation Range of FCS
1070 Q=ASC(MID$(RESPONSE$,J,1))XOR Q
1080 NEXT J
1090 FCSD$=HEX$(Q)
1100 IF LEN(FCSD$)=1 THEN FCSD$=”0”+FCSD$ .FCS calculated in a program
1110 IF FCSD$ < > FCSP$ THEN FCSCK$=”ERR”
1120 PRINT ”FCSD$=”;FCSD$;”FCSP$=”;FCSP$;
”FCSCK$=”;FCSCK$; .....FCS correctly received :OK
1130 RETURN              FCS not received correctly:ERR
```

# Appendix C
## Data Capacity Tables

# QR Code

## QR Code (Model 2)

The relation between matrix size (number of cells) and data capacity is shown in the table below.
In this example, the matrix size is 29 × 29 cells.

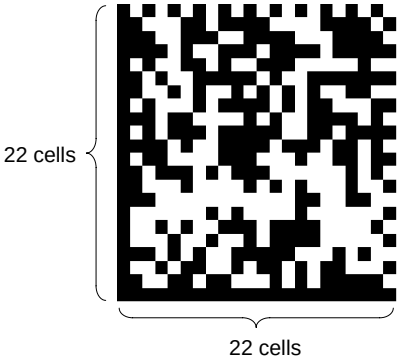



| Matrix size (Version) | Error correction level | Data capacity | | Matrix size (Version) | Error correction level | Data capacity | |
|---|---|---|---|---|---|---|---|
| | | Num. Cap. | Alpha Num. Cap. | | | Num. Cap. | Alpha Num. Cap. |
| **21 × 21 (Version 1)** | L (7%) | 41 | 25 | **33 × 33 (Version 4)** | L (7%) | 187 | 114 |
| | M (15%) | 34 | 20 | | M (15%) | 149 | 90 |
| | Q (25%) | 27 | 16 | | Q (25%) | 111 | 67 |
| | H (30%) | 17 | 10 | | H (30%) | 82 | 50 |
| **25 × 25 (Version 2)** | L (7%) | 77 | 47 | **37 × 37 (Version 5)** | L (7%) | 255 | 154 |
| | M (15%) | 63 | 38 | | M (15%) | 202 | 122 |
| | Q (25%) | 48 | 29 | | Q (25%) | 144 | 87 |
| | H (30%) | 34 | 20 | | H (30%) | 106 | 64 |
| **29 × 29 (Version 3)** | L (7%) | 127 | 77 | **41 × 41 (Version 6)** | L (7%) | 322 | 195 |
| | M (15%) | 101 | 61 | | M (15%) | 255 | 154 |
| | Q (25%) | 77 | 47 | | Q (25%) | 178 | 108 |
| | H (30%) | 58 | 35 | | H (30%) | 139 | 84 |

# Data Matrix

## Data Matrix (ECC200)

The relation between matrix size (number of cells) and data capacity is shown in the table below.
In this example, the matrix size is 22 × 22 cells.




| Matrix size | Maximum data capacity | |
|---|---|---|
| | Num. Cap. | Alpha Num. Cap. |
| 10 × 10 | 6 | 3 |
| 12 × 12 | 10 | 6 |
| 14 × 14 | 16 | 10 |
| 16 × 16 | 24 | 16 |
| 18 × 18 | 36 | 25 |
| 20 × 20 | 44 | 31 |
| 22 × 22 | 60 | 43 |
| 24 × 24 | 72 | 52 |
| 26 × 26 | 88 | 64 |

# Index

## Numbers



## A



## B



## C



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## E



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## J



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## M



## N



## O



## P



## Q



## R

## S



## T



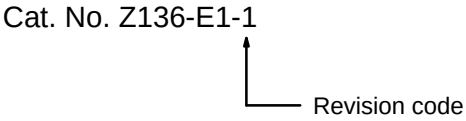
## V



## W

# Revision History

A manual revision code appears as a suffix to the catalog number on the front cover of the manual.




The following table outlines the changes made to the manual during each revision. Page numbers refer to the previous version.

| Revision code | Date | Revised content |
|---|---|---|
| 1 | July 1999 | Original production |

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OMRON

**Authorized Distributor:**

Cat. No. Z136-E1-1

Note: Specifications subject to change without notice.

Printed in Japan
0799-0.5M Ⓐ

Cat. No. Z136-E1-1

# V530-R150 2-Dimensional Code Reader OPERATION MANUAL

OMRON