

Autofocus Code Reader

SR-1000 Series

User's Manual Rev.6.0



Read this manual before use.

Keep this manual in a safe place for future reference.



■ Symbols

The following symbols alert you to important messages. Be sure to read these messages carefully.

	It indicates a hazardous situation which, if not avoided, will result in death or serious injury.
	It indicates a hazardous situation which, if not avoided, could result in death or serious injury.
	It indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
	It indicates a situation which, if not avoided, could result in product damage as well as property damage.



It indicates cautions and limitations that must be followed during operation.



It indicates additional information on proper operation.



It indicates tips for better understanding or useful information.



Indicates the reference pages in this manual or the reference pages in separate manuals.

Introduction

This user's manual describes the connection/wiring procedure, setting instructions, and precautions for using the "SR-1000 Series Autofocus Code Reader". Please read this manual thoroughly before using the SR-1000 Series to ensure optimum performance. Keep this manual handy for quick future reference.

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General Precautions

 WARNING	<ul style="list-style-type: none">Do not use this product for the purpose to protect a human body or a part of human body.This product is not intended for use as explosion-proof product. Do not use this product in hazardous location and/or potentially explosion atmosphere.
 CAUTION	<ul style="list-style-type: none">You must verify that the SR-1000 Series are operating correctly in terms of functionality and performance before the start and the operation of the SR-1000 Series.We recommend that you take substantial safety measures to avoid any damage in the event of a problem occurring.
 NOTICE	<ul style="list-style-type: none">KEYENCE never warrant the function or performance of the SR-1000 Series if it is used in a manner that differs from the SR-1000 Series specifications contained in this instruction manual or if the SR-1000 Series are modified by yourself.When the SR-1000 Series is used in combination with other instruments, functions and performance maybe degraded, depending on operating conditions and the surrounding environment.

Safety Precautions

Safety Precautions on LED Product

 CAUTION	<ul style="list-style-type: none">Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.Follow the instructions mentioned in this manual. Otherwise, injury to the human body (eyes and skin) may result.<ul style="list-style-type: none">Do not stare into the beam.Do not disassemble this product.LED emission from this product is not automatically stopped when it is disassembled.Do not view directly with optical instruments. Viewing the LED output with certain optical instruments (for example, eye loupes, magnifiers and microscopes) within a distance of 100 mm may pose an eye hazard.
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1-1 Checking the Package Contents

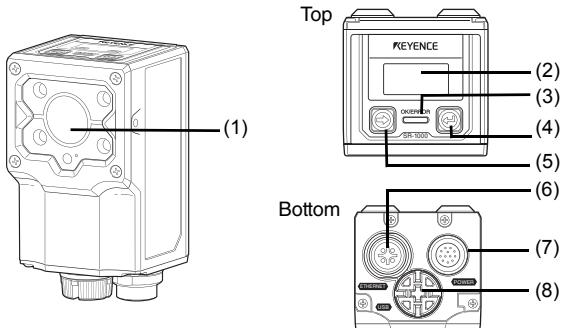
Model	Name	Package content	Qty.	Appearance
SR-1000/1000W	Auto focus code reader (Fixed type)	Reader unit	1	
	Instruction manual		1	
	Ethernet port cover		1	

Option

Model	Name	Package content	Qty.	Appearance
SR-H6W	Setup software (AutoID Network Navigator)	DVD-ROM	1	
OP-87224/ 87225/87226	Control cable	Cable (2 m/5 m/10 m)	1	
OP-87353/87354/ 87355	Control cable (NFPA-compliant)	Cable (2 m/5 m/10 m)	1	
OP-87527/87528/ 87529	Control cable (NFPA-compliant) D-sub connector type	Cable (2 m/5 m/10 m)	1	
OP-87230/87231/ 87232	Ethernet cable (NFPA-compliant)	Cable (2 m/5 m/10 m)	1	
OP-88304/88305/ 88306	L-shaped control cable (NFPA-compliant)	Cable (2 m/5 m/10 m)	1	
OP-88307/88308/ 88309	L-shaped control cable (NFPA-compliant) D-sub connector type	Cable (2 m/5 m/10 m)	1	
OP-88301/88302/ 88303	L-shaped Ethernet cable (NFPA-compliant)	Cable (2 m/5 m/10 m)	1	
OP-51580	USB cable	Cable (2 m)	1	
OP-87866	Mounting bracket	Mounting bracket	1	
		Screw (M4)	4	
OP-88002	Adjustable bracket	Mounting bracket	1	
		Screw (M4)	4	
SR-10AR	Reflector attachment	Attachment	1	
		Screw (M3)	2	

Model	Name	Package content	Qty.	Appearance
SR-10AH	High resolution lens attachment	Attachment	1	
	Screw (M3)	2		

1-2 Part Names



No.	Name	Description
(1)	Scanner	Section that reads codes.
(2)	Display	Shows reading results or matching level.
(3)	OK/ERROR LED	Indicates whether the reading is possible or not. OK: Green, ERROR: Red.
(4)	ENTER button	Button used to confirm functions.
(5)	SELECT button	Button used to select functions.
(6)	Ethernet port	Port for connecting the Ethernet cable.
(7)	Control port	Port for connecting the control cable.
(8)	USB port	Port for connecting the USB cable for setting.

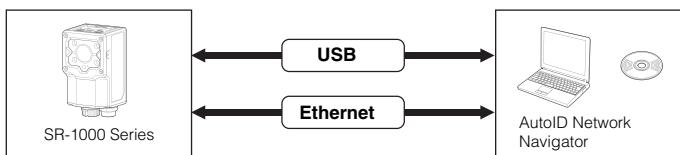
NOTICE When not using an Ethernet cable, be sure to mount the Ethernet port cover. Be sure to mount the USB port cover when using. If the port cover is not mounted, the unit will not fulfil enclosure rating specifications.

1-3 System Configuration and Setup Flow

System Configuration

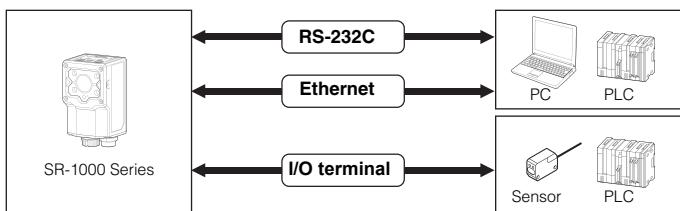
SR-1000 Series systems have the following configurations.

■ During setup



* You cannot connect to AutoID Network Navigator through the RS-232C interface.

■ During use



Setup flow

- 1 Check the package contents.

"1-1 Checking the Package Contents" (Page 3)

- 2 Wire the reader and mount it on a surface.

"2-1 Connection and Wiring" (Page 5)

- 3 Power the reader.

"4-1 Tuning" (Page 9)

- 4 Tune the reader.

Start operation.

- 5 Use AutoID Network Navigator to set up the SR-1000 Series.

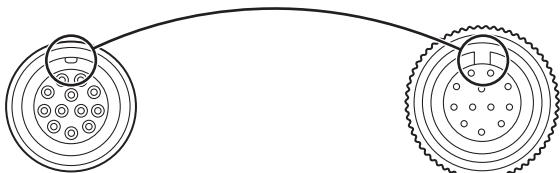
"5-1 Connecting" (Page 10)

2-1 Connection and Wiring

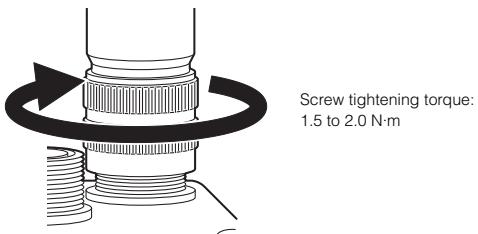
Connection and Wiring

■ Connecting the control cable and wiring

- 1 Align the protrusion in the cable connector with the notch in the control port.

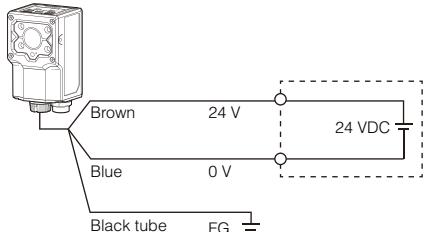


- 2 Tighten the connector screw by turning it clockwise.

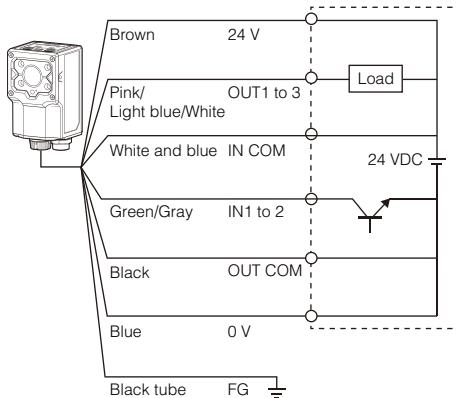


- 3 Connect the wires according to usage.

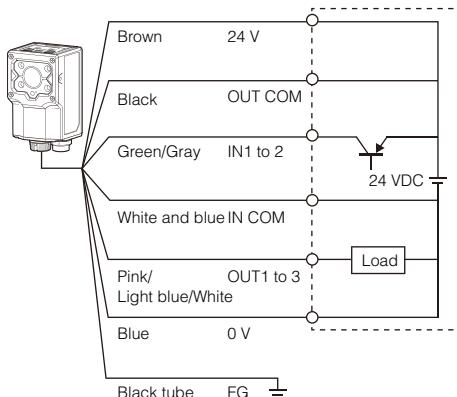
● When the I/O terminals are not used



● NPN wiring



● PNP wiring

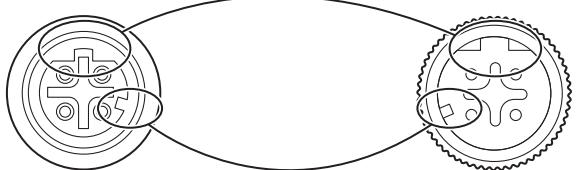


Wire color	Name	Description	Signal direction	Initial assignment	AWG
Brown	24 V	24 VDC	Input	-	26
Blue	0 V	Power GND	-	-	26
Orange	RXD (RD)	RS-232C Receive	Input	-	28
Yellow	TXD (SD)	RS-232C Send	Output	-	28
Purple	SGND	RS-232C GND	-	-	28
Green	IN1	Input signal 1	Input	Reading start	26
Gray	IN2	Input signal 2	Input	-	28
White and blue	IN COM	Input common	-	-	28
Pink	OUT1	Output signal 1	Output	Reading OK	28
Light blue	OUT2	Output signal 2	Output	Reading ERROR	28
White	OUT3	Output signal 3	Output	BUSY	28
Black	OUT COM	Output common	-	-	28
Black tube	FG	Frame ground	-	-	-

NOTICE	<ul style="list-style-type: none"> Be sure to turn power off before attempting to connect or disconnect the control cable. Insert the connector straight so that it is not tilted and then tighten it securely. Under-tightening can lead to a loose connector due to vibrations, resulting in poor contact. After tightening it as much as possible by hand, tighten it further approximately 90° - 120° using a tool such as pliers. Insulate unused wires individually. Be sure to provide Class D ground for the FG wire. The shield and FG wires of the control cable and the shield wire of the Ethernet cable are electrically connected via the main unit housing. Be sure to provide them with a common ground.
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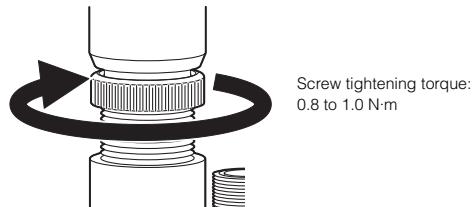
■ Connecting the Ethernet cable

- 1 Align the protrusion in the cable connector with the notch in the Ethernet port and connect the cable to the main unit.



- 2 Tighten the connector screw by turning it clockwise.

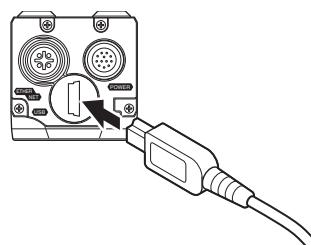
The screw tightening torque should be within the range between 0.8 and 1.0 N·m.



NOTICE	<ul style="list-style-type: none"> When connecting the connector, insert it so that it does not tilt, and then push in and tighten the connector securely. Under-tightening can lead to a loose connector due to vibrations, resulting in poor contact. After tightening it as much as possible by hand, tighten it further approximately 5° - 10° using a tool such as pliers. Do not bend the base of the Ethernet cable connector repeatedly. It may cause connection failure. When not using an Ethernet cable, be sure to mount the Ethernet port cover. If the port cover is not mounted, the unit will not fulfil enclosure rating specifications.
---------------	---

■ Connecting the USB cable

- 1 Confirm the orientation and insert the connector straight so that it is not tilted.



NOTICE	<ul style="list-style-type: none"> When connecting, insert the connector straight so it does not tilt. Otherwise, the connector pin may be damaged. Be sure to mount the USB port cover when using. If the port cover is not mounted, the unit will not fulfil enclosure rating specifications.
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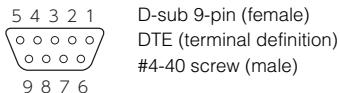
2-2 Wiring to a PC

RS-232C

■ OP-87527/87528/87529/88307/88308/88309

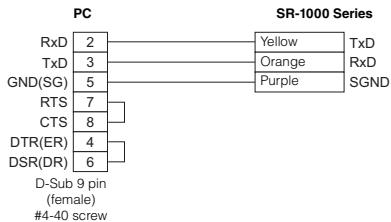
Connect the cable to the RS-232C port of the PC.

- OP-87527/87528/87529/88307/88308/88309 pin arrangement



Pin number	Symbol	Description	Signal direction
2	TXD (SD)	RS-232C send	Output
3	RXD (RD)	RS-232C receive	Input
5	SGND	RS-232C GND	-

■ OP-87353/87354/87355/87224/87225/87226/88304/88305/88306



Ethernet

Connect the OP-87230/87231/87232/88301/88302/88303 cable to the Ethernet port of the PC.

- For the Ethernet communication settings, refer to "5-3 Communication Settings" (page 11).

USB

Connect the OP-51580 cable to the USB port of the PC.

● Installing the USB driver

The first time that you connect the SR-1000 to a PC and turn on the SR-1000, you will be prompted to install the driver.

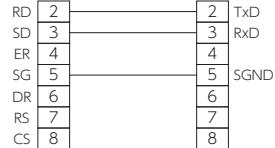
Specify the USB driver inside the "SR-H6W" DVD-ROM to install it.

2-3 Wiring to a PLC or Peripheral

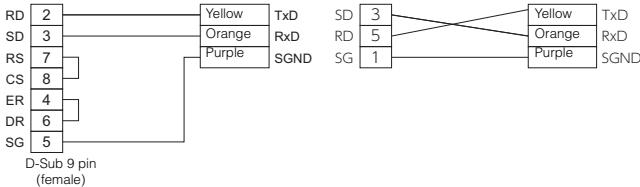
RS-232C

■ Connecting to the KV Series

KV-L21V/NC20L(port1)
KV-N10L/NC10L
OP-87527/87528/87529/
88307/88308/88309



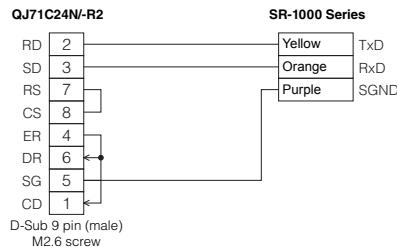
KV-L21V/NC20L(port1) SR-1000 Series KV-L21V(port2) SR-1000 Series KV-N10L/NC10L SR-1000 Series



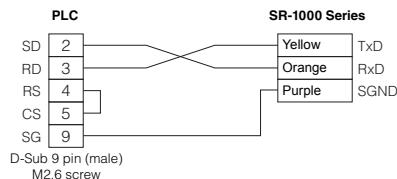
KV-NC20L(port2) SR-1000 Series
RD 4 Yellow TxD
SD 1 Orange RxD
SG 5 Purple SGND

Handheld programmer SR-1000 Series
Modular Connector
RD 3 Yellow TxD
SD 5 Orange RxD
SG 4 Purple SGND

■ Connecting to the MELSEC Series

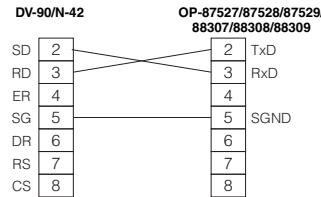


■ Connecting to the SYSMAC Series



■ Connecting to a peripheral manufactured by KEYENCE

• DV-90/N-42



- * This connection can be made with the addition of the OP-87533 conversion connector.
- * When using the N-42, set the baud rate to 38400 bps or lower.

Ethernet

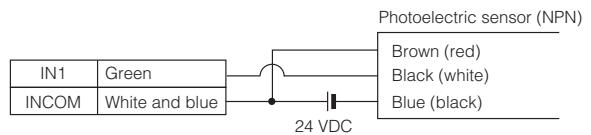
Connect the OP-87230/87231/87232/88301/88302/88303 cable to the Ethernet port of the PLC.

- For the Ethernet communication settings, refer to "5-3 Communication Settings" (page 11).

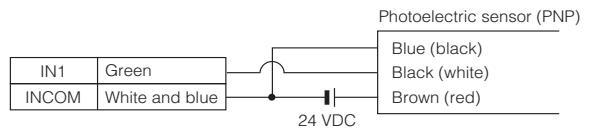
2-4 Wiring to a Sensor or Switch

Example of wiring the reader to a photoelectric sensor manufactured by KEYENCE

● NPN



● PNP



Example of wiring the reader to a switch

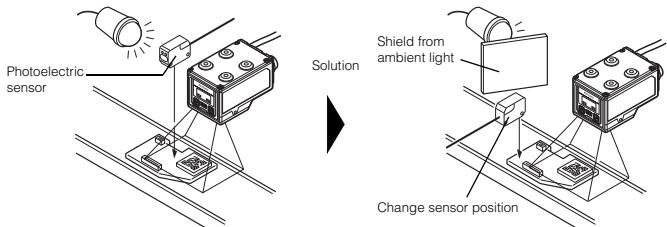


3-1 Before Mounting

Check the mounting conditions according to the following precautions.

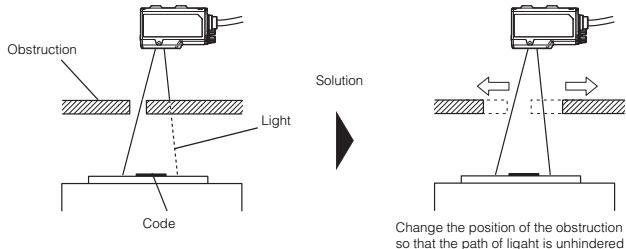
■ Confirm that ambient light is not affecting the reader.

Prevent ambient light—from sources such as sunlight, other lights, and photoelectric sensors—from entering the light receiving area of the SR-1000 Series. Ambient light may lead to unstable readings or incorrect readings.



■ Confirm the reader's beam is unobstructed.

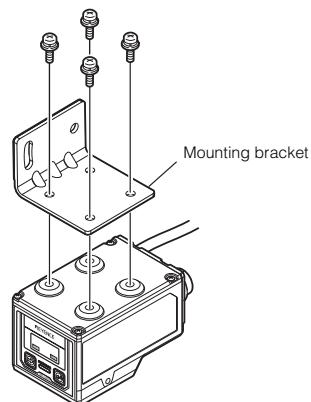
If the beams of light are obstructed, the barcode may become undetectable.



NOTICE
Use a light shield or a similar object to ensure that the SR-1000 Series does not receive strong light (direct or reflected) output from a laser marker or similar device. The SR-1000 Series may be damaged if it receives this kind of light.

When using the optional mounting bracket (OP-87866)

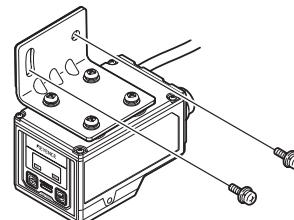
1 Attach the optional mounting bracket to the SR-1000 Series.



- Supplied screw size : M4
- Tightening torque : 0.5N·m

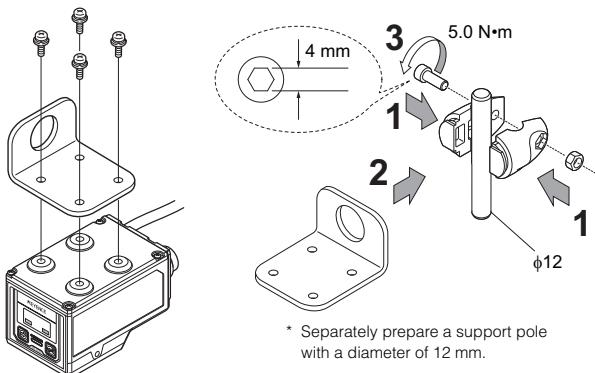
2 Secure the mounting bracket.

Mounting screws are not included.



- Mounting screw size : M5

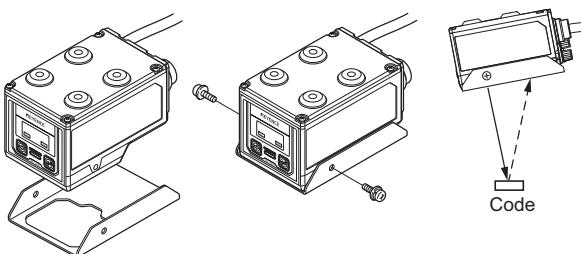
Attaching the OP-88002



* Separately prepare a support pole with a diameter of 12 mm.

- Mounting bracket: M4
- Supplied screw size: 0.5N·m

Attaching the SR-10AR



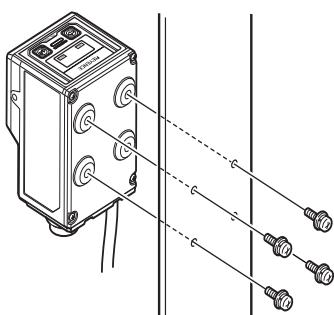
- Mounting bracket: M3
- Supplied screw size: 0.5N·m

3-2 Mounting Methods

Mounting

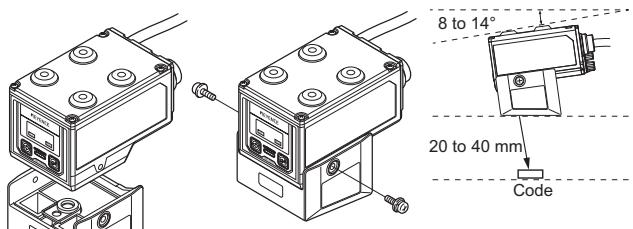
1 Secure the SR-1000 Series unit with screws.

Mounting screws are not included.



- Mounting screw size : M4
- Tightening torque : 0.5N·m
- Screw hole depth of the SR-1000 Series : 5 mm

Attaching the SR-10AH



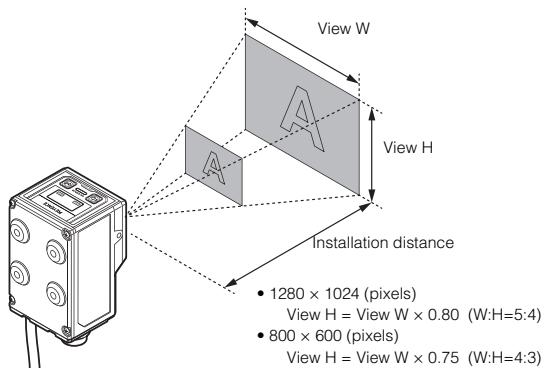
- * When using the SR-10AH, you cannot use the SR-1000 pointer.
- * The SR-10AH is dedicated for use with the SR-1000.
- * When using the SR-10AH, the code size/cell size measurement performed by AutoID Network Navigator will not be displayed correctly.

- Mounting bracket: M3
- Supplied screw size: 0.5N·m

3-3 Position Adjustment

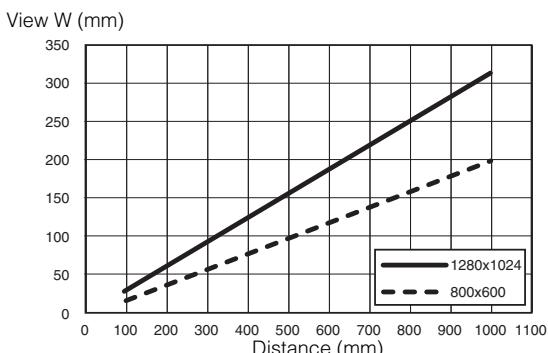
Field of View and Installation Distance

The SR-1000 Series provides a range of installation distances and fields of view depending on the type of the reader. Confirm the type of the reader and its field of view.



- 1280 x 1024 (pixels)
View H = View W x 0.80 (W:H=5:4)
- 800 x 600 (pixels)
View H = View W x 0.75 (W:H=4:3)

■ SR-1000 (Standard type)



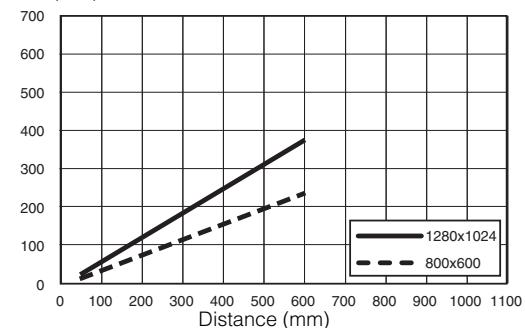
Typical example

Unit: mm

Distance	1280 x 1024 (pixel)		800 x 600 (pixel)	
	Width	Height	Width	Height
110	30	24	19	14
140	40	32	25	18
230	68	54	42	32
300	90	72	56	42
400	122	97	76	57
600	185	148	116	87
1000	312	250	195	146

■ SR-1000W (Wide-view type)

View W (mm)



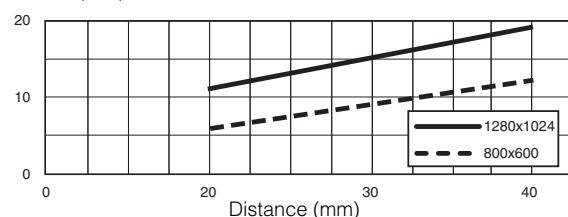
Typical example

Unit: mm

Distance	1280 x 1024 (pixel)		800 x 600 (pixel)	
	Width	Height	Width	Height
50	35	28	22	16
100	67	54	42	31
150	99	79	62	46
230	150	120	93	70
300	194	155	121	91
400	257	206	161	120
600	384	307	240	180

■ SR-1000 + SR-10AH (High-resolution type)

View H (mm)



Typical

Unit: mm

Distance	1280 x 1024 (pixel)		800 x 600 (pixel)	
	Horizontal	Vertical	Horizontal	Vertical
20	11	9	7	5
30	15	12	9	7
40	19	15	11	8

■ Minimum resolution

- SR-1000
- SR-1000W
- SR-1000 + SR-10AH

Unit: mm

Distance	2D code	Barcode	Distance	2D code	Barcode
110	0.063		50	0.082	
110 to 140	0.082		50 to 100	0.14	
110 to 230	0.14		50 to 150	0.20	
110 to 300	0.18		50 to 230	0.30	
110 to 400	0.24		50 to 300	0.38	
110 to 600	0.37		50 to 400	0.51	
110 to 1000	0.61		50 to 600	0.76	

Distance	2D code	Barcode
20	0.025	-
20 to 30	0.030	-
20 to 40	0.040	0.082

* You can use the "Installation Guide" of AutoID Network Navigator to calculate the installation distance and the field of view.

4-1 Tuning

What Is Tuning?

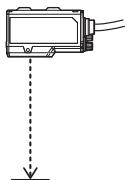
With just a simple operation, the SR-1000 Series automatically adjusts the reading parameters to the optimal values based on the target codes and stores these parameters in its internal memory. This function is called "Tuning." This chapter explains how to use the unit's buttons to complete tuning.

* For details on how to complete tuning using AutoID Network Navigator, refer to "5-2 Reading Settings" (page 10).

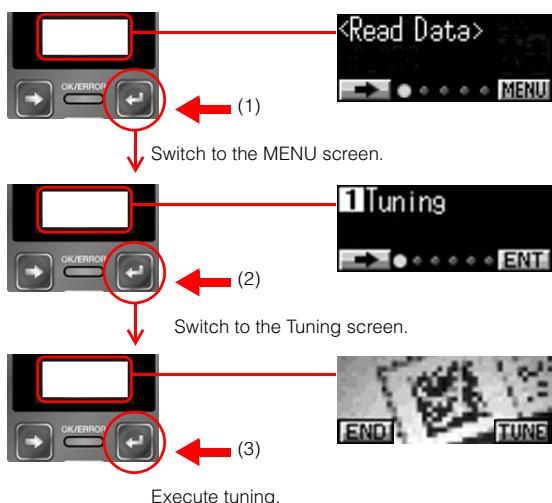
Operation Procedure

1 Turn on the SR-1000 Series.

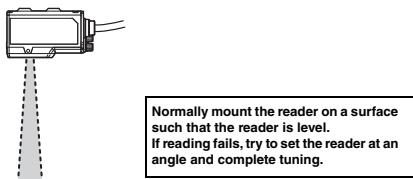
2 Align the green pointer with the code.



3 Press the [ENTER] button three times as shown below.



The LED flashes and tuning starts.



When tuning is complete, the reading rate test mode screen is displayed.



This completes the tuning procedure.

Point

- Operations when tuning is executed with the SR-1000 Series unit
 - In smart mode
When tuning, the focus position is automatically adjusted according to the mounting distance of the unit.
 - In custom mode
Use AutoID Network Navigator to adjust the focus position according to the mounting distance.
 - The pointer position is an approximation of the center position of the field of view. The center may be offset depending on the distance. Make adjustments while watching the unit's display screen.
 - For details on how to complete tuning using AutoID Network Navigator, refer to □ "5-2 Reading Settings" (page 10).

4-2 Reading Check

Display



(1)	Reading rate	Displays the reading rate, which indicates the number of times the code could be read among 10 scans.
(2)	Live View display	If you press the [ENTER] button on this screen, the live view of the SR-1000 Series will be displayed.
(3)	OK/ERROR LED	Reading OK: Lit in green. Reading error: Lit in red.

* When the SR-1000 Series is operating in "custom mode," the following display is shown.



(1)	Reading rate	Displays the reading rate, which indicates the number of times the code could be read among 10 scans
(2)	Matching level	Displays the reading stability (0 to 100)*1

*1 For details on the matching level, refer to "9-8 Matching level" (page 47).

5-1 Connecting

Installing AutoID Network Navigator

Run "AutoID Launcher.exe" inside the "AutoID Network Navigator" folder of the SR-H6W, and then install the program by following the instructions on the screen.

- * Refer to the AutoID Network Navigator Specifications □ "17-1 Specifications" (page 90).

Important

- When installing and executing, log in as the user with administrator privileges.
- Install ".Net Framework 3.5 SP1" before you install AutoID Network Navigator. You do not have to install it again if it is already installed.
- If the UAC (User Account Control) dialog box is displayed during the installation, click [Continue].
- Exit all active applications before starting the installation. The installation of the software may be impeded by security software.
- To uninstall AutoID Network Navigator, double-click the corresponding program in the list shown in the following location.
□ From the [Control Panel] screen, click [Uninstall a program].

Opening AutoID Network Navigator and Connecting to the Reader

1 Use a USB cable (OP-51580) to connect the SR-1000 Series and a PC.

2 Double-click the "AutoID Network Navigator" shortcut on the desktop.



If the following information is displayed, the connection has been established.



Point

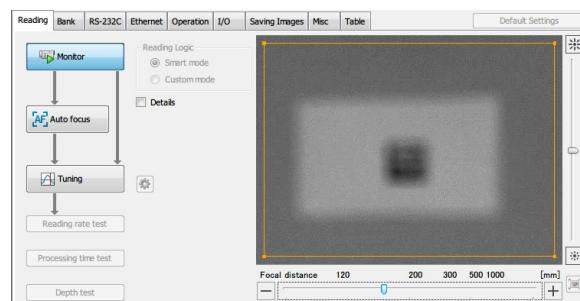
- To connect to the reader from AutoID Network Navigator, you can use the following two methods:
(1) Connect through the USB interface.
(2) Connect through the Ethernet interface.
- Normally connect to the reader through the USB interface. If you want to connect to the reader through the Ethernet interface, refer to □ "6-14 Connect to AutoID Network Navigator over Ethernet" (page 23).
- When you connect to the reader through the USB interface, you can only connect to one SR-1000 Series unit per PC. To set up two or more SR-1000 Series units, connect to one unit at a time.

5-2 Reading Settings

Tuning

1 Click [Monitor].

The images scanned by the SR-1000 Series will be displayed in real time. Watch the images to confirm the code positions.



2 Click [Auto focus].

The focus of the SR-1000 Series is adjusted automatically.



* If multiple focus positions are found, a dialog box is displayed to enable you to select one position. Select the option that gives the clearest code.

3 Click [Tuning].

The SR-1000 Series automatically adjusts the reading parameters to the optimal values based on the target code.

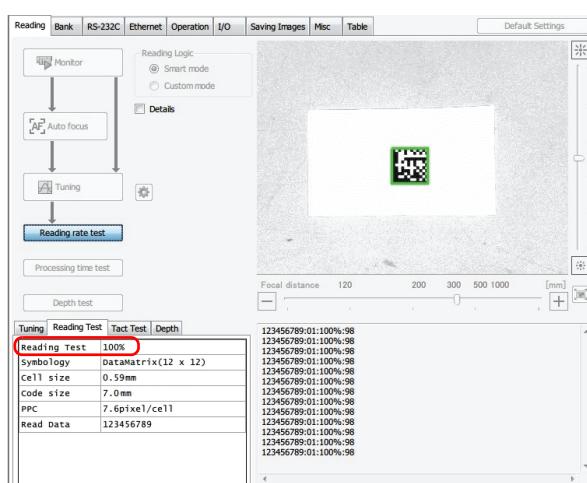
Reading settings are adjusted when the tuning complete message is displayed.

Reading Check

■ Reading rate test

1 Click [Reading rate test].

2 The reading rate is displayed in the location indicated below.



3 Move the code within the field of view to check that the code can be read stably.

4 Click [Reading rate test] again to complete the reading rate test.

Point

The "Cell size," "Code size," and "Resolution" displayed during the reading rate test are approximate values calculated from the image data.

■ Test modes

(1)	Reading Rate Test	Measures and displays the reading rate, which indicates the number of times the code could be read among 10 scans
(2)	Tact Test	Measures and displays the time required for reading
(3)	Depth Test	Displays an approximation of the reading depth by virtually changing the distance from the current mounting distance

Point

If you want to configure the code reading settings, refer to the following topics.

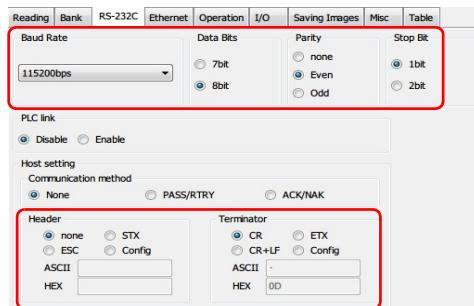
- To widen the field of view:
□ "6-1 Change Field of View" (page 13)
- To read multiple types of codes:
□ "6-2 Read Multiple Codes" (page 13)
- To read moving codes:
□ "6-3 Read Moving Codes" (page 16)

5-3 Communication Settings

RS-232C Connection

1 Click the [RS-232C] tab.

2 Configure the following items to match the PC/PLC that you will connect to.



Reference

- For details on RS-232C, refer to "11-1 Serial Communication" (page 53).
- If you will use the PLC link function, refer to "13-1 PLC Link Overview" (page 65).

Ethernet Connection

1 Click the [Ethernet] tab.

2 Set the IP address and other values to those assigned to the SR-1000 Series.



3 Click [Start the setup wizard], and then configure the communication settings by following the instructions on the screen.

Point

If you want to change the subnet mask, change the following value to one in the range of 8 to 30.

Example) 24 → 255.255.255.0
16 → 255.255.0.0
8 → 255.0.0.0

Reference

IP address	Specify a unique IP address on the network.
Subnet Mask	Match this value with that of the device that you will connect to.
Default Gateway	Normally leave this setting at its default value. Only use this setting in circumstances when you are using a router.

Setup Wizard

You can easily configure the Ethernet settings by following the instructions in the setup wizard.

Example) TCP communication with a PC

1 Trigger input method

Select the reading trigger input method.

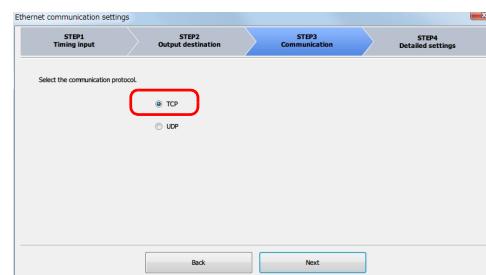
I/O terminal input	The trigger input will be provided by a sensor or switch wired to the SR-1000 Series.
Command input	The trigger input will be provided by way of commands sent from the host (PC).



2 Destination for of read data

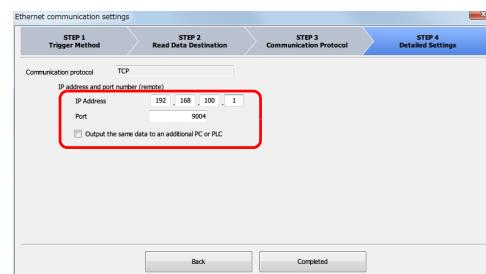


3 Communication protocol



4 Detailed settings

Enter the IP address and port number of the PC that you will connect to, and then click [Completed].



5 Click [Send Configuration].

- Reference
- Use the [Table] tab to change the header or terminator.
 - For information on communication other than that described above, refer to the following topics.
 - Detailed Ethernet settings
 - "11-2 Socket Communication (TCP, UDP)" (page 53)
 - PLC link
 - "13-1 PLC Link Overview" (page 65)
 - EtherNet/IP
 - "14-1 EtherNet/IP Overview" (page 71)
 - PROFINET
 - "15-1 PROFINET Overview" (page 84)
 - TCP Settings

5-4 Sending Settings

Send the settings that you have selected with AutoID Network Navigator to the SR-1000 Series. Sending the settings changes the settings on the reader.

Sending Settings

1 Click [Send Configuration].



2 When a message indicating that the transmission is complete is displayed, click [OK].

3 When you finish configuring the settings, click the following button.

The communication between AutoID Network Navigator and the SR-1000 Series will be disconnected.



This completes the setting procedure.

Important

- Communication between the SR-1000 Series and a PLC or other communication device is enabled when the connection with AutoID Network Navigator is disconnected.
- Note that data cannot be sent to a PLC or similar device while the SR-1000 Series is connected to AutoID Network Navigator.

5-5 Saving Settings/ Quick Setup Codes

The AutoID Network Navigator settings can be saved as *.ptc files. This is useful when you want to check the SR-1000 Series settings at a later time and when you want to configure a newly purchased SR-1000 Series with the same settings.

Saving a Configuration File

1 Click the [Save] button.



2 Select the location in which to save the file, enter the file name, and then click [Save].

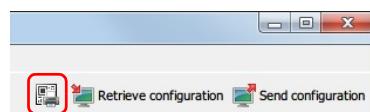
Point

- Reading configuration files
 - "8-2 Restoring Settings (AutoID Network Navigator)" (page 27)
- If you have configured settings for use in script programming such as the edit data function, edit image file name function, or the OUT terminal control function, a message regarding the saving of the script file will be displayed.

Printing Quick Setup Codes

Create a quick setup code that is based on the settings changed in AutoID Network Navigator. You can change the settings on the SR-1000 Series by having it read the printed code.

1 Click the [Quick Setup Code Creation] button.

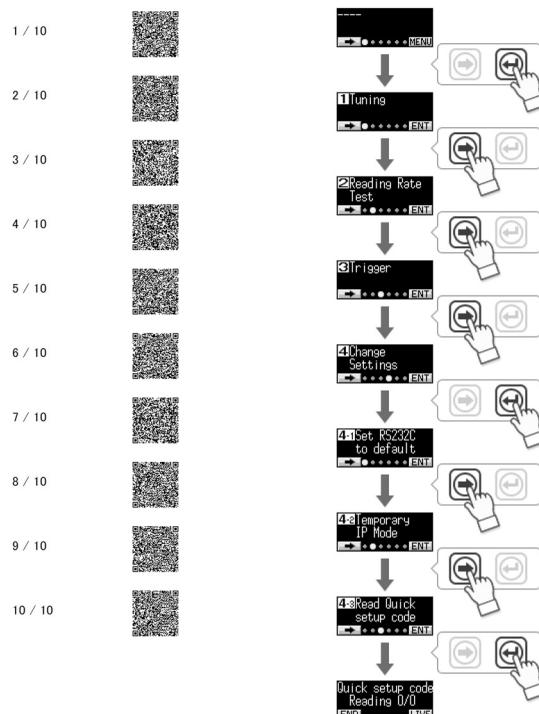


2 If necessary, enter set a comment and the error correction level.

Remarks	This comment will be added to the quick setup code printout.
Error correction level	The quick setup code will be created with the set error correction level. Normally, you do not have to change this value.

3 Click [Print].

- Printout example



Point

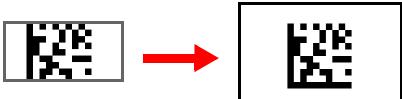
- When a printer with low print quality is used, the cells in the 2D code may bleed and become unreadable. Be sure to use a printer with 300 dpi or greater for printing.
- For details on how to read quick setup codes, refer to "8-3 Restoring Settings (Quick Setup Code)" (page 27).
- The quick setup codes do not include preset data and script files.

6-1 Change Field of View

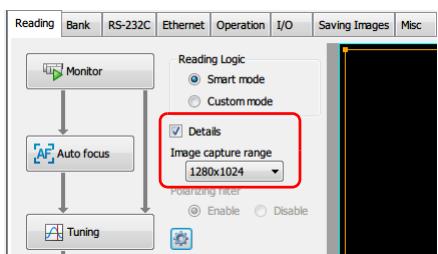
■ SR-1000 Series field of view sizes

Default value	800 × 600 pixels
Minimum value	96 × 96 pixels
Maximum value	1280 × 1024 pixels

Widening the Field of View

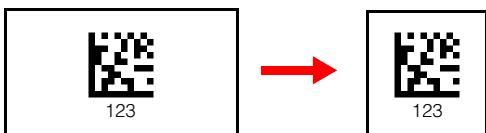


- 1 Select the [Details] check box.
- 2 Change [Image capture range] to "1280x1024."

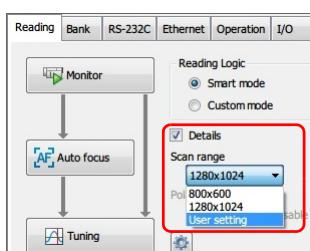


- 3 Execute tuning.

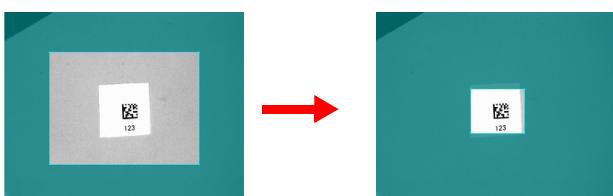
Limiting the Field of View



- 1 Select the [Details] check box.
- 2 Change [Image capture range] to "User setting."



- 3 The image capture range window will be displayed. Click [Capture].
- 4 Use the mouse to limit the image capture range by dragging it, and then click [OK].

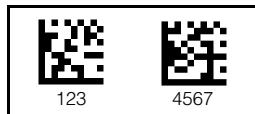


- 5 Execute tuning.

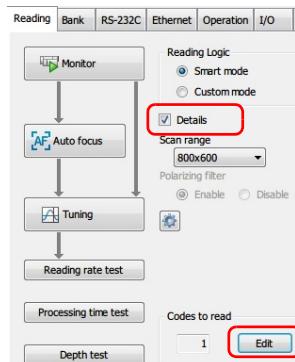
- Reference
- The wider you make the field of view, the longer the reading time will be.
 - The narrower you make the field of view, the shorter the reading time will be.

6-2 Read Multiple Codes

Reading Multiple Codes of the Same Type



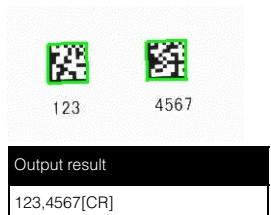
- 1 Select the [Details] check box.
- 2 Click [Edit] under [Codes to read].



- 3 Change the [Codes to read], and then click [OK].



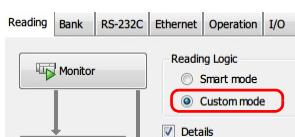
- 4 Execute tuning.



Reading Multiple Codes of Different Types



- 1 Change [Reading Logic] to "Custom mode."



- 2 Click [Monitor], and then drag the monitor screen to limit the tuning area.

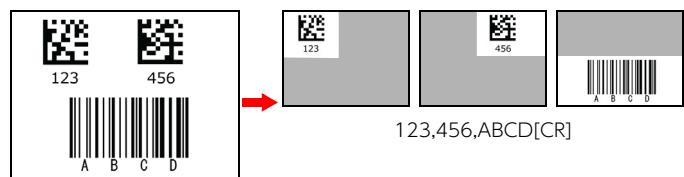


3 Execute tuning.

The tuning result is registered in "Bank1."

Item	Bank1
Alternate	Enable
Symbology	DataMatrix
Polarizing filter	Enable
Exposure (us)	1615
Gain	25
Filter	Disable

Dividing the Field of View for Reading Multiple Codes



4 Click [Bank2].

Item	Bank1	Bank2	Bank3
Alternate	Enable	Disable	Disable
Symbology	DataMatrix	QR	QR
Polarizing filter	Enable	Enable	Enable
Exposure (us)	1615	30	30
Gain	25	0	0
Image filter	Disable	Disable	Disable

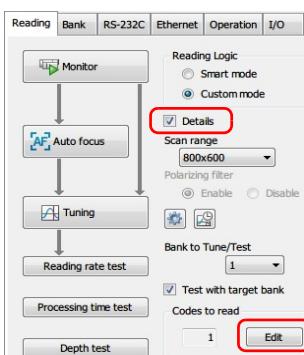
5 Drag the monitor screen to limit the tuning area for the remaining codes.



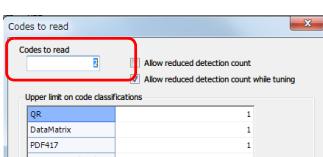
6 Execute tuning.

7 Select the [Details] check box.

8 Click [Edit] under [Codes to read].



9 Change the [Codes to read], and then click [OK].

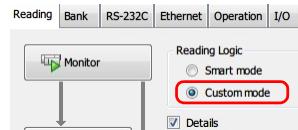


10 Click [Send Configuration].



- What are "banks" (parameter banks)?
 - "9-4 Read Behavior" (page 32)
- What is "custom mode"?
 - "9-4 Read Behavior" (page 32)
- A comma is the character that is used to delimit blocks of data when multiple codes are read, but you can change this to an arbitrary character.
 - "6-7 Edit Read Data" (page 19)
- [CR] is the character that is used to delimit blocks of data, but you can change this to an arbitrary character.
 - "6-7 Edit Read Data" (page 19)

1 Change [Reading Logic] to "Custom mode."



2 Click [Monitor], and then drag the monitor screen to limit the tuning area.



3 Execute tuning.

The tuning result is registered in Bank1.

Item	Bank1
Alternate	Enable
Symbology	DataMatrix
Polarizing filter	Enable
Exposure (us)	1615
Gain	25
Filter	Disable

4 Click [Bank2].

Item	Bank1	Bank2	Bank3
Alternate	Enable	Disable	Disable
Symbology	DataMatrix	QR	QR
Polarizing filter	Enable	Enable	Enable
Exposure (us)	1615	30	30
Gain	25	0	0
Image filter	Disable	Disable	Disable

5 Drag the monitor screen to limit the tuning area.



6 Execute tuning.

The tuning result is registered in Bank2.

7 Click [Bank3].

8 Drag the monitor screen to limit the tuning area.

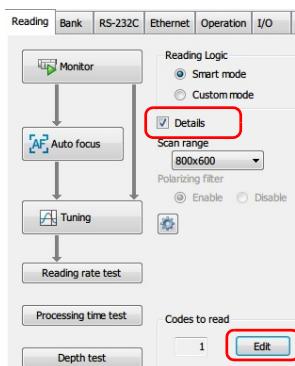


9 Execute tuning.

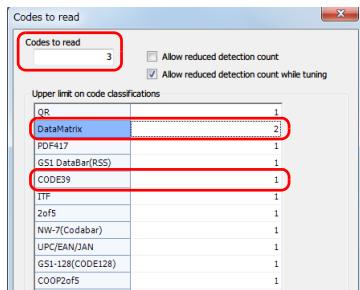
The tuning result is registered in Bank3.

10 Select the [Details] check box.

11 Click [Edit] under [Codes to read].



12 Change the [Codes to read], and then click [OK].



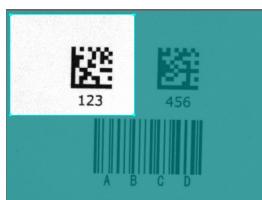
13 Click the [Bank] tab.

14 Click [Decoding area] for Bank1.

Item	Bank1	Bank2	Bank3
Alternate	Enable	Disable	Disable
Repeat read attempts	0	0	0
Decode timeout (x10ms)	4	10	10
Shutter delay (x1ms)	0	0	0
Decoding area	240, 21	40, 212, 1...	240, 212, 1...
Inverse read	Disable	Disable	Disable
Reverse read	Disable	Disable	Disable

15 The decoding area setting screen will be displayed. Click [Capture].

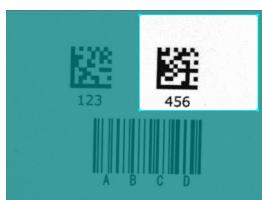
16 Specify the decoding area as shown below, and then click [OK].



17 Click [Decoding area] for Bank2.

18 The decoding area setting screen will be displayed. Click [Capture].

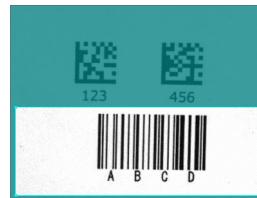
19 Specify the decoding area as shown below, and then click [OK].



20 Click [Decoding area] for Bank3.

21 The decoding area setting screen will be displayed. Click [Capture].

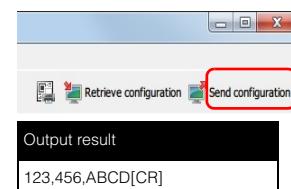
22 Specify the decoding area as shown below, and then click [OK].



23 On the [Table] tab, expand [Misc], and then set [Data output per bank] to "Enable."

Item	Value
i) RS-232C	
ii) Ethernet	
iii) Field network/PLC link	
iv) Format	
v) Operation	
vi) I/O	
vii) Saving Images	
□ Misc	
Output data with ENTER button	Enable
Filling size	0
Filling character	20
Silent Mode	
Data output per bank	Enable
Reader	READER

24 Click [Send Configuration].



When tuning finishes, codes outside of the specified tuning area may be read. This is because the SR-1000 Series performs reading over the entire field of view when tuning finishes. Therefore, when there are multiple codes that can be read with the same conditions in the field of view, the reader may read all the codes.



Reading can only be performed multiple times for the same code types and the same data when all the codes are within the same scan.

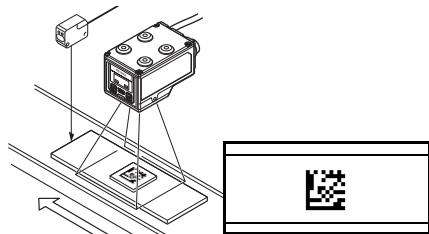
6-3 Read Moving Codes

When Using a Trigger Sensor

■ Organization

● Sensor position adjustment

Adjust the sensor position so that the code is within the field of view when the trigger signal is received from the sensor.



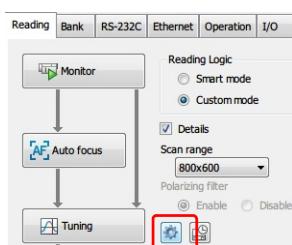
● Sensor wiring

Refer to "2-1 Connection and Wiring" (page 5).

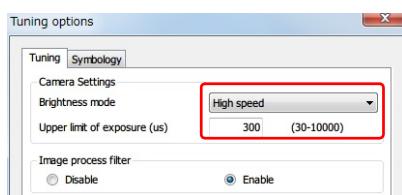
■ Tuning method

1 Change [Reading Logic] to "Custom mode."

2 Click the [Tuning Setup] button.

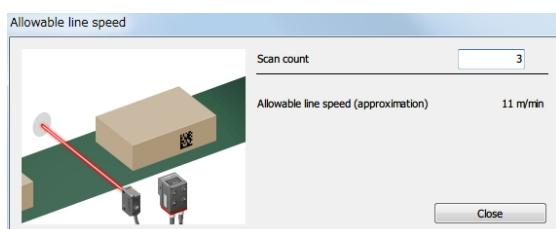


3 Change [Brightness mode] to "High speed," and then set the [Exposure upper limit (μs)].



4 Execute tuning.

5 If you click [View allowable line speed] on the tuning completion message, an approximation of the allowable line speed will be displayed.



Point

- When scanning a high-speed line, trigger input supplied by a sensor is necessary.
- For high-speed lines that have short tact times, set [Reading Mode] on the [Operation] tab to "Single."
- If the exposure time is too short, you will be able to read objects that move at higher speeds but the field of view will become dark, so it will be difficult to view codes.

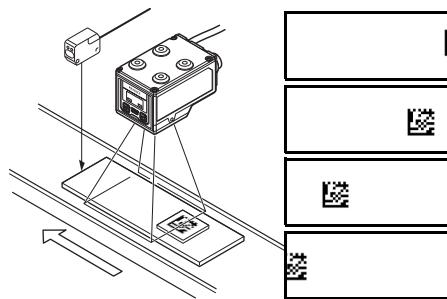


- If the exposure time is too long, the images of the scanned codes will be blurry. Adjust the exposure time to match the line speed.



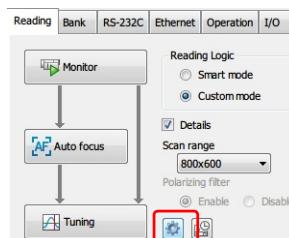
When Using a Trigger Sensor and Code Position is Unknown

■ Tuning method in burst read mode

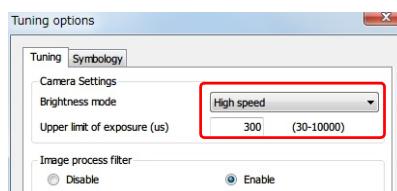


1 Change [Reading Logic] to "Custom mode."

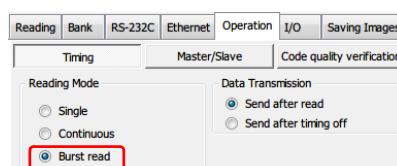
2 Click the [Tuning Setup] button.



3 Change [Brightness mode] to "High speed," and then set the [Exposure upper limit (μs)].



4 Change [Reading Mode] on the [Operation] tab to [Burst read].



5 Return to the [Reading] tab, and then execute tuning.

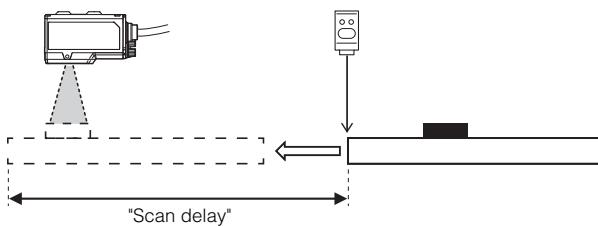
* If you click [View allowable line speed] on the tuning completion message, an approximation of the allowable line speed will be displayed.

6 Click [Send Configuration].

For details on the "Burst read" mode, refer to □ "9-4 Read Behavior" (page 32).

■ Setting the scan delay

When the sensor is positioned to send a trigger signal before the code will be within the field of view, set the "Scan delay".



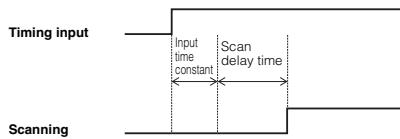
1 On the [Bank] tab, select "Bank1."

2 Change the [Shutter delay] value.

Reading	Bank	RS-232C	Ethernet	Operation	I/O
Item	Bank1				
Common	Alternate	Enable			
	Repeat read attempts	0			
	Decode timeout (x10ms)	8			
	Shutter delay (x1ms)	10			
	Decoding area	0, 0, 1279,...			
	Inverse read	Disable			
	Reverse read	Disable			
	Base tilt angle	0			
	Tilt angle range	180			

3 Click [Send Configuration].

The timing when scanning starts is shown below.

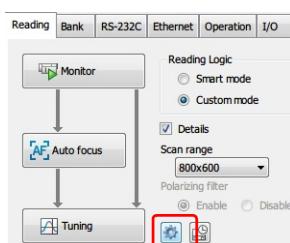


When Not Using a Trigger Sensor

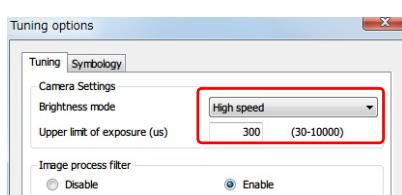
To set up the SR-1000 Series to a state in which it reads at all times without using a trigger sensor, configure the settings as shown below.

1 Set [Reading Logic] to "Custom mode."

2 Click the [Tuning Setup] button.



3 Change [Brightness mode] to "High speed," and then set the [Exposure upper limit (μs)].

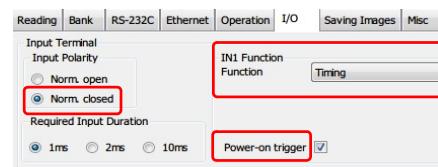


4 Change [Reading Mode] on the [Operation] tab to [Continuous].



5 Configure the settings on the [I/O] tab as shown below.

With these settings, the reader will scan at all times after it turns on.



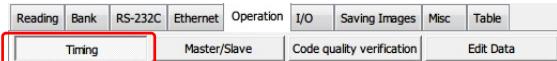
6 Return to the [Reading] tab, and then execute tuning.

7 If you click [View allowable line speed] on the tuning completion message, an approximation of the allowable line speed will be displayed.

Set the approximation for a line speed with a scan count of 3 or higher.

- For details on the "Continuous" read mode, refer to "9-4 Read Behavior" (page 32).
- Changing the decode timeout to a short time makes it possible to guarantee the scan count, which may improve the scanning of high-speed lines. However, if the decode timeout is too short, the reader may not be able to read codes. Set a sufficient decode timeout value according to the results of the read time test.
- When scanning a high-speed line, a trigger input supplied by a sensor is necessary.

6-4 Change Reading Behavior



Reading Mode

Change the reading behavior for a single trigger input.

Single	In this mode, a single code is read while the trigger input is on.
Continuous	In this mode, multiple codes are read consecutively while the trigger input is on.
Burst read	In this mode, a single code is read by scanning multiple times while the trigger input is on.

Data Transmission

Change the timing in which the read data and the OUT terminal results are output.

Send after read	The read data and the OK/ERROR signal will be output immediately after the code is read.
Send after timing off	The read data and the OK/ERROR signal will be output when the trigger input turns off, not immediately after the code is read.

Timing Mode

Change the reading behavior according to the input time of the trigger signal.

Level trigger	While the trigger input is on, the LED lights and the SR-1000 Series is reading. When a code is read, the LED turns off and the data is transmitted.
One-shot trigger	On the rising edge of the trigger input, the LED lights only for the specified time. The SR-1000 Series is reading during this time. When a code is read, the LED turns off and the data is transmitted.

Duplicate Reading Prevention

This function is only used when the reading mode is set to "Continuous". This function prevents duplicate reading of the same code.

Duplicate Reading Prevention Interval	The same code will not be read for the specified length of time.
---------------------------------------	--

For details on reading behavior, refer to "9-4 Read Behavior" (page 32)

6-5 Control Multiple Readers

Reading	Bank	RS-232C	Ethernet	Operation	I/O	Saving Images	Misc	Table
Timing	Master/Slave	Code quality verification	Edit Data					

Master/Slave

The master outputs its read data to the host device.
The slaves output their data to the master.

■ Operation Setting

Not used	Use this setting when you will not control multiple readers.
Multi Drop	Use this setting when you will install multiple readers on multiple lines and collect all the output data in a single reader.
Multi Head	Use this setting when you will install multiple readers for reading a single target and collect all the output data in a single reader.

■ Group name

Normally do not change this setting.
Only use when you want to configure multiple master/slave groups on the same network.

■ Unit ID

Use as Master	Check this box to assign the reader as the master unit. Clear this check box to use the reader as a slave unit.
Slave ID	You can specify an ID (1 to 31) for use in distinguishing slaves from each other.

■ Append Information

Add group name	The "Group name" will be appended to the read data.
Add Master/Slave ID	The "Unit ID" will be appended to the read data. Master: 0 Slave: 1 to 31

-  **Point**
- Specify a unique ID for each slave.
 - The ID of the master is 0.

 For details on the master/slave function, refer to  "9-6 Master/Slave Function" (page 37)

6-6 Check Print Quality

Reading	Bank	RS-232C	Ethernet	Operation	I/O	Saving Images	Misc	Table
Timing	Master/Slave	Code quality verification	Edit Data					

Matching Level

The matching level is a numeric value that indicates how easily the SR-1000 Series read a code. The higher the value, the easier it is to read the code. (The value ranges from 0 to 100.)



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Matching Level Judgment	Set whether or not to use the matching level.
Verification threshold	Set the matching level threshold. The UNSTABLE signal can be output from the OUT terminal when the reading results are below the threshold.
Append matching level	The matching level will be appended to the read data. Example) <Read data>:<matching level>

 For details on the matching level, refer to  "9-8 Matching level" (page 47)

Code Quality Verification

The code quality verification function verifies the 2D code scanned with the SR-1000 Series according to a marking quality evaluation specified by a third-party institution.



A



F

■ Code quality verification

You can select from the following verification standards:

- ISO/IEC 15415
- ISO/IEC TR 29158 (AIM DPM-1-2006)
- SAE AS9132
- SEMI T10-0701
- Japanese pharmaceuticals for medical use

Verification threshold	Set the threshold for the verification result. The UNSTABLE signal can be output from the OUT terminal when the reading results are below the threshold.
Append grade	The verification grade will be appended to the read data. Example) <Read data>:<verification grade>
Select expression of grades	You can change the verification grade expression. <ul style="list-style-type: none">• Alphabet• Numeric
Append detailed verification result	You can append the detailed verification result when an "Append grade" check box is selected.

 Note that the code quality verification function is designed to evaluate the printing quality of the standard-compliant 2D codes in the images scanned with the SR-1000 Series. This function cannot be used as an official 2D code verification device.

 For details on the code quality verification function, refer to  "9-7 Code Quality Verification" (page 39)

6-7 Edit Read Data

Reading	Bank	RS-232C	Ethernet	Operation	I/O	Saving Images	Misc	Table
Timing	Master/Slave	Code quality verification		Edit Data				

Data Addition Function

You can append the following items to read data.

Symbology	The read code type
Symbol ID	The AIM symbol identifier
Read count	The number of scans from the time when the trigger turned on to the time when reading finished
Read time	The length of time from when the trigger turned on to when reading finished
Parameter bank	The number of the parameter bank that was used when reading succeeded
Code vertex	The coordinates of the vertex of the read code
Code center	The coordinates of the center of the read code
ECC level (UEC)	The unused error correction ratio* ¹
Time	The time when the code was read* ²
Image file name	The file name of the captured image

*1 The average value will be appended when multiple codes are read for one scan.

*2 To use this function, an SNTP server is required.

Data Editing (Script)

With the SR-1000 Series, you can edit the read data to output in the desired format by programming scripts.

 For details on scripts, refer to "9-9 Preset Data Comparison" (page 48)

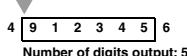
Format

Partition mark	The character that is used to delimit the blocks of data when data is appended Default value: ":"
Inter-delimiter	The character that is used to delimit the blocks of data when multiple codes are read Default value: ":"

-  When you want to limit the number of digits output from the read data enable [Output length limitation] under [Code] on the [Bank] tab, and then set the following items.
- "Mode"
 - "Output length"
 - "Starting position"

- Example)
- "Mode" = Forward
 - "Output length" = 5
 - "Starting position" = 2

The second digit from the front



6-8 Control the I/O Terminals

Reading	Bank	RS-232C	Ethernet	Operation	I/O	Saving Images	Misc	Table
Timing	Master/Slave	Code quality verification		Edit Data				

Input Terminals (IN Terminals)

■ Input Polarity

Norm. open (normally open)	The input is normally off. When a signal is applied, the input turns on.
Norm. closed (normally closed)	The input is normally on. When a signal is applied, the input turns off.

■ Required Input Duration

The time from the point when a signal is applied to the IN terminal to the point when operation begins.

■ IN1 Function and IN2 Function

Set the operation when a signal is applied to the IN terminal.

Timing	Reading will be executed.
Preset	Reading will be executed in order to register master data for use in a preset comparison.
Test	The specified test mode will start.
Capture	An image will be captured with the SR-1000.
Clear PLC link error	If a PLC link error has occurred, the reader will recover from the error.
Trigger lock	Reading will be locked such that it is not executed even if a trigger signal is applied.
Quick setup	A quick setup code will be read.* ¹
Tuning	Tuning will be executed.* ¹
Disable	This terminal's function will be disabled.

*1 The signal must be applied continuously until the operation is finished.

■ Power-on trigger

When the SR-1000 Series turns on, the IN terminal signal will be turned on once. You can use this setting when "Input Polarity" is set to "Norm. closed" to keep the signal turned on continuously when the SR-1000 Series turns on.

● Norm. open (normally open) and Norm. closed (normally closed) operation

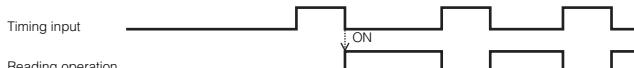
◆ Norm. open (normally open)

- Normal

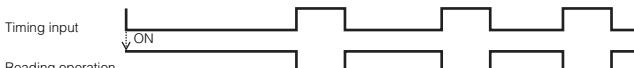


◆ Norm. closed (normally closed)

- Normal



- Power-on trigger setting



- To prevent chattering, increase "Required Input Duration".

- Regardless of the "Timing Mode" setting, "Test," "Capture," "Trigger lock," and "Quick setup" input functions always operate as if this setting is "Level trigger."

Output Terminals (OUT Terminals)

■ OUT1 Function to OUT3 Function

The signals turn on under the following conditions.

OK	Reading success
ERROR	Reading error
STABLE	Greater than or equal to the threshold ^{*1}
UNSTABLE	Less than or equal to the threshold ^{*1}
PRESET OK	Successful reading for the registration of master data for use in preset comparison
TUNING OK	Tuning success
SCRIPT CONTROL	When controlling OUT terminals with scripts
NG (Comparison NG)	NG Comparison in preset comparison
TRG BUSY	During trigger input ^{*2}
LOCK BUSY	Forced trigger lock/during trigger input or testing by way of main unit button operations
MODE BUSY	Reading quick setup code/test mode/saving to ROM
ERR BUSY	Error occurrence (buffer full or reader error)
CONFIG BUSY	AutoID Network Navigator control
EXT. LIGHT	SR-1000 reading ^{*3}

*1 This corresponds to the matching level threshold or code quality verification threshold.

*2 While this signal is on, the next reading operation will not be received.

This signal also turns on in the following situations:

During the start-up period, during preset data registration, while images are being sent to an FTP server, during tuning, during test mode, while monitoring, while images are being saved, while quick setup codes are being read, and during script execution

*3 Use this to synchronize the reader with an external light. This function can only be assigned to OUT3.

■ Output Duration

Set the duration for which output will be generated from the OUT terminal.

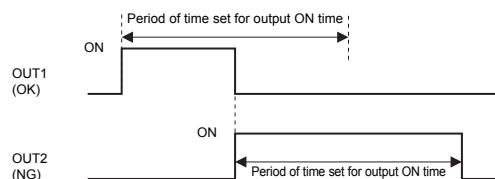
Default value: 500 ms

■ TRG BUSY at Power-On

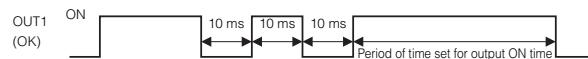
Use this function to turn on the "TRG BUSY" signal from the time when the power is turned on until the time that stable operation is possible. When stable operation is possible, this signal turns off.

Point

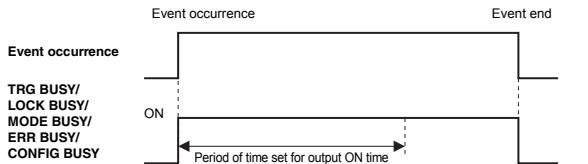
- "OK/ERROR/STABLE/UNSTABLE/TUNING OK/SCRIPT CONTROL/PRESET OK/NG (Comparison NG)," "TRG BUSY/LOCK BUSY/MODE BUSY/ERR BUSY/CONFIG BUSY," and "EXT. LIGHT" cannot be assigned to the same terminal.
- If a subsequent output instance occurs during the output duration, this output will be given priority.



- If multiple output instances occur during the output duration, the output will be turned off for 10 ms, and then the subsequent signal will be turned on. If output instances occur continuously, the output turns on for at least 10 ms before it turns off and then turns on again.)



- The BUSY signal (TRG BUSY/LOCK BUSY/ MODE BUSY/ERR BUSY/ CONFIG BUSY) operation is shown below.



- Regardless of the value set for Output Duration, BUSY signals remain on until the corresponding BUSY operation is finished.
- If multiple BUSY signals are set for a single output terminal, the signal will remain on until all the BUSY operations are finished.

6-9 Save Captured Images

Reading Bank RS-232C Ethernet Operation I/O Saving Images Misc Table

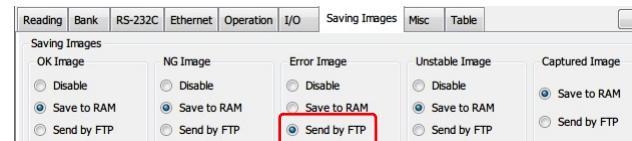
Saving Images in Real Time

■ Send by FTP

Images captured by the SR-1000 Series will be sent to the FTP server in real time.

Example) Sending images to the FTP server when a reading error occurs

1 Select "Send by FTP" under [Error Images].



2 Set the IP address of the FTP server to send data to.

Set the user name and password to match an account on the FTP server.



3 Click [Send Configuration].

Importing Images Saved on the SR-1000 Series to a PC

■ Save to RAM

Images captured by the SR-1000 Series will be saved to its RAM.

Example) Saving images to RAM when a reading error occurs

1 Select "Save to RAM" under [Error Image].

2 Click [Send Configuration].

■ File View

To acquire the files saved to the SR-1000 Series RAM, use "File View." For details on how to use File View, refer to "7-5 Acquire Saved Files (File View)" (page 25)

Changing the Image Quality of Saved Images

■ Format

You can select Bitmap or JPEG.

● Quality (JPEG)

Select the JPEG quality. "10" gives the highest quality. "1" gives the lowest quality.

■ Binning

You can sub-sample the image to reduce the file size.

"No binning" gives the largest image.

"1/64" gives the smallest image.

Changing the Image Save Mode

■ Image save mode

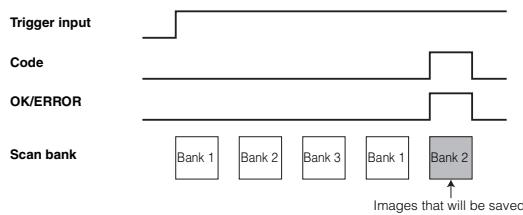
Save final bank image	The last image captured during reading will be saved. Normally use this mode.
Save specified number of images after timing ON	The specified number of images will be saved counting from the time when the trigger turns on.* 1
Save specified number of images before timing OFF	The specified number of images will be saved counting backwards from the time when the trigger turns off.* 1

*1 Images will be saved as the "capture image."

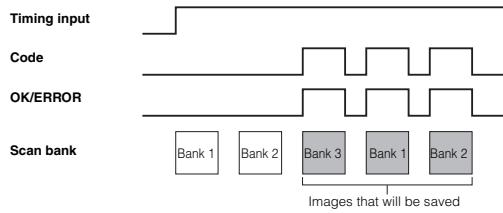
The saved image is determined when the reader judges whether reading was successful or a reading error occurred.

● Save final bank image

- When reading is successful

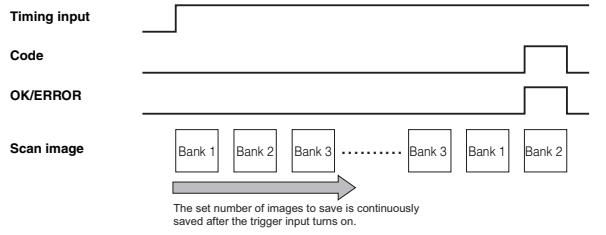


- When a reading error occurs

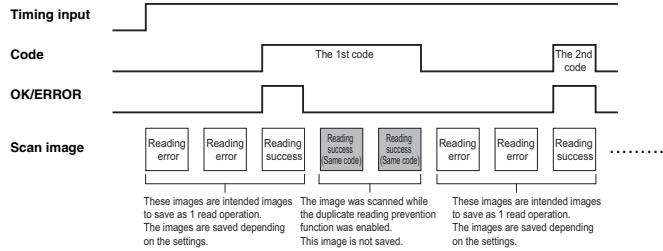


● Save specified number of images after timing ON

- In single/burst read mode

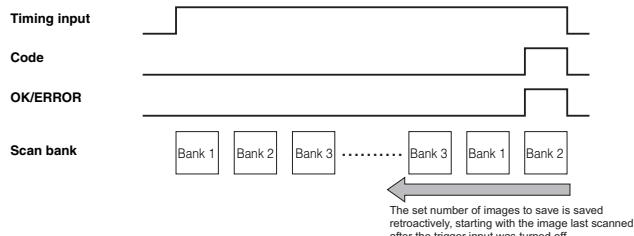


- In continuous read mode

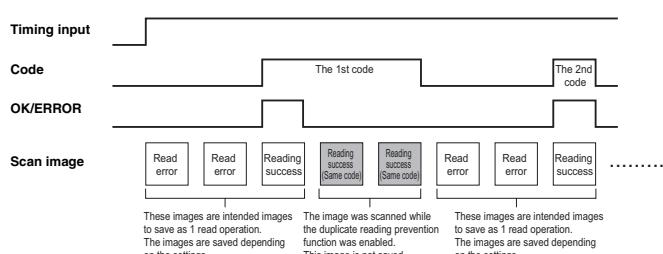


● Save specified number of images before timing OFF

- In single/burst read mode



- In continuous read mode



- Point**
- The name of the file saved differs depending on whether reading was successful or a reading error occurred.
 - When the settings are configured to read multiple codes, when one code is read successfully, its image is judged to be the OK image.

Image File Name

The image file name is set in the following format:

Saved file number	-	Image type identifier	-	Bank No.	.bmp
-------------------	---	-----------------------	---	----------	------

- Saved file number: 3-digit image file serial number
- Image type identifier character : Character that indicates the image type
 - S: Successfully read images
 - N: Comparison NG images
 - E: Read error images
 - W: Unstable images
 - C: Captured image

- Bank No: Bank number used to obtain the image.

Example) File name for successful read with bank No. 1
001_S_01.bmp



- You can use script programming to change the names of saved image files.
- "9-10 Scripts" (page 49)
- The saved file number is from 000 to 999. The number after 999 is 000. If you restart the reader, the numbers will start from 000 again.
- If an image is saved with an existing saved file number, the old image will be overwritten with the new one.

6-10 Output Read Data to CSV Files

Appending Read Data to *.CSV Files through the FTP Interface

You can use the FTP interface to append read data to files on the server.

1 On the [Table] tab, expand [Ethernet], and then expand [Ethernet data (FTP)].

2 Change [Send read data to FTP] to [On].

3 Set [Remote FTP server IP address], [Remote FTP server user account name], [Remote FTP server user account password], and [File name].

Reading	Bank	RS-232C	Ethernet	Operation	I/O	Saving Images	Misc	Table
<input checked="" type="checkbox"/> Open all								
Item								Value
<input checked="" type="checkbox"/> RS-232C								
<input checked="" type="checkbox"/> Ethernet								
<input checked="" type="checkbox"/> SR-1000 Ethernet settings								
<input checked="" type="checkbox"/> Command communication								
<input checked="" type="checkbox"/> Ethernet data (server)								
<input checked="" type="checkbox"/> Ethernet data (client)								
<input checked="" type="checkbox"/> Ethernet data (FTP)								
Send read data to FTP								Enable
IP address (Remote FTP server)								192.168.100.1
User account (Remote FTP server)								admin
Password (Remote FTP server)								admin
Passive mode								Disable
Append to preceding data								Enable
Change directory								Disable
Keep connected								Disable
File Name								data.csv

4 Click [Send Configuration].

5 Exit AutoID Network Navigator.

6-11 Compare the Read Data (Preset Data Comparison)

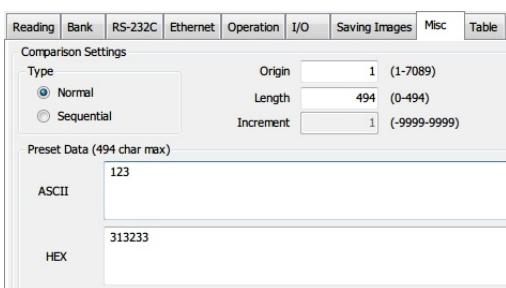
You can compare the read data to give OK and NG outputs.
The master data for this comparison is called "preset data."

● Output terminal operation

Reading successful and the read data matches the "preset data"	OK
Reading successful and the read data does not match the "preset data"	Comparison NG
Reading error	ERROR

Compare Read and Registered Data

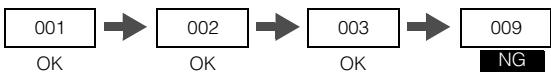
- 1 On the [Misc] tab, set [Type] to [Normal].
- 2 Under [Preset Data], register the master data against which to compare the read data.



- 3 On the [I/O] tab, assign "Comparison NG" to one of the output terminal functions from [OUT1 Function] to [OUT3 Function].
- 4 Click [Send Configuration].
- 5 Exit AutoID Network Navigator.

Compare Sequential Data

When you are reading codes in a sequence, you can check that numbers in the read data are changing sequentially.



- 1 On the [Misc] tab, set [Type] to [Sequential].
- 2 On the [I/O] tab, assign "NG (Comparison NG)" to one of the output terminal functions from [OUT1 Function] to [OUT3 Function].
- 3 Click [Send Configuration].
- 4 Exit AutoID Network Navigator.

Read a Code to Register Comparison Data (Preset Data)

- 1 On the [I/O] tab, change [IN2 Function] to [Preset Input].
- 2 Click [Send Configuration].
- 3 Exit AutoID Network Navigator.
- 4 Reading starts when a signal is applied to the IN2 terminal, and the code that is read will be registered as the preset data.

- For details on preset data comparisons, refer to "9-9 Preset Data Comparison" (page 48)
 You can also use commands to register the preset data. "12-2 Reading and Tuning Commands" (page 54)

6-12 Suppress Data Output

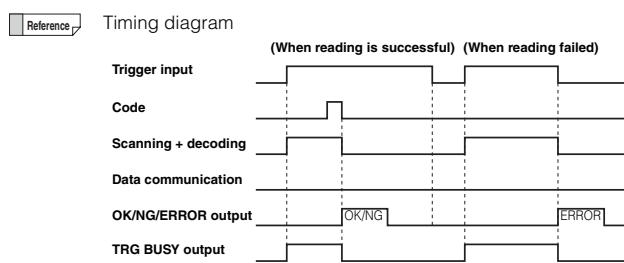
Silent Mode

By using "silent mode," you can suppress the output of read data in the following situations.

Output will still turn on from the OUT terminals in the normal manner. The main unit's display will also appear in the normal manner. Use this mode when you do not need the read data.

Reading success (comparison OK)
Comparison NG
Reading error
Stable
Unstable
Preset OK
Test mode
Tuning

- 1 On the [Misc] tab, select the check boxes under [Silent Mode] that correspond to the situations in which you want to suppress data output.
- 2 Click [Send Configuration].
- 3 Exit AutoID Network Navigator.

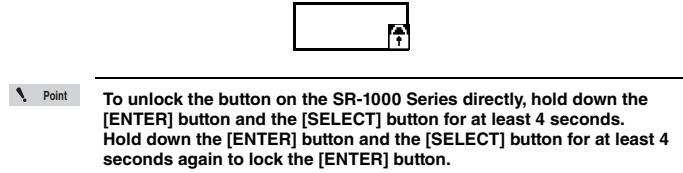


6-13 Lock SR-1000 Series Buttons

By locking the operation of the SR-1000 Series' [ENTER] button, you can limit the operation of the SR-1000 Series.

- 1 On the [Misc] tab, select the "Lock" check box under [ENTER button].
- 2 Click [Send Configuration].
- 3 Exit AutoID Network Navigator.

When you specify this setting as above, the following image will be shown on the SR-1000 Series display, and the ENTER button will be locked.



6-14 Connect to AutoID Network Navigator over Ethernet

Connection Method

1 Connect the Ethernet cable of the SR-1000 Series to a PC.

2 Configure the network settings of the PC.

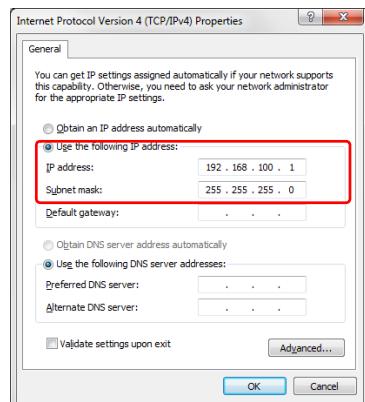
● Configuring Windows 7 network settings

- (1) Click the [Start] button, and then click [Control Panel].
- (2) Type "adapter" in the search box, and then click [View Network Connection].



- (3) Right-click "Local Area Connection," and then click [Properties] on the menu that appears.
- (4) Click "Internet Protocol Version 4 (TCP/IPv4)," and then click [Properties].
- (5) Select [Use the following IP address], and then set the IP address and subnet mask as shown below.

IP address	192.168.100.1
Subnet mask	255.255.255.0



- (6) Click [OK] to close all the windows.

* If a firewall or security program is running on the PC, disable them temporarily.

3 Double-click "AutoID Network Navigator" on the desktop.



4 Click [Connect over Ethernet].

If the SR-1000 Series is detected automatically, the connection has been established.

The default IP address of the SR-1000 Series when it is shipped from the factory: 192.168.100.100

* If the above procedure doesn't detect the SR-1000 Series

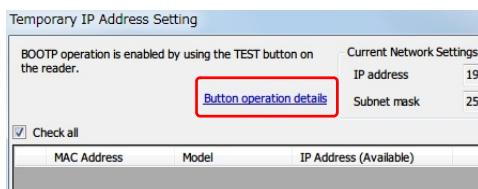
- An IP address other than "192.168.100.xxx" may be assigned to the SR-1000 Series that you are attempting to connect to. Follow the procedure shown below to connect to the reader.

Using a Temporary IP Address to Establish the Connection

1 Click the following button in AutoID Network Navigator.



2 Click "Button operation details."



3 Operate the SR-1000 Series according to the instructions shown on the screen.

The SR-1000 Series will restart and display "Temporary IP mode."

4 Click [Close].

If the following information is displayed, the connection has been established.
Click [OK].



If you set the SR-1000 Series to "Temporary IP mode," broadcast packets will be sent within the network.

If you make the SR-1000 Series assign a temporary IP, the SR-1000 Series will restart, so the RAM information will be deleted.

7-1 Check the Read Data

Terminal



1 Click [Terminal].

2 Turn on the sensor (switch) wired to the SR-1000 Series.*¹

When reading is successful, the read data is displayed.

*1 You can also start reading by clicking [LON] in the terminal.

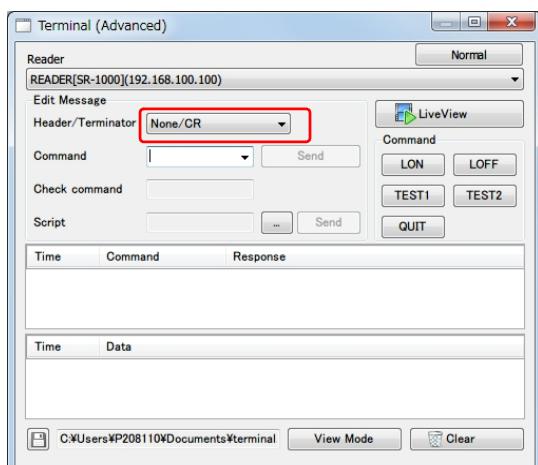
7-2 Send Commands

Terminal



1 Click [Terminal].

2 Type a command in the command input field, and then press Enter.



* For details on commands, refer to "12-1 Command Communication" (page 54).

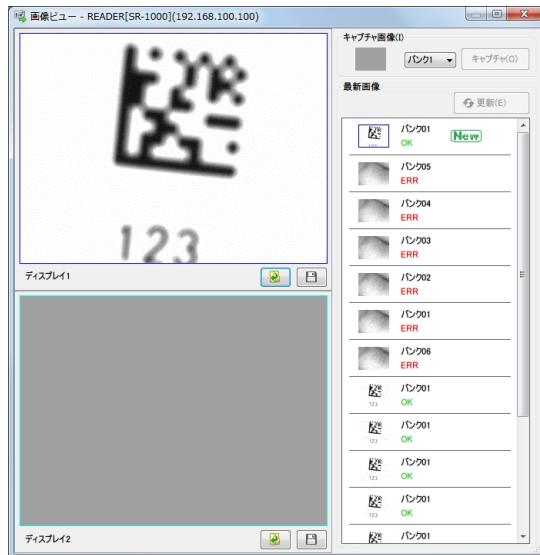
7-3 Acquire Saved Images (Image View)

Image View



1 Click [Image View].

The following screen is displayed.



The newest images are displayed at the top of the screen.
The following icon is displayed next to the latest image.

7-4 View Live Images (MultiMonitor)

Installing MultiMonitor

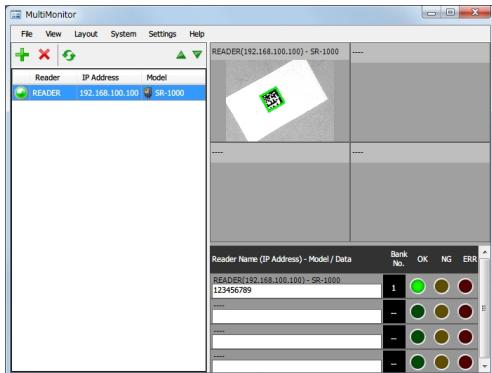
Run "AutoID Launcher.exe" inside the "AutoID Network Navigator" folder of the SR-H6W, and then install the program by following the instructions on the screen.

Starting MultiMonitor

- 1 Use the Ethernet interface to connect the SR-1000 Series and a PC, and then configure the network settings to enable communication.
- 2 Double-click the "MultiMonitor" shortcut on the desktop.



When you start "MultiMonitor," the SR-1000 Series units on the network will be detected automatically.



- Point
- You cannot run MultiMonitor and AutoID Network Navigator at the same time.
 - If you want to view SR-1000 Series Live View images during operation, use "MultiMonitor."
 - To use MultiMonitor, connect the SR-1000 Series and the PC through the Ethernet interface. You cannot use MultiMonitor with a USB connection.

7-5 Acquire Saved Files (File View)

Installing File View

Run "AutoID Launcher.exe" inside the "AutoID Network Navigator" folder of the SR-H6W, and then install the program by following the instructions on the screen.

Starting File View

- 1 Use the Ethernet interface to connect the SR-1000 Series and a PC, and then configure the network settings to enable communication.
- 2 Double-click the "File View" shortcut on the desktop.

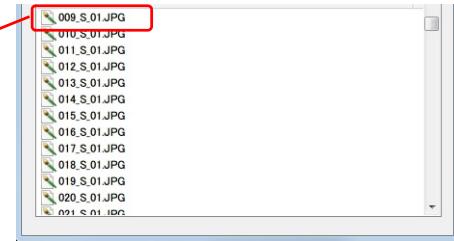


- 3 When you start "File View," the SR-1000 Series units on the network will be detected automatically.

Sending and Receiving Files

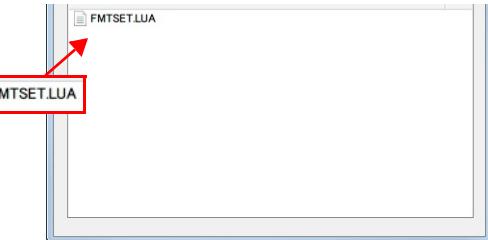
■ Receiving files (PC ← SR-1000)

Use the mouse to drag the displayed files.



■ Sending files (PC → SR-1000)

Drag configuration files and script files.



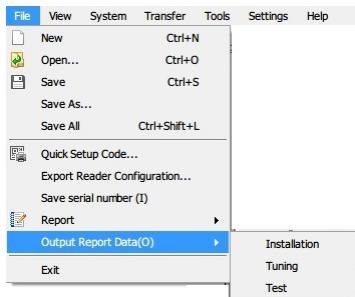
- Point
- You cannot run File View and AutoID Network Navigator at the same time.
 - To use File View, connect the SR-1000 Series and the PC through the Ethernet interface. You cannot use File View with a USB connection.
 - If you send a file with the same name as an existing file, the existing file will be overwritten.

7-6 Output Read Results as a Report

Report Output Function

With AutoID Network Navigator, you can output reports based on the installation guide results, tuning results, and test results.

Creating Report Data



■ Installation guide results output

Open the installation guide. Then you can enter information about the code, working distance, etc.

Use the "Installation Guide" screen to output report data.

■ Tuning results output

After tuning the SR-1000 Series, click this menu command to output the report data.

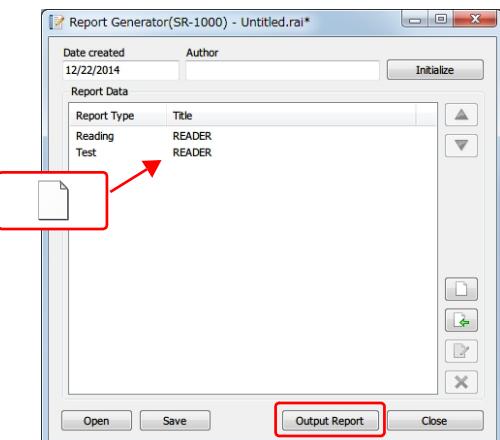
■ Test results output

After completing tests with SR-1000 Series, click this menu command to output the report data.

Report Output

1 Go to [File], select [Report], and then click [SR-1000].

2 Drag the report data to this dialog box.



3 Click [Output Report].

4 Below is an example of how the saved file will display when it is opened.

KEYENCE														
Reading Results														
•Tuning Conditions				•Light Settings										
Setup item		Setting value		Setup item		Setting value								
Model:Informationen				Use internal lighting										
SR-1000W				Enable										
Brightness mode		High quality		Use external lighting		Disable								
Exposure (us)		-		Median										
•Reading Details														
Captured image			Tuning graph			Tuning result								
						Symbology DataMatrix								
						Reverse read Disable								
						Decode timeout (x10 ms) 12								
						Polarizing filter Enable								
						Exposure (us) 4638								
						Gain 50								
						Image filter Close								
						Image capture range 1280x1024								
						Horizontal field-of-view size (approximation; mm) ---								
						Installation distance (approximation; mm) ---								
						PPC ---								
						Code size width (approximation; mm) ---								
						Cell size width (approximation; mm) ---								
						Supported line speed (approximation; m/min) ---								
						Processing time (approximation; ms) ---								
•Remarks														
[Review]														

8-1 Checking SR-1000 Series Settings

Receiving Settings

1 Use a USB cable (OP-51580) to connect the SR-1000 Series and a PC.

2 Start AutoID Network Navigator.

If the following information is displayed, the procedure is finished.
Check the settings.



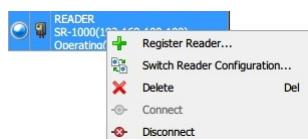
For details on saving settings and issuing quick setup codes, refer to "5-5 Saving Settings/ Quick Setup Codes" (page 12).

8-2 Restoring Settings (AutoID Network Navigator)

Send Configuration to a New SR-1000 Series

1 Follow steps in [8-1] to connect to AutoID Network Navigator.

2 Right-click the reader, and then click "Switch Reader Configuration" on the menu that appears.



3 Select a saved configuration file (*.ptc).

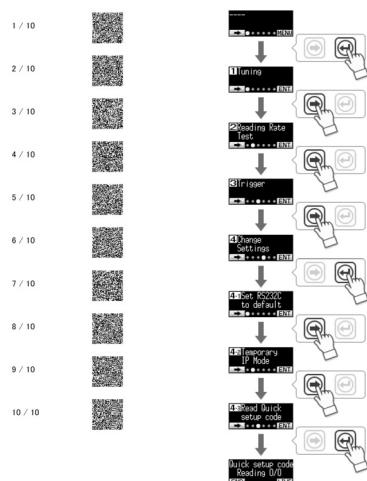
4 A confirmation message asking you whether you want to apply the settings will be displayed. Click "Yes."

When the completion message is displayed, the configuration is complete.

8-3 Restoring Settings (Quick Setup Code)

Reading Quick Setup Codes

1 Prepare the printed quick setup codes.



2 Turn on the SR-1000 Series.

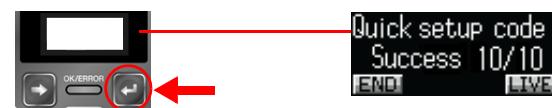
3 Press the SR-1000 Series buttons as shown below.



4 When the SR-1000 Series LED lights, scan all the quick setup codes.



5 Select [SAVE] on the following display to finish applying the settings.



- For details on how to print quick setup codes, refer to "5-5 Saving Settings/ Quick Setup Codes" (page 12).
- If it is difficult to read the codes, select [LIVE] in step 3, and then configure the settings while viewing the captured images.

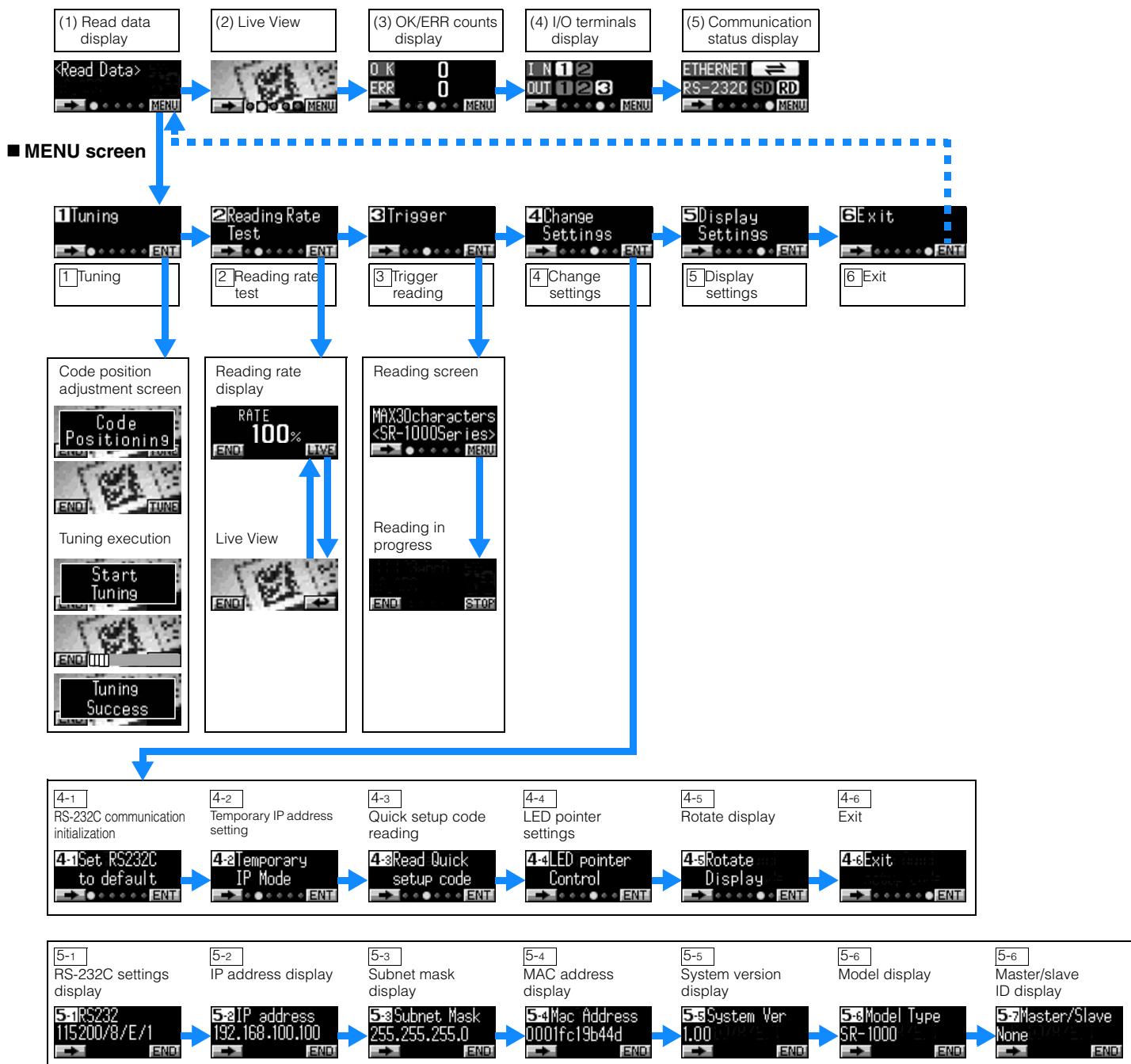


9-1 Reader Display Details

List of Displays

■ Operation screen

When the SR-1000 Series turns on, the start screen displays, and then (1) read data display appears.



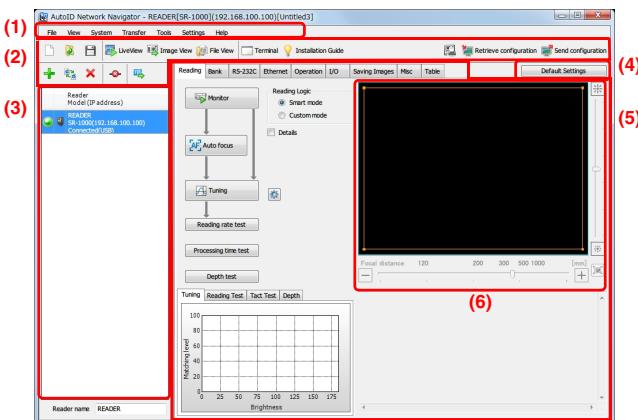
(1) Read data display	This is the normal display screen. It displays the read data of the SR-1000 Series. ^{†1}
(2) Live View	This screen displays the captured image of the SR-1000 Series. The part at the center of the field of view is displayed.
(3) OK/ERR counts display	This screen displays the OK and ERROR counts output by the SR-1000 Series. When the power is turned off, the counts are reset.
(4) I/O terminals display	This screen displays the status of the IN terminals and OUT terminals.
(5) Communication status display	This screen displays the Ethernet and RS-232C communication status.

¹ Data that exceeds 30 bytes in size cannot be displayed. Only alphanumeric characters and some symbols can be displayed. Characters that cannot be displayed are shown as black squares (█).

[1] Tuning	Use this menu to execute tuning.
[2] Reading rate test	Use this menu to conduct the reading rate test.
[3] Trigger reading	Press the ENTER button on this menu to check reading.
[4] Change settings	Use this menu to read quick setup codes, initialize the RS-232C communication, and to configure other settings.
[5] Display settings	Use this menu to view settings such as the RS-232C communication settings and the Ethernet IP address.
[6] Exit	Exit the menu and return to "(1) Read data display."

9-2 AutoID Network Navigator Details

Screen



(1)	Menu bar	Open configuration files and view the version of the SR-1000 Series.
(2)	Icons	Start tools and send/receive configuration files.
(3)	Reader list	Displays a list of the readers detected by AutoID Network Navigator.
(4)	Setting initialization	Initializes the SR-1000 Series selected from (3) Reader list. To initialize an SR-1000 Series reader, click this button, select the items to initialize, and then send the settings.
(5)	Settings view	Configure the settings of the SR-1000 Series selected from (3) Reader list.
(6)	Monitor screen	After you click [Monitor], which displays the live image captured by the SR-1000 Series, you can perform the following operations. Use the slider on the right to change the brightness. Use the lower slider to change the focal distance.



While AutoID Network Navigator is running and is connected to the SR-1000 Series, you cannot communicate between the SR-1000 Series and a PLC or other PC. If you want to communicate with a PLC or other PC, exit AutoID Network Navigator.

Icon Explanation

	New	Create a new configuration file for the selected model.
	Open	Open a configuration file.
	Save (overwrite)	Save (overwrite) the existing configuration file.
	Register	Register a reader.
	Switch settings	Switch the settings of the selected reader to the settings in a configuration file.
	Delete	Delete a registered reader.
	Disconnect	Disconnect a reader from AutoID Network Navigator.
	Temporary IP address setting	Use the "temporary IP address setting" function to connect to a reader through the Ethernet interface.
	Print quick setup code	Print a quick setup code.

Reader List Display

Lamp status	Description
Green	Registered reader
Blue	Registered reader is communicating with AutoID Network Navigator [*] 1
Gray	Disconnected
Red	Registered reader is incapable of communicating with AutoID Network Navigator

*1 With this status, it is not possible to communicate through the Ethernet or RS-232C interfaces between the SR-1000 Series and a PLC or other PC.



- You can disconnect a reader by clicking its lamp icon.



- Right-click an SR-1000 Series reader to use a variety of commands such as registering the reader and switching its settings.



Menu Bar Details

File	
New	Create a new configuration file.
Open	Open a configuration file.
Save	Save (overwrite) the existing configuration file.
Save As	Save the existing configuration file with a new name.
Save All	Save all the open configuration files.
Quick Setup Code	Print a quick setup code.
Export Reader Configuration	Output the list of settings to a .txt file.
Save serial number	Saves the reader's serial number. (SR-D100 series only)
Report	Output a report. □ "7-6 Output Read Results as a Report" (page 26)
Output Report Data	Output the report data. The items that you can output are shown below. <ul style="list-style-type: none">• Installation• Tuning• Test □ "7-6 Output Read Results as a Report" (page 26)
View	
Reader View	Show and hide the reader list.
Highlight Configured Fields	Highlights the settings changed from the factory default configuration.
System	
Register Reader	Register a reader.
Switch Reader Configuration	Switch the settings of the selected reader to the details of a configuration file.
Delete Reader	Delete the selected reader from the list.
Temporary IP address setting	Assign a temporary IP address to a reader in order to connect to it.
Confirm Firmware Version	Display the version of the reader.
Update Firmware	Update the reader firmware.
Transfer	
Retrieve Configuration	Receive the settings of the reader on the PC.
Send Configuration	Send a configuration to the reader.
Tools	
Live View	□ "7-3 Acquire Saved Images (Image View)" (page 24)
Image View	□ "7-4 View Live Images (MultiMonitor)" (page 25)
File View	□ "7-5 Acquire Saved Files (File View)" (page 25)
Terminal	□ "7-1 Check the Read Data" (page 24)
Installation Guide	From the code size, you can check the reading distance and field-of-view size of the reader being used.
Settings	
Select Network Card	Select the network card to use when establishing an Ethernet connection with AutoID Network Navigator.
Options	Set the options for AutoID Network Navigator.
Help	
Manual	This is a link to the manual.
About	Display version information for AutoID Network Navigator.

■ [Settings] - [Options]

Search Readers on Application Startup	Set whether to automatically search for readers when AutoID Network Navigator starts.
Automatic Registration	Set whether to automatically register the reader after the "Search Readers on Application Startup" function.
Communication Timeout	Set the communication timeout for AutoID Network Navigator. When you cannot establish connections with the "5sec" setting, change this to "10sec."
Terminal on Live View Startup	Set whether to start the terminal at the same time that Live View opens.
Automatic Reader Disconnection	When the specified time elapses, communication between AutoID Network Navigator and the registered reader will be disconnected.
Receive Settings upon Reconnect	Set whether to receive reader settings when communication is resumed after automatic reader disconnection.
Display Matching Level in Smart Mode	Set whether to display the matching level on the [Reading Test] tab in smart mode.

9-3 List of AutoID Network Navigator Settings

[Table] Tab

■ RS-232C

Item name	Default value	Setting range	Details
RS-232C communication	Enable	Enable or Disable	Select whether to enable or disable RS-232C communication.
Baud Rate	115200bps	9600bps to 115200bps	-
Data Bits	8bit	7bit or 8bit	-
Parity	Even	None, Even, or Odd	-
Stop Bit	1bit	1bit or 2bit	-
Communication method	None	None, PASS/RTRY, or ACK/NAK	-

■ Ethernet

SR-1000 IP settings

Item name	Default value	Setting range	Details
IP address	192.168.100.100		The IP address of the SR-1000 Series.
Subnet Mask	24	8 to 30	-
Default Gateway	0.0.0.0	0.0.0.0 to 255.255.255.255	-
Keep Alive	Enable	Enable or Disable	When this setting is enabled, the connection will be terminated when there is no communication with the remote device for a period of 60 consecutive seconds.
Command communication			
Communication method	TCP	Not used, TCP, or UDP	The communication method used to receive commands.
Port (Waiting)	9004	1024 to 65535 ¹	-
Ethernet data (server)			
Communication method	TCP	Not used or TCP	The server operation setting for socket communication.
Port (Waiting)	9004	1024 to 65535 ¹	-
Ethernet data (client)			
Communication method	Not used	Not used, TCP or UDP	The socket operation setting for socket communication.
Remote IP address 1	0.0.0.0	0.0.0.0 to 255.255.255.255	The remote IP address.
Remote port 1	9004	1024 to 65535	-
Remote IP address 2	0.0.0.0	0.0.0.0 to 255.255.255.255	This setting is used when the same data is output to an additional PC or PLC.
Remote port 2	9004	1024 to 65535	-
Connection request	Disable	Disable or Enable	
Send read data to FTP			
Send read data to FTP	Disable	Disable or Enable	Save the read data as a file on the FTP server.
Remote FTP server IP address	0.0.0.0		The remote IP address.
Remote FTP server user account name	admin		-
Remote FTP server user account password	admin		-
Passive mode	Disable	Disable or Enable	Enable this function when the FTP server operates passive communication.
Append to preceding data	Enable	Disable or Enable	Use this setting to append read data to preceding data sent through the FTP interface within .txt files.
Change directory	Disable	Disable or Enable	-
Directory name	data		-
Keep connected	Disable	Disable or Enable	-
File name	data.txt		-

*1 Excluding 9013, 9014, 9015, 5920, 9016, 5900, and 44818

■ Field network/PLC link

Item name	Default value	Setting range	Details
PLC communication protocol	Not used	¹	Select the protocol to use in communicating with the PLC.
Remote IP address	0.0.0.0		The remote IP address.
Remote port	5000	1024 to 65535	-
DM front address	0	²	-
Control region address	0	²	-
Response region address	0	²	-
PLC link timing input	Do not use	Do not use or Use	Use this setting to operate timing input with the PLC's bits.
UDP port number	5000	1024 to 65535 ³	-
Node address	1	0 to 65535	-
Output length	64	1 to 100	-
Timing/Data wait (x 10 ms)	10	0 to 99	-
Retry duration	5	1 to 10	-
EtherNet/IP			
Data handshake	Disable	Disable or Enable	-
Input assembly data size (send)	500	40 to 1400	Size of the data to send.
Output assembly data size (receive)	500	4 to 1400	Size of the data to receive.
Byte swapping	Disable	Disable or Enable	Setting for use in swapping the DM storage order.
PROFINET			
Device name	sr-1000		-
Data handshake	Disable	Disable or Enable	-

*1 MC protocol (RS-232C), SYSWAY (RS-232C), KV STUDIO (RS-232C), MC protocol (Ethernet), OMRON (Ethernet), KV STUDIO (Ethernet), EtherNet/IP, or PROFINET

*2 The setting range varies depending on the PLC link type.

*3 Excluding 9013, 9014, 9015, 9016, 5920, 5900 and 44818

■ Format

Item name	Default value	Setting range	Details
Header		(0 to 5 characters)	The characters to be added in front of the data
Terminator	0D	(0 to 5 characters)	The characters to be added at the end of the data
Partition mark	3A	(1 character)	The delimiting character to use when multiple codes are read
Inter-delimiter	2C	(0 to 5 characters)	The delimiting characters to use when adding data
Composite delimiter		(0 to 5 characters)	-
Append data size	Disable	Disable or Enable	-
Append checksum	Disable	Disable or Enable	-

■ Operation

Trigger input

Item name	Default value	Setting range	Details
Test mode on startup	None	None, Reading rate test, or Read time test	-
Timing Mode	Level trigger	Level trigger or One-shot trigger	-
One-shot trigger duration (x 10 ms)	100	3 to 2550	-
Timing ON command	4C4F4E(LON)	(1 to 32 characters)	Use hexadecimal characters to specify the command that will be used to start reading.
Timing OFF command	4C4F4646(LOFF)	(1 to 32 characters)	Use hexadecimal characters to specify the command that will be used to stop reading.
One-character timing recognition	Disable	Disable or Enable	Use this setting to execute the timing ON command without header and terminator characters.

Reading behavior

Reading Mode	Single	Single, Continuous, or Burst read	¹
Data Transmission	Send after read	Send after read or Send after timing off	Set the timing with which to send the data after a code is read.
Duplicate Reading Prevention Interval (x 100 ms)	10	0 to 255	-
Read Error String	4552524F52 (ERROR)	(0 to 8 characters)	The code to output when a reading error occurs.
Burst Interval (x 1 ms)	0	0 to 255	-
Shorten bank transition	Enable	Disable or Enable	-

Master/slave

Operation Setting	Not used	Not used, Multi Drop, or Multi Head	Master/slave operation setting.
Group name	GROUP01	(1 to 16 characters)	-
Unit ID	0	0 to 31	-
Number of read data in Multi Head mode	1	1 to 8	-

Alternate

Order	Begin with successfully read bank	Sequential or Begin with successfully read bank	-
Matching level judgment function			
Matching level OK/NG judgment	Disable	Disable or Enable	-
Matching level threshold	70	0 to 99	-
Code quality verification			
ISO/IEC15415 verification	Disable	Disable or Enable	-
ISO/IEC 15415 verification threshold	Disable	Disable, D, C, B, or A	-
ISO/IEC TR 29158 (AIM DPM-1-2006) verification	Disable	Disable or Enable	-
ISO/IEC TR 29158 (AIM DPM-1-2006) verification threshold	Disable	Disable, D, C, B, or A	-
SAE AS9132 verification	Disable	Disable or Enable	-
SAE AS9132 verification threshold	Disable	Disable or Enable	-
SEMI T10-0701 verification	Disable	Disable or Enable	-
Japanese pharmaceutical code quality verification, target code selection	-	-, CUSTOM, or ALL	-
Japanese pharmaceutical code quality verification threshold	Disable	Disable, D, C, B, or A	-
ISO/IEC16022 verification	Disable	Disable or Enable	-
ISO/IEC16022 verification threshold	Disable	Disable, D, C, B, or A	-
Select expression of grades	Alphabet	Alphabet or Numeric	²
Append detailed verification result	Disable	Disable or Enable	²
Append values	Disable	Disable or Enable	²

Edit data

Data edit by script	Disable	Disable or Enable	Select whether to use scripts.
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Additional data

Time	Disable	Disable or Enable	-
Code classification	Disable	Disable or Enable	-
Symbol ID	Disable	Disable or Enable	-
Parameter bank	Disable	Disable or Enable	-
Read count	Disable	Disable or Enable	-
Code vertex	Disable	Disable or Enable	-
Code center	Disable	Disable or Enable	-
ECC level (UEC)	Disable	Disable or Enable	-
Matching level	Disable	Disable or Enable	-
ISO/IEC 15415 verification result	Disable	Disable or Enable (total grade)	-
ISO/IEC TR 29158 (AIM DPM-1-2006) verification result	Disable	Disable or Enable (total grade)	-
SAE AS9132 verification result	Disable	Disable or Enable (total)	-

Item name	Default value	Setting range	Details
SEMI T10-0701 verification result	Disable	Disable or Enable	-
Japanese pharmaceutical code quality verification result	Disable	Disable or Enable	-
Image file name	Disable	Disable or Enable	-
Read time	Disable	Disable or Enable	-
Group name	Disable	Disable or Enable	This is the master/slave group name. ³
Master/Slave ID	Disable	Disable or Enable	This is the master/slave unit ID. ³
Comparison			
Comparison method	Normal	Normal or Sequential	-
Origin	1	1 to 7089	-
Length	494	0 to 494	-
Preset data		(0 to 494 characters)	This is the data to compare against.
Increment	1	-9999 to 9999	Set this value when the comparison method is "Sequential."

*1 When you are using "smart mode," you can only select "Single."

*2 This is displayed when you select an "Append grade" check box on the [Code quality verification] screen of the [Operation] tab.

*3 This is displayed when the master/slave function is enabled.

I/O terminals

Input terminal common

Item name	Default value	Setting range	Details
Input Polarity	Norm. open	Norm. open or Norm. closed	-
Required Input Duration	1ms	1 ms, 2 ms, or 10ms	The length of time that trigger input must be left on until reading starts.
IN1 function			
Function	Timing	*1	-
Test mode	Reading rate test	Reading rate test or Read time test	Set this value when "Start test mode" is assigned to the input terminal.
Bank used to capture images	1	1 to 16	Set this value when "Capture" is assigned to the input terminal.
Startup state	Disable	Disable or Enable	-
IN2 function			
Function	Disable	*1	-
Test mode	Reading rate test	Reading rate test or Read time test	Set this value when "Start test mode" is assigned to the input terminal.
Bank used to capture images	1	1 to 16	Set this value when "Capture" is assigned to the input terminal.
Startup state	Disable	Disable or Enable	-
Output Terminal			
TRG BUSY at Power-On	Enable	Disable or Enable	-
Output Duration (x 10 ms)	50	1 to 255	-
OUT1 Function	OK	*2	-
OUT2 Function	ERROR	*2	-
OUT3 Function	*3	*2, 4	-
External Light Output Polarity	Norm. open	Norm. open or Norm. closed	Set this value when "EXT. LIGHT" is assigned to OUT3.

*1 Disable, TIMING, Preset Input, TEST, Capture, Clear PLC link error, Trigger lock, Read the quick setup code, or TUNING

*2 OK, ERROR, STABLE, UNSTABLE, PRESET OK, TUNING OK, SCRIPT CONTROL, and NG (Comparison NG)

*3 TRG BUSY, LOCK BUSY, MODE BUSY, ERR BUSY, and CONFIG BUSY

*4 EXT. LIGHT

Saving images

Saving images

Item name	Default value	Setting range	Details
OK Image	Disable	*1	Method for saving images with the "OK" output function.
NG Image	Save to RAM	*1	Method for saving images with the "NG" output function.
Error Image	Save to RAM	*1	Method for saving images with the "ERROR" output function.
Unstable Image	Save to RAM	*1	Method for saving images with the "UNSTABLE" output function.
Captured Image	Save to RAM	Save to RAM or Send by FTP	Method for saving images when they are captured.
Format	JPEG	JPEG or Bitmap	-
Quality (JPEG)	5	1 to 10	-
Binning	1/4	Full, 1/4, 1/9, 1/16, or 1/64	-
Image save mode	Save final bank image	Save final bank image, Save specified number of images after timing ON, or Save specified number of images after timing OFF	-
Number of images to save	32	1 to 32	-
Edit image file name by script (FTP transmission only)	Disable	Disable or Enable	Select whether to use scripts.
FTP settings²			
Item name	Default value	Setting range	Details
IP address	0.0.0.0	0.0.0.0 to 255.255.255.255	The remote IP address.
User Account	admin		-
Password	admin		-
Passive mode	Disable	Disable or Enable	-
Change directory	Disable	Disable or Enable	-
Keep connected	Disable	Disable or Enable	-

*1 Disable, Save to RAM, or Send by FTP

*2 This item is set when you assign "Send by FTP" to one of the image saving methods.

Misc

Item name	Default value	Setting range	Details
Output data on button	Enable	Disable or Enable	-
Filling size	0	0 to 999	-
Filling character	20		-
Silent Mode	-	*1	-
Data output per bank	Disable	Enable	-
Reader	READER	(1 to 8 characters)	-
ENTER button	Unlock	Unlock or Lock	-
Pointer lighting	Auto lighting	Manual lighting, Auto lighting, or Only light when capturing images	-
Rotated display	Do not rotate	Rotate by 180 degrees	-

Specify command response string

Basic command response string	Not specified	Not specified, Detailed response, User setting, or Echo back	Set the responses to commands.
Success response string	4F4B(OK)	(1 to 8 characters)	*2
Failure response string	4552(NG)	(1 to 8 characters)	*2

SNTP

SNTP server address	0.0.0.0	0.0.0.0 to 255.255.255.255	IP address of the SNTP server used to synchronize the time.
Time zone	+9.00	-12.00 to +13.00	-
Update cycle (min)	1	1 to 99	-

Monitor

Displayed image	After image filter	Before image filter or After image filter	-
Rotate image	Do not rotate	Do not rotate or Rotate by 180 degrees	-

Tuning

Auto polarizing filter adjustment	Enable	Disable or Enable	-
Code search	Limit	Limit or Do not limit	Limit the code search conditions on the basis of the tuning result in order to shorten the decode time.

*1 When comparison is OK, when reading is OK, when there is a reading error, when reading is stable (OK/comparison not OK), when reading is not stable (OK/comparison not OK), preset results, test mode, tuning, when comparison is not OK

*2 This item is set when the basic command response string is set to "User setting."

Search Settings

You can use the search box shown in the following image to search for items in the list of settings.

The screenshot shows a software interface for managing settings. At the top, there is a navigation bar with tabs: Reading, Bank, RS-232C, Ethernet, Operation, I/O, Saving Images, Misc, Table, and Default Settings. Below the navigation bar is a search bar with the placeholder text "Setting item search". A red rectangle highlights this search bar. To the right of the search bar is a "Search" button. The main area contains a table with two columns: "Item" and "Value". The "Item" column lists several categories: RS-232C, Ethernet, Field network/PLC link, Format, Operation, I/O, Saving Images, and Misc. The "Value" column currently has no entries. The background of the main area is gray.

9-4 Read Behavior

Tuning

Tuning

This function uses SR-1000 Series button operations or AutoID Network Navigator operations to automatically adjust to the optimal values the parameters for reading the target codes, and then saves these parameters in the internal memory.

Tuning operation methods

The following three operation methods are available.

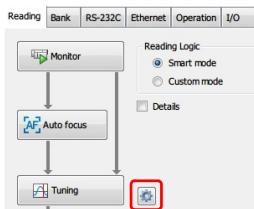
- (1) SR-1000 Series button operations "4-1 Tuning" (page 9)
- (2) AutoID Network Navigator operations "5-2 Reading Settings" (page 10)
- (3) Operations with the corresponding function assigned to an input terminal "6-8 Control the I/O Terminals" (page 19)



When an input terminal is used to activate tuning, parameter bank number 1 is automatically overwritten with the tuning result.

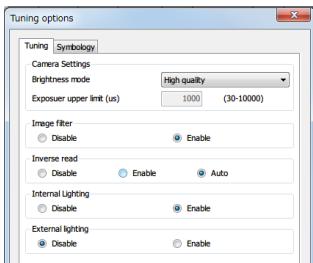
Setting tuning conditions

Use AutoID Network Navigator to set the tuning conditions. Click the following button to display the [Tuning Options] screen.



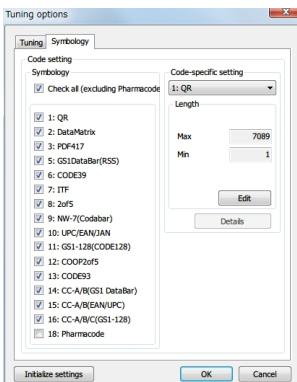
Tuning options

[Tuning] tab



Brightness mode	Normally select "High quality." Select "High speed" when you are reading moving codes. "6-3 Read Moving Codes" (page 16)
Exposure upper limit	Enter this value when [Brightness mode] is set to "High speed." Set the upper limit for the exposure time.
Image filter	Select whether to use an image filter during tuning. * When you complete tuning for 1D barcodes, there are limits placed on the types of image filters.
Inverse Read	Use this setting to read codes with black/white inversion. Normally select "Auto."
Internal Lighting	Select whether to use internal lighting. Normally select "Enable."
External Lighting	If you will synchronize tuning with external lighting, select "Enable."

[Symbology] tab



Symbology	Select the codes for which the reader will be tuned. You can shorten the tuning time by limiting the types of codes.
Code-specific setting	Set the conditions to read during tuning for each type of code. Examples of these conditions are "Length" and "Quiet zone scale factor."

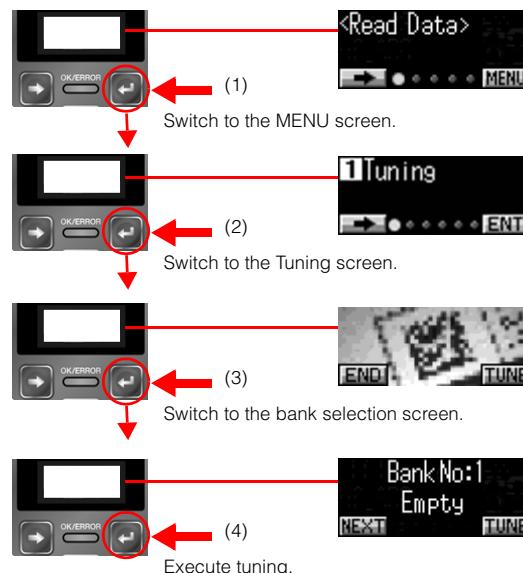
Using reader buttons to tune in custom mode

When you set the reading method (reading logic) of the SR-1000 Series to "Custom mode," follow the procedure shown below to tune the reader.

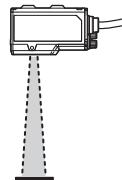
1 Turn on the SR-1000 Series.

2 Align the green pointer with the code.

3 Press the [ENTER] button as shown below.



The LED flashes and tuning starts.



When tuning is finished, the reading rate test mode screen is displayed.



This completes the tuning procedure.

Point

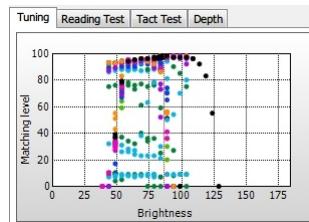
- In custom mode
The focus is not adjusted when tuning is executed. When you change the mounting distance, use AutoID Network Navigator to set the focus.
For details on how to tune using AutoID Network Navigator, refer to "5-2 Reading Settings" (page 10).
- If the following screen is displayed when you tune in custom mode, it means that other settings are already being used with the selected bank. To overwrite the existing settings, press the [ENTER] button. If you want to save the new settings to a different bank, press the [NEXT] button to select a bank that displays "Empty," and then press the [ENTER] button.



Details of Tuning Results

If you use AutoID Network Navigator to tune the reader, the following results will be displayed.

• Tuning results



• Image filters and color codes

The plotted points of the tuning results indicate the following filter results.

Color	Filter name	Color code (RGB)
●: Black	Disable	0,0,0
●: Yellow-green	Equalize	68,192,0
●: Green	Shrink	0,130,58
●: Light blue	Expand	0,183,238
●: Blue	Open	0,67,238
●: Purple	Close	171,0,242
●: Pink	Median	241,0,198
●: Orange	Unsharp Mask	255,138,0

Smart Mode and Custom Mode

The SR-1000 Series has two reading methods (reading logics): "smart mode" and "custom mode."

■ Smart mode

This mode is enabled in the factory default configuration. The SR-1000 Series automatically changes its internal parameters on the basis of a single tuning result in order to read codes.

This mode can increase the reading stability when the following changes occur:

- Thick/thin printing
- Incomplete/stained printing
- Varying contrast

■ Custom mode

You can use AutoID Network Navigator to switch to this mode. The SR-1000 Series reads codes while switching internally between multiple parameter banks.

Use "custom mode" when:

- You are reading multiple types of codes.
- You are reading multiple codes whose printing conditions vary greatly.
- You are using the code quality verification function.
- You will set the reading mode to "Continuous" or "Burst read."
- You are prioritizing read time.
- You are reading codes on high-speed lines.

Alternate

■ Parameter bank

When you use the SR-1000 Series "custom mode," set the exposure time, image filter usage, and other reading parameters. These parameters are stored in items called "parameter banks" or "banks." The SR-1000 Series has 16 parameter banks. The following are the main items stored in parameter banks.

- Code type
- Lighting conditions
- Exposure time
- Image filter usage

■ Alternate function

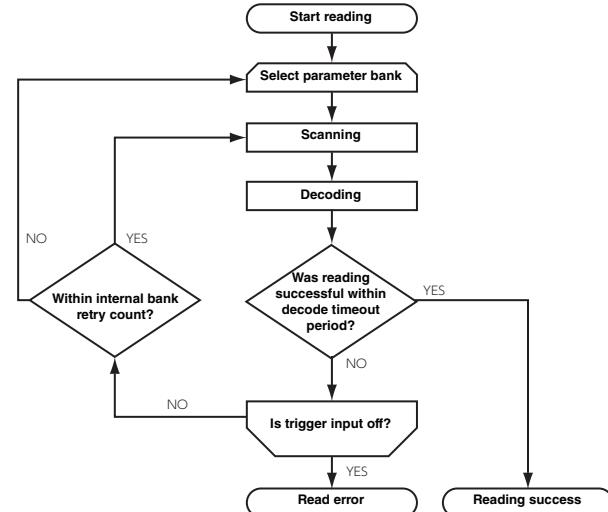
With the SR-1000 Series "custom mode," codes are read while the SR-1000 Series automatically switches between multiple registered parameter banks. This operation is called the "alternate function."

With the alternate function, you can stably read codes even if they have varying printing conditions.

Point

- The alternate function requires processing time in order to find the optimal parameter bank. (The processing time depends on the decode timeout.)
- The alternate function is disabled in the factory default configuration. When you use "custom mode" to specify a parameter bank, the alternate function is enabled.
- The alternate function is disabled when:
 - You use smart mode.
 - The alternate function is disabled for all parameter banks.
 - You use commands or a field network to read using a specific parameter bank.

■ Alternate function operations



■ Alternate order

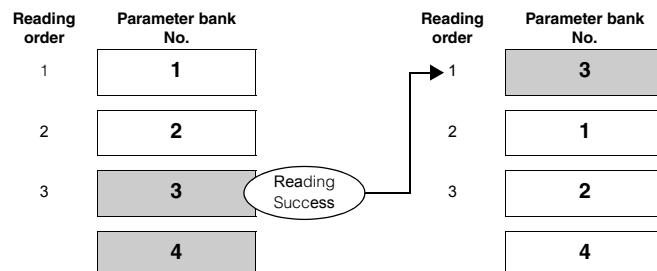
• Sequential

Codes are read by switching between parameter banks in order starting with number 1.

• Begin with successfully read bank

When reading is successful, the same parameter bank will be the first one used for the next reading operation.

By using this function, you can shorten the read time when the print quality changes in units of lots.



Point

If you are using the "Begin with successfully read bank" setting, this will be returned to the sequential order when:

- The power supply turns off.
- Test mode starts.
- The reset command (RESET) is sent.
- The alternate settings are changed.

■ Parameter bank display

In AutoID Network Navigator, parameter bank settings are displayed as shown below.

Item	Bank1	Bank2	
	Alternate	Enable	Disable
Repeat read attempts	0	0	
Decode timeout (x10ms)	10	10	
Shutter delay (x1ms)	0	0	
Decoding area	240, 212, 1...	240, 212, 1...	
Inverse read	Disable	Disable	
Reverse read	Disable	Disable	
Base tilt angle	0	0	
Tilt angle range	180	180	
Symbology	QR	QR	
Length	CUSTOM	CUSTOM	
Code detail setting	CUSTOM	CUSTOM	
Output Length Limitation	Disable	Disable	
Mode	Forward	Forward	
Length of output	7089	7089	
Starting index of output	1	1	
Use internal lighting	Enable	Enable	
Use external lighting	Disable	Disable	
Polarizing filter	Enable	Enable	
Exposure (μs)	30	30	
Camera	Gain	0	

Setting name

Common

Alternate	Set whether to use the alternate function during reading. When Alternate is set to "Disable," the corresponding parameter bank will not be used in reading.
Repeat read attempts	For a specific parameter bank, set the number of times to capture images or decode until the alternate function is used.
Decode timeout (x10 ms)	Set the upper limit of the decode time. If decoding cannot complete within this period, the next scan will begin.
Shutter delay (x1 ms)	Set the delay between the reception of trigger input and the start of scanning. This is only enabled for the first bank.
Decoding area	Limit the decoding area.
Inverse read	Set whether to read codes whose black and white parts are inverted.
Reverse read	Set whether to read codes that have been flipped right to left.
Base tilt angle	Set the base angle for a tilt angle range to limit reading. When DataMatrix is set, the finder pattern rotates until it appears as an "L". When the QR code is set, the corner without a finder pattern will become the bottom right corner and 0 degrees. The angle rotates in the clockwise direction (counterclockwise for Reverse read).
Tilt angle range	Set the tilt angle range to limit reading. Specify the value as ±X degrees to the base tilt angle.

Code

Symbology	Set the code type to read.
Length	Set the number of digits of the code to read.
Code detail setting	Configure the detailed settings for each code type.
Output length limitation	Use this setting to limit the number of output digits of the read data.
Mode	Select the direction in which to limit the number of output digits.
Length of output	Set the number of valid output digits.
Starting index of output	Set the starting output digit.

Light

Use internal lighting	Use the built-in LED of the SR-1000 Series.
Use external lighting	If you connect an external light to the SR-1000 Series, enable this setting.
Polarizing filter	Use the built-in polarizing filter of the SR-1000 Series.

Scan

Exposure (μs)	Set the exposure time that is used when scanning images.
Gain	Set the gain that is used when scanning images.

Filter

Image filter n	Set the image filter type.
Image filter n count	Set the image filter count.

Algorithm

Grid correction	Enable or disable the grid correction.
-----------------	--

Read Behavior

When you are using custom mode, the SR-1000 Series executes the following processing during reading.

- (1) Trigger input processing : Trigger input is verified and lighting is controlled.
- (2) Scanning + image transfer : The image is scanned within the specified exposure time and the image is transferred.
- (3) Decoding processing : The captured image is filtered and the code is recognized (decoding processing).
- (4) Data communication processing: The decoded results are output as data.

Since (2) and (3) above are operated based on the settings registered with the parameter bank, operation is repeated using the alternate function until a code is read or an instruction to finish read operation is given (timing OFF).

Specify the following operations for the above processing:

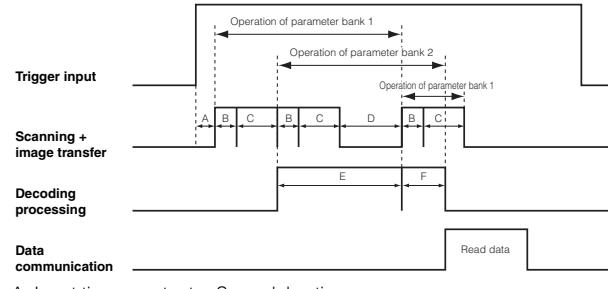
- Timing Mode Choose from level trigger or one-shot trigger.
- Timing to send data Choose from "Send after read" or "Send after trigger input OFF."
- Read mode Specify Single, Continuous, or Burst read.

■ Timing diagram

This section describes the steps of basic operations of the SR-1000 Series.

Operating conditions are as follows:

- Timing Mode : Level trigger
- Timing to send data : Send after read
- Read mode : Single
- Parameter bank : Set 2 banks, alternate mode



A: Input time constant + Scan delay time

B: Exposure time for each parameter bank

C: Image transfer time*1

D: Scan interval

E: Decode timeout period set for each parameter bank

F: Decoding time when reading is successful

- The above is the image when reading is successful. For read error, B, C, D, and E are repeated continuously and read error data is output when the trigger input is turned off.
- In modes other than burst read mode, the next scan processing starts at the same time as the decoding processing.

*1 The image transfer time depends on the size of the image capture range.

- Image transfer time guidelines

800 × 600 pixels	Approx. 12 ms
1280 × 1024 pixels	Approx. 20 ms

Timing Mode

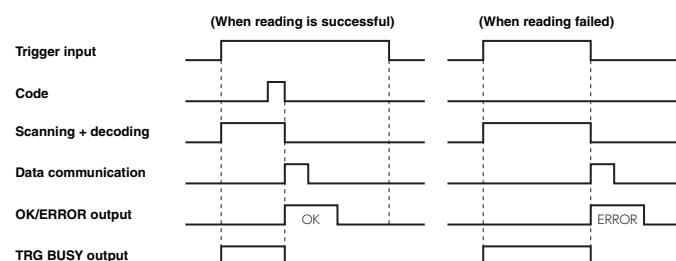
■ Level trigger

While the trigger input is on, the LED lights and reading begins.

When a code is read, the LED turns off and the data is transmitted.

If a code cannot be read before the trigger input turns off, a reading error occurs.

● Timing diagram*1



■ One-shot trigger

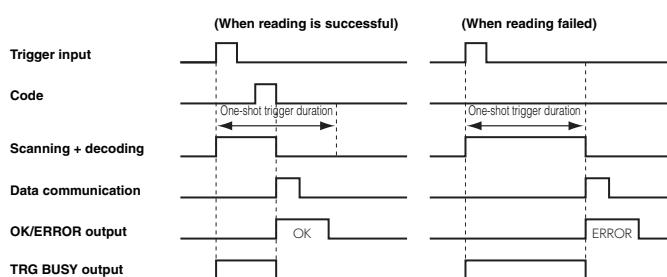
On the rising edge of the trigger input, the LED lights only for the specified time.

Reading is attempted during this time.

When a code is read, the LED turns off and the data is transmitted.

If a code cannot be read during the one-shot trigger duration, a reading error occurs.

● Timing diagram^{*1}



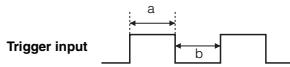
■ Differences between the level trigger and the one-shot trigger

	Reading	Reading success	Reading error
Level trigger	While the trigger input is on	When the code can be read while the trigger input is on	When the code cannot be read before the trigger input turns off
One-shot trigger	During the specified time from the rising edge of the trigger input	When the code can be read during the one-shot trigger duration	When the code cannot be read during the one-shot trigger duration

*1 The timing diagrams indicate examples with the factory default configurations of the "Reading Mode" and "Data Transmission" settings. For the sake of simplicity, the input time constant and the scan delay time have been omitted.

Point

- When the trigger input is on for a length of time greater than or equal to the input time constant, the SR-1000 Series starts reading.
- The "TRG BUSY" output turns on when the rising edge of the trigger input is recognized and remains on until the code reading is complete or the trigger input is turned off.
- Ensure that the trigger input remains on for a length of time sufficient to facilitate reading.
- Set the one-shot trigger duration to a length of time sufficient to facilitate reading.
- The one-shot trigger duration can be set to a value from 30 to 25500 ms.
- The one-shot trigger duration is only a setting. The reading time may not match this value due to factors such as the communication load.
- When a code is read at an interval shorter than the OK/NG/ERROR output ON time, the output turns off even if the output ON time of the previous output signal has not elapsed, and a new output signal turns on for the specified output ON time. If the same output terminal operations occur successively, the previous output signal turns off, and then the new output signal turns on 10 ms later.
- In order to recognize the trigger input turning on, it must turn on for a length of time greater than or equal to the input time constant.
- In order to recognize the trigger input turning off, it must turn off for a length of time greater than or equal to the input time constant.
- When using a fast-tact, high-speed pulse signal as the trigger input, set the on/off time of the pulse signal to a value that is greater than or equal to the input time constant.
- Let the input time constant be a and the trigger input off time be b . The trigger input off state is not recognized if a is greater than b . Ensure that a is less than or equal to b .



Data Transmission

■ Send after read

The read data and the OK/ERROR signal will be output immediately after the code is read. Normally use this mode.

● Timing diagram

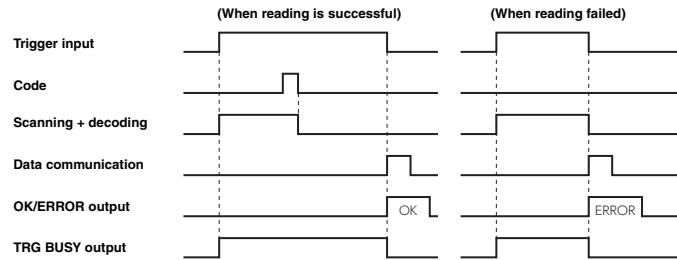
The details are the same as those explained under "Timing Mode."

■ Send after timing off

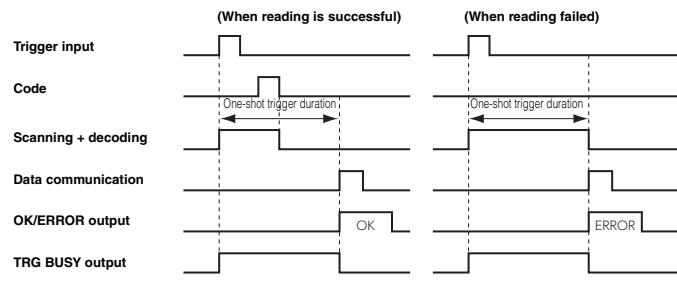
The read data and the OK/ERROR signal will be output when the trigger input turns off, not immediately after the code is read.

● Timing diagrams^{*1}

- Level trigger



- One-shot trigger



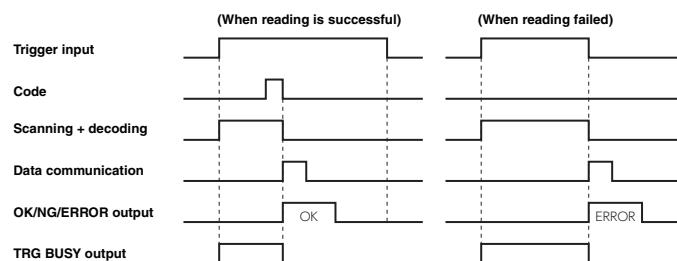
*1 The timing diagrams indicate examples with the factory default configuration of the "Reading Mode" setting. For the sake of simplicity, the input time constant and the scan delay time have been omitted.

Reading Mode

■ Single

In this mode, a single code is read while the trigger input is on. Normally use this mode.

● Timing diagram^{*1}

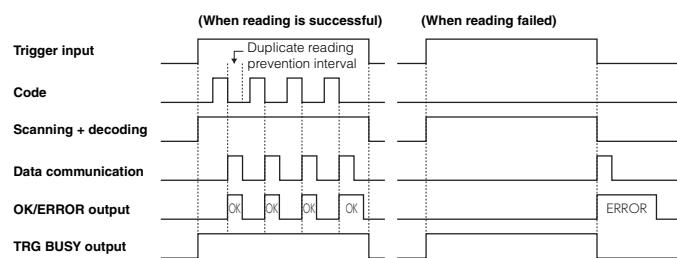


■ Continuous

In this mode, multiple codes are read consecutively while the trigger input is on. Data is transmitted each time that a code is read.

The bank setting reading function cannot be used with "Continuous".

● Timing diagram^{*1}

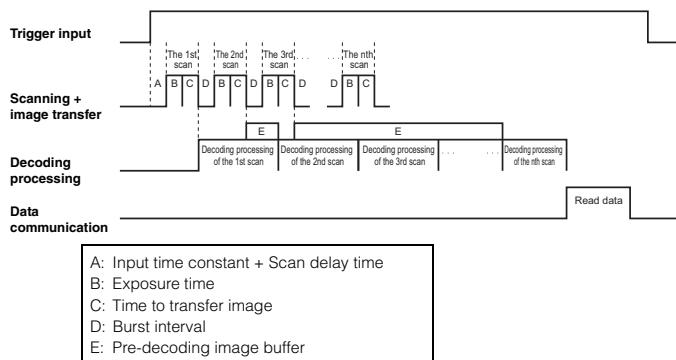


■ Burst read

In this mode, multiple codes are first scanned and then processed while the trigger input is on. Use this mode to increase your ability to read moving codes.

- Scan count: 32 max.
- Scan interval: Can be set to a value between 0 and 255 ms
- * The actual scan interval is the scan interval plus the image transfer time.

● Timing diagram*



- If multiple parameter banks have been registered, scanning is completed using the alternate function.
- When decoding is completed, scanning processing is stopped even when the number of scans has not reached 32.
- If decoding fails, the processing moves to the next decoding after expiration of the decode timeout period of each parameter bank.

*1 The timing diagrams indicate examples with the factory default configurations of the "Timing Mode" and "Data Transmission" settings. For the sake of simplicity, the input time constant and the scan delay time have been omitted.

Point

- If codes that have the same symbology and content are being read in series with the "Continuous" setting, adjust the time that codes take to pass the reader so that this time is longer than the "Duplicate Reading Prevention Interval" setting.
- With "Continuous", bank specification reading is not possible.

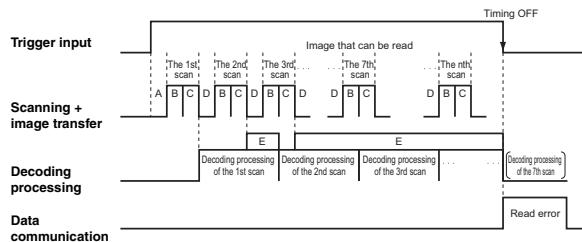
Reference

Regarding the trigger input time in burst read mode
In burst read mode, both scan processing and decoding processing are executed, but decode processing takes more time. Therefore, even when the scan processing is finished, there will be a time period where decoding processing is not yet finished. If the trigger input turns off with the decoding processing unfinished, a reading error will occur even if images of readable codes have been scanned.

Ensure that the trigger input remains on for a length of time sufficient to complete of decoding.

Example) The trigger input turns off prior to the completion of decoding processing.

If, as shown below, the trigger input turns off with the decoding processing necessary for scanning unfinished, a reading error will occur even if readable images were present.



9-5 Reading Test

Reading Rate Test Mode

This test mode scans codes and measures the reading rate according to the number of times that the codes were read correctly. The result is output once per 10 decodes.

● Output format

Read data	:	Bank number	:	a%	:	Matching level
-----------	---	-------------	---	----	---	----------------

a = Reading rate as a value from 0 to 100

● Operation

- Using the [Reading rate test] button in AutoID Network Navigator
- Using a command
- Assigning the function to an input terminal

Read Time Test Mode

This test mode measures the amount of time that it takes to read a code. The amount of time required from the start of reading until the completion of reading is measured, and then the result is output.

If decoding fails, the result is 0 ms.

The result is output when decoding is completed successfully 10 times or when decoding fails.

● Output format

Read data	:	Bank number	:	now=ams	:	max=bms	:	min=cms
-----------	---	-------------	---	---------	---	---------	---	---------

a: Latest read time
b: Maximum read time
c: Minimum read time

● Operation

- Using the [Processing time test] button in AutoID Network Navigator
- Using a command
- Assigning the function to an input terminal

Depth Measurement Test Mode

This test mode performs a pseudo-measurement of a depth approximation by changing the focus from the current installation position.

● Operation

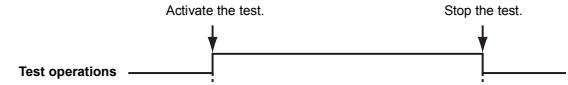
- Using the [Depth test] button in AutoID Network Navigator

- Reference
- When a test mode starts, the data addition function is disabled.
 - In [Smart mode], the SR-1000 Series reads by internally switching between different sets of reading conditions. Therefore, if you use "read time test mode" with codes that are difficult to read, the reader will repeatedly switch between sets of conditions while measuring, so the monitor screen may flash (switch between being lit and being dark).
 - Test modes using arbitrary trigger input times (online test mode) The normal "reading rate test mode" and "read time test mode" output results once per 10 decoding operations. However, you can output results with arbitrary input times by using the following commands.
#TEST1: Reading rate test mode (online test mode)
#TEST2: Read time test mode (online test mode)

Command details:

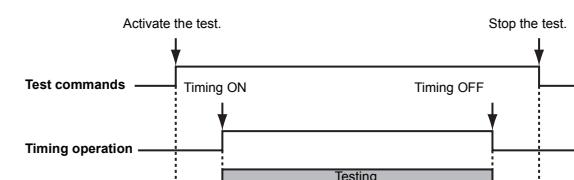
"12-2 Reading and Tuning Commands" (page 54)

- Normal test mode



- Online test mode

When you execute online test mode, the reading rate and read time are measured from the point that the trigger input turns on to the point that it turns off.



- Data format of the reading rate test mode (online)

Read data	:	Bank number	:	a%	:	b	/	c	:	Matching level
-----------	---	-------------	---	----	---	---	---	---	---	----------------

a = 0-100 : Reading rate

b = 1-65535 : Decode count

c = 1-65535 : Scan count

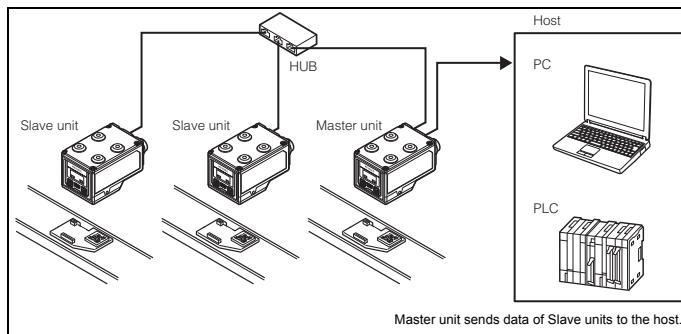
9-6 Master/Slave Function

The Master/Slave function has two types of modes: Multi drop link mode and Multi head mode. This section describes the overview of each mode.

Multi drop link mode

With this mode, one Master unit collects the read data of multiple units (up to 32 units) of SR-1000 Series operating with different purposes and sends the data to the host.

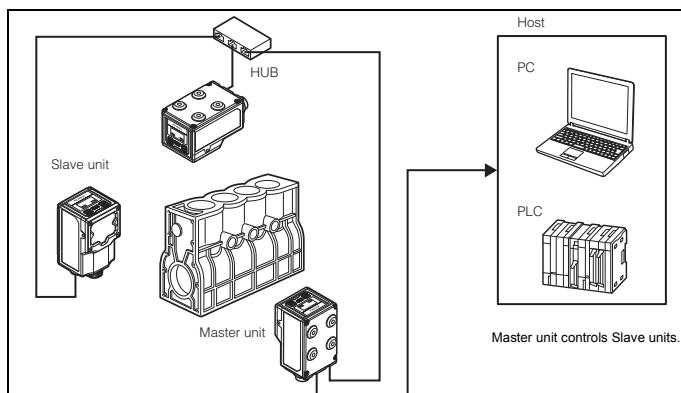
Because the host only has to communicate with the SR designated as Master, the host does not need to consider communication with multiple units. Thus, the system load is reduced with the simple program. Also for PLC, only one communication unit is necessary to control multiple units. This enables the simple device configuration.



Multi head mode

Use this mode when you do not know the position of a code on a target or when the target is larger than the field of view and the entire target cannot fit within the field of view using one unit.

Because multiple units (up to 8 units) of SR-1000 Series can be handled as one device, the host does not need to consider communication with multiple units, and the program becomes simple.



Usable Reading Modes and Protocols

■ Reading modes

Reading mode	Multi drop link	Multi head
Single	✓	✓
Continuous	-	-
Burst	✓	-

■ Protocols

Protocol	Multi drop link	Multi head
Non-procedure	✓	✓
TCP	✓	✓
MC protocol	✓	✓
SYSWAY	✓	✓
KV STUDIO	✓	✓
EtherNet/IP	-	✓
PROFINET	-	✓



• Specify a unique ID for each slave.

- The ID for the master is 0.
- When using the "master/slave function," both "Ethernet" and "RS-232C" can be selected for data output from the master. However, Ethernet connections must be made between the master and slaves.
- You can make multiple master/slave groups on the same network by assigning different names to the groups.
- When the master is in the LOCK BUSY status, the data of the slave cannot be received.
Example: When the MENU screen is displayed on the master main body
- With networks on which multiple devices are connected, when a large load is applied, delays and packet losses may occur. Verify carefully before operating.
- When using the master/slave function, the maximum data size that can be sent from the slave to the master is 1024 bytes.



- The slave unit settings will not be reflected in the following items. They depend on the master unit settings.
"Header," "terminator," "data length," and "checksum"
- Protocol used between the master and slave units: UDP
The units communicate by way of Directed Broadcast.

Multi-drop Link Mode

■ Control methods

The following three methods are available for use to start reading.

(1) Trigger signal

Turn on the trigger signals for the master and slave units.

(2) Reading start command

Specify the ID number on and send a command to the master.

(3) Trigger area when using PLC link

Specify the ID number on and turn on the trigger area on the master.

■ Data format

• Normal

Header	Read data	Terminator
--------	-----------	------------

• When using the additional data settings

Header	Read data	:	Group name	:	ID	Terminator
--------	-----------	---	------------	---	----	------------

■ Commands

Function	Command name	Parameters	Response
Start reading	%Tm-LON	m=00-31: ID	-
Start reading (bank specification)	%Tm-LON,b	m=00-31: ID b:01 to 16	-
Stop reading	%Tm-LOFF	m=00-31: ID	-
Version confirmation	%Tm-KEYENCE	m=00-31: ID	%Tm-OK,KEYENCE,SR-1000, m = 00-31: ID v: Version
Cancel reading	%Tm-CANCEL	m=00-31: ID	%Tm-OK,CANCEL m = 00-31: ID

■ Configuration procedure

● Master settings

(1) Network settings

- 1 Open the [Ethernet] tab.
- 2 Enter the [IP address] and [Subnet Mask] settings to assign to the master unit.

(2) Destination settings

- Ethernet

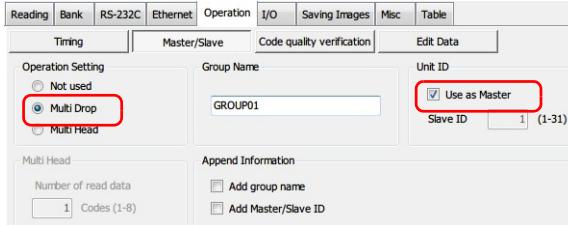
- 1 Open the [Ethernet] tab, and then start the [Setup Wizard].
- 2 STEP 1 Select the trigger input method.
- 3 STEP 2 Select the output destination.
- 4 STEP 3 Select the communication protocol.
- 5 STEP 4 Configure connection destination settings such as the [IP Address] and the [Port].
- 6 Exit the [Setup Wizard].

• RS-232C

- 1 Open the [RS-232C] tab.
- 2 Match communication settings such as the "Baud Rate" with those of the host device.

(3) Master/slave function settings

- 1 On the [Operation] tab, open the [Master/Slave] screen.
- 2 Configure the settings as shown below.



- 3 Click [Send Configuration].

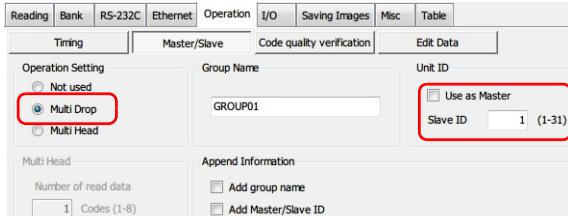
● Slave settings

(1) Network settings

- 1 Open the [Ethernet] tab.
- 2 Enter the "IP address" and "Subnet Mask" settings.

(2) Master/slave settings

- 1 On the [Operation] tab, open the [Master/Slave] screen.
- 2 Configure the settings as shown below. Specify a unique ID for each slave.



- 3 Click [Send Configuration].

Multi-head Mode

■ Control methods

(1) Trigger signal

Turn on the trigger signal for the master unit.

(2) Reading start command

Send a command to the master.

(3) Trigger area when using PLC link

Turn on the trigger area on the master unit.

■ Data format

• Normal

Header	Read data	Terminator
--------	-----------	------------

• When using the additional data settings

Header	Read data	:	Group name	:	ID	Terminator
--------	-----------	---	------------	---	----	------------

■ Commands

Function	Command name	Parameter	Response
Start reading	LON	-	-
Start reading (bank specification)	LON.b	b: 01 to 16	-
Stop reading	LOFF	-	-
Version confirmation	KEYENCE	-	OK,KEYENCE,SR-1000,v v: Version
Cancel reading	CANCEL	-	OK,CANCEL

■ Configuration procedure

● Master settings

(1) Network settings

- 1 Open the [Ethernet] tab.
- 2 Enter the [IP address] and [Subnet Mask] settings to assign to the master unit.

(2) Destination settings

- Ethernet

- 1 Open the [Ethernet] tab, and then start the [Setup Wizard].

- 2 STEP 1 Select the trigger input method.

- 3 STEP 2 Select the output destination.

- 4 STEP 3 Select the communication protocol.

- 5 STEP 4 Configure connection destination settings such as the [IP Address] and the [Port].

- 6 Exit the [Setup Wizard].

• RS-232C

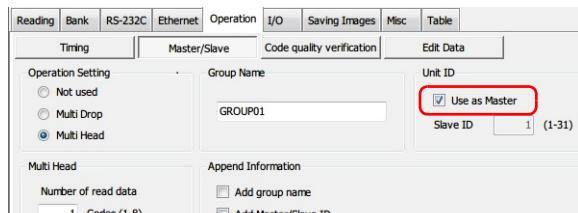
- 1 Open the [RS-232C] tab.

- 2 Match communication settings such as the "Baud Rate" with those of the host device.

(3) Master/slave function settings

- 1 On the [Operation] tab, open the [Master/Slave] screen.

- 2 Configure the settings as shown below.



- 3 Click [Send Configuration].



Only read data is sent from slave units to the master unit.
Other data such as test mode and preset registration results is not output.

● Slave settings

(1) Network settings

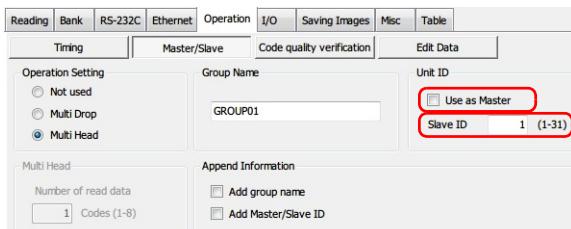
1 Open the [Ethernet] tab.

2 Enter the "IP address" and "Subnet Mask" settings.

(2) Master/slave settings

1 On the [Operation] tab, open the [Master/Slave] screen.

2 Configure the settings as shown below. Specify a unique ID for each slave.

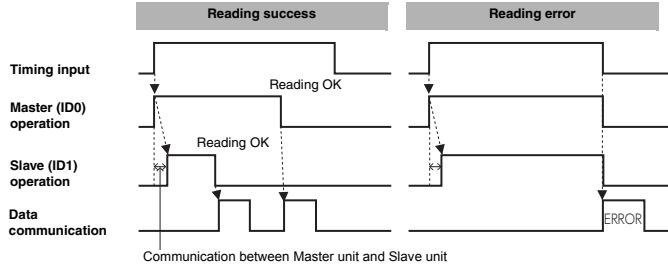


3 Click [Send Configuration].

■ Timing diagrams

Example 1)

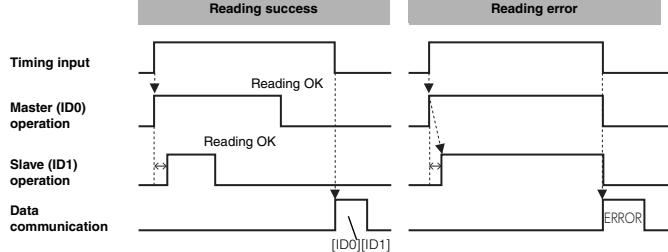
Number of read data elements: 2 Data transmission timing: Send after read



For each read unit ID, the read data is sent to the host device through the master unit.

Example 2)

Number of read data elements: 2 Data transmission timing: Send after timing off



If there are multiple read data elements and transmission is made after timing turns off, the data is output starting from the smallest unit ID regardless of the order in which the data was read.

Point

- Set the data transmission timing on the master unit.
Set slave units to "Send after read."
- Set "Codes to read" to a value that is less than or equal to the total number of readers to connect. If "Codes to read" is set to a value that is larger than this, you will not be able to finish reading.
- When you use multi head mode, you can only select the "Error Image" and "Captured Image" options for saving images.
- OUT terminal when using multi head mode
If only one of multiple units successfully performs reading, that one unit will output OK and all other units will output ERROR.

9-7 Code Quality Verification

What is Code Quality Verification?

The Code quality verification function evaluates the level (High/Low) of total grade based on the verification result output and the set threshold by verifying the 2D code scanned with the SR-1000 Series according to the marking quality evaluation specified by a third-party institution.

The SR-1000 Series provides the following 2D code verifications according to the Code quality verification standards.

Standards	Description	Code type
ISO/IEC15415	This is the 2D code marking quality evaluation standard established by International Organization for Standardization. This is mainly used to evaluate 2D codes printed on labels.	QR DataMatrix PDF417
ISO/IEC TR 29158 (AIM DPM-1-2006)	This is the DPM (Direct Part Marking) 2D code marking quality evaluation standard established by Automatic Identification Manufacturers. This is based on ISO/IEC15415. This was also standardized by International Organization for Standardization in 2011.	QR DataMatrix
SAE AS9132	This is the DataMatrix code marking quality evaluation standard established by SAE (Society of Automotive Engineers) and used by the aerospace industry.	DataMatrix
SEMI T10-0701	This is the DataMatrix code marking quality evaluation standard established by SEMI (Semiconductor Equipment and Materials International) and printed on semiconductor-related materials.	DataMatrix
Japanese Pharmaceutical Code quality verification	Function for evaluating the print quality of codes on pharmaceuticals, recommended by the Safety Division of Pharmaceutical and Food Safety Bureau and the Economic Affairs Division of Health Policy Bureau under the Ministry of Health, Labour and Welfare. It makes reference to ISO/IEC15415 and ISO/IEC15416.	GS1-128 GS1 DataBar Limited GS1 DataBar Stacked CC-A (GS1 DataBar Limited) CC-A (GS1 DataBar Stacked)
ISO/IEC16022	This is a DataMatrix code marking quality evaluation function. It makes reference to ISO/IEC16022:2000.	DataMatrix



Note that this Code quality verification function is designed to evaluate marking quality of the standards-compliant 2D codes of the images scanned with the SR-1000 Series, but cannot be used as an official 2D code verification device.



When you select ISO/IEC15415, you can verify code quality of standalone PDF 417 and MicroPDF417 codes.

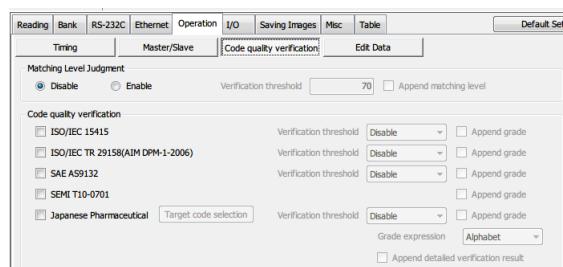
Code Quality Verification Function Settings

■ Configuration procedure

1 Change [Reading Logic] to "Custom mode."

2 On the [Operation] tab, click [Code quality verification].

3 Select all the check boxes of the items that you want to verify.



4 Click [Send Configuration].

■ Settings

Verification threshold	Set the threshold for the verification result. The UNSTABLE signal can be output from the OUT terminal when the reading results are below the threshold.
Append grade	The verification grade will be appended to the read data. Example) <Read data>:<verification grade>
Select expression of grades	You can change the verification grade expression. <ul style="list-style-type: none"> • Alphabet • Numeric
Append detailed verification result	You can append the detailed verification result when an "Append grade" check box is selected.

Point

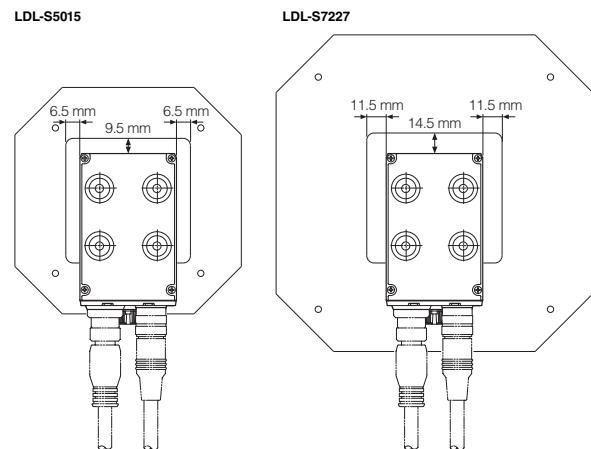
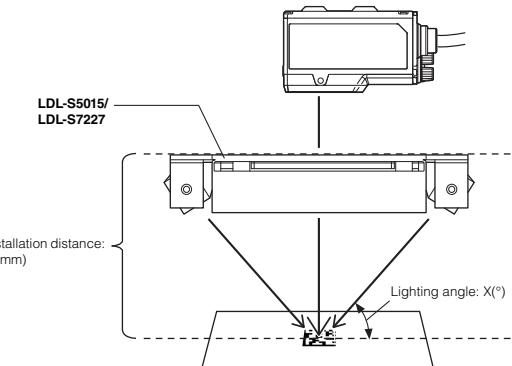
- The decode time is longer when the code quality verification function is enabled.
Complete tuning after enabling the code quality verification function or set the decode timeout to the value that is required for reading. Use the read time test mode to confirm there are no problems with the read time for operation.
- If reading ends with part of the code outside of the SR-1000 field of view, the verification result grade and the detailed verification result will both be displayed as hyphens (-).
- If you want to add the evaluation values used in the judgment of verification results, select the following check boxes.
On the [Operation] tab, click [Code quality verification], and then select the [Append grade] check boxes.
- When you are using the Japanese pharmaceutical code quality verification function, you have to select the target code type after you select the verification item check boxes.

Key Points for Installation

If you want to use the code verification function of the SR-1000 Series with precision, note the following points.

■ Installation method

Use the LDL-S5015/LDL-S7227 (made by NISSIN ELECTRONIC CO., LTD.) and mount lighting at an angle of 45°. (If necessary, you can also mount lighting at an angle of 30° to perform verification.)
In this situation, disable the SR-1000 Series internal lighting.



■ LDL-S5015/LDL-S7227 installation distance: Y mm

Lighting angle: X(°)	LDL-S5015	LDL-S7227
45°	66 mm	90 mm
30°	44.7 mm	61.2 mm

■ Recommended lighting

Manufacturer: NISSIN ELECTRONIC CO., LTD.

	Model	Description
LED illumination	LDL-S5015	108 mm squared, 26 mm deep
	LDL-S7227	162 mm squared, 34 mm deep
LPRD-30W		24 VDC power supply input, 2 channels
Branch cable	L-2BK	2 branches, 1 channel - 2 light
	L-4BK	4 branches, 2 channels- 4 light

Criterion

Evaluation by the Code quality verification function is made for the total evaluation grade.

Evaluation standards are as follows.

■ ISO/IEC15415, ISO/IEC TR 29158 (AIM DPM-1-2006), Japanese pharmaceutical, ISO/IEC16022

High: Verification result >= Threshold value

Low: Verification result < Threshold value

■ SAE AS9132

High: Verification result = Pass

Low: Verification result = Fail

Important SEMI T10-0701 does not offer total evaluation grade and cannot make evaluations.
This means that functions that can be used after evaluation cannot be used with SEMI T10-0701.

Functions that Use Judgment Results

Functions that can use code quality verification evaluation results

■ STABLE terminal output, UNSTABLE terminal output

STABLE terminal output: This is output when the total evaluation grade is the threshold value or more.

UNSTABLE terminal output: This is output when the total evaluation grade is less than the threshold value.

(□ "6-8 Control the I/O Terminals (Page 19)")

■ Saving images of unstable reading

When the total evaluation grade is less than the threshold value, scanned images are saved according to the setting (If the FTP transmission is set, images are sent to the connection destination.).

(□ "6-9 Save Captured Images (Page 20)")

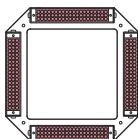
■ Silent mode

When the total evaluation grade is more or less than the threshold value, data communication can be restrained using the silent mode.

Refer to □ "6-12 Suppress Data Output" (page 22)

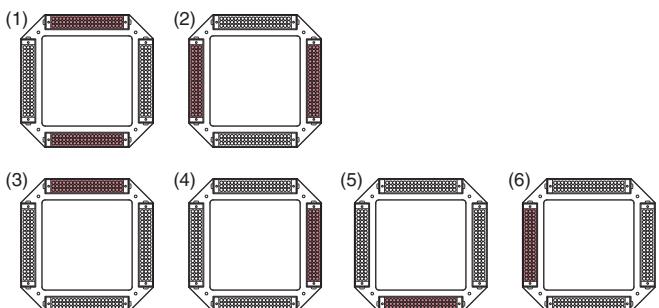
■ Lighting patterns

- Standard lighting pattern



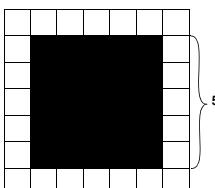
- Special lighting patterns

When you have to set the lighting in a fixed direction, such as when reading a DPM code on a hairline background, install the lighting at an angle of 30°, and then use one of the following lighting patterns.

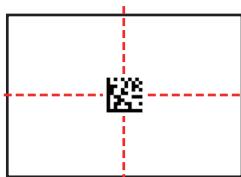


■ Other precautions

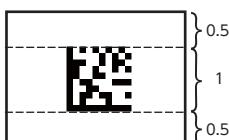
- Ensure that there are five or more pixels per cell.
If there are less than five pixels per cell, reduce the distance between the SR-1000 Series and the codes, and then adjust the focus and tune the reader again.



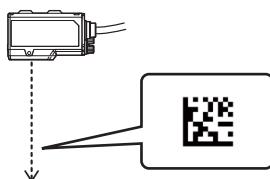
- Position codes so that they are in the center of the field of view.



- Ensure that there are spaces equal to one half the code size or more both above and below the codes.



- Install the reader so that the codes are upright (not rotated) relative to the screen



- Mount the reader on a surface such that the product is level with, not angled to, the codes.

Data Formats of Code Quality Verification Results

● ISO/IEC15415

Setting		Append values	Data format example
Append grades	Append detailed verification result		
Alphabet			Read data: C
Alphabet		✓	Read data: C (-)
Alphabet	✓		Read data: C/A/C/B/A/B/-/A/A/B/A
Alphabet	✓	✓	Read data: C(-)A(-)/A(0.733)(C(-)C(-)B(-)B(-)D(-)D(-))/A(0.002)/A(0.002)/A(1.000)/B(-0.646)/A(-0.289)
Numeric			Read data: 2.0
Numeric		✓	Read data: 2.0(-)
Numeric	✓		Read data: 2.0/4.0/2.0/3.0/4.0/3.0/-/4.0/-/4.0/4.0/4.0/4.0/3.0/4.0
Numeric	✓	✓	Read data: 2.0(-)4.0(-)4.0(0.733)/2.0(-)2.0(-)3.0(-)D(-)D(-)/C(-)4.0(0.002)/A(0.002)/A(1.000)/3(0(-)0.646)/4.0(-)0.289)

● ISO/IEC TR 29158 (AIM DPM-1-2006)

Setting			Data format example
Append grades	Append detailed verification result	Append values	
Alphabet			Read data: C
Alphabet		✓	Read data: C (-)
Alphabet	✓		Read data: C/A/C/B/A/B/-/A/A/B/A/B/A
Alphabet	✓	✓	Read data: C(-)A(-)A(0.733)(C(-)C(-)/B(-)/(-)/(-)/(-))A(0.002)/A(0.002)/A(1.000)/B(-0.646)/A(-0.289)
Numeric			Read data: 2.0
Numeric		✓	Read data: 2.0(-)
Numeric	✓		Read data: 2.0/4.0/2.0/3.0/4.0/3.0/-/4.0/-/4.0/4.0/4.0/4.0/3.0/4.0
Numeric	✓	✓	Read data: 2.0(-)/4.0(-)/4.0(0.733)/2.0(-)/2.0(-)/3.0(-)/(-)/(-)/(-)A(0.002)/A(0.002)/A(1.000)/B(-0.646)/A(-0.289)

SAF AS9132

* Settings for Select expression of grades are not reflected.

Setting			Data format example
Append grades	Append detailed verification result	Append values	
✓			Read data: P
	✓		Read data: P(-)
	✓		Read data: F/P/P/F/P
✓	✓		Read data: E(-)P(-)V(P(0.632)/E(0.852)/P(0.005))
	✓	✓	Read data: E(-)P(-)V(P(0.632)/E(0.852)/P(0.005))

SEMILT10-0701

* Settings for Select expression of grades, Append detailed verification result and Append values are not reflected.

Setting			Data format example
Append grades	Append detailed verification result	Append values	
			Read data: 0.561/0.096/0.490/0.529/3.115/3.136/0.068/ 0.087/0.136/0.087/1.000

- Japanese Pharmaceutical Code quality verification
(Composite Symbol)

- ISO/IEC 16022

Setting			Data format example
Append grades	Append detailed verification result	Append values	
Alphabet			Read data: C
Alphabet		✓	Read data: C (-)
Alphabet	✓		Read data: C/A/C/B/A/A
Alphabet	✓	✓	Read data: C(-)/A(-)/C(0.632)/B(0.069)/A(1.000)/A(0.118)/A(0.118)
Numeric			Read data: 2.0
Numeric		✓	Read data: 2.0(-)
Numeric	✓		Read data: 2.0/4.0/2.0/3.0/4.0/4.0/4.0
Numeric	✓	✓	Read data: 2.0(-)/4.0(-)/2.0(0.632)/3.0(0.069)/4.0(1.000)/4.0(0.118)/4.0(0.118)

Output Order of Code Quality Verification Results

● ISO/IEC 15415

	Evaluation item names	Abbreviated names
(1)	Overall	ALL
(2)	Decode	DEC
(3)	Symbol Contrast	SC
(4)	Modulation	MOD
(5)	Reflectance Margin	RM
(6)	Fixed Pattern Damage	FPD
(7)	Format Information Damage	FID
(8)	Version Information Damage	VID
(9)	Axial Nonuniformity	AN
(10)	Grid Nonuniformity	GN
(11)	Unused Error Correction	UEC
(12)	Print Growth Horizontal	PGH
(13)	Print Growth Vertical	PGV

● ISO/IEC TR 29158 (AIM DPM-1-2006)

	Evaluation item names	Abbreviated names
(1)	Overall	ALL
(2)	Decode	DEC
(3)	Cell Contrast	CC
(4)	Cell Modulation	CM
(5)	Reflectance Margin	RM
(6)	Fixed Pattern Damage	FPD
(7)	Format Information Damage	FID
(8)	Version Information Damage	VID
(9)	Axial Nonuniformity	AN
(10)	Grid Nonuniformity	GN
(11)	Unused Error Correction	UEC
(12)	Print Growth Horizontal	PGH
(13)	Print Growth Vertical	PGV

● SAE AS9132

	Evaluation item names	Abbreviated names
(1)	Overall	ALL
(2)	Quiet Zone	QZ
(3)	Symbol Contrast	SC
(4)	Angular Distortion	AD
(5)	Module Fill	MF

● SEMI T10-0701

	Evaluation item names	Abbreviated names
(1)	Symbol Contrast	SC
(2)	Signal to Noise Ratio	SNR
(3)	Horizontal Mark Growth	HMG
(4)	Vertical Mark Growth	VMG
(5)	DataMatrix Cell Width	DMCW
(6)	DataMatrix Cell Height	DMCH
(7)	Horizontal Mark Move	HMM
(8)	Vertical Mark Move	VMM
(9)	Cell Defects	CD
(10)	Finder Pattern Defects	FPD
(11)	Unused Error Correction	UEC1 to UEC10

*3

● Japanese Pharmaceutical Code quality verification

	Evaluation item names	Abbreviated names
(1)	Overall Composite Symbol	ALL
(1)	Overall	ALL
(2)	Decode	DEC
(3)	EdgeDetermination	EDGE
(4)	Symbol Contrast	SC
(5)	Minimum Reflectance	MINR
(6)	Minimum Edge Contrast	MINE
(7)	Modulation	MOD
(8)	Quiet Zone	QZ
(9)	Decodability	DCD
(10)	Defects	DEF
(1)	Overall	ALL
(2)	Decode	DEC
(3)	EdgeDetermination	EDGE
(4)	Symbol Contrast	SC
(5)	Minimum Reflectance	MINR
(6)	Minimum Edge Contrast	MINE
(7)	Modulation	MOD
(8)	Quiet Zone	QZ
(9)	Decodability	DCD
(10)	Defects	DEF
(11)	Codeword Yield	CY
(12)	Codeword Print Quality	CPQ
(13)	Unused Error Correction	UEC

1D & 2D

1D

2D

● ISO/IEC 16022

	Evaluation item names	Abbreviated names
(1)	Overall	ALL
(2)	Decode	DEC
(3)	Symbol Contrast	SC
(4)	Axial Nonuniformity	AN
(5)	Unused Error Correction	UEC
(6)	Print Growth Horizontal	PGH
(7)	Print Growth Vertical	PGV

*1 Enabled only for QR and micro QR code "-" is displayed for DataMatrix, PDF417, MicroPDF417.

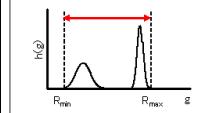
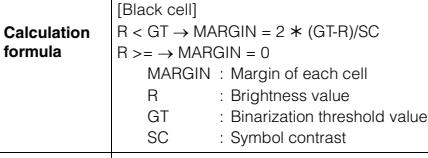
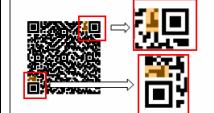
*2 QR code Model 2 Version 7 and later versions are only enabled. "-" is displayed for others.

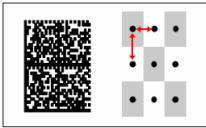
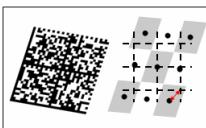
*3 The number of items displayed for UEC, evaluation item for SEMI T10-0701 varies according to the code size.

*4 PGH and PGV do not include total evaluation.

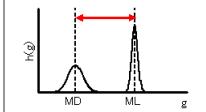
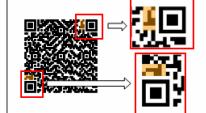
Verification Items

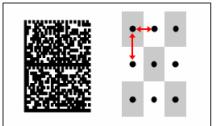
ISO/IEC 15415

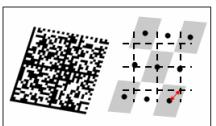
Decode success/failure		DEC (Decode)
Description	Evaluates whether decoding is possible or not.	-
	-	
	-	
Symbol contrast		SC (Symbol Contrast)
Description	Evaluates the difference between the maximum brightness value (Rmax) and minimum brightness value (Rmin) in the code area.	
	SC = (Rmax-Rmin)/255 Rmax : Maximum brightness value Rmin : Minimum brightness value	
	A : more than 0.70 B : 0.55 to 0.70 C : 0.40 to 0.55 D : 0.20 to 0.40 F : less than 0.20	
Modulation		MOD (Modulation)
Description	Evaluates the variation degree in cell brightness	-
	Each cell's MOD = 2 * (abs (R-GT)/SC)	
	R : Brightness value GT : Binarization threshold value SC : Symbol contrast	
Reflectance margin		RM (Reflectance Margin)
Description	Evaluates the variation degree in cell brightness with black and white of the correct cell considered.	
	[White cell] R >= GT → MARGIN = 2 * (R-GT)/SC R < GT → MARGIN = 0	
	[Black cell] R < GT → MARGIN = 2 * (GT-R)/SC R >= → MARGIN = 0 MARGIN : Margin of each cell R : Brightness value GT : Binarization threshold value SC : Symbol contrast	
Fixed pattern damage		FPD (Fixed Pattern Damage)
Description	Evaluates the degree of the fixed pattern damage (area on the right) dependent on the code type.	
	-	
	-	
Format information damage		FID (Format Information Damage)
Description	Evaluates the format information damage degree of QR code.	
	-	
	-	
Version information damage		VID (Version Information Damage)
Description	Evaluates the version information damage degree of QR code (Model 2, version 2 and later versions).	
	-	
	-	

Axial nonuniformity		AN (Axial Nonuniformity)
Description	Evaluates the distortion degree in vertical and horizontal size of the code.	
Calculation formula	$AN = \text{abs}(\bar{X}_{avg} - \bar{Y}_{avg}) / ((\bar{X}_{avg} + \bar{Y}_{avg})/2)$ $\bar{X}_{avg} : \text{Average cell size in horizontal direction}$ $\bar{Y}_{avg} : \text{Vertical cell size in horizontal direction}$	
Criterion	A : less than 0.06 B : 0.06 to 0.08 C : 0.08 to 0.10 D : 0.10 to 0.12 F : more than 0.12	
Grid nonuniformity		GN (Grid Nonuniformity)
Description	Evaluates the maximum position slip of each cell	
Calculation formula	$GN = H_{max}/X$ $H_{max} : \text{Maximum position slip amount}$ $X : \text{Cell size}$	
Criterion	A : less than 0.38 B : 0.38 to 0.50 C : 0.50 to 0.63 D : 0.63 to 0.75 F : more than 0.75	
Unused error correction		UEC (Unused Error Correction)
Description	Evaluates the ratio of error correction unused at the time of decoding.	
Calculation formula	$UEC = 1.0 - ((e + 2t)/(d - p))$ $e : \text{Number of code words that cannot be read}$ $t : \text{Number of error code words}$ $d : \text{Number of error corrected code words}$ $p : \text{Number of error detected code words}$	
Criterion	A : more than 0.62 B : 0.50 to 0.62 C : 0.37 to 0.50 D : 0.25 to 0.37 F : less than 0.25	
Print growth (horizontal)		PGH (Print Growth Horizontal)
Description	Evaluates the mark cell growth in the horizontal direction. This item is not included in the total evaluation.	
Calculation formula	$(D - 0.5)/0.15$ $D : \text{On the horizontal clock pattern}$ $\text{Ratio of the number of pixels of mark cell}$	
Criterion	A : -0.50 to 0.50 B : -0.70 to -0.50 or 0.50 to 0.70 C : -0.85 to -0.70 or 0.70 to 0.85 D : -1.00 to -0.85 or 0.85 to 1.00 F : less than -1.00 or more than 1.00	
Print growth (vertical)		PGV (Print Growth Vertical)
Description	Evaluates the mark cell growth in the vertical direction. This item is not included in the total evaluation.	
Calculation formula	$(D - 0.5)/0.15$ $D : \text{On the vertical clock pattern}$ $\text{Ratio of the number of pixels of mark cell}$	
Criterion	A : -0.50 to 0.50 B : -0.70 to -0.50 or 0.50 to 0.70 C : -0.85 to -0.70 or 0.70 to 0.85 D : -1.00 to -0.85 or 0.85 to 1.00 F : less than -1.00 or more than 1.00	

ISO/IEC TR 29158 (AIM DPM-1-2006)

Decode success/failure		DEC (Decode)
Description	Evaluates whether decoding is possible or not.	
Calculation formula	-	
Criterion	-	
Cell contrast		CC (Cell Contrast)
Description	Evaluates the difference between the average brightness value of bright cell (ML) and average brightness value of dark cell (MD).	
Calculation formula	$CC = (ML - MD)/ML$ $ML : \text{Average brightness value of bright cell}$ $MD : \text{Average brightness value of dark cell}$	
Criterion	A : more than 0.30 B : 0.25 to 0.30 C : 0.20 to 0.25 D : 0.15 to 0.20 F : less than 0.15	
Cell modulation		CM (Cell Modulation)
Description	Evaluates the variation degree in cell brightness	
Calculation formula	[White cell] $CM = (R - GT)/(ML - GT) \text{ (When } R \geq GT)$ [Black cell] $CM = (GT - R)/(GT - MD) \text{ (When } R < GT)$ $R : \text{Brightness value}$ $GT : \text{Binariization threshold value}$ $ML : \text{Average brightness value of bright cell}$ $MD : \text{Average brightness value of dark cell}$	
Criterion	-	
Reflectance margin		RM (Reflectance Margin)
Description	Evaluates the variation degree in cell brightness with black and white of the correct cell considered.	
Calculation formula	[White cell] $R \geq MARGIN = (R - GT)/(ML - GT)$ $R < GT \rightarrow MARGIN = 0$ [Black cell] $R > GT \rightarrow MARGIN = (GT - R)/(GT - MD)$ $R \geq = \rightarrow MARGIN = 0$ $MARGIN : \text{Margin of each cell}$ $R : \text{Brightness value}$ $GT : \text{Binariization threshold value}$ $CC : \text{Cell contrast}$	
Criterion	-	
Fixed pattern damage		FPD (Fixed Pattern Damage)
Description	Evaluates the degree of the fixed pattern damage (area on the right) dependent on the code type.	
Calculation formula	-	
Criterion	-	
Format information damage		FID (Format Information Damage)
Description	Evaluates the format information damage degree of QR code.	
Calculation formula	-	
Criterion	-	
Version information damage		VID (Version Information Damage)
Description	Evaluates the version information damage degree of QR code (Model 2, version 7 and later versions).	
Calculation formula	-	
Criterion	-	
		

Axial nonuniformity		AN (Axial Nonuniformity)
Description	Evaluates the distortion degree in vertical and horizontal size of the code.	
Calculation formula	AN = abs (Xavg - Yavg)/((Xavg + Yavg)/2) Xavg : Average cell size in horizontal direction Yavg : Vertical cell size in horizontal direction	
Criterion	A : less than 0.06 B : 0.06 to 0.08 C : 0.08 to 0.10 D : 0.10 to 0.12 F : more than 0.12	

Grid nonuniformity		GN (Grid Nonuniformity)
Description	Evaluates the maximum position slip of each cell	
Calculation formula	GN = Hmax/X Hmax : Maximum position slip amount X : Cell size	
Criterion	A : less than 0.38 B : 0.38 to 0.50 C : 0.50 to 0.63 D : 0.63 to 0.75 F : more than 0.75	

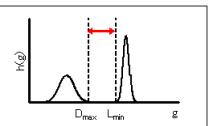
Unused error correction		UEC (Unused Error Correction)
Description	Evaluates the ratio of error correction unused at the time of decoding.	
Calculation formula	UEC = 1.0 - ((e + 2t)/(d - p)) e : Number of code words that cannot be read t : Number of error code words d : Number of error corrected code words p : Number of error detected code words	—
Criterion	A : more than 0.62 B : 0.50 to 0.62 C : 0.37 to 0.50 D : 0.25 to 0.37 F : less than 0.25	

Print growth (horizontal)		PGH (Print Growth Horizontal)
Description	Evaluates the mark cell growth in the horizontal direction. This item is not included in the total evaluation.	
Calculation formula	(D - 0.5)/0.15 D : On the horizontal clock pattern Ratio of the number of pixels of mark cell	

Print growth (vertical)		PGV (Print Growth Vertical)
Description	Evaluates the mark cell growth in the vertical direction. This item is not included in the total evaluation.	
Calculation formula	(D - 0.5)/0.15 D : On the vertical clock pattern Ratio of the number of pixels of mark cell	

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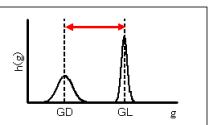
Quiet zone		QZ (Quiet Zone)
Description	Evaluates if multiple cells of quiet zone exist around the code.	
Calculation formula	-	

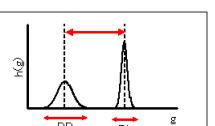
Symbol contrast		SC (Symbol Contrast)
Description	Evaluates the difference between the maximum brightness value of dark cell (Dmax) and minimum brightness value of bright cell (Lmin) in the code area.	
Calculation formula	(Lmin - Dmax)/255 Lmin : Minimum brightness value of bright cell Dmax : Maximum brightness value of dark cell	
Criterion	Pass : more than 0.20 Fail : less than 0.20	

Angular distortion		AD (Angular Distortion)
Description	Evaluates the distortion degree from 90 degrees of the angle formed by the straight line at L part.	
Calculation formula	-	

Module fill		MF (Module Fill)
Description	Evaluates the distortion from the correct size of the cell size.	
Calculation formula	Length of the side of cell/Module size	
Criterion	Pass : 0.60 to 1.05 Fail : less than 0.60 or more than 1.05	

SEMI T10-0701

Symbol contrast		SC (Symbol Contrast)
Description	Evaluates the difference between the average brightness value of background (GL) and average brightness value of foreground (GD).	
Calculation formula	(GL - GD)/255 GL : Average brightness value of background GD : Average brightness value of foreground	
Criterion	1 is the best.	

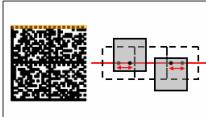
Signal to noise ratio		SNR (Signal to Noise Ratio)
Description	Evaluates the symbol contrast size against brightness variation.	
Calculation formula	(GL - GD)/Max (DL, DD) GL : Average brightness value of background GD : Average brightness value of foreground DL : Dispersion of background brightness value DD : Dispersion of foreground brightness value Max() : Maximum value	
Criterion	The greater, the better.	

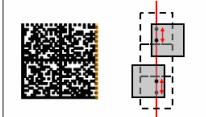
Horizontal mark growth		HMG (Horizontal Mark Growth)
Description	Evaluates the expansion and contraction degree of mark cell width of the timing pattern on the upper part.	
Calculation formula	Med (MCW)/(Med (MCW) + Med (SCW)) MCW : Mark cell width SCW : Space cell width Med () : Median value	
Criterion	0.5 is the best. Small → Thin Large → Thick	

Vertical mark growth		VMG (Vertical Mark Growth)
Description	Evaluates the expansion and contraction degree of mark cell height of the timing pattern on the right.	
Calculation formula	Med (MCH)/(Med (MCH) + Med (SCH)) MCH : Mark cell height SCH : Space cell height Med () : Median value	
Criterion	0.5 is the best. Small→Thin Large→Thick	

Average cell width		DMCW (DataMatrix Cell Width)
Description	Evaluates the average cell width.	
Calculation formula	(UL + BL)/(2 * N) UL : Number of upper side pixels BL : Number of bottom side pixels N : Number of horizontal cells	
Criterion	-	

Average cell height		DMCH (DataMatrix Cell Height)
Description	Evaluates the average cell height.	
Calculation formula	(RL + LL)/(2 * M) RL : Number of right side pixels LL : Number of left side pixels M : Number of vertical cells	
Criterion	-	

Horizontal misplacement		HMM (Horizontal Mark Misplacement)
Description	Evaluates the misplacement of the mark cell center position of the timing pattern on the upper part.	
Calculation formula	$\sum MHi / (N * DMCW)$ MHi : Amount of the horizontal misplacement of each cell on upper TP N : Number of horizontal cells DMCW : Average cell width	
Criterion	0 is the best. (1 means the 1-cell misplacement.)	

Vertical misplacement		VMM (Vertical Mark Misplacement)
Description	Evaluates the misplacement of the mark cell center position of the timing pattern on the right.	
Calculation formula	$\sum MVi / (M * DMCH)$ MVi : Amount of the vertical misplacement of each cell on the right TP M : Number of vertical cells DMCH : Average cell width	
Criterion	0 is the best. (1 means the 1-cell misplacement.)	

Cell defects		CD (Cell Defects)
Description	Evaluates the number of pixels for which white and black judgment was wrong.	
Calculation formula	Number of wrong pixels/All pixels	
Criterion	0 is the best.	

Finder pattern defects		FPD (Finder Pattern Defects)
Description	Evaluates the number of pixels for which white and black judgment was wrong at the L part.	
Calculation formula	Number of wrong pixels at the L part/All pixels at the L part	
Criterion	0 is the best.	

Unused error correction		UEC (Unused Error Correction)
Description	Evaluates the ratio of error correction unused at the time of decoding.	
Calculation formula	$UEC = 1.0 - ((e + 2t) / (d - p))$ e : Number of code words that cannot be read t : Number of error code words d : Number of error corrected code words p : Number of error detected code words	
Criterion	1.00 : Error correction is not used at all. 0.00 : Decoding failed or error correction has been used up.	

Japanese pharmaceutical code verification (GS1 DataBar Limited, GS1 DataBar Stacked, GS1-128)

Decode success/failure		DEC(Decode)
Description	Evaluates whether decoding is possible or not.	
Number of edges		EDGE (EdgeDetermination)
Description	Determines whether the read number of edges is equal to the assumed number of edges.	
Calculation formula	-	
Criterion	A : Success F : Failure	
Symbol contrast		SC (Symbol Contrast)
Description	Evaluates the difference between the maximum brightness value (Rmax) and minimum brightness value (Rmin) in the code area.	
Calculation formula	$SC = R_{max} - R_{min}$	
Criterion	A : $SC \geq 70\%$ B : $SC \geq 55\%$ C : $SC \geq 40\%$ D : $SC \geq 20\%$ F : $SC < 20\%$	
Minimum Reflectance		MINR (Minimum Reflectance)
Description	Minimum reflectance among scanned waveforms	
Calculation formula	-	
Criterion	A : $R_{min} \leq 0.5 R_{max}$ F : $R_{min} > 0.5 R_{max}$	
Minimum edge contrast		MINE (Minimum Edge Contrast)
Description	Minimum value of reflectance gap between space (including the quiet zone) and an adjacent bar	
Calculation formula	$EC = R_s - R_b$ $EC_{min} = \text{Min}(EC)$ Rs : Reflectance of space Rb : Reflectance of space	
Criterion	A : $EC_{min} \geq 15\%$ F : $EC_{min} < 15\%$	
Modulation		MOD (Modulation)
Description	Ratio between the minimum edge contrast and the symbol contrast	
Calculation formula	$MOD = EC_{min} / SC$	
Criterion	A : $MOD \geq 0.70$ B : $MOD \geq 0.60$ C : $MOD \geq 0.50$ D : $MOD \geq 0.40$ F : $MOD < 0.40$	
Minimum quiet zone		QZ (Quiet Zone)
Description	Evaluates whether the quiet zone width conforms to the standards.	
Calculation formula	-	
Criterion	A : Satisfied F : Not satisfied	
* The evaluation of GS1 DataBar Limited (including CC-A/CC-B) is dependent on the main unit setting.		
Decodability		DCD (Decodability)
Description	Decode margin is dependent on the code type Evaluates the level of error between the ideal line width pattern and the actual line width pattern.	
Calculation formula	-	
Criterion	-	
Defects		DEF (Defects)
Description	Evaluates color unevenness in an element.	
Calculation formula	$Defects = ERN_{max} / SC$ ERN = (Gap between the maximum and minimum values of reflectance in an element), $ERN_{max} = \text{Max}(ERN)$	
Criterion	A : Defects ≤ 0.15 B : Defects ≤ 0.20 C : Defects ≤ 0.25 D : Defects ≤ 0.30 F : Defects > 0.30	

Japanese pharmaceutical code verification (GS1 DataBar composite) and ISO/IEC 15415 (PDF 417, MicroPDF417)

Decode success/failure		DEC(Decode)
Description	Evaluates whether decoding is possible or not.	-
Calculation formula	-	
Criterion	A : Success F : Failure	
Number of edges		EDGE (EdgeDetermination)
Description	Determines whether the read number of edges is equal to the assumed number of edges.	-
Calculation formula	-	
Criterion	A : Match F : Mismatch	
Symbol contrast		SC (Symbol Contrast)
Description	Evaluates the difference between the maximum brightness value (R_{max}) and minimum brightness value (R_{min}) in the code area.	-
Calculation formula	$SC = R_{max} - R_{min}$	
Criterion	A : $SC \geq 70\%$ B : $SC \geq 55\%$ C : $SC \geq 40\%$ D : $SC \geq 20\%$ F : $SC < 20\%$	
Minimum reflectance		MINR (Minimum Reflectance)
Description	Minimum reflectance among scanned waveforms	-
Calculation formula	-	
Criterion	A : $R_{min} \leq 0.5 R_{max}$ F : $R_{min} > 0.5 R_{max}$	
Minimum edge contrast		MINE (Minimum Edge Contrast)
Description	Minimum value of reflectance gap between space (including the quiet zone) and an adjacent bar	-
Calculation formula	$EC = R_s - R_b$ $EC_{min} = \min(EC)$ R_s : Reflectance of space R_b : Reflectance of space	
Criterion	A : $EC_{min} \geq 15\%$ F : $EC_{min} < 15\%$	
Modulation		MOD (Modulation)
Description	Ratio between the minimum edge contrast and the symbol contrast	-
Calculation formula	$MOD = EC_{min} / SC$	
Criterion	A : $MOD \geq 0.70$ B : $MOD \geq 0.60$ C : $MOD \geq 0.50$ D : $MOD \geq 0.40$ F : $MOD < 0.40$	
Minimum quiet zone		QZ (Quiet Zone)
Description	Evaluates whether the quiet zone width satisfies the standards.	-
Calculation formula	-	
Criterion	A : Satisfied F : Not satisfied	
Decodability		DCD (Decodability)
Description	Decode margin dependent on the code type Evaluates the level of error between the ideal line width pattern and the actual line width pattern.	-
Calculation formula	-	
Criterion	-	
Defects		DEF(Defects)
Description	Evaluates color unevenness in an element.	-
Calculation formula	Defects = ERN_{max} / SC $ERN = (\text{Gap between the maximum and minimum values of reflectance in an element}) / ERN_{max}$, $ERN_{max} = \text{Max (ERN)}$	
Criterion	A : Defects ≤ 0.15 B : Defects ≤ 0.20 C : Defects ≤ 0.25 D : Defects ≤ 0.30 F : Defects > 0.30	

Effective codeword ratio		CY(Codeword Yield)
Description	Ratio of successfully read codewords	-
Calculation formula	-	
Criterion	A : $CY \geq 71\%$ B : $CY \geq 64\%$ C : $CY \geq 57\%$ D : $CY \geq 50\%$ F : $CY < 50\%$	
Codeword print quality		CPQ (Codeword Print Quality)
Description	Evaluates the print quality of codewords.	-
Calculation formula	-	
Criterion	-	
Unused error correction		UEC (Unused Error Correction)
Description	Evaluates the ratio of error correction unused at the time of decoding.	-
Calculation formula	$UEC = 1.0 - ((e + 2t) / (d - p))$ e : Number of codewords that cannot be read t : Number of error codewords d : Number of error corrected codewords p : Number of error detected codewords	
Criterion	A : $UEC \geq 0.62$ B : $UEC \geq 0.50$ C : $UEC \geq 0.37$ D : $UEC \geq 0.25$ F : $UEC < 0.25$	

■ GS1 DataBar Limited and CC-A/B (GS1 DataBar Limited)

GS1 DataBar Limited (including GS1 DataBar Limited as a part of CC-A/B) is characterized by being closely similar to some portion of other barcodes in terms of the bar structure.
Accordingly, the standard regarding GS1 DataBar Limited was amended in 2011.

The amended standard requires that a trailing space five times the width of the narrow bar is maintained to the right of GS1 DataBar Limited.

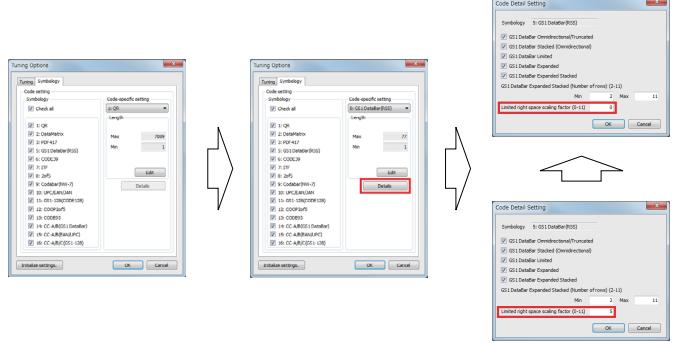


A space 5 times the narrow bar width as shown here must be secured.

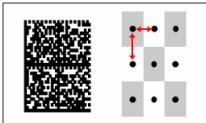


For materials with a dark surface, if the spaces are printed with a laser marker, the marker may not comply with the new standard. In this case, the SR-1000 Series cannot be tuned with the factory default setting.

If tuning is not possible with these printed codes, set the Limited right space scaling factor to 0 and retry tuning.



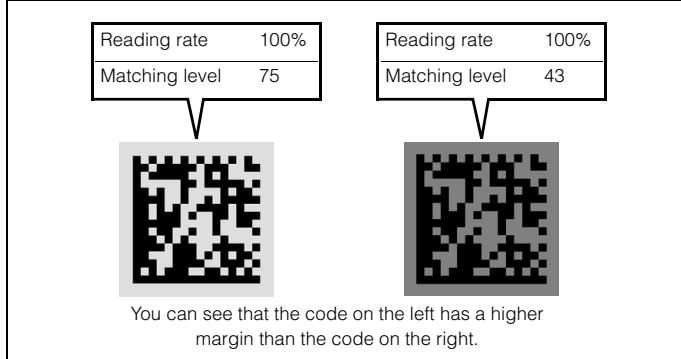
● ISO/IEC16022 Verification

Decode		DEC (Decode)
Description	Evaluates whether decoding is possible or not.	-
Calculation formula	-	-
Criterion	A : Approved F : Failed	-
Symbol Contrast		SC (Symbol Contrast)
Description	Evaluates the difference between the code region brightness top 10% average (RL) and bottom 10% average (RD).	-
Calculation formula	$SC = RL - RD / 255$	-
Criterion	A : $SC \geq 70\%$ B : $SC \geq 55\%$ C : $SC \geq 40\%$ D : $SC \geq 20\%$ F : $SC \leq 20\%$	-
Axial Nonuniformity		AN (Axial Nonuniformity)
Description	Evaluate degree of distortion in the vertical and horizontal size of the code.	-
Calculation formula	$AN = abs(Xavg - Yavg) / (Xavg + Xavg) / 2$ Xavg: Average cell size in horizontal direction Yavg: Average cell size in vertical direction	
Criterion	A : less than 0.06 B : 0.06 to 0.08 C : 0.08 to 0.10 D : 0.10 to 0.12 F : more than 0.12	-
Unused Error Correction		UEC (Unused Error Correction)
Description	Evaluates percentage of error correction not used during decoding.	-
Calculation formula	$UEC = 1.0 - ((e + 2t) / (d - p))$ e : Number of code words not read t : Number of error code words d : Number of corrected code words p : Number of code words where error detected	-
Criterion	A : more than 0.62 B : 0.50 to 0.62 C : 0.37 to 0.50 D : 0.25 to 0.37 F : less than 0.25	-
Print Growth (Horizontal)		PGH (Print Growth Horizontal)
Description	Evaluates the growth in horizontal direction marked cell.	-
Calculation formula	$(D - 0.5) / 0.15$ D : Proportion of number of pixels in marked cells on horizontal clock pattern	
Criterion	A : -0.50 to 0.50 B : -0.70 to -0.50 or 0.50 to 0.70 C : -0.85 to -0.70 or 0.70 to 0.85 D : -1.00 to -0.85 or 0.85 to 1.00 F : less than -1.00 or more than 1.00	-
Print Growth Vertical		PGV (Print Growth Vertical)
Description	Evaluates the growth in vertical direction marked cell.	-
Calculation formula	$(D - 0.5) / 0.15$ D : Proportion of number of pixels in marked cell on vertical clock pattern	
Criterion	A : -0.50 to 0.50 B : -0.70 to -0.50 or 0.50 to 0.70 C : -0.85 to -0.70 or 0.70 to 0.85 D : -1.00 to -0.85 or 0.85 to 1.00 F : less than -1.00 or more than 1.00	-

9-8 Matching level

Matching level is a reference value for determining how easy it is for the SR-1000 to read the code for successful image reading when the SR-1000 reads the code successfully.

It can be used to check the reading allowance or it can also be used as correlation index of a parameter bank when tuning.



Matching level OK/NG judgment function

Matching level OK/NG judgment function notifies about changes in code marking conditions and changes in read conditions by determining whether the matching level is high or low against the set threshold. Before a serious problem occurs due to reduced stability of reading, this function can be used as information to take an appropriate action.

Criteria for judging matching level

Criteria for judging the matching level is as follows:

High: Matching level \geq Threshold

Low: Matching level $<$ Threshold

Functions that use matching level OK/NG judgments

The following 4 types of functions can be used by enabling the matching level OK/NG judgment function.

■ STABLE terminal output, UNSTABLE terminal output

STABLE terminal outputOutput when the matching level exceeds the threshold.
UNSTABLE terminal outputOutput when the matching level falls below the threshold.
(□ "6-8 Control the I/O Terminals (Page 19)")

■ Saving unstably read images

When the matching level is lower than the threshold, save it in accordance with the scan image settings (when set to FTP transmission, send to the destination).
(□ "6-9 Save Captured Images (Page 20)")

■ Silent Mode

When the matching level is higher or lower than the threshold, data communication can be restrained using silent mode.
(□ "6-12 Suppress Data Output (Page 22)")

■ Function to append matching level

Matching level can be appended to read data.

(□ "10-2 Data Communication Format (Page 51)")

Setting the matching level judgment function

□ "6-6 Check Print Quality" (page 18)

- Point • The decode time is longer when the matching level judgment function is enabled. Complete tuning after enabling the function or set the decode timeout to the value that is required for reading. Use the read time test mode to confirm there are no problems with the read time for operation.
- When you use the matching level judgment function, use "custom mode" for the reading method (the reading logic).

Precautions

■ Notes when using the code quality verification function

The code quality verification results may change according to the reading method and parameter bank.

- If the reading method is set to "smart mode," the verification results may vary. Use "custom mode."
- When there are multiple parameter banks, the verification results may vary due to differences in the brightnesses of acquired images. Implement marking verification under the same brightness conditions.
- If the colors of the code and background change, set the parameter bank used as standard, and then verify code quality.

9-9 Preset Data Comparison

Preset Data Function

This function allows the SR-1000 Series to compare the read code data against the registered code data (preset data), and output an OK/NG signal to indicate whether or not they match. This allows the SR-1000 Series to detect different codes simply without a trigger sensor or other devices. One set of preset data can be stored in the SR-1000 Series (maximum 494 digits). The starting digit (starting position) and range (number of digits) for the comparison can be set in the preset data, so even codes with more than 494 digits can be verified.

Point

- The comparison starts at the specified starting position on the preset data and continues for the specified number of digits. Data cannot be verified at multiple points.
- You cannot use the preset data comparison function when reading multiple codes.

Registering Preset Data

Use one of the following three methods to register to the SR-1000 Series preset data for comparison.

(1) Use AutoID Network Navigator to register the data.

□ "6-11 Compare the Read Data (Preset Data Comparison)" (page 22)

(2) Use commands to register the data.

Example) Registering "123" as the data
Send the following command.

WP,402,313233[CR]

□ "12-3 SR-1000 Series Configuration Commands" (page 56)

(3) Read a code to register the data.

You can read a code to register its read results as the preset data.

• Results output when reading a code to register as the preset data

PR	nn	:	Result data	nn = Preset registration result (00 to 05)
----	----	---	-------------	--

nn	Description	Result data
00	Preset registration success	Read data
01	Preset read failure	Read error data
02	The preset effective digit is specified as 0.	
03	The number of digits of read data is less than the number of digits for preset start.	[null]
04	The preset registration is not possible because the operation mode is set to multi 2 or multiple read.	
05	Two or more "!" exist in preset data.	

Output Terminal Operation

When you make a comparison against preset data, the results output from the output terminal are shown below.

■ Output terminal operation

Reading successful and the read data matches the preset data	OK
Reading successful and the read data does not match the preset data	NG (Comparison NG)
Reading error	ERROR

To assign the above functions to an output terminal, refer to □ "6-8 Control the I/O Terminals" (page 19).

Preset Data Wild Cards

You can use "!" and "?" as wild cards in the preset data.

■ Meanings of "!" and "?" in the preset data

!	This indicates an arbitrary character string. You can only use this wild card once within the preset data.
?	This indicates an arbitrary character. You can use this wild card multiple times within the preset data.

Examples)

Preset data	Read data	Output result
123!	1234	OK
	12345	OK
	1111	NG (Comparison NG)
123?	1234	OK
	12345	NG (Comparison NG)
	1111	NG (Comparison NG)
1234	1234	OK
	12345	NG (Comparison NG)
	1111	NG (Comparison NG)

□ Reference If no preset data is registered, "!" is automatically registered for the preset data.

Sequence Comparison

This function checks sequencing of numeric values.

You can make comparisons in situations where the numeric values within the code change one by one, such as checking serial numbers.

■ Operation

If the comparison is successful, the numeric value of the comparison data is incremented (or decremented).

If the comparison is not successful, the numeric value of the comparison data is not incremented (or decremented) until the correct sequence value is checked. The first numeric value registered as a preset after the power is turned on is treated as the basis for incrementing (or decrementing) in the comparison.

■ Settings

Configure the following settings.

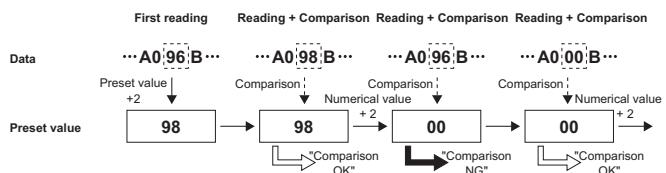
Comparison method	"Sequential."
Origin	Specify the digit at which to start the comparison.
Length	Specify how many digits to compare starting at the "Origin."
Increment	Set the increment (or decrement) of a single operation.

Example) Operation with the following settings

Origin: 3

Length: 2

Increment: 2



□ Point The following restrictions are placed on the sequence comparison function:

- The comparison results in NG when a value other than a numerical value is read.
- The preset data cannot be registered through communication.

9-10 Scripts

With the SR-1000 Series, you can use a simple programming language known as "scripts" to operate with a higher degree of freedom than is available with the setup software (AutoID Network Navigator).

This function is aimed at those who have programming experience. For details, refer to the separate document "SR-1000/D100/750/700 Series Script Reference."

What Can Scripts Do?

(1) Edit data.

- Cutting arbitrary locations from the read data
- Adding arbitrary character strings to the read data
- Comparing data and outputting result data
- Four arithmetic operations (add, subtract, multiply, and divide)
- Adding code rotation angles

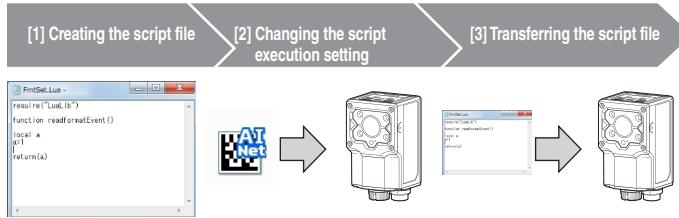
(2) Control the output from the output terminals.

- Comparing data and generating output from the output terminals

(3) Edit image file names.

- Changing the name of the image file to send over FTP
- Adding time stamps to image file names

Configuration Procedure



[1] Creating the script file

Create the script file (FmtSet.Lua) and write the program using a text editor such as notepad.exe.

[2] Changing the script execution settings

Using AutoID Network Navigator, enable the script execution setting of the SR-1000 Series.

• Setting locations

(1) Edit data.

On the [Operation] tab, click [Edit Data], and then select the "Use script" check box.

(2) Control the output from the output terminals.

On the [Operation] tab, click [Edit Data], and then select the "Use script" check box.

*On the [I/O] tab, select the "SCRIPT CONTROL" check box under [OUT1 Function], [OUT2 Function], or [OUT3 Function].

(3) Edit image file names.

On the [Saving Images] tab, select the "Use script" check box under [Edit Image File Name].

* You have to configure the FTP transmission settings.

[3] Transferring the script file

Transfer the script file (FmtSet.Lua) to the SR-1000 Series.

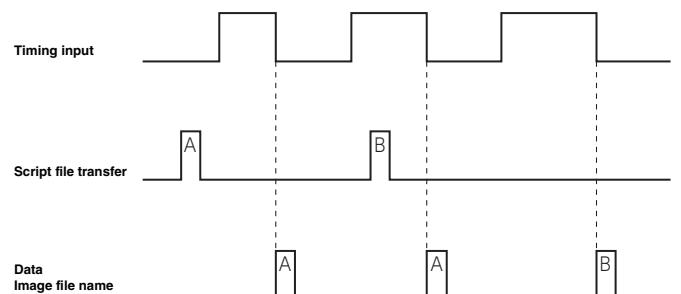
• Transfer methods

- Use [Send Configuration] in AutoID Network Navigator to transfer the script file.
- Use the [Terminal] in AutoID Network Navigator to transfer the script file.
- Transfer the script file from "File View."
- Transfer the script file through the FTP interface.

■ Script file application timing

Even while the SR-1000 Series is running, you can transfer script files at any time through the FTP interface.

In this situation, the script program will be applied after the trigger turns on after the file is transferred.



- When transferring a script file using "File View" or the FTP interface, you have to set the file name to "FmtSet.Lua".
- If config.ptc or FmtSet.Lua is transferred to the SR-1000 through the FTP interface while the SR-1000 is operating, its reading operation will be canceled.

Handling Script Files

This section describes how to handle script files when restoring the SR-1000 to its factory default configuration or when using the changeover function.

Operation contents	FmtSet.lua
AutoID Network Navigator "Retrieve Configuration"	Receives with the configuration file at the same time.
AutoID Network Navigator "Send Configuration"	Sends with the configuration file at the same time.
AutoID Network Navigator "Default Settings"	Remains.
Send or delete by FileView	Transmission and deletion possible from PC.
Reading quick setup codes	Remains.
Send command	SAVE
	LOAD
	DFLT
	BSAVE
	BLOAD

Check Information Using Commands

Function	Command name	Parameter	Response
Obtaining the script processing time ¹	SCPTIME	-	OK,SCPTIME,now=Aus, maxBus,min=Cus A: The most recent script processing time B: The maximum processing time C: The minimum processing time
Script debug setting ²	SCPDBG,n	n = 1: Debugging on 0: Debugging off	OK,SCPDBG
Obtaining the script error results	SCPERR	-	OK,SCPERR,m m: Script error details
Obtaining the script file version	SCPVER	-	OK,SCPVER,m,n m: Script library version n: Version written in FmtSet.Lua

*1 Returns the processing time of scripts that have been executed since the power turned on

*2 If you turn debugging on, the "print(str)" commands within the script file will be executed.

10-1 SR-1000 Series Communication Types

The SR-1000 Series is equipped with the following three communication paths.

- (1) I/O communication
- (2) RS-232C
- (3) Ethernet

(1) I/O Communication

You can perform the operations listed below by assigning functions to the I/O terminals.

Input terminals	Start reading or tuning by applying signals from an external sensor or switch.
Output terminals	Turn signals on to activate an external buzzer or LED when reading is successful or fails.

■ Wiring the I/O terminals

□ "2-1 Connection and Wiring"

■ Assigning functions to the I/O terminals

□ "6-8 Control the I/O Terminals (Page 19)"

(2) RS-232C

With the RS-232C interface of the SR-1000 Series, you can use the following types of communication.

■ Serial communication

You can communicate with devices that have RS-232C interfaces. You can transfer the read data of the SR-1000 Series in a procedureless manner and use commands to start reading.

- "11-1 Serial Communication" (page 53)
- "12-1 Command Communication" (page 54)

Protocol	None, PASS/RTRY, or ACK/NAK
----------	-----------------------------

■ PLC link

You can communicate with PLCs that support the "PLC link function." Because the SR-1000 Series directly controls the memory in the PLC, communication programs are not necessary. This leads to a reduction in man-hours spent creating programs.

□ "13-1 PLC Link Overview" (page 65)

Protocol	KV Studio, MC protocol, or SYSWAY
----------	-----------------------------------

(3) Ethernet

With the Ethernet interface of the SR-1000 Series, you can use the following types of communication.

■ Socket communication (TCP/UDP)

You can use socket communication to transfer the read data of the SR-1000 Series.

You can use commands to control the operations and change the settings of the SR-1000 Series.

- "11-2 Socket Communication (TCP, UDP)" (page 53)
- "12-1 Command Communication" (page 54)

Protocol	TCP, UDP
----------	----------

■ PLC link

You can communicate with PLCs that support the "PLC link function." Because the SR-1000 Series directly controls the memory in the PLC, communication programs are not necessary. This leads to a reduction in man-hours spent creating programs.

□ "13-1 PLC Link Overview" (page 65)

Protocol	KV Studio, MC protocol, or OMRON PLC Link
----------	---

■ EtherNet/IP

□ "14-1 EtherNet/IP Overview" (page 71)

Protocol	EtherNet/IP
----------	-------------

■ PROFINET

□ "15-1 PROFINET Overview" (page 84)

Protocol	PROFINET
----------	----------

■ FTP

The SR-1000 Series can perform the following operations through the FTP interface.

- Transferring captured images
- Receiving configuration files and script files
- Appending read data to text files on the FTP server

Protocol	FTP
----------	-----

When using the SR-1000 Series as an FTP server, operate the FTP server in anonymous mode.

■ SNTP

The SR-1000 Series can obtain time information from SNTP servers and can synchronize its time with that of these servers.

Protocol	SNTP
----------	------

- Reference • The following functions use the protocols shown here.

File View: FTP
MultiMonitor: UDP
Master/slave function: UDP

► Important When you use EtherNet/IP or PROFINET, you cannot use the "master/slave function's" multi drop link.

Ethernet Communication Port Numbers

Communication name	Listen/remote port	Protocol	Port number
Command communication	Listen port	TCP, UDP	1024 to 65535 ¹
Ethernet data (server)	Listen port	TCP	1024 to 65535 ¹
Ethernet data (client)	Remote port	TCP, UDP	1024 to 65535
PLC link	Remote port	UDP	1024 to 65535
FTP communication	-	FTP	20: FTP data port (ACTIVE mode) 21: FTP service port

*1 9013, 9014, 9015, 9016, 5900, 5920, and 44818 cannot be set as they are reserved for the reader system.

10-2 Data Communication Format

The SR-1000 data communication format is common for both RS-232C and Ethernet.

Communication Format for Read Data

Read data is sent using the ASCII code with the header and terminator added, as shown below.

Header	Read Data	Terminator
--------	-----------	------------

Various types of data can be appended to read data.

Header and terminator can be selected from the following options using AutoID Network Navigator. They also can be set to any string up to 5 characters.

● Header

None/ **STX** (0x02) / **ESC** (0x1B)

● Terminator

CR (0x0D) / **CR** **LF** (0x0D) (0x0A) / **ETX** (0x03)

Read Error Codes

If the code cannot be read, the SR-1000 Series will send a read error code to the host device.

Read error code default setting: ERROR

Header	ERROR	Terminator
--------	-------	------------

Read error codes can be set to any string of text, up to 8 characters, using AutoID Network Navigator.

Additionally, the device can be set to not send error codes.

Appending Data

Various types of data can be appended to read data.

■ Read data format

The data format for appending various types of data to read data is shown below:

Data size	Time	:	Code type	:	Symbol ID	Read data	:	Parameter bank numbers	:	Scan count	:	Positioning level	:	Code vertex coordinates	:	Code center coordinates	:
-----------	------	---	-----------	---	-----------	-----------	---	------------------------	---	------------	---	-------------------	---	-------------------------	---	-------------------------	---

Unused ECC ratio	Matching level	:	ISO/IEC15415 verification result	:	ISO/IEC TR 29158 (AIM DPM-1-2006) verification result	:	SAE AS9132 verification result	:	SEMI T10-0701 verification result	:
------------------	----------------	---	----------------------------------	---	---	---	--------------------------------	---	-----------------------------------	---

Japanese pharmaceutical code quality verification result	ISO/IEC16022 verification result	:	Image file name	:	Group name	:	Master/ Slave ID	:	Read time	Checksum
--	----------------------------------	---	-----------------	---	------------	---	------------------	---	-----------	----------

Delimiter characters

- The colon (:) as a delimiting character can be changed via AutoID Network Navigator (one character).
- No delimiter character is inserted after "Data size" and "Symbol ID", and before "Checksum".

Precautions when appending data

- Appended data can be set via a command or from AutoID Network Navigator.
- Only the selected data will be appended to the read data. The data size changes because of this.
- Checksum defers by the contents of the appended data.

Details of Appended Data

■ Data size

The data size is the total size of parts (1), (2), and (3), plus 4 bytes.

Header	(1) Data size	(2) Read data + appended data	(3) Checksum	Terminator
--------	------------------	----------------------------------	-----------------	------------

■ Time

Appends the time the data was output.

Appended data range: YYYYMMDDhhmmss

- Data format

YYYYMMDDhhmmss	:	Read data
----------------	---	-----------

■ Code type

You can append the read code type number to the read data.

Number	Code type
1	QR
2	DataMatrix
3	PDF417
5	GS1 DataBar(RSS)
6	CODE39
7	ITF
8	2of5
9	NW-7(Codabar)
10	JAN/EAN/UPC
11	CODE128
12	COOP 2 of 5
13	CODE93
14	CC-A/B(GS1 DataBar)
15	CC-A/B/C(EAN/UPC)
16	CC-A/B/C(GS1-128)
18	Pharmacode

■ Symbol ID

Appends the symbology identifier, specified by AIM, before the read data. It is not appended when a reading has failed.

- Data format

Symbol ID	Read data
-----------	-----------

Code type	Detail	Symbol ID
QR	: Model 1	JQ0
	: Model 2, ECI not applied	JQ1
	: Model 2, ECI applied	JQ2
	: Model 2, ECI not applied, FNC1 (1st)	JQ3
	: Model 2, ECI applied, FNC1 (1st)	JQ4
	: Model 2, ECI not applied, FNC1 (2nd)	JQ5
DataMatrix	: Model 2, ECI applied, FNC1 (2nd)	JQ6
	: ECC 200	Jd1
	: ECC 200, FNC1 (1st)	Jd2
	: ECC 200, FNC1 (2nd)	Jd3
	: ECC 200, ECI applied	Jd4
	: ECC 200, ECI applied, FNC1 (1st)	Jd5
CODE39	: ECC 200, ECI applied, FNC1 (2nd)	Jd6
	No check digit validation	JA0
	Check digit is validated and transmitted.	JA1
ITF	Check digit is validated but not transmitted.	JA3
	No check digit validation	Ji0
	Check digit is validated and transmitted.	Ji1
NW-7(Codabar)	Check digit is validated but not transmitted.	Ji3
		JF0
	UPC-A, UPC-E, JAN/EAN13	JE0
JAN/EAN/UPC	JAN/EAN8	JE4
	UPC-A, UPC-E, JAN/EAN13 Addon 2, addon 5	JE3
	FNC1 not included.	JC0
CODE128	FNC1 on the first digit (GS1-128).	JC1
	FNC1 on the second digit.	JC2
		je0
GS1 Databar	Standard	JL0
	Extended channel interpretation	JL1
	Basic channel interpretation	JL2
PDF417, MicroPDF417		JG0
2of5		JS0
COOP2of5		JX0
Trioptic CODE39		JA8

■ Data format for composite codes

- Composite code (GS1/CODE128 + PDF)

je0	Barcode data	a	2D code data
-----	--------------	---	--------------

- Composite code (JAN/EAN/UPC + PDF)

JEm	Barcode data	a	2D code data
-----	--------------	---	--------------

* m= Numeric value

* a= Composite delimiter: Can be changed by way of the settings.
(Default: Not set. You can use up to 5 characters to set the value.)

■ Parameter bank number

Appends the parameter bank number that was read.

It is not appended when a reading fails.

- Data format

Read data	:	nn
nn = parameter bank number (01 - 10)		

■ Scan count

Appends the number of reading attempts of the SR-1000 Series while the timing input is turned ON.

Failed reading operations are also counted.

- Data format

Read data	:	nnnnn
nnnnn = scan count (1 - 65535)		

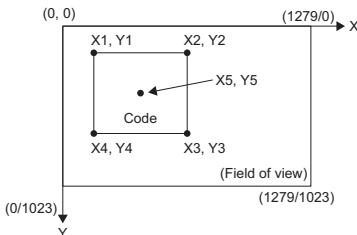
■ Code vertex coordinates/Code center coordinates

Appends the coordinates of the vertexes and center position of the read code.

- Data format

Code vertex coordinates:	Read data	:	X1/Y1	:	X2/Y2	:	X3/Y3	:	X4/Y4
Code center coordinates:	Read data	:	X5/Y5						
X1/Y1 to X4/Y4 : Code vertex coordinates (Xn = 0 - 1279, Yn = 0 - 1023)									
X5/Y5 : Code center coordinates (X5 = 0 - 1279, Y5 = 0 - 1023)									

Coordinates are specified for code positions in an image as below:



- Reference Output of the code vertex coordinate when executing multiple readings of the same code.
When multiple readings are executed for 1 scan, the coordinates are output in the following order:
 - Coordinates with code center coordinates higher in the field of view (smaller in Y) are prioritized.
 - If 2 coordinates have the same Y coordinates, the center coordinates of the code further to the left in the field of view (smaller in X) are prioritized.

Output format for multi read is as follows:

Read data 1, Read data 2, ..., Read data n	Read data 1 corner coordinates: Read data 2 corner coordinates: ...: Read data n corner coordinates	Read data 1 center coordinates: Read data 2 center coordinates: ...: Read data n center coordinates
---	---	---

- Point If the code vertex coordinates are out of the decoding range, that value becomes "- (minus)".
(Reading is possible even if all the vertexes are not within the decoding range.)

■ Unused ECC ratio

Appends the unused error correction ratio.

The average value will be appended when several codes are read for 1 scan (multi read).

It is not appended when a reading fails.

- Data format

Read data	:	nnn	%
nnn = unused ECC ratio (0 - 100)			

■ Matching level

Appends the matching level value of the read code.

- Matching levels of each code will be appended for the multi read.
- Value is not appended when a reading fails.
- Data format

Read data	:	nnn
nnn = matching level value (0 - 100)		

■ Code quality verification results

For details on the code quality verification results, refer to □ "9-7 Code Quality Verification" (page 39)

11-1 Serial Communication

You can communicate with devices that have RS-232C interfaces. You can transfer the read data of the SR-1000 Series in a procedureless manner and use commands to start reading.

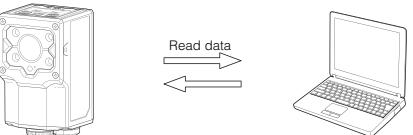
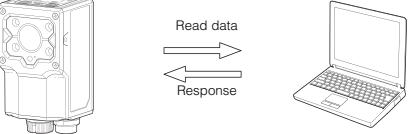
RS-232C Communication Settings Defaults

Baud Rate : 115200bps
Data Bits : 8bit
Parity : Even
Stop Bit : 1bit

Serial Communication (RS-232C) Settings

- 1 Open the [RS-232C] tab.
- 2 Set the following items to match the device that you will connect to.
 - Baud Rate
 - Data Bits
 - Parity
 - Stop Bit
- 3 Select the communication protocol.
- 4 Click [Send Configuration].

● Communication protocols

Protocol	Operation
None	The read data will be output as-is. 
PASS/RTRY	1. The read data is transferred to the host device. 2. The SR-1000 Series waits for a response from the host device. (PASS: Normal completion. RTRY: Resend request.) 3. PASS or RTRY is sent from the host. •PASS: Transmission complete. •RTRY: Resend the same read data to the host device and wait for a PASS response. 
ACK/NAK (0x06/0x15)	*1 

*1 This protocol uses ACK (0x06) instead of "PASS" and NAK (0x15) instead of "RTRY" in the PASS/RTRY protocol. Other than the differences in the character strings to send, this protocol is identical to the PASS/RTRY protocol.

• PASS/RTRY communication format

[PASS][CR]	[RTRY][CR]
[STX][PASS][ETX]	[STX][RTRY][ETX]

* You can also add [ESC] at the front and [LF] at the end.

• ACK/NAK communication format

[ACK]	[NAK]
-------	-------

* Do not add headers or terminators.

- Point
- When you are using PASS/RTRY or ACK/NAK, the SR-1000 Series can read codes while it is waiting for a response. Data read in this situation is stored in the send buffer.

- When you are using PASS/RTRY or ACK/NAK, the SR-1000 Series can receive commands while it is waiting for a response.

- When you are using PASS/RTRY or ACK/NAK, a send buffer overflow will occur if the SR-1000 Series attempts to store more data than its send buffer can hold.

- Send buffer capacity: 10 KB

■ Operation when a send buffer overflow occurs

- "E4 BUFFER OVER" is shown on the SR-1000 Series display.
- ERR BUSY is output.

- All data stored in the buffer is discarded.

■ Recovering from a send buffer overflow

- Restart the SR-1000 Series.

- Send the buffer clear command "BCLR" to the SR-1000 Series.

- Send the reset command "RESET" to the SR-1000 Series.

- Send PASS (ACK) to the SR-1000 Series. When PASS (ACK) is sent to the SR-1000 Series, it outputs the character string "OVER" and recovers to normal operation.

- If you restart the SR-1000 Series or send the buffer clear or reset command to it when a buffer overflow has not occurred, all the data in the send buffer will be cleared.

11-2 Socket Communication (TCP, UDP)

The SR-1000 Series supports the following types of Ethernet socket communication.

- TCP
- UDP

Ethernet Communication Settings Defaults

IP address : 192.168.100.100
Subnet Mask : 255.255.255.0 (24 bits)
Default Gateway : 0.0.0.0

TCP Settings

- 1 Open the [Ethernet] tab.
- 2 Enter the [IP address] and [Subnet Mask] settings to assign to the SR-1000 Series.
- 3 Start the [Setup Wizard].
- 4 STEP 1 Select the trigger input method.
- 5 STEP 2 Select the device to connect to.
- 6 STEP 3 Select [TCP].
- 7 STEP 4 Configure connection destination settings such as the [IP Address] and the [Port].
- 8 Exit the [Setup Wizard].
- 9 Click [Send Configuration].

UDP Settings

- 1 Open the [Ethernet] tab.
- 2 Enter the [IP address] and [Subnet Mask] settings to assign to the SR-1000 Series.
- 3 Start the [Setup Wizard].
- 4 STEP 1 Select the trigger input method.
- 5 STEP 2 Select the device to connect to.
- 6 STEP 3 Select [UDP].
- 7 STEP 4 Configure connection destination settings such as the [IP Address] and the [Port].
- 8 Exit the [Setup Wizard].
- 9 Click [Send Configuration].

Settings During Socket Communication

■ Continually Send Connection Requests

When a connection is not established, the timing with which requests are made to establish a connection is determined by the "Continually Send Connection Requests" setting.

- Disable: When read data is determined and data output is ready.
- Enable: When the power is turned on. Also, continuously when a connection is not established.

■ Keep Alive

This function checks whether the connection established with a remote device is still alive.

● Operating condition

This function activates when no communication is made for 60 seconds.

● Operation details

- A Keep packet is sent to the remote device and the response is checked.
- Response: Keep the connection established.
 - No response: Disconnect the connection.

12-1 Command Communication

What Is Command Communication?

By sending commands from a PLC or PC, you can start reading and change the settings of the SR-1000 Series.

■ Command communication interfaces

The following two command communication paths are available.

- RS-232C (serial communication)
- Ethernet (TCP socket communication)

■ Types of commands

The following two types of commands are available.

- Operation commands : Commands used to control operations such as reading and tuning.
- Configuration commands: Commands used to change or check the settings.

Command Communication Format

■ Format

Header	Command	Terminator
--------	---------	------------

When formatting commands, the following three combinations of headers and terminators are available.

Command format		Response format	
Header	Terminator	Header	Terminator
(1) None	[CR]	None	[CR]
(2) None	[CR] + [LF]	None	[CR]
(3) [STX]	[ETX]	[STX]	[ETX]

Example) Sending the command to turn on the OUT1 terminal (OUTON,1)

Command	OUTON,1[CR]
Response	OK,OUTON,1[CR]

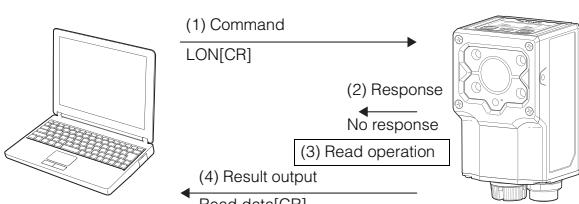


- Commands are sent and received in ASCII code.
- If **ESC** is appended at the beginning of the command, the **ESC** will clear the receive buffer of the SR-1000 Series. If communication cannot be completed correctly due to the presence of unnecessary characters in the receive buffer of the SR-1000 Series, append **ESC** to the command and send it.
Example) [ESC]LON[CR]
- Set the character interval to less than 10 seconds when sending commands to the SR-1000 Series. If 10 seconds elapse, the SR-1000 Series will delete all received characters from the buffer.

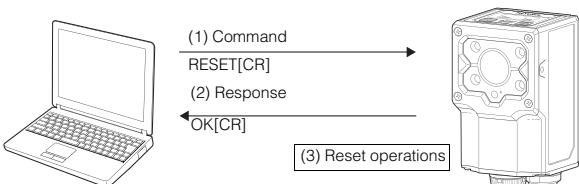
Command Communication Process

- 1 The host (PC or PLC) sends a command to the SR-1000 Series.
- 2 The SR-1000 Series sends a response and operates according to the command.

Example 1) Operation command "LON"



Example 2) Operation command "RESET"



Error Responses

After receiving a command, if the corresponding processing fails, the SR-1000 Series returns an error in response.

■ Response format

Header	ER,	Command name	Error code	Terminator
--------	-----	--------------	------------	------------

Example) When an undefined command is received.

Command	ABCD[CR]
Response	ER,ABCD,00[CR]

■ Error codes

Error Code	Explanation
00	Undefined command received
01	Mismatched command format (Invalid number of parameters)
02	The parameter 1 value exceeds the set value
03	The parameter 2 value exceeds the set value
04	Parameter 2 is not set in HEX (hexadecimal) code
05	Parameter 2 set in HEX (hexadecimal) code but exceeds the set value
10	There are 2 or more ! marks in the preset data Preset data is incorrect
11	Area specification data is incorrect
12	Specified file does not exist
13	"mm" for the %Tmm-LON.bb command exceeds the setting range.
14	Communication cannot be checked with the %Tmm-KEYENCE command.
20	This command is not executable in the current status (execution error)
21	The buffer has overflowed, so commands cannot be executed
22	An error occurred while loading or saving parameters, so commands cannot be executed
23	Commands sent from RS-232C cannot be received because AutoID Network Navigator is being connected.
99	SR-1000 Series may be faulty. Please contact your nearest KEYENCE sales office.



- For the following commands, no response is returned when the command is received or if an error occurs. Only the reading results are output.
"LON," "LOFF," "PRON," and "PROFF"
- If you want to receive responses to the above commands, configure the following setting.
On the [Table] tab, click [Misc], and then set "Basic command response string."
- For the following commands, the response is "OK" if the command is processed successfully and "ERR**" if an error occurs.
"TUNE," "QUIT," "RESET," and "BCLR"

12-2 Reading and Tuning Commands

Operation Commands

■ Starting/finishing reading

Function	Command name	Parameter	Response
Start reading	LON	-	-
Start reading (bank specification)	LON_b(LONb)	b = 01 to 16	-
Finish reading	LOFF	-	-

When reading is successful, the read data is output.

When reading fails, "ERROR" is output.

■ Tuning

Function	Command name	Parameter	Response
Focus adjustment	FTUNE	-	OK,FTUNE
Start tuning	TUNE_b(TUNEb)	b = 01 to 16 Bank number	OK*
Finish tuning	TQUIT	-	OK

*1 When the focus adjustment is complete, the result is output in the following formats.

Success: Focus Tuning SUCCEEDED

Failure: Focus Tuning FAILED

*2 When the tuning operation is complete, the result is output in the following formats.

When tuning is successful: Tuning SUCCEEDED,tms,000000x00

When tuning fails: Tuning FAILED,tms,00000x0y

t: Tuning time

x: Advice

o: None

1: Use an image filter. 2: Consider the installation, lighting, and printing conditions.

4: The brightness is insufficient.

y: Failure factor

1: Code detection impossible. 2:Unstable reading.

■ Preset data registration

Function	Command name	Parameter	Response
Start reading for preset data registration	PRON	-	*
Finish reading for preset data registration	PROFF	-	*

* For details on responses during preset registration, refer to "9-9 Preset Data Comparison" (page 48)

■ Reading quick setup codes

Function	Command name	Parameter	Response
Start quick setup code reading	RCON	-	OK,RCON
Finish quick setup code reading	RCOFF	-	OK,RCOFF
Quick setup code reading status check	RCCHK	-	(Obtained value)

■ Test mode

Function	Command name	Parameter	Response
Reading rate test	TEST1	-	OK,TEST1
Reading rate test (bank specification)	TEST1,b	b=01 to 16	OK,TEST1
Read time test	TEST2	-	OK,TEST2
Read time test (bank specification)	TEST2,b	b=01 to 16	OK,TEST2
Quit test mode	QUIT	-	OK,QUIT

* Online test mode*1

Function	Command name	Parameter	Response
Reading rate test	#TEST1	-	OK,#TEST1
Reading rate test (bank specification)	#TEST1,b	b=01 to 16	OK,#TEST1
Read time test	#TEST2	-	OK,#TEST2
Read time test (bank specification)	#TEST2,b	b=01 to 16	OK,#TEST2
Quit test mode	# QUIT	-	OK,#QUIT

*1 In this mode, testing is only executed while the trigger input is on.

■ I/O terminal control

Function	Command name	Parameter	Response
Input terminal status check	INCHK,D	D=1:IN1 2:IN2	OK,INCHK,m m = OFF: The terminal is off. ON: The terminal is on.
Turn on an output terminal	OUTON,D	D=1:OUT1 2:OUT2 3:OUT3	OK,OUTON
Turn off an output terminal	OUTOFF,D	D=1:OUT1 2:OUT2 3:OUT3	OK,OUTOFF
Turn on OUT1 to OUT3	ALLON	-	OK,ALLON
Turn off OUT1 to OUT3	ALLOFF	-	OK,ALLOFF

■ Reset

Function	Command name	Parameter	Response
Reset	RESET	-	OK

The SR-1000 Series is reset after it outputs a response.

■ Send buffer clear

Function	Command name	Parameter	Response
Send buffer clear	BCLR	-	OK

Clear the send buffer of the SR-1000 Series.

■ Checking the reading history

Function	Command name	Parameter	Response
Check the reading history	NUM	-	OK,NUM,a,b,c,d a: OK count b: NG count c: ERROR count d: STABLE count e: Trigger input count (0 to 65535)
Bank usage count history	NUMB	-	OK,NUMB,b1,b2,...,b16,n b1 to b16: Reading count of bank 1 to bank 16 n: Trigger input count (0 to 4294967295)

Acquire the counts corresponding to the time from when the reader turned on to the present point in time.

Turning the power off or sending a RESET command resets the counts to 0. If the trigger input count reaches its upper limit, all values will be reset to 0.

■ Image scanning control

Function	Command name	Parameter	Response
Capture execution	SHOT,b (SHOTb)	b: 01 to 16 Bank number	OK

Capture an image (only one time) for the specified bank.

■ Forced control of reading and scanning

Function	Command name	Parameter	Response
Cancel operation ¹	CANCEL	-	OK,CANCEL
Trigger lock ²	LOCK	-	OK,LOCK
Lock release ²	UNLOCK	-	OK,UNLOCK

*1 You will not receive reading error codes when you execute a CANCEL command.

*2 If you send the LOCK command, reading operations will be locked until you send the UNLOCK command.

■ Pointer control

Function	Command name	Parameter	Response
Turn the pointer on	AMON	-	OK,AMON
Turn the pointer off	AMOFF	-	OK,AMOFF

■ Time settings

Function	Command name	Parameter	Response
Set the time	TMSET,t	t	OK,TMSET
Check the time	TMGET	-	OK,TMGET,t

* t: YYYY = Year (4 bytes)
hh = Hour (2 bytes)
mm = Minute (2 bytes)
ss = Second (2 bytes)

■ Confirmation during script file execution

Function	Command name	Parameter	Response
Script processing time	SOPTIME	-	OK,SCPTIME, now=Aus, max=Bus, min=Cus A: The execution time of the immediately previous script B: The maximum processing time C: The minimum processing time
Script debugging	SCPDBG,D	D = 0: Debugging off 1: Debugging on	OK,SCPDBG
Obtain the script error	SCPERR	-	OK,SCPERR,m m: Error character string
Obtain the script version	SCPVER	-	OK,SCPVER,m,n m: Script library version n: Version written in FmtSet.Lua

■ Saving/loading settings

Function	Command name	Parameter	Response
Save settings*	SAVE	-	OK,SAVE
Load saved settings	LOAD	-	OK,LOAD
Initialize settings	DFLT	-	OK,DFLT

* If you turn the power off before executing the SAVE command, the settings that you have configured will be discarded.

■ Other commands

Function	Command name	Parameter	Response
Version confirmation	KEYENCE	-	OK,KEYENCE,SR-1000,v v: Version
Obtain the command status	CMDSTAT	-	OK,CMDSTAT,m m = none: No processing wait: Wait for setting application update: Updating
Obtain the MAC address	EMAC	-	OK,EMAC,D D = MAC address (12 bytes)
Obtain the error status	ERRSTAT	-	OK,ERRSTAT,m m = None: No error system: System error update: Update error cfg: Set value error ip: IP address duplication over: Buffer overflow pic: PLC link error profinet: PROFINET error lua: Script error hostconnect: Host connection error
Obtain the BUSY status	BUSYSTAT	-	OK,BUSYSTAT,m m = none: No processing trg: TRG BUSY update: Update processing file: Saving the file af: Moving the autofocus lens
Clear the PLC link error	PCLR	-	OK,PCLR
Clear the FTP communication error	HCLR	-	OK,HCLR
Save backup settings	BSAVE,D	D:1-8 (config1.ptc - config8.ptc)	OK,BSAVE
Load backup settings	BLOAD,D	D:1-8 (config1.ptc - config8.ptc)	OK,BLOAD

Function	Command name	Parameter	Response
Copy bank configuration	BCOPY_m,n	m: Copy source n: Copy destination	OK,BCOPY

12-3 SR-1000 Series Configuration Commands

Configuration Commands

The following five types of configuration commands are available.

- Parameter bank configuration commands (WB/RB)
- Code configuration commands for tuning (WC/RC)
- Operation configuration commands (WP/RP)
- Communication configuration commands (WN/RN)
- Batch transmission of setting/confirmation commands (WA/RA)



- Send the **SAVE** command to save the contents changed by configuration commands in the memory. If you do not send the **SAVE** command, when the power is turned off or the **RESET** command is received, the settings will return to the state that they were in before they were changed.
- The setting contents sent during SR-1000 operations are applied when the current operation finishes, not after the response to the command is sent.

Parameter bank configuration commands (WB/RB)

Parameter bank configuration command is sent in the following format:

- Configuration change

Send command **WB , bb mmm , nnn...**

Response Normal process **OK , WB**

Abnormal process **ER , WB , ee** ee: Error code

- Configuration confirmation

Send command **RB , bb mmm**

Response Normal process **OK , RB , nnn...**

Abnormal process **ER , RB , ee** ee: Error code

bb : Parameter bank number 01 - 16 Fixed to 2 bytes
mmm : Command number Fixed to 3 bytes
nnn... : Setting value (varies according to command number)

Example) Setting the Exposure of the parameter bank 1 to 300 μ s.

Configuration change

Send command	WB,01100,0300
Response (Normal process)	OK,WB

Configuration confirmation

Send command	RB,01100
Response (Normal process)	OK,RB,0010

Scan condition setting

Function	Command Number	Setting value	Explanation	Default
Lighting	Internal lighting use	000	0 : Not used 1 : Used	1
	External lighting use	004	0 : Not used 1 : Used	0
Scanning	Exposure time	100	2 to 10000	30
	Gain	101	0 to 84	-
Filter setting	1st filter type	200	0 : Disable 1 : Equalize 2 : Expand 3 : Shrink 4 : Open 5 : Close 6 : Median 7 : Unsharp Mask	0
	2nd filter type	201		
	3rd filter type	202		
	4th filter type	203		
	1st filter count	210		
	2nd filter count	211		
	3rd filter count	212		
Polarizing filter	4th filter count	213	Specify with count	1
Filter usage	010	0, 1		

■ Code settings

Function	Command Number	Setting value	Explanation	Default
Code type	300	1 to 18	1 : QR 2 : DM 3 : PDF417(microPDF 417) 5 : GS1 DataBar(RSS) 6 : CODE39(Trioptic CODE 39) 7 : ITF 8 : 2of5 9 : NW-7(Codabar) 10 : JAN/EAN/UPC 11 : CODE128 12 : COOP2of5 13 : CODE93 14 : CC-A/B/GS1 DataBar 15 : CC-A/B(EAN/UPC) 16 : CC-A/B/C(GS1-128) 18 : Pharmacode	1
Maximum read length	303	1 to 7089		7089
Minimum read length	304	1 to 7089		1
Output length limitation	306	0, 1	0 : Disable 1 : Enable	0
Direction of output	307	0, 1	0 : Forward 1 : Backward	0
Length of output	308	1 to 7089	Not applicable to the CC-A/B/C 2D code	7089
Starting index of output	309	1 to 7089	Not applicable to the CC-A/B/C 2D code	1
QR code version settings	400	0000 to 3FFF	Specifies version 1 to 14 with bit assign and set with HEX.	3FFF
	401	00000 to FFFF	Specifies version 1 to 20 with bit assign and set with HEX.	FFFFF
	402	00000 to FFFF	Specifies version 21 to 40 with bit assign and set with HEX.	FFFFF
	403	0 to F	Specifies version M1 to M4 with bit assign and set with HEX.	F
Specify the reading target size of DataMatrix code	410	0000000 to 3FFFFFF	Specifies the code size of DataMatrix code with bit assign and set with HEX. ■ Square 1st bit: 10x10 13th bit: 44x44 2nd bit: 12x12 14th bit: 48x48 3rd bit: 14x14 15th bit: 52x52 4th bit: 16x16 16th bit: 64x64 5th bit: 18x18 17th bit: 72x72 6th bit: 20x20 18th bit: 80x80 7th bit: 22x22 19th bit: 88x88 8th bit: 24x24 20th bit: 96x96 9th bit: 26x26 21st bit: 104x104 10th bit: 32x32 22nd bit: 120x120 11th bit: 36x36 23rd bit: 132x132 12th bit: 40x40 24th bit: 144x144 ■ Rectangle 25th bit: 8x18 26th bit: 8x32 27th bit: 12x26 28th bit: 12x36 29th bit: 16x36 30th bit: 16x48	3FFFFFF
GS1 DataBar settings	390	0,1	GS1 DataBar Omnidirectional/ Truncated 0 : Disable 1 : Enable	1
	391	0,1	GS1 DataBar Stacked/ StackedOmnidirectional 0 : Disable 1 : Enable	1
	392	0,1	GS1 DataBar Limited 0 : Disable 1 : Enable	1
	393	0,1	GS1 DataBar Expanded 0 : Disable 1 : Enable	1
	394	0,1	GS1 DataBar ExpandedStacked 0 : Disable 1 : Enable	1
	395	2 to 11	GS1 DataBar Expanded Stacked (Number of rows) minimum	2
	396	2 to 11	GS1 DataBar Expanded Stacked (Number of rows) maximum	11

Function	Command Number	Setting value	Explanation	Default
CODE39 settings	375	0,1	Send start/stop characters 0 : Disable 1 : Enable	0
	376	0,1	Inspect check-digit 0 : Disable 1 : Enable	0
	377	0,1	Send check-digit 0 : Disable 1 : Enable	1
	378	0,1	Trioptic CODE39 reading 0 : Disable 1 : Enable	1
	379	0,1	Full ASCII conversion 0 : Disable 1 : Enable	0
ITF settings	385	0,1	Inspect check-digit 0 : Disable 1 : Enable	0
	386	0,1	Send check-digit 0 : Disable 1 : Enable	1
NW-7 (Codabar) settings	380	0,1	Send start/stop characters 0 : Disable 1 : Enable	1
	381	0,1	Send start/stop characters letter type 0 : as lowercase 1 : as UPPERCASE	0
	382	0,1	Inspect check-digit 0 : Disable 1 : Enable	0
	383	0,1	Send check-digit 0 : Disable 1 : Enable	1
	384	0 to 6	Check-digit type 0 : Modulus 16 1 : Modulus 11 2 : Modulus 10/Weight 2 3 : Modulus 10/Weight 3 4 : Check DR 5 : Modulus 11 6 : Luhn	0
JAN/EAN/UPC settings	350	0,1	UPC-E reading 0 : Disable 1 : Enable	1
	351	0,1	EAN/JAN 8 digits reading 0 : Disable 1 : Enable	1
	352	0,1	EAN/JAN 13 digits reading 0 : Disable 1 : Enable	1
	353	0,1	UPC-A Output 0 : Output in 13 digits 1 : Output in 12 digits	0
	354	0,1	Add "number system" to UPC-E 0 : Disable 1 : Enable	0
	355	0,1	2-digit supplemental 0 : Disable 1 : Enable	1
	356	0,1	5-digit supplemental 0 : Disable 1 : Enable	1
	357	0,1	Ignore UPC without supplemental 0 : Disable 1 : Enable	0
CODE128 settings	358	0,1	GTIN compatible 14-digit output 0 : Disable 1 : Enable	0
	366	0,1	GS1-128 0 : Disable 1 : Enable	1
Maximum read length	315	1 to 2361		2361
Minimum read length	316	1 to 2361		1
PDF417 settings	420	1 to 3	PDF417 read code type settings 1: PDF417 only 2: MicroPDF only 3: PDF417 and MicroPDF	3
CC-A/B/C (GS1-128) reading	437	0,1	CC-C code reading 0 : Disable 1 : Enable	1
Maximum number of pharmacode bars	440	2 to 16	Specified by the number of bars	16
Minimum number of pharmacode bars	441	2 to 16	Specified by the number of bars	9

■ Reading operation settings

Function	Command Number	Setting value	Explanation	Default
Alternate	600	0,1	0 : Disable 1 : Enable	0
Internal bank retry count	601	00 to 32		00
Decode timeout duration	602	0001 to 1000	Specify in units of 10 ms	0010
Scan delay time	603	0 to 2550	Specify in units of 1 ms	0
Decoding area	604	abcd	a:0000-1279 b:0000-1023 c:0095-1279 d:0095-1023 * The minimum size is 96 dot x 96 dot. (a,b) (c,d)	02402121030811
Inverse	605	0,1	0 : Disable 1 : Enable	0
Reverse	606	0,1	0 : Disable 1 : Enable	0
Base tilt angle	607	0 to 359	Unit: 1 degree	0
Tilt angle range	608	0 to 180	Unit: 1 degree * Base tilt angle ± Tilt angle range will be enabled.	180
Grid correction	500	0,1	0 : Disable 1 : Enable	1
Quiet zone scale factor	611	*1	Quiet zone scale factor (x 1) *Barcode only • The targets are codes other than QR and DataMatrix codes. • This only applies to the barcodes of composite codes. ² .	Depends on the code type.

*1 0 to 11: GS1 DataBar, CC-A/B (GS1 DataBar)

1 to 11: Other than the above codes

*2 Quiet zone applicable range

• GS1 DataBar, GS1 DataBar Limited: Right quiet zone

• Other than the above codes : The quiet zones on both ends

Tuning Code Setting Command Format (WC/RC)

Send the code setting command for tuning in the following formats.

- Configuration change

Send command **WC , mmmm , nnn...**

Response Normal process **OK , WC**

Abnormal process **ER , WC , ee** ee: Error code

- Configuration confirmation

Send command **RC , mmmm**

Response Normal process **OK , RC , nnn...**

Abnormal process **ER , RC , ee** ee: Error code

mmmm: Command number 4-byte fixed

nnn : Setting value (changeable according to the command number)

Example) Setting the maximum read length to 1000 digits

Configuration change

Send command	WC,0100,1000
Response (Normal process)	OK, WC

Configuration confirmation

Send command	RC,0100
Response (Normal process)	OK,RC,1000

■ Tuning target code settings

Function	Command Number	Setting value	Explanation	Default
QR code settings	0100	0001 to 7089	Maximum read length	7089
	0101	0001 to 7089	Minimum read length	1
DataMatrix code settings	0200	0001 to 3116	Maximum read length	3116
	0201	0001 to 3116	Minimum read length	1
PDF417 settings	0300	1 to 2710	Maximum read length	2710
	0301	1 to 2710	Minimum read length	1
	0303	1 to 3	Target code 1 : PDF417 2 : MicroPDF417 3 : PDF417, MicroPDF417	3
GS1 DataBar settings	0500	01 to 77	Maximum read length	77
	0501	01 to 77	Minimum read length	1
	0502	0 to 11	GS1 DataBar Limited Right quiet zone scale factor setting	5
	0503	0,1	GS1 DataBar Omnidirectional/ Truncated 0 : Disable 1 : Enable	1
	0504	0,1	GS1 DataBar Stacked/ StackedOmnidirectional 0 : Disable 1 : Enable	1
	0505	0,1	GS1 DataBar Limited 0 : Disable 1 : Enable	1
	0506	0,1	GS1 DataBar Expanded 0 : Disable 1 : Enable	1
	0507	0,1	GS1 DataBar ExpandedStacked 0 : Disable 1 : Enable	1
	0508	2 to 11	GS1 DataBar Expanded Stacked (Number of rows) minimum	2
	0509	2 to 11	GS1 DataBar Expanded Stacked (Number of rows) maximum	11
CODE39 settings	0600	03 to 50	Maximum read length	50
	0601	03 to 50	Minimum read length	3
	0602	1 to 11	Quiet zone scale factor	7
	0603	0,1	Send start/stop characters 0 : Disable 1 : Enable	0
	0604	0,1	Inspect check-digit* 0 : Disable 1 : Enable	0
	0605	0,1	Send check-digit* 0 : Disable 1 : Enable	1
	0606	0,1	Trioptic CODE39 reading 0 : Disable 1 : Enable	1
	0607	0,1	Full ASCII conversion* 0 : Disable 1 : Enable	0

Function	Command Number	Setting value	Explanation	Default
ITF settings	0700	02 to 50	Maximum read length	50
	0701	02 to 50	Minimum read length	6
	0702	1 to 11	Quiet zone scale factor	7
	0703	0,1	Inspect check-digit 0 : Disable 1 : Enable	0
	0704	0,1	Send check-digit 0 : Disable 1 : Enable	1
	0900	03 to 50	Maximum read length	50
NW-7 (Codabar) settings	0901	03 to 50	Minimum read length	4
	0902	1 to 11	Quiet zone scale factor	7
	0903	0,1	Send start/stop characters letter type 0 : Disable 1 : Enable	1
	0904	0,1	Send start/stop characters letter type 0 : as lowercase 1 : as UPPERCASE	0
	0905	0,1	Inspect check-digit 0 : Disable 1 : Enable	0
	0906	0,1	Send check-digit 0 : Disable 1 : Enable	1
JAN/EAN/UPC settings	0907	0 to 6	Check-digit type 0 : Modulus 16 1 : Modulus 11 2 : Modulus 10/Weight 2 3 : Modulus 10/Weight 3 4 : Check DR 5 : Modulus 11-A 6 : Luhn	0
	1002	1 to 11	Quiet zone scale factor	7
	1003	0,1	UPC-E reading 0 : Disable 1 : Enable	1
	1004	0,1	EAN/JAN 8 digits reading 0 : Disable 1 : Enable	1
	1005	0,1	EAN/JAN 13 digits reading 0 : Disable 1 : Enable	1
	1006	0,1	UPC-A Output 0 : Output in 13 digits 1 : Output in 12 digits	0
CODE128 settings	1007	0,1	Add "number system" to UPC-E 0 : Disable 1 : Enable	0
	1008	0,1	2-digit supplemental 0 : Disable 1 : Enable	1
	1009	0,1	5-digit supplemental 0 : Disable 1 : Enable	1
	1010	0,1	Ignore UPC without supplemental 0 : Disable 1 : Enable	0
	1011	0,1	GTIN compatible 14-digit output 0 : Disable 1 : Enable	0
	1100	001 to 100	Maximum read length	100
2 of 5 (Industrial 2of5) settings	1101	001 to 100	Minimum read length	1
	1102	4 to 11	Quiet zone scale factor	7
	1103	0,1	GS1-128 0 : Disable 1 : Enable	1
	0800	01 to 50	Maximum read length	50
COOP 2of5 settings	0801	01 to 50	Minimum read length	4
	0802	1 to 11	Quiet zone scale factor	7
	1200	02 to 50	Maximum read length	50
CODE93 settings	1201	02 to 50	Minimum read length	4
	1202	1 to 11	Quiet zone scale factor	7
	1300	01 to 50	Maximum read length	50
	1301	01 to 50	Minimum read length	1
Pharmacode settings	1302	1 to 11	Quiet zone scale factor	7
	1800	2 to 16	Maximum number of bars	16
	1801	2 to 16	Minimum number of bars	9
	1802	1 to 11	Quiet zone scale factor	9
	1803	0 to 3	Code direction 0 : Horizontal, read left to right 1 : Horizontal, read right to left 2 : Vertical, read top to bottom 3 : Vertical, read bottom to top	0
	1805	0,1	Binary output 0 : Disable 1 : Enable	0

* With the settings for reading Trioptic CODE39, this setting does not function.

► Important

If you set the "Quiet zone scale factor" setting to a value that is smaller than the default value, erroneous or poor quality reading may occur. Normally use this setting with its default value.

Operation configuration commands (WP/RP)

Operation configuration command is sent in the following format:

- Configuration change

Send command **WP , mmm , nnn...**

Response Normal process **OK , WP**

Abnormal process **ER , WP , ee** ee: Error code

- Configuration confirmation

Send command **RP , mmm**

Response Normal process **OK , RP , nnn...**

Abnormal process **ER , RP , ee** ee: Error code

mmm : Command number Fixed to 3 bytes

nnn... : Setting value (varies according to command number)

Example) When setting the timing mode to "One-shot trigger" (one-shot signal trigger)

Configuration change

Send command	WP,101,1
Response (Normal process)	OK,WP

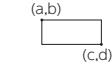
Configuration confirmation

Send command	RP,101
Response (Normal process)	OK,RP,1

■ I/O terminal setting

Function	Command Number	Setting value	Explanation	Default
IN terminal settings	IN1 terminal function	000	0 : Not use 1 : Trigger input 2 : Preset Input 3 : Start test mode. 4 : Capture 5 : Clear PLC link error 6 : Trigger lock 7 : Read the quick setup code 8 : Tuning operation	1
	IN2 terminal function	001	0 to 8	0
	IN1 terminal test mode assignment	002	1 : Reading rate test 2 : Processing time test	1
	IN2 terminal test mode assignment	003	1 to 2	1
	Bank to assign to the IN1 terminal captured image	004	1 to 16	Bank number
	Bank to assign to the IN2 terminal captured image	005		1
	IN1 terminal input at power-on	006	0, 1	0 : Not use 1 : Enable
	IN2 terminal input at power-on	007	0, 1	0 : Not use 1 : Enable
	Input polarity	010	0, 1	0 : Normal open point 1 : Normal close point
	Input pulse width	011	0 to 2	0 : 1 ms 1 : 2 ms 2 : 10 ms
OUT terminal settings	OUT1 terminal function	020	0 : Not set 1 : OK 2 : Verification NG 4 : ERROR 8 : STABLE 16 : PRESET_OK 32 : TRG_BUSY 64 : LOCK_BUSY 128 : MODE_BUSY 256 : ERROR_BUSY 512 : EXT_LIGHT ¹ 1024 : UNSTABLE 2048 : TUNING OK 4096 : SCRIPT CONTROL 8192 : CONFIG BUSY	1
	OUT2 terminal function	021	0 to 8672	4
	OUT3 terminal function	022		480
	BUSY output on startup	024	0, 1	0 : Not use 1 : Enable
	Output duration	025	1 to 255	Specify in units of 10 ms
	External light output polarity	026	0, 1	0 : Norm. open (normally open) 1 : Norm. closed (normally closed)

■ Operation mode settings

Function	Command Number	Setting value	Explanation	Default
Trioptic CODE39 reading	100	0 to 2	0 : None 1 : Reading rate test 2 : Read time test	1
Timing mode settings	Timing mode	101	0, 1	0 : Level trigger 1 : One-shot trigger
	One-shot trigger duration	102	0003 to 2550	Specify in units of 10 ms
	Trigger input ON command character string	103	hhhhhh h...	Specify up to 8 characters (16 HEX bytes) from HEX (0x00 to 0xFF). 4C4F4E (LON)
	Trigger input OFF command character string	104	hhhhhh h...	Specify up to 8 characters (16 HEX bytes) from HEX (0x00 to 0xFF). 4C4F4646 (LOFF)
	Trigger input ON/OFF recognition with one character	105	0, 1	0 : Not use 1 : Enable *
	Reading mode setting	200	0 to 3	0 : Single 1 : Continuous 2 : Burst
	Data transmission	201	0, 1	0 : Send after read 1 : Send after timing off
	Multi read duplicate reading prevention interval	202	000 to 255	Specify by the 100 ms
	Specifying alternate order	204	0, 1	0 : Order of parameter bank number 1 : Begin with successful bank
	Read error character string	205	hhhhhh h...	Specify a maximum of 8 characters (HEX 16 bytes) with HEX (0x00 to 0x7F). Set FF if error codes are not output. 4552524 F52 (ERROR)
Reading behavior settings	Matching level OK/NG judgment	206	0, 1	0 : Enable 1 : Disable
	Matching level threshold	207	00 to 99	
	Automatic pointer lighting setting	209	0 to 2	0 : Do not light automatically 1 : Light automatically 2 : Only light when capturing images
	Burst interval	208	000 to 255	Specify by the 1 ms
	Shorten bank transition	214	0, 1	Set whether to execute the next scan without waiting for the decode timeout to elapse if it is judged that no code is present in the scanned image.
	Image capture range specification	215	abcd	a : 0000-1279 b : 0000-1023 c : 0095-1279 d : 0095-1023 * Minimum size: 96 dots x 96 dots * The number of dots in the x direction must be a multiple of 32. Example) If a = 0000 and c = 0127, the number of dots is 128, which is a multiple of 32. (a,b) 
	Reading method (reading logic)	216	0, 1	0 : Custom mode 1 : Smart mode
				024021210390811

* When enabled, you can specify the following characters as the trigger on/off commands.

0	1	2	3	4	5	6	7
0	NUL	DLE	SP	0	@	'	p
1	SOH	DC1	!	1			a
2	STX	DC2	"	2			r
3	ETX	DC3		3			s
4	EOT	DC4	\$	4			t
5	ENQ			5			e
6		SYN	&	6			v
7	BEL	ETB		7			w
8	BS	CAN	(8			x
9	HT	EM)	9			y
A		SUB	*	:			z
B	VT	?	+	:	[k	{
C	CL	FS	,	<	\	l	
D		GS	-	=	J	m	}
E	SO	RS	.	>	^	n	~
F	SI	US	/	?		o	del

If you specify STX or ETX, it will no longer be possible to recognize commands in the <STX> command <ETX> format.

Function		Command Number	Setting value	Explanation	Default
Code quality verification function	Code quality verification standard selection	230	0 to F	0 : No selected 1 : ISO/IEC 15415 2 : ISO/IEC TR 29158 (AIM DPM-1-2006) 4 : SAE AS9132 8 : SEMI T10-0701 Specify the setting with HEX using sum of each item.	0
	ISO/IEC15415 verification threshold	231	0 to 4	0 : Disable 1 : D 2 : C 3 : B 4 : A	0
	ISO/IEC TR 29158 (AIM DPM-1-2006) verification threshold	232	0 to 4	0 : Disable 1 : D 2 : C 3 : B 4 : A	0
	SAE AS9132 verification threshold	233	0,1	0 : Disable 1 : Enable	0
	Japanese pharmaceutical code quality verification execution	234	0 to 1F	0: Not set 1: GS1-128 2: GS1 DataBar Limited 4: GS1 DataBar Stacked 8: CC-A(GS1-DataBar Limited) 10: CC-A(GS1-DataBar Stacked) This setting is handled as a HEX value. Use a HEX value that is the sum of the items in order to specify the setting.	0
	Japanese pharmaceutical code quality verification threshold	235	0 to 4	0: Disable 1: D 2: C 3: B 4: A	0
	ISO/IEC16022 code quality verification execution	236	0,1	0 : Disable 1 : Enable	0
	ISO/IEC16022 code quality verification execution	237	0 to 4	0: Disable 1: D 2: C 3: B 4: A	0
	Japanese pharmaceutical code quality verification result appending setting	344	0,1	0: Do not append 1: Append	0
	ISO/IEC16022 code quality verification result appending setting	345	0,1	0 : Do not append 1 : Append	0
	Grade expression setting when appending values to verification result	350	0,1	0 : Alphabet 1 : Numerical value	0
Settings for the number of read codes	Detailed item addition setting when appending values to verification result	351	0,1	0 : Do not append 1 : Append	0
	Evaluation value addition setting when appending values to verification result	352	0,1	0 : Do not append 1 : Append	0
	Codes to read	250	1 to 128	-	1
	Allow reduced detection count	251	0,1	0: Do not allow 1: Allow	0

Function		Command Number	Setting value	Explanation	Default
Maximum number of read codes	QR	252	1 to 128	-	1
	DataMatrix	253	1 to 128	-	1
	PDF417 (micro PDF)	254	1 to 128	-	1
	GS1 DataBar	255	1 to 128	-	1
	CODE39	256	1 to 128	-	1
	ITF	257	1 to 128	-	1
	2of5	258	1 to 128	-	1
	NW-7 (Codabar)	259	1 to 128	-	1
	JAN/EAN/UPC	260	1 to 128	-	1
	CODE128	261	1 to 128	-	1
	COOP2of5	262	1 to 128	-	1
	CODE93	263	1 to 128	-	1
Output data order settings	CC-A/B (GS1 DataBar)	264	1 to 64	-	1
	CC-A/B (EAN/UPC)	265	1 to 64	-	1
	CC-A/B (GS1 128)	266	1 to 64	-	1
	Pharmacode	267	1 to 128	-	1
	Code type number order priority	270	1 to 4	Priority = 1 (high), priority = 4 (low) ^{*1}	1
	Scanning order priority	271			2
	Code center X coordinate priority	272			3
	Code center Y coordinate priority	273			4
Priority	Code type number order setting	280	0,1	0: Ascending 1: Descending	0
	Scanning order setting	281			0
	Code center X coordinate order setting	282			0
	Code center Y coordinate order setting	283			0
	Data output per bank	290		0: Disable 1: Enable ^{*2}	0

*1 If priorities are the same, the order will be assigned as follows: code type number > scanning order > code center X coordinate > code center Y coordinate.

*2 Read data is output in ascending order of bank numbers. For banks in which reading was not successful, error character strings will be output.

■ Data appending function setting

Function	Command Number	Setting value	Explanation	Default
Time appending	300	0, 1	0 : Do not append 1 : Append	0
Code type appending	301	0, 1	0 : Do not append 1 : Append	0
Symbol ID appending	302	0, 1	0 : Do not append 1 : Append	0
Bank number appending	303	0, 1	0 : Do not append 1 : Append	0
Scan count appending	305	0, 1	0 : Do not append 1 : Append	0
Read time appending	306	0, 1	0 : Do not append 1 : Append	0
Position level appending	307	0, 1	0 : Do not append 1 : Append	0
Code vertex appending	308	0, 1	0 : Do not append 1 : Append	0
Code center appending	309	0, 1	0 : Do not append 1 : Append	0
Unused ECC ratio appending	310	0, 1	0 : Do not append 1 : Append	0
Matching level appending	312	0, 1	0 : Do not append 1 : Append	0
File name appending (full path display)	313	0, 1	0 : Do not append 1 : Append	0
Burst number appending	318	0, 1	0 : Do not append 1 : Append	0
Read detailed error code appending	319	0, 1	0 : Do not append 1 : Append	0
Setting the function to append ISO/IEC15415 verification result.	340	0, 1	0 : Do not append 1 : Append	0
Setting the function to append ISO/IEC TR 29158 (AIM DPM-1-2006) verification result.	341	0, 1	0 : Do not append 1 : Append	0
Setting the function to append SAE AS9132 verification result	342	0, 1	0 : Do not append 1 : Append	0
Setting the function to append SEMI T10-0701 verification result	343	0, 1	0 : Do not append 1 : Append	0
Setting for Master/Slave group name addition	320	0, 1	0 : Do not append 1 : Append	0
Setting for Master/Slave ID addition	321	0, 1	0 : Do not append 1 : Append	0
Data edit function (Data edit by script)	360	0, 1	0 : Disable 1 : Enable	0

■ Preset data comparison settings

Function	Command Number	Setting value	Explanation	Default
Number of verification start digits	400	0001 to 7089		0001
Number of verification digits	401	000 to 494	Maximum value for sequential value verification = 9	494
Preset data registration	402	hhhhhhh...	Up to 494 characters (HEX 988 bytes) can be specified from HEX (0x00 to 0xFF). FF : Not set	FF
Verification method	403	0, 1	0 : Normal 1 : Sequential value verification	0
Incremental setting for sequential value verification	404	-9999 to +9999	-9999 to +9999	+0001

■ Image saving function settings

Function	Command Number	Setting value	Explanation	Default
Saving destination of read OK images	500	0 to 3	0 : Disable saving 1 : Save to RAM 3 : FTP transmission	0
Saving destination of verification NG images	501			1
Saving destination of read error images	502			1
Saving destination of unstable images	503			1
Saving destination of capture images	504	1, 3	1 : Saving to RAM 3 : FTP transmission	1
Image saving mode	505	0 to 2	0 : Latest bank image 1 : Specified number of images after trigger input ON 2 : Specified number of images after trigger input OFF	0
Specify the number of images to save from trigger input ON/OFF	506	1 to 32		32
Edit image file name function (Edit image file name by script)	510	0, 1	0 : Disable 1 : Enable	0
Image format specification	511	0, 1	0 : BMP 1 : JPG	1
Quality (JPEG)	512	1 to 10	"*10" gives the highest quality.	1
Binning	513	1 to 4	0: Full 1: 1/4 2: 1/9 3: 1/16 4: 1/64	

■ Other settings

Function	Command Number	Setting value	Explanation	Default
Output data on TEST switch	600	0, 1	0 : Disable 1 : Enable	1
Delimiter character	601	hh	Specify 1 character (2 HEX characters) from (0x00 to 0x7F)	3A
Inter delimiter	602	hhhhhhh h...	Specify up to 5 characters (10 HEX bytes) from HEX (0x00 to 0x7F). FF : Not set	2C
Data filling size	603	000 to 999		000
Data filling character	604	hh	Specify 1 character (2 HEX characters) from (0x00 to 0x7F)	20
Silent Mode	606	0 to 255	0 : Not selected 1 : Verification OK, Read OK 2 : Verification NG 4 : Read ERROR 8 : Stable reading 16 : Unstable reading 32 : Preset result 64 : Test Mode 128 : Tuning Specify the setting by sum of the values of the items.	0
Reader name	607	hhhhhhhh...	Specify up to 8 characters (16 HEX bytes) from UNICODE (UTF-16 BigEndian). FF : Not set	005200450 041004400 450052 (READER)
Trigger command response string	610	0 to 2	0 : Default 1 : Detailed response 2 : User setting 3 : Echo back	0
ENTER button lock	611	0, 1	0 : Disable lock 1 : Enable lock	0
Trigger command success response string	613	hhhh...	Up to 8 characters can be specified. Specify characters with HEX (0x00 to 0x7F).	4F4B
Trigger command failure response string	614	hhhh...	* This is valid when the trigger command response setting is User setting.	4552
Rotate display image	615	0, 1	0 : Normal Mode 1 : 180 degrees rotation	0
Camera rotation settings	901	0, 1	0 : Normal Mode 1 : 180 degrees rotation	0

■ Tuning options

Function	Command Number	Setting value	Explanation	Default
Brightness adjustment mode	801	0, 1	0 : High quality mode 1 : High speed mode	0
Exposure on high speed mode	802	30 to 10000	Exposure time (μs)	1000
Image filter	805	0, 1	0 : Disable 1 : Enable	1
Allow reduced detection count while tuning	806	0, 1	0 : Do not allow 1 : Allow	1
Decoding area limit	810	abcd	a : 0000-1279 b : 0000-1023 c : 0095-1279 d : 0095-1023 * The minimum size is 96 dots x 96 dots (a,b)  (c,d)	0240021210390811
Polarizing filter	811	0, 1	0 : Not used 1 : Used	1
Auto polarizing filter adjustment	812	0, 1	0 : Disable*1 1 : Enable	1
Tuning target code	820	1 to 0FFF7	1 : QR 2 : DM 4 : PDF417(microPDF) 10 : GS1DataBar 20 : CODE39 (Trioptic CODE 39) 40 : ITF 80 : 2of5 100 : NW7(Barcode) 200 : JAN/EAN/UPC 400 : CODE128 800 : COOP2of5 1000 : CODE93 2000 : CC-A/B (GS1 DataBar) 4000 : CC-A/B(EAN/UPC) 8000 : CC-A/B/C(GS-128) 20000 : Pharmacode Use the sum of the items (in hexadecimal) to specify the setting.	0FFF7
Black/white inversion setting when tuning	823	0 to 2	0 : Disable 1 : Enable 2 : Automatic	2
Internal lighting when tuning	821	0, 1	0 : Not used 1 : Used	1
External lighting when tuning	822	0, 1	0 : Not used 1 : Used	0

*1 When "0" is specified, tuning is executed with the conditions set with WRP,811

■ Common communication settings

Function	Command Number	Setting value	Explanation	Default
Append checksum	003	0, 1	0 : Disable 1 : Enable	0
Append data size	004	0, 1	0 : Disable 1 : Enable	0
Header settings	005	hhhh...	Specify up to 5 characters (16 HEX bytes) from HEX (0x00 to 0x7F). FF : Not set	FF
Terminator settings	006	hhhh...	Specify up to 5 characters (16 HEX bytes) from HEX (0x00 to 0x7F). FF : Not set	0D

■ RS-232C communication settings

Function	Command Number	Setting value	Explanation	Default
Baud rate setting	100	0 to 4	0 : 9600bps 1 : 19200bps 2 : 38400bps 3 : 57600bps 4 : 115200bps	4
Data length setting	101	0, 1	0 : 7bit 1 : 8bit	1
Parity check setting	102	0 to 2	0 : Disable 1 : Even 2 : Odd	1
Stop bit length setting	103	0, 1	0 : 1bit 1 : 2bit	0
Communication protocol setting	104	0 to 2	0 : No Handshaking 1 : PASS/RTRY 2 : ACK/NAK	0
RS-232C communication	109	0, 1	0: Not used 1: Used	1

■ Ethernet communication settings

Function	Command Number	Setting value	Explanation	Default
IP address setting	200	a. b. c. d	a : 0 to 255 b : 0 to 255 c : 0 to 255 d : 0 to 255	192.168.100.100
Subnet mask setting	201	8 to 30	Specify with bit length 255.255.255.0 ...24 255.0.0.0 ...8	24
Default gateway setting	202	a. b. c. d	a : 0 to 255 b : 0 to 255 c : 0 to 255 d : 0 to 255	0.0.0.0 (Not set)
Ethernet command	203	0 to 2	0: Not used 1: TCP 2: UDP	1
Command standby port number	204	1024 to 65535*1	-	9004
Ethernet data (server) setting	205	0,1	0: Not used 1: TCP	1
Ethernet data (server) standby port number	206	1024 to 65535*1	-	9004
Ethernet data (client) setting	207	0 to 2	0: Not used 1: TCP 2: UDP	0
Ethernet data (client) remote IP address 1	208	a.b.c.d	a : 0 to 255 b : 0 to 255 c : 0 to 255 d : 0 to 255	0.0.0.0
Ethernet data (client) remote port number 1	209	1024 to 65535	-	9004
Ethernet data (client) remote IP address 2	210	a.b.c.d	a : 0 to 255 b : 0 to 255 c : 0 to 255 d : 0 to 255	0.0.0.0
Ethernet data (client) remote port number 2	211	1024 to 65535	-	9004
Continually send connection requests	213	0,1	0: Disable 1: Enable	0
Keep alive setting	214	0,1	0: Disable 1: Enable	0

*1 You cannot specify 9013, 9014, 9015, 9016, 5900, 5920, or 44818.



To change and apply the communication configuration, make sure to send a SAVE command.

■ PLC communication settings

Function	Command Number	Setting value	Explanation	Default
Remote IP address (TCP communication)	300	a.b.c.d	a : 0 to 255 b : 0 to 255 c : 0 to 255 d : 0 to 255 Use when the protocol is TCP.	0.0.0.0 (Not set)
Remote port (TCP communication)	301	1024 to 65535	Use only for TPC protocol.	5000
Port number setting for this device	302	1024 to 65535	-	5000
Protocol setting	303	0 to 8	0 : Not used 1 : MC protocol (RS-232C) 2 : SYSWAY 3 : KV Studio(RS-232C) 4 : MC protocol (Ethernet) 5 : OMRON PLC Link 6 : KV Studio 7 : EtherNet/IP 8 : PROFINET	0
DM front address	304	MC: 0 to 32767 SYSWAY: 0 to 9999 KV: 0 to 65534		0
Control region address	305	MC: 0 to 7F SYSWAY: 0 to 6143 KV: 1 to 599		0
Response region address	306	MC: 0 to 7F SYSWAY: 0 to 6143 KV: 1 to 599		0
Output data length setting	307	001 to 100	* Set the upper limit of writing length.	64
PLC link timing input	308	0, 1	0 : Disable 1 : Enable	0
Timing/Data wait	309	00 to 99	by the 100 ms	1
Retry duration (s)	310	1 to 10	by the second	5
EtherNet/IP data handshake setting	321	0, 1	0 : Do not handshake 1 : Handshake	0
EtherNet/IP Input assembly data size setting	322	0040 to 1400	by 1	500
EtherNet/IP Output assembly data size setting	323	0040 to 1400	by 1	500
EtherNet/IP Byte swapping setting	324	0, 1	0 : Disable (ROCKWELL) 1 : Enable (KEYENCE/OMRON)	0
PROFINET device name	330	nnn...	Up to 240 characters Specify with ASCII codes * Device naming rule 1 : PROFINET device name length: 1 to 240 characters 2 : 1 label length: 1 to 63 characters 3 : Only [a to z] (alphabet lower case), [0 to 9] (numbers), [-] (hyphen), [.] (period) can be used for a device name. 4 : [-] (hyphen) cannot be used at the beginning of the label. 5 : [-] (hyphen) cannot be used at the end of the label. 6 : port-xyz, port-xyz-abcd cannot be the name of the first label. abcd and xyz mean [0 to 9] (numbers). 7 : Device names cannot be made in the IP address format. (n.n.n.n n=0.....999) 8 : Labels cannot start with xn-. 9 : The first character of labels cannot be a number. If these rules are not observed, an error occurs.	sr-1000
PROFINET handshake	331	0, 1	0 : Do not handshake 1 : Handshake	0

Function	Command Number	Setting value	Explanation	Default
PLC link Number of characters in output data Extended settings	332	0, 1	The number of characters in the output data can be extended to a maximum of 512 characters. 0 : Disabled 1 : Enabled	0

■ FTP Communication Settings

- Image transmission

Function	Command Number	Setting value	Explanation	Default
IP address of the connection destination FTP server	400	a.b.c.d	a : 0 to 255 b : 0 to 255 c : 0 to 255 d : 0 to 255 For 0.0.0.0., the FTP client does not operate.	0.0.0.0 (Not set)
User name of the connection destination FTP server	401	aaaa…	ASCII setting (max. 16 characters)	admin
Password of the connection destination FTP server	402	aaaa…	ASCII setting (max. 16 characters)	admin
Directory transfer at connection	403	0, 1	0 : Disable 1 : Enable	0
Directly name of the transfer destination	404	aaaa…	ASCII setting (max. 32 characters)	image
FTP connection request transmission as necessary	405	0, 1	0 : Disable 1 : Enable	0
PASV command transmission	408	0, 1	0 : Disable 1 : Enable	0

- FTP transmission of read data

Function	Command Number	Setting value	Explanation	Default
FTP transmission of read data	420	0,1	0: Disable 1: Enable	0
Remote IP address	421	a.b.c.d	a: 0 to 255 b: 0 to 255 c: 0 to 255 d: 0 to 255	0.0.0.0
User name	422		ASCII (max. 16 characters)	admin
Password	423		ASCII (max. 16 characters)	admin
Directory transfer at connection	424	0,1	0: Disable 1: Enable	0
Name of the directory to transfer to	425		ASCII (max. 32 characters)	data
Send FTP connection request as necessary	426	0,1	0: Disable 1: Enable	0
Passive mode	429	0,1	0: Disable 1: Enable	0
Append to preceding data	430	0,1	0: Disable 1: Enable	1
File name	431		File name (max. 128 characters)	data.txt

■ Master/slave function

Function	Command Number	Setting value	Explanation	Default
Master/Slave operation configuration	500	0 to 2	0 : Disable 1 : Multi drop link 2 : Multi head	0
Master/Slave ID during operation	501	0 to 31	If 0 is set, it operates as Master.	0
Number of read data in Multi Head mode	502	1 to 8		1
Master/Slave function group name	503	nnnn...	Up to 16 characters Specify with ASCII codes * 0x20 to 0x7E of ASCII codes can be used.	GROUP01

■ SNTP settings

Function	Command Number	Setting value	Explanation	Default
Remote SNTP server address	520	a, b, c, d	a : 0 to 255 b : 0 to 255 c : 0 to 255 d : 0 to 255 If 0.0.0.0 is set, the SNTP server is not accessed.	0.0.0.0
Time zone	521	0 to 33	0 to 32 0 : GMT-12:00 1 : GMT-11:00 2 : GMT-10:00 3 : GMT-9:00 4 : GMT-8:00 PSD 5 : GMT-7:00 6 : GMT-6:00 CST, Mexico City, Central America 7 : GMT-5:00 EST 8 : GMT-4:30 9 : GMT-4:00 AST 10 : GMT-3:30 11 : GMT-3:00 Brasilia 12 : GMT-2:00 Central Atlantic 13 : GMT-1:00 14 : GMT London, UTC 15 : GMT+1:00 Berlin, Brussels, Rome, Paris, Berne 16 : GMT+2:00 Athens, Jerusalem 17 : GMT+3:00 Kuwait 18 : GMT+3:30 19 : GMT+4:00 Moscow 20 : GMT+4:30 21 : GMT+5:00 22 : GMT+5:30 New Delhi 23 : GMT+5:45 24 : GMT+6:00 25 : GMT+6:30 26 : GMT+7:00 Bangkok 27 : GMT+8:00 Kuala Lumpur, Singapore, Taipei, Beijing 28 : GMT+9:00 Japan, Seoul 29 : GMT+9:30 30 : GMT+10:00 Canberra, Sydney 31 : GMT+11:00 32 : GMT+12:00 33 : GMT+13:00	28
Update cycle (min)	522	1 to 99		1

Each Setting/Confirmation Command Format

When using the batch transmission command, link each setting/confirmation command in the following format after deleting W/R from each command.

■ Parameter bank configuration command

Change command **B . bb mmm , nnn...**

Confirmation command **B . bb mmm**

Confirmation command response **B . bb nnn...**

bb : Parameter bank number 01 - 16 Fixed to 2 bytes

mmm : Command number Fixed to 3 bytes

nnn... : Setting value (varies according to command number)

■ Code configuration command for tuning

Change command **C . mmmm , nnn...**

Confirmation command **C . mmmm**

Confirmation command response **C . nnn...**

mmmm: Command number Fixed to 4 bytes

nnn... : Setting value (changeable according to the command number)

■ Operation configuration command

Change command **P . mmm , nnn...**

Confirmation command **P . mmm**

Confirmation command response **P . nnn...**

mmm : Command number Fixed to 3 bytes

nnn... : Setting value (varies according to command number)

■ Communication configuration command

Change command **N . mmm , nnn...**

Confirmation command **N . mmm**

Confirmation command response **N . nnn...**

mmm : Command number Fixed to 3 bytes

nnn... : Setting value (varies according to command number)

Example)

- (1) Batch transmission of the WB command and WP command

Send command **WA , B , 01700 , 2 , P , 200 , 0 , P , 201 , 1**

Response **OK , WA**

- (2) Confirm the setting content sent at (1)

Send command **RA , B , 01700 , P , 200 , P , 201**

Response **OK , RA , B , 2 , P , 0 , P , 1**

- (3) Sending multiple WN commands

Send command **WA , N , 000 , 2 , N , 001 , 2 , N , 002 , 1**

Response **OK , WA**

*After sending WN commands, make sure to send the SAVE command to reflect the setting.

- (4) Confirm the setting content sent at (3)

Send command **RA , N , 000 , N , 001 , N , 002**

Response **OK , RA , N , 2 , N , 0 , N , 1**

Point

- When using the batch transmission command, the reflecting order of the setting is the same as the sending order of the setting commands.
- Make sure to send the SAVE command after sending the batch transmission command containing the communication setting command.
- The batch transmission command can send up to 2048 bytes of number of characters (excluding header and terminator).
- The location (n) of the error command returns the location first confirmed from the head of the transmission command.

13-1 PLC Link Overview

PLC Link

The PLC link enables the SR-1000 Series to directly write data into the internal memory of the PLC (data memory and data registers) by way of the RS-232C and Ethernet interfaces.

Since the SR-1000 Series directly controls memory in the PLC, it eliminates the need for a communication program. Therefore, man-hours needed to create programs can be reduced.



- The following restrictions are imposed regarding the use of the PLC link:**
- You cannot use the PLC link to change the SR-1000 settings.
 - You cannot use the PLC link to activate test modes.
 - You cannot use the PLC link to send operation commands and configuration commands.
 - Due to long communication time, it is not suitable for a line that requires high-speed processing.
 - The amount of data that can be processed depends on the output data length. A maximum number of digits is 100. (Default output data length is 64 digits.)

List of supported PLCs

■ RS-232C

KEYENCE

Series name	Connection method	Model
KV Series	CPU built-in port	KV-7300/3000, KV Nano Series
	Communication unit	KV-L21V/KV-L20V/L20R, KV-N10L/NC10L/NC20L

Mitsubishi Electric

Series name	Connection method	Model
MELSEC Series	Serial communication unit	QJ71C24N-R2 LJ71C24-R2

OMRON

Series name	Connection method	Model
SYSMAC Series	CPU built-in port	CS1 Series
		CJ1 Series
		CJ2 Series
		CP1 Series*
Serial option board	CP1W-CIF01	
	CP1W-CIF11	
	CP1W-CIF12	
Serial communication unit	CJ1W-SCU□□(-V1)	
	CS1W-SCU□□V1	
Communication board	CS1-SUB□□-V1	

* A serial option board is necessary, depending on the model.

■ Ethernet Interface

KEYENCE

Series name	Connection method	Model
KV Series	CPU built-in port	KV-5000/5500/7500
	Ethernet unit	KV-LE21V/LE20V, KV-NC1EP

Mitsubishi Electric

Series name	Connection method	Model
MELSEC Series	CPU built-in port	Q03UDECPU, Q04/06/10/13/20/26/ 50/100UDEHCPU Q03/04/06/13/26UDVCPU L02CPU/06CPU/26CPU-BT iQ-F FX5U
		QJ71E71-100/-B5/-B2

OMRON

Series name	Connection method	Model
SYSMAC Series	CPU built-in port	CJ2M-CPU3 Series

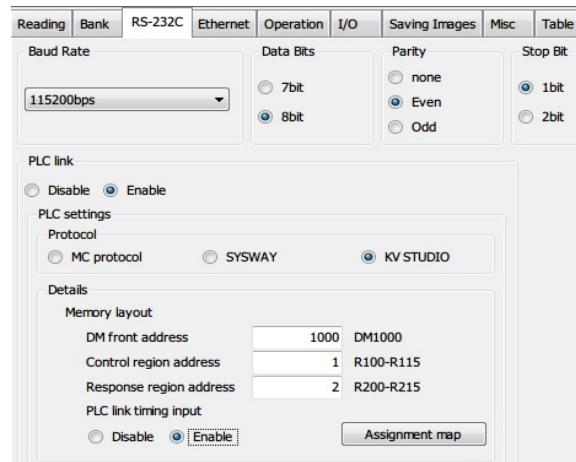
13-2 Settings

We have prepared information regarding connecting PLCs to the SR Series. Download the information from the KEYENCE website.

SR-1000 Series Settings

■ RS-232C

- 1 Open the [RS-232C] tab.
- 2 Set the [Baud Rate], [Data Bits], [Parity], and [Stop Bit] settings to match the PLC.
- 3 Under [PLC link], select [Enable].
- 4 Select the [Protocol].
- 5 Set [PLC link timing input] to "Enable."
 - * This is not necessary when you are using the IN1 terminal of the SR-1000 Series to apply triggers.
- 6 Click [Send Configuration].



■ Ethernet

- 1 Open the [Ethernet] tab.
- 2 Enter the [IP address] and [Subnet Mask] settings to assign to the SR-1000 Series.
- 3 Start the [Setup Wizard].
- 4 STEP 1 Select the trigger input method.
- 5 STEP 2 Select [Field network/PLC].
- 6 STEP 3 Select the communication protocol.
- 7 STEP 4 Configure connection destination settings such as the [IP Address] and the [Port].
- 8 Exit the [Setup Wizard].
- 9 Click [Send Configuration].

When you are using the PLC link, you can only use the RS-232C interface or the Ethernet interface.

PLC Settings Examples

■ KV Series

● RS-232C

Operation	KV BUILDER/KV STUDIO mode
Interface	RS-232C *1
Division	0
Baud rate	Automatic *2
Data bit length	8 bits *2
Parity	Even (e) *2
Stop bit length	1 bit *2
Checksum	None *2
RS/CSFlow control	Disable

*1 To use port2, set the interface to "RS-232C".

*2 For KV BUILDER/KV STUDIO mode, a fixed value is used.

● Ethernet

IP address	192.168.100.10
Subnet mask	255.255.255.0 (default)
Port (VT)	8502 (default)

■ MELSEC Series Configuration

● RS-232C

• QJ71C24N-R2

Set communication conditions with the GX-Developer.

("I/O assignment configuration" in "PC parameters")

Type	Intelligent
Type name	Name of the unit to be installed
Points	32 points
First XY	First output signal of the target unit (hexadecimal number)
("Option configuration" under "I/O assignment settings" in "PC parameters")	
Unit type	Serial communication/modem interface unit
Unit type name	Name of the unit to be installed
("Switch configuration" under "I/O assignment configuration" in "PC parameters")	
Settings	Value
Operation configuration	Independent
Data bit length	8 bits
Parity bit	Present
Odd/even parity	Odd (o)
Stop bit length	1 bit
Checksum code	Present
Writing during RUN	Allowed
Configuration change	Allowed
Communication rate configuration	9600 bps
Communication protocol configuration	MC protocol (format 5)
Division configuration	0

● Ethernet

• QJ71E71-100-B5-B2

Set communication conditions with the GX-Developer.

("I/O assignment configuration" in "PC parameters")

Type	Intelligent
Type name	Name of the unit to be installed
Points	32 points
First XY	First output signal of the target unit (hexadecimal number)
("Target unit number for "Ethernet/CC IE/MELSECNET" in "Network parameters")	
Network type	Ethernet
First I/O No.	Number specified in "I/O assignment configuration" in PC parameters
Network No.	Any number
Group No.	Any number
Division	Any number
Mode	Online
("Operation configuration" for "Ethernet/CC IE/MELSECNET" in "Network parameters")	
Communication data code configuration	Binary code communication
Initial timing configuration	Always waiting for OPEN (Communication possible during STOP)
IP address	192.168.100.10 *1
Writing permitted during RUN	Check
Send frame configuration	Ethernet (V2.0)
TCP living confirmation configuration	KeepAlive is used.

*1 Configure so that it matches the network.

* The port number is 5000.

● CPU built-in port

Set communication conditions with the GX-Developer.

("Built-in Ethernet port configuration" in "PC parameters")

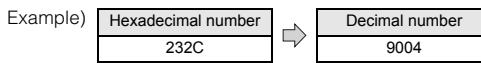
IP address	192.168.100.10 *1
Subnet mask patterns	255.255.255.0 *1
Default router IP address	192.168.100.254 *1
Communication data code configuration	Binary code communication
Writing permitted during RUN (FTP and MC protocol)	Check

*1 Configure so that it matches the network.

("Built-in Ethernet port configuration" in "PC parameters")

Protocol	UDP
Open system	MC protocol
Port number with Ethernet module installed	232C (hexadecimal number) * Any number

* The port number of the SR-1000 Series must be specified in decimal number while the Q Series port number with Ethernet module installed is specified in hexadecimal number.



● L02CPU/26CPU-BT

Set communication conditions with the GX-Works2.

("Built-in Ethernet port configuration" in "PC parameters")

IP address	192.168.100.10 *1
Subnet mask patterns	255.255.255.0 *1
Default router IP address	192.168.100.254 *1
Communication data code configuration	Binary code communication
Writing permitted during RUN (FTP and MC protocol)	Check

*1 Make the configuration appropriate to the network.
("Built-in Ethernet port configuration" in "PC parameters")

Protocol	UDP
Open system	MC protocol
Port number with Ethernet module installed	232C (hexadecimal number) * Any number

* The port number of the SR-1000 Series must be set in decimal numbers.

■ SYSMAC Series Configuration

● RS-232C

Set communication conditions with the CX-Programmer.

● CPU built-in port

PLC system configuration→Upper link port (serial port)

Communication configuration	User configuration
Baud rate	9600 bits/s
Parameter	7,2,E
Mode	Upper link
ID No.	0

* When communication configuration is established as a standard, baud rate and parameters are fixed as above.

● Serial communication unit/board

I/O table/unit configuration

Presence or absence of optional configuration	Optional configuration
Communication mode	Upper link
Data length	7 bits
Stop bit	2 bits
Parity	Even
Transmission rate	9600 bps
CTS control	None
Upper link ID No	0

● Ethernet

Set communication conditions with CX-Programmer.

● CPU built-in port

[Rotary switch]

Unit number	0
Node address	1 *1

[TCP/IP]

IP address	192.168.100.10
Subnet mask	255.255.255.0

[FINS/UDP]

FINS/UDP port	9600 (default)
IP address conversion	IP address table method
Remote IP address dynamic conversion	Do not perform dynamic conversion of the remote IP address.
Destination node address	2

IP address 192.168.100.100 *2

*1 Set the node address to a value that is different from that of the SR-1000 Series.

*2 Specify the IP address of the SR-1000 Series.

Devices That Can Be Used

The devices that can be accessed with the PLC link are shown below.

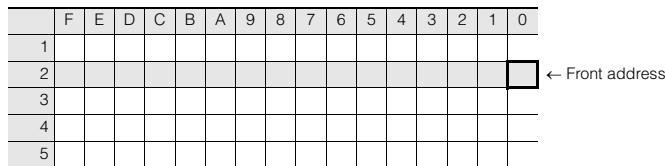
PLC	Specified area	Device name	Available range
KV Series	Control region	Input relay, output relay	R100 to R59915 ^{*1}
	Response region		
	Data region	Data memory	DM0 to DM65534
MELSEC Series	Control region	Input device	Y0 to Y7FF ^{*2}
	Response region	Output device	X0 to X7FF ^{*2}
	Data region	Data register	0 to 32737
SYSMAC Series	Control region	CIO, internal auxiliary relay	0 to 6143ch
	Response region		
	Data region	Data memory	D0000 to D9999

- The available range indicates the maximum value of the device accessible when the PLC link function is used. When you set the DM front address, control region address, or response region address, do so by taking into account the number of necessary devices.
- Even with the same PLC model, depending on the specifications and the configuration, it may not be possible to specify the maximum value for the device region that can actually be used and there may be regions that cannot be used. For more information on the available regions, refer to the appropriate PLC manual.

*1 In the AutoID Network Navigator entry field, the range is to

*2 In the AutoID Network Navigator entry field, the range is to

- Specifying the front addresses of the control region and response region If you enter the value in the AutoID Network Navigator entry field, the shaded area indicated below will be specified.



13-3 Memory Maps

To use the SR-1000 Series over the PLC link, the functions of the SR-1000 Series need to be assigned to the PLC devices. For the SR-1000 Series, assign the front address of each device to match the target functions.

Control region	Device used to write commands from the PLC
Response region	Device used to write responses from the SR-1000 Series
Data region	Device used to write the reading result data of the SR-1000 Series*

* Use this device in custom mode and when you specify parameter banks.

Assignment of Functions

■ Control region

When the control region address A is specified, functions are assigned in order as shown below starting with the specified beginning address.

A+15	A+14	A+13	A+12	A+11	A+10	A+9	A+8	A+7	A+6	A+5	A+4	A+3	A+2	A+1	A+0
Reserved area															

Address	Description	Data description	SR-1000 Write	PLC Write
A+00	PLC timing area	0: Instruction for timing OFF 1: Instruction for timing ON		✓
A+01	Data write processing method	0: Real time processing 1: Sequential processing		✓
A+02	Sequential processing Data write enabled	0: Data write disabled 1: Data write enabled		✓
A+03	BLOAD request	0: - 1: BLOAD start		✓
A+04	BLOAD Complete Clear	0: - 1: BLOAD completed or failed, bit clear		✓

* Set the Timing Signal Input via PLC Link to On to turn the timing signal on and off using the PLC timing area and BLOAD request.

* Make sure the file number (1 - 8) is added to D+00 Bank/BLOAD File Number before turning A+03 on. The BLOAD process will fail if the number is outside the range or the corresponding file does not exist.

* B+06 and B+07 are set to 0 when A+04 is turned on.

* BLOAD requests cannot be manually stopped before completion once started.

■ Response region

When the response region address B is specified, functions are assigned in order as shown below starting with the specified beginning address.

B+15	B+14	B+13	B+12	B+11	B+10	B+9	B+8	B+7	B+6	B+5	B+4	B+3	B+2	B+1	B+0
Reserved area															

Address	Description	Data description	SR-1000 Write	PLC Write
B+00	PLC timing input response area	0: Timing OFF 1: Instruction for timing ON	✓	
B+01	Reserved area	-	-	-
B+02	Sequential processing Data write request	0: No data 1: Data write request	✓	
B+03	Sequential processing Data write complete	0: Data write incomplete 1: Data write complete	✓	
B+04	Real time processing Data being written	0: No data being written 1: Data being written	✓	
B+05	BLOAD response	0: BLOAD request off 1: BLOAD request on		✓
B+06	BLOAD completion	0: - 1: BLOAD complete		✓
B+07	BLOAD failure	0: - 1: BLOAD fail		✓

* Do not use reserved areas.

* Focus will be adjusted when B+06 is turned on. Wait at least 5 seconds after turning on B+06 before turning on the timing signal input.

* The D+00 Bank/BLOAD File Number remains the same even when B+06 is on. Set D+00 Bank/BLOAD File Number to 0 when alternating banks.

■ Data region

When the data region address D is specified, functions are assigned in order as shown below starting with the specified beginning address.

Address	Description	Data description	SR-1000 Write	PLC Write
D+00	Specify reading bank/ BLOAD file number	0: Do not specify bank (Alternate) 1 to 16: Specify bank n 1 to 8: BLOAD file number		✓
D+01	Reserved area			
D+02	Output data length	Length of data (read data + append data) output from the SR-1000 Series	✓	
D+03	Data writing process count	Read data writing count from the SR-1000 Series to PLC is displayed.*1	✓	
D+04	1st and 2nd digits of output data*4	ASCII code 2 characters*2*3*	✓	
D+05	3rd and 4th digits of output data*4	ASCII code 2 characters*2*3*	✓	
	...			
D+53	99th and 100th digits of output data*4	ASCII code 2 characters*2*3*	✓	
	...			
D+259	511th and 512th digits of output data*5	ASCII code 2 characters*2*3*	✓	

*1 When the next data reaches at the count of 65535, the value of count returns to 1.

*2 When the output data length is an odd number, [NUL] (0x00) is written in the "Output data length + 1".

*3 The order in which data of each PLC is stored is as follows:

KV : High order byte → Low order byte

SYSMAC : High order byte → Low order byte

MELSEC : Low order byte → High order byte

*4 The data length output from the SR-1000 Series depends on the data output length set in the SR-1000 Series. (Default: 64 digits)

0-byte data is output as data with a length of 0.

*5 When the 5PLC link data size limit is 512 characters

Point

- If output data cannot fit in the output data region, starting with that digit, the remaining data will be discarded.

■ Data region (with master/slave function)

When you use the master/slave function, the following functions are assigned.

Address	Description	Data description	SR-1000 Write	PLC Write
D+00	Specify reading bank/ BLOAD file number (master only)	0: Do not specify bank (Alternate) 1 to 16: Specify bank n 1 to 8: BLOAD file number		✓
D+01	Specify ID	Specify the ID that will supply the trigger input when you have specified the Multi Drop setting. 0 to 31: ID		✓
D+02	Output data length	Length of data (read data + append data) output from the SR-1000 Series	✓	
D+03	Data writing process count	The count of read data written to the PLC from the SR-1000 Series.*1	✓	
D+04 to D+53	Digit 1 to digit 100 of the output data*4	Read data of ID: 0.*2,*3	✓	ID: 0
D+54	Data writing ID	The ID of the reader to which the most recent data was written is displayed.	✓	
D+55	Trigger input count for the master unit (ID: 0)	The trigger input count for the master unit (ID: 0) is displayed.	✓	
D+56 to D+59	Reserved area			

D+60 to D+109	1st to 100th digits of output data*4	Read data of ID: 1.*2,*3	✓	ID: 1
D+110 to D+159	1st to 100th digits of output data	Read data of ID: 2.*2,*3	✓	ID: 2
D+1560 to D+1609	1st to 100th digits of output data*	Read data of ID: 31.*2,*3	✓	ID: 31

*1 When the next data reaches at the count of 65535, the value of count returns to 1.

*2 When the output data length is an odd number, [NUL] (0x00) is written in the "Output data length + 1".

*3 The order in which data of each PLC is stored is as follows:

KV : High order byte → Low order byte

SYSMAC : High order byte → Low order byte

MELSEC : Low order byte → High order byte

*4 The data length output from the SR-1000 Series depends on the data output length set in the SR-1000 Series main unit. (Default: 64 digits)

0-byte data is output as data with a length of 0.

When using the master/slave function, the PLC link data size limit cannot be extended (512 characters).

Device Assignment Function Details

■ Read trigger area

This bit is used to start and stop reading.

Address	Description	Data description
A+00	PLC timing area	0: Instruction for timing OFF 1: Instruction for timing ON
B+00	PLC timing input response area	0: Timing OFF 1: Instruction for timing ON

A+00: When this bit is set to ON (1), the SR-1000 Series starts reading.
B+00: When the SR-1000 Series recognizes that A+00 has been set to ON, it sets "B+00" to ON.

■ Data write processing method

You can select from two data writing processing methods: "real time processing" and "sequential processing." Switch between the processing methods by setting the value of [A+01] to "0" and "1."

● Real time processing

Data will be sent immediately after reading.

Address	Description	Data description
A+01	Data write processing format	0: Real time processing 1: Sequential processing
B+04	Real time processing Data being written	0: No data being written 1: Data being written

A+01: Set this bit to OFF (0) in advance.

B+04: While this bit is set to ON, data is being written. It is set to OFF when writing finishes.

● Sequential processing

After reading, data is stored in the send buffer of the SR-1000 Series until the writing of data to the PLC is enabled.

Address	Description	Data description
A+01	Data write processing method	0: Real time processing 1: Sequential processing
A+02	Sequential processing Data write enabled	0: Data write disabled 1: Data write enabled
B+02	Sequential processing Data write request	0: No data 1: Data write request
B+03	Sequential processing Data write complete	0: Data write incomplete 1: Data write complete

A+01: Set this bit to ON (1) in advance.

A+02: When this bit is set to ON (1), the SR-1000 Series writes read data into "D+04 to D+53."

When this bit is set to OFF (0), the SR-1000 Series stores data in the send buffer without writing new data.

B+02: This bit is set to ON when read data is present in the send buffer.

B+03: This bit is set to ON when the writing of data is finished.

■ Reading bank specification

Use this address to specify the bank when the SR-1000 Series is in custom mode.

Address	Description	Data description	Data format
D+00	Specify read bank	0: Bank not specified (alternate) 1 to 10: Bank n specified	Binary code

D+00: When a bank number has been entered in this address, setting "A+00" to ON (1) starts reading with this bank specified.

■ Output data length

The area is used to write data length output from the SR-1000.

Address	Description	Data description	Data format
D+02	Output data length	Length of data output from the SR-1000 Series	Binary code

■ Output data

Address	Description	Data description	Data format
D+04 to D+53	Output data	2 characters of ASCII code/ address*1*2*3	ASCII code

*1 When the output data length is an odd number, [NUL] (0x00) is written in the "Output data length + 1".

*2 The order in which data of each PLC is stored is as follows:

MELSEC : Low order byte → High order byte

SYSMAC : High order byte → Low order byte

KV : High order byte → Low order byte

*3 The data length output from the SR-1000 Series depends on the data output length set in the SR-1000 Series main unit. (Default: 64 digits)

- If "A+00" is switched between ON and OFF at high speed, the SR-1000 Series will miss the changes in "A+00," which will prevent the trigger input from turning on or off normally. In this situation, write the program so that "B+00" is used to check whether the SR-1000 Series has recognized the change in "A+00."
- If the code reading interval is shorter than the PLC link communication time, data that cannot be written to the PLC will be stored in the send buffer of the SR-1000 Series.
- The SR-1000 Series can hold up to 100 pieces of data. If this limit is exceeded, all data in the send buffer is erased and "OVER" is written into "D+04 to D+53." (This is a send buffer overflow.)
- When a send buffer overflow occurs, the SR-1000 Series stops operation, writes "OVER" to the PLC, and then recovers to an operating state.
- When you are using "sequential processing," be sure to set "A+02" to ON (1) after you have prepared the PLC to receive the data.

13-4 Operation Examples

Example 1) Trigger method: Level trigger. Data writing method: Real time processing.

Memory layout	Signal name	Address	When reading is successful	When reading fails
Control region	Data write processing method	A+01		
	Trigger area	A+00		
Read operation (light is lit)				
Response region	Trigger response area	B+00		
	Writing data	B+04		
Data region	Output data	D+02...		

● When reading is successful

- "A+00," "A+01," and "B+00" are set to OFF (0).
- "A+00" is set to ON (1).
- When the SR-1000 Series recognizes that "A+00" has been set to ON (1), "B+00" is set to ON (1) and reading starts.
- When the code is read, its data is written into "D+04 to D+53."
- "A+00" is set to OFF (0).
- When the SR-1000 Series recognizes that "A+00" has been set to OFF (0), "B+00" is set to OFF (0).

● When reading fails

- "A+00," "A+01," and "B+00" are set to OFF (0).
- "A+00" is set to ON (1).
- When the SR-1000 Series recognizes that "A+00" has been set to ON (1), "B+00" is set to ON (1) and reading starts.
- "A+00" is set to OFF (0).
- When the SR-1000 Series recognizes that "A+00" has been set to OFF (0), "B+00" is set to OFF (0) and reading stops.
- The code could not be read, so "ERROR" is written to "D+04 to D+53."

Example 2) Trigger method: One-shot trigger. Data writing method: Real time processing.

Memory layout	Signal name	Address	When reading is successful	When reading fails
Control region	Data write processing method	A+01		
	Trigger area	A+00		
Read operation (light is lit)				
Response region	Trigger response area	B+00		
	Writing data	B+04		
Data region	Output data	D+02...		

● When reading is successful

- "A+00," "A+01," and "B+00" are set to OFF (0).
- "A+00" is set to ON (1).
- When the SR-1000 Series recognizes that "A+00" has been set to ON (1), "B+00" is set to ON (1) and reading starts.
- "A+00" is set to OFF (0).
- When the code is read, its data is written into "D+04 to D+53."
- When the "One-shot trigger duration" elapses, "B+00" is set to OFF (0) and reading stops.

● When reading fails

- "A+00," "A+01," and "B+00" are set to OFF (0).
- "A+00" is set to ON (1).
- When the SR-1000 Series recognizes that "A+00" has been set to ON (1), "B+00" is set to ON (1) and reading starts.
- "A+00" is set to OFF (0).
- When the "One-shot trigger duration" elapses, "B+00" is set to OFF (0) and reading stops.
- The code could not be read, so "ERROR" is written to "D+04 to D+53."

Example 3) Trigger method: Level trigger. Data writing method: Sequential processing.

Memory layout	Signal name	Address	When reading is successful	When reading fails
Control region	Data write processing method	A+01		
	Trigger area	A+00		
	Data write enabled	A+02		
Read operation (light is lit)				
Response region	Trigger response area	B+00		
	Data write request	B+02		
	Data write complete	B+03		
Data region	Output data	D+02...		

● When reading is successful

- "A+00" and "B+00" are set to OFF (0).
- "A+01" is set to ON (1).
- "A+00" is set to ON (1).
- When the SR-1000 Series recognizes that "A+00" has been set to ON (1), "B+00" is set to ON (1) and reading starts.
- When a code is read, "B+02" is set to ON (1).
- "A+00" is set to OFF (0).
- When "A+02" is set to ON (1), the data is written into "D+04 to D+53."
- When data writing is complete, "B+03" is set to ON (1).
- When "A+02" is set to OFF (0), "B+03" is set to OFF (0).

● When reading fails

- "A+00" and "B+00" are set to OFF (0).
- "A+01" is set to ON (1).
- "A+00" is set to ON (1).
- When the SR-1000 Series recognizes that "A+00" has been set to ON (1), "B+00" is set to ON (1) and reading starts.
- "A+00" is set to OFF (0).
- When the code cannot be read, "ERROR" is written to the send buffer, so "B+02" is set to ON (1).
- When "A+02" is set to ON (1), "ERROR" is written into "D+04 to D+53."
- When data writing is complete, "B+03" is set to ON (1).
- When "A+02" is set to OFF (0), "B+03" is set to OFF (0).

* Complete processing so that "A+02" is set to ON (1) when "B+03" is set to OFF (0) and "B+02" is set to ON (1). This makes it possible to obtain all the data even when multiple pieces of data are stored in the send buffer.

Point

- The read data stored in the "D+04 to D+53" data region is overwritten with the new read data.
- If the number of digits in the read data changes, parts of the previous read data may remain in "D+04 to D+53." If necessary, delete the data stored in "D+04 to D+53" after this data is sent.
- Timing with which to transfer the data stored in "D+04 to D+53" to a different block of data memory
"Real time processing:" Transfer the data when "B+04" is set to OFF (0).
"Sequential processing:" Transfer the data when "B+03" is set to ON (1).

Example 4) Using the Changeover Function

■ Configuration

Set the Timing Signal Input via PLC Link to On.

Details	Memory layout
DM front address	0 D0
Control region address	0 Y00-Y0F
Response region address	0 X00-X0F
PLC link timing input	
<input checked="" type="radio"/> Disable	<input type="radio"/> Enable
(Also select this when using the changeover function.)	
Assignment map	

■ Timing Chart

Memory layout	Signal name	Address	BLOAD is successful	BLOAD fails
Control region	BLOAD request	A+03		
	BLOAD Complete Clear	A+04		
	PLC timing area	A+00		
Response region	BLOAD response	B+05		
	BLOAD completion	B+06		
	BLOAD failure	B+07		
Data region	BLOAD file number	D+00		

● BLOAD Completion

- 1 D+00 describes the file number in binary.
- 2 A+03 is turned on (1).
- 3 B+05 is turned on (1) to enable SR-1000 series devices to recognize BLOAD requests.
- * B+05 remains off (0) when not using BLOAD.
- 4 B+06 (1) is turned on after the configuration file has been successfully switched.
- 5 A+04 is turned on, which turns off B+06 (0).
- 6 D+00 is set to 0.
- 7 B+06 is turned on (1) and then A+00 is turned on (1) after 5 seconds.

● BLOAD Failures

- 1 D+00 describes the file number in binary.
- 2 A+03 is turned on (1).
- 3 Turn on B+05 (1) to enable SR-1000 series devices to recognize BLOAD instructions.
- * B+05 remains off (0) when not using BLOAD.
- 4 B+07 is turned on (1) if the configuration file fails to be switched.
- 5 A+04 is turned on, which turns off B+07 (0).

Point

- Turn on (1) BLOAD request "A+03" when the DATA write request "B+02" is a state of 0 (a state of no data).
- After completion of BLOAD, if the network setting (IP address setting) is edited, Turn off BLOAD completion "B+06" at the same time when BLOAD request "A+03" is turned off.

Reference Program

This is a reference program for the use of the KV Series. In this program, error handling is not considered, thus program by taking into account error handling and test in actual operation.

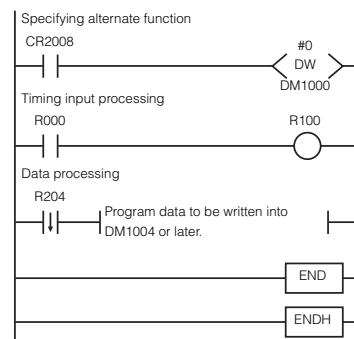
■ SR-1000 Series configuration

It is assumed that the SR-1000 Series is configured as follows:

- Timing : Level trigger
- Read mode : Single
- Memory assignment : DM front address: DM1000
Control region address: R100
Response region address: R200
- PLC link timing input: Yes

* To use on a trial basis, specify the PLC communication interface to the SR-1000 Series and configure communication for the KV Series.

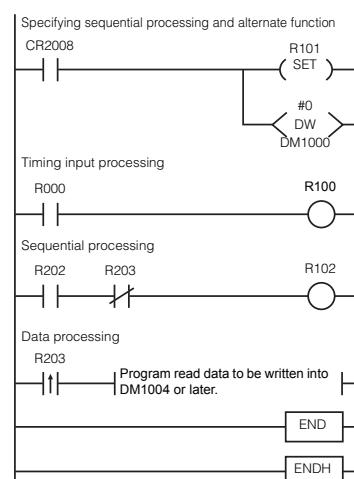
■ Real time processing



Write "0" into DM1000 and set to use the alternate function.

Input R000 as read timing.

■ Sequential processing



Set up the R101 and set it to sequential processing.

Write "0" into DM1000 and set to use the alternate function.

Input R000 as read timing.

Use the data write request flag (R202), data write enabled flag (R102), data write complete flag (R203) to execute sequential processing.

13-5 PLC Link Error

When a PLC Link Error Occurs

When a PLC link error occurs, the SR-1000 Series exhibits the following behavior:

- "E7 PLC LINK" is shown on the SR-1000 Series display.
- "ERR BUSY" is output from the output terminals.



Check Points

When a PLC link error occurs, check the following points:

● Wiring

- Is the cable between the SR-1000 Series and the PLC connected correctly?
- Are there any breaks in the cable?
- If you are communicating via RS-232C, is the wiring correct?

● Settings

- Do the communication settings of the SR-1000 Series match those of the PLC?
- Are the "memory layout" settings within the range of use of the PLC?

● Operation

- After the PLC settings were configured, was the PLC restarted?

Recovering from PLC Link Errors

- Restart the SR-1000 Series.
- Press the SR-1000 Series [SELECT] button for 3 seconds.
- When "Clear PLC link error" is assigned to IN1 or IN2, turn on IN1 or IN2.
- Send the clear PLC link error command (PCLR) to the SR-1000 Series.
- Send the reset command (RESET) to the SR-1000 Series.

Point

- While a PLC link error is occurring, trigger input signals are not accepted.
- When PLC link errors are cleared, all the data stored in the send buffer is cleared.
- When you have specified to use a PLC, this setting may not be applied until you restart the PLC. After you specify this setting, be sure to restart the PLC.

14-1 EtherNet/IP Overview

What Is EtherNet/IP?

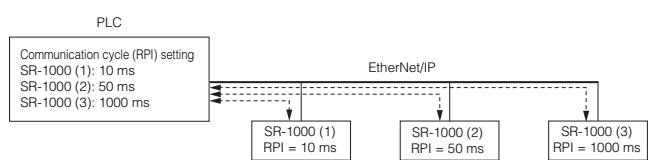
EtherNet/IP is an industrial communications network managed by the ODVA (Open DeviceNet Vendor Association, Inc.). EtherNet/IP communication can share the network with normal Ethernet communication.

Cyclic and Message Communication

In EtherNet/IP, there is cyclic communication (Implicit message) that handles periodic sending and receiving of data, and there is also message communication (Explicit message) which handles sending and receiving of commands/responses arbitrarily.

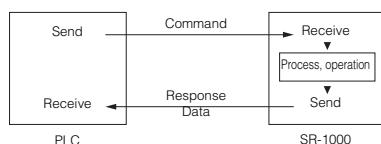
■ Cyclic communication

In cyclic communication, RPI (communication cycle) can be set according to the priority of data that is sent and received. Overall communication load adjusted data can be sent and received.



■ Message communication

In message communication, timing is controlled through commands/responses.



List of Supported PLCs

■ PLC manufactured by KEYENCE

PLC model	EtherNet/IP Communication unit	Software used
KV-3000	KV-EP21V	
KV-5000	KV-EP21V	
KV-7500/5500	- (KV-5500 built-in port or KV-EP21V)	KV STUDIO
KV-N24/N40/N60/NC32T	KV-NC1-EP	

■ PLC manufactured by Rockwell Automation

• ControlLogix/Compact Logix category PLC

PLC model	EtherNet/IP Communication unit	Firmware version	Software used	Version of software used
1756 ControlLogix	1756-ENBT			
1769 CompactLogix	- (SR-2000 built-in port)	Ver. 13 or later	RsLogix5000	Ver. 13 or later

• Micro Logix 1100/1400 category PLC

PLC model	EtherNet/IP Communication unit	Firmware version	Software used	Version of software used
1761/1766 MicroLogix	- (SR-2000 built-in port)/1761-NET-ENI	Series A, Revision A, FRN1	RsLogix500	Ver. 7.10 or later
1762/1763/1764 MicroLogix	1761-NET-ENI			

■ PLC manufactured by Omron

PLC model	EtherNet/IP Communication unit	Software used
SYSMAC CJ2	- (CJ2 built-in port or CJ1W-EIP21)	
SYSMAC CJ1	CJ1W-EIP21	CX-One
SYSMAC CS1	CS1W-EIP21	

SR-1000 Series EtherNet/IP Communication Specifications

Cyclic communication (Implicit message)	Number of connections	16*	
	Communication size	KEYENCE KV Series Rockwell Automation ControlLogix CompactLogix	4 to 1444 bytes 4 to 496 bytes
	Applicable messaging methods	OMRON CJ/CS Series	4 to 1436 bytes
Message communication (Explicit message)	Number of connections	16*	
	Applicable messaging methods	UCMM (unconnected type), Class 3 (connected type)	

* In total, there are 16 connections in cyclic communication and message communication.

Usable Functions

The functions that the SR-1000 Series can use with EtherNet/IP are shown below.

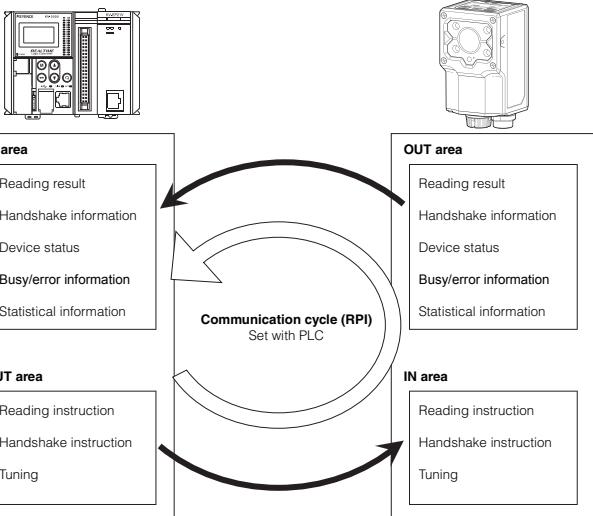
Function	Description
Reading instruction	Begins reading operation. Also executes reading end, bank setting reading, etc.
Preset instructions	Records successfully read data as preset data. Also registers or deletes preset data from the PLC.
Tuning instructions	Executes tuning. Can save tuning results in the set bank.
Error-handling	Checks the cause of the error that occurred in the main unit, and returns the error. (Example: Buffer overflow check/cancellation)
Main unit status acquisition	Checks the main unit status (BUSY status).
Operation results acquisition	Acquires read data. When set to silent mode, the read data is not updated.
Terminal status acquisition	Acquires input terminal and output terminal status.
Main unit reset instructions	Displays the SR-1000 Series software reset.

NOTICE	About the exclusion process The SR-1000 Series can simultaneously give control instructions to multiple interfaces (I/O terminal, RS-232C, Ethernet Communication (TCP/IP), EtherNet/IP communication, test key operation). However, when a control instruction is being received from one interface, instructions from other interfaces cannot be received.
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14-2 Cyclic Communication

Cyclic Communication

This communication can be used to execute reading or tuning by setting bits to ON or OFF.



NOTICE

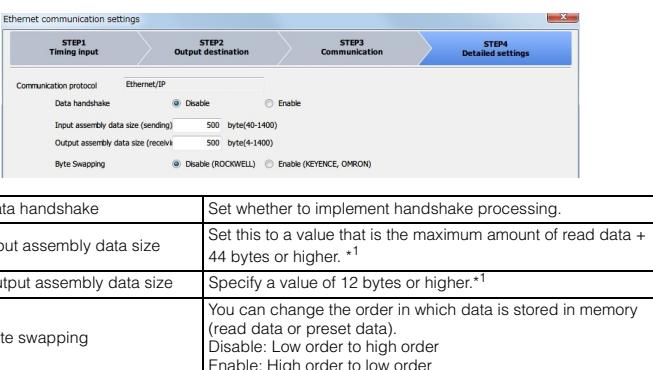
- Communication settings such as the communication cycle and data size are set in the PLC.
- When there is a large load in the network which connects many devices including EtherNet/IP devices, delays or packet loss may occur. Perform a thorough verification before operation.
- When communicating via EtherNet/IP with PLCs (MicroLogix Series manufactured by Rockwell, etc.) that do not support cyclic communication, use message communication.

SR-1000 Series Settings

- Open the [Ethernet] tab.
- Enter the [IP address] and [Subnet Mask] settings to assign to the SR-1000.



- Start the [Setup Wizard].
- STEP 1 Select the trigger input method.
- STEP 2 Select [Field network/PLC].
- STEP 3 Select [EtherNet/IP].
- STEP 4 Configure the detailed EtherNet/IP settings.



*1 Increase the value according to the number of digits in the read data or preset data.

- Exit the [Setup Wizard].
- Click [Send Configuration].

PLC Settings

When you use cyclic communication, configure the following settings on the PLC.

- Connection settings
- Settings of the device to communicate with by way of EtherNet/IP

For setting details, refer to the PLC's manual.

■ Connection type

Open a connection from the PLC to the SR-1000 Series during EtherNet/IP cyclic communication. The types of usable connections vary depending on the device. The connections that can be used by the SR-1000 Series are shown below.

Connection type	Data type	Instance ID	Size (byte)	RPI (ms)
Exclusive Owner (Data transmission + control)	Result data (Input Assemblies)	0X64(100)	40 to 1400	10 to 10000
	Control data (Output Assemblies)	0X65(101)	8 to 1400	
Input Only (Data transmission only)	Result data (Input Assemblies)	0X64(100)	40 to 1400	10 to 10000
	Control data (Output Assemblies)	0XFE(254)	0	

Exclusive Owner	<ul style="list-style-type: none">SR-1000 → PLC: Data transmissionPLC → SR-1000: Control instruction <p>Use this connection to send data from the SR-1000 Series and to enable the PLC to send control instructions, such as starting reading, to the SR-1000.</p>
Input Only	<ul style="list-style-type: none">SR-1000 → PLC: Data transmission <p>Use this connection to only send data from the SR-1000 Series. You can use multiple connections with a single SR-1000 Series. (To a maximum of 16 connections.)</p>

Point	<ul style="list-style-type: none">When you use "Input Only," you have to set the RPIs of all the devices for "Exclusive Owner" and "Input Only" to the same values.Multiple "Exclusive Owner" connections cannot be used with a single SR-1000 Series unit.The trigger timing of each connection is executed in a cyclic manner.When using the KV series, the connection names are assigned as shown below. 1: Exclusive Owner → Result data/control data class 1 2: Input Only → Result data class 1 (Input Only)
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KV-5500 Series settings

We have prepared information regarding connecting the KV-5500 and the SR Series.

Download the information from the KEYENCE website.

CJ Series settings

We have prepared information regarding connecting the CJ Series and the SR Series.

Download the information from the KEYENCE website.

1 Set the PLC network communication.

Using the CX-Developper, make the communication settings of PLC's IP address, etc.

2 Set the EtherNet/IP network configuration for PLC and SR-1000.

Using Network Configurator, set the network configuration.

* The EDS file for SR-1000 is in the EDS folder on disc1 of SR-H6W.

3 Register the transmission area tag and the reception area tag for PLC.

Right-click the PLC icon on Network Configurator, select [Parameter] - [Edit], enter the [Edit device parameter] setting screen, and edit the tag.

4 Make the setting to relate the PLC tag with the SR-1000 tag.

Register the device on the [Edit device parameter] setting screen and make the connection assignment setting.

Transfer the configuration parameters to the PLC to complete the setting.

[Setting example]

Connection I/O type: Class1

Originator device (PLC)	Target device (SR-1000)
Input tag set	E0_00000 - [500byte]
Connection type	Multi-cast connection
Output tag set	D00000 - [500byte]
Connection type	Point to Point connection

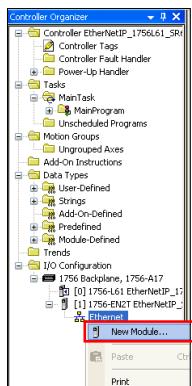
* For operation details of CX-Developper and Network Configurator, see "SYSMAC CS/CJ Series EtherNet/IP Unit User's Manual" published by Omron.

Control Logix/Compact Logix Series settings

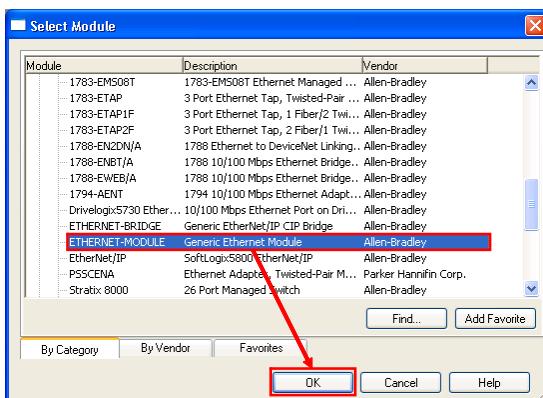
We have prepared information regarding connecting the Control Logix/Compact Logix Series and the SR Series.

Download the information from the KEYENCE website.

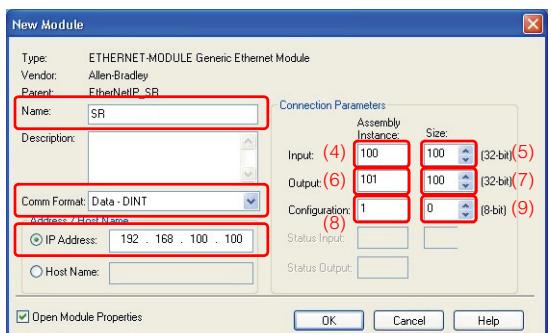
- Right-click the EtherNet/IP enabled device on the RSLogix5000 and select New Module.



- Click the Communications' [+] button, select ETHERNET-MODULE (Generic Ethernet Module), and click OK.



- Set the ETHERNET-MODULE as follows:



(1) Name	Arbitrary value
(2) Comm Format	Arbitrary value Data - DINT (double integer, 4 bytes) Data - INT (integer, 2 bytes) Data - SINT (single integer, 1 byte)
(3) IP Address	IP address of the SR-1000 Series
(4) Input Assembly Instance	100
(5) Input Size	Input assembly size of the SR-1000 Series ¹
(6) Output Assembly Instance	101 ²
(7) Output Size	Input assembly size of the SR-1000 Series ¹
(8) Configuration	1 ³
(9) Configuration Size	0 ³

¹ In AutoID Network Navigator, the input assembly size and output assembly size are set with 8 bits, but these are set with 32 bits on the RSLogix5000.

8-bit notation	32-bit notation
100	25

² When operating with the "Input Only" connection type, set (6) to 254 and (7) to 0.

³ The SR-1000 Series does not use the Configuration setting. However, enter the above value since failing to do so will result in an incomplete input error.

Memory Maps

Result data (Input Assemblies)

Input Assemblies write responses from the SR-1000 Series to the PLC. When using this device, each device function is assigned as follows. Device status, Result Data, etc. are written to the Input Assemblies.

■ Input Assemblies memory map (Instance ID: 0x64)

SR-1000 → PLC

Address	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0				ERR BUSY	MODE BUSY	LOCK BUSY	TRG BUSY	BUSY	General Error	Buffer Overflow Error				Read Data Update Complete	Read Data Update Available	Error
1	External Instruction Operation Failure			BLOAD Failure	Tuning Failure	Preset Data Registration Failure	Preset Reading Failure	Reading Error	External Instruction Operation Complete		BLOAD Complete	Tuning Complete	Preset Data Registration Complete	Preset Reading Complete	Reading Complete	
2			SAE K39132 Unstable	AIM DPM Unstable	ISO/IEC15415 Level Unstable	Matching Unstable	Unstable		OUT3 Status	OUT2 Status	OUT1 Status			IN2 Status	IN1 Status	
3																
4																Matching Level
5																ISO/IEC15415 Grade
6																AIM DPM Grade
7																
8																Reading Error Cause
9																Preset Reading Failure Cause
10																Preset Data Registration Failure Cause
11																Tuning Failure Cause
12																BLOAD Failure Cause
13																
14																
15																External Instruction Operation Error Cause
16																General Error Cause
17																Slave ID
18																Read Data Ready Count
19																Read Data Update Count
20																Trigger Input Count for Master
21																Read Data Size
22 and above																Read Data

* Gray parts are reserved areas for the system.

Control data (Output Assemblies)

Output Assemblies write instructions from the PLC to the SR-1000 Series. When using this device, each device function is assigned as follows. Output Assemblies operate device control instructions, error clear, handshake process, etc.

■ Output Assemblies memory map (Instance ID: 0x65)

PLC → SR-1000

Address	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0				BLOAD Request	Tuning Start Request	Preset Data Registration Start Request	Preset Reading Start Request	Reading Error Clear	Transmission Buffer Clear						Read Data Update Permitted	
1															External Instruction Operation Complete Clear	
2															BLOAD Complete Clear	Tuning Complete Clear
3															Preset Data Registration Complete Clear	Preset Reading Complete Clear
4																Reading Complete Clear
5																
6 and above																Preset Data

* Gray parts are reserved areas for the system.

Details of Result Data (Input Assemblies)

Address 0 Bit 0 to Bit 7 Handshake and error status

Address	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0																

Address	Bit	Name	Description	Data contents
0	0	Error	This Bit turns ON when either "6 Buffer Overflow Error" or "7 General Error" bit is ON.	0 : No error 1 : Error
0	1	Read Data Update Available	This Bit is used when using handshake. This displays whether read data exists or not.	0 : No read data 1 : Read data available
0	2	Read Data Update Complete	This Bit is used when using handshake. This turns ON when read data update is complete.	0→1: Result data update complete
0	6	Buffer Overflow Error	This turns ON when buffer overflow error occurs.	0 : No error 1 : Error
0	7	General Error	This turns ON when a communication or main unit error occurs. It does not turn ON when a buffer overflow error occurs. If this turns ON, the error code is output to "Address 16 General Error Cause".	0 : No error 1 : Error

* Handshake is a communication procedure to make the permission system for read data writing.

* Use handshaking when using the multi head mode of the master/slave function.

Address 0 Bit 8 to Bit 13 BUSY status

Address	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0																

Address	Bit	Name	Description	Data contents
0	8	BUSY	This Bit turns ON when any of the following BUSY Bits (9 to 13) is ON.	0 : - 1 : BUSY status
0	9	TRG BUSY	TRG BUSY	0 : - 1 : TRG BUSY status
0	10	LOCK BUSY	LOCK BUSY	0 : - 1 : LOCK BUSY status
0	11	MODE BUSY	MODE BUSY	0 : - 1 : MODE BUSY status
0	12	ERR BUSY	ERR BUSY	0 : - 1 : ERR BUSY status

Address 1 Bit 0 to Bit 7 Completion status

Address	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
1																

Address	Bit	Name	Description	Data contents
1	0	Reading Complete	This turns ON when reading is complete.* ¹	0 : - 1 : Complete* ²
1	1	Preset Reading Complete	This turns ON when preset reading is complete.	0 : - 1 : Complete* ²
1	2	Preset Data Registration Complete	This turns ON when preset data registration is complete.	0 : - 1 : Complete* ²
1	3	Tuning Complete	This turns ON when tuning is complete.	0 : - 1 : Complete* ²
1	4	BLOAD Complete	This turns ON when BLOAD is complete.	0 : - 1 : Complete* ²
1	7	External Instruction Operation Complete	This turns ON when "Reading", "Preset reading" or "Tuning" is executed with the IN terminal or command and the operation is complete.	0 : - 1 : Complete* ²

*1 This Bit also turns ON when the character string of "ERROR" is output when reading error occurs.

*2 This returns to 0 when the applicable clear bit is set to ON or when the Output Assemblies "Reading Start Request" bit is set to ON.

Point Check that "BUSY" is set to OFF before starting processing such as reading and tuning. When "BUSY" is set to ON, reading and tuning processing cannot start even if you provide instructions to do so. In the multi head mode of the master/slave function, the "Reading Complete" bit remains OFF.

Address 1 Bit 8 to Bit 15 Error status

Address	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
1																

Address	Bit	Name	Description	Data contents
1	8	Reading Error	This turns ON when reading error or comparison NG occurs.	0 : - 1 : Reading error, Comparison NG*
1	9	Preset Reading Failure	This turns ON when preset reading fails.	0 : - 1 : Preset reading failure*
1	10	Preset Data Registration Failure	This turns ON when preset data registration fails.	0 : - 1 : Preset data registration failure*
1	11	Tuning Failure	This turns ON when tuning fails.	0 : - 1 : Tuning failure*
1	12	BLOAD Failure	This turns ON when BLOAD fails.	0 : - 1 : BLOAD failure*
1	15	External Instruction Operation Failure	This turns ON when "Reading", "Preset reading" or "Tuning" is executed with the IN terminal or command and the operation fails.	0 : - 1 : External instruction operation failure*

* If any of the above errors occurs, the error code is output to "Failure cause status (Input Assemblies address 8 to 16)".

Address 2 Bit 0 to Bit 6 Terminal status

Address	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
2																

Address	Bit	Name	Description	Data contents
2	0	IN1 Status	This represents IN1 terminal status.	0 : OFF 1 : ON
2	1	IN2 Status	This represents IN2 terminal status.	0 : OFF 1 : ON
2	4	OUT1 Status	This represents OUT1 terminal status.	0 : OFF 1 : ON
2	5	OUT2 Status	This represents OUT2 terminal status.	0 : OFF 1 : ON
2	6	OUT3 Status	This represents OUT3 terminal status.	0 : OFF 1 : ON

* The above chart shows the contents when the input polarity setting of the SR-1000 is Norm. open (normally open). For Norm. closed (normally closed), the data is reversed as 0: ON 1: OFF.

* To check the writing of the read data, use not modes OUT 1 to 3, but the "Reading Complete" bit or the "External Instruction Operation Complete" bit. Depending on the communications load, the OUT terminal ON status and completion of reading may not synchronize.

Address 2 Bit 8 to Bit 12 Judgment result status for matching level and code quality verification function

Address	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
2																

Address	Bit	Name	Description	Data contents
2	8	Unstable	This Bit turns ON when any of the following Unstable Bits (9 to 12) is ON.	0 : Stable 1 : Unstable
2	9	Matching Level Unstable	Matching level judgment result	0 : Stable 1 : Unstable
2	10	ISO/IEC15415 Unstable	ISO/IEC15415 verification judgment result	0 : Stable 1 : Unstable
2	11	AIM DPM Unstable	ISO/IEC TR 29158 (AIM DPM-1-2006) verification judgment result	0 : Stable 1 : Unstable
2	12	SAE AS9132 Unstable	SAE AS9132 Unstable verification judgment result	0 : Stable 1 : Unstable

* Use this status when the code quality verification function of SR-1000 is enabled.

For the code quality verification function settings, refer to "9-7 Code Quality Verification".

* In the multi head mode of the master/slave function, the matching level and the status of the code quality verification function cannot be used.

Address 4 to 6

Total evaluation grade for matching level and code quality verification function

Address	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
4																
5																
6																

Address	Bit	Name	Description	Data contents	Data type
4		Matching Level	Matching Level * If multiple codes are read, the minimum value is output.	0 to 100 ¹	UINT
5		ISO/IEC15415 Grade	Total evaluation grade for ISO/IEC15415 verification	4 : A ¹ 3 : B 2 : C 1 : D 0 : F	UINT
6		AIM DPM Grade	Total evaluation grade for ISO/IEC TR 29158 (AIM DPM-1-2006)	4 : A ¹ 3 : B 2 : C 1 : D 0 : F	UINT

* Use this status when the code quality verification function of SR-1000 is enabled. For the code quality verification function settings, refer to "9-7 Code Quality Verification".

*1 This returns to 0 when the Output Assemblies "Reading Complete Clear" bit is set to ON.

Address 8 to 16

Failure cause status

Address	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
8																
9																
10																
11																
15																
16																

Address	Bit	Name	Description	Data contents	Data type
8		Reading Error Cause	When any of the error statuses (Input Assemblies Address 1, Bit 8 to Bit 15) turns on, the error code is output to the applicable location.	Error code*	UINT
9		Preset Reading Failure Cause			UINT
10		Preset Data Registration Failure Cause			UINT
11		Tuning Failure Cause			UINT
12		BLOAD Failure Cause			UINT
15		External Instruction Operation Error Cause			UINT
16		General Error Cause			UINT

* For error codes, refer to List of error codes (Page 76).

Address 18 to 19

Read data status

Address	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
18																
19																

Address	Bit	Name	Description	Data contents	Data type
18		Read Data Ready Count	Read Data Ready Count	0 to 65535*	UINT
19		Read Data Update Count	Read Data Update Count	0 to 65535*	UINT

* When the count number reaches 65535 and the next data arrives, the count number returns to 0.

Address 21 or above

Read data

Address	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
21																
22																
:																

Address	Bit	Name	Description	Data contents	Data type
21		Read Data Size	Read data length	0 and above*	UINT
22 and above		Read Data	Read Data	Read data*	BYTE[]

* When the header, terminator and append data are set to the read data of SR-1000, the header, terminator, append data and inter-delimiter are also output. [CR] has been set to the terminator as the default setting. Accordingly, [CR] is appended after the read data for output.

* If the silent mode is set for SR-1000, read data is not output.

* The read data is cleared each time that a code is read.

Address 17, 20

Master/slave

These are used in the multi head mode of the master/slave function.

Address	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
17																
20																

Address	Bit	Name	Description	Data contents	Data type
17		Slave ID	Displays the ID number of the reader which sent the most recent data.	0 to 31	UINT
20		Trigger input count for master	The trigger input count for the master unit (ID: 0) is displayed.	0 to 65535*	UINT

* If the count is 65535, it will be reset to 0 when the next read data arrives.

Details of Control Data (Output Assemblies)

Address 0 Bit 1 to Bit 7 Handshake/Clear bit

Address	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0																

Address	Bit	Name	Description	Data contents
0	1	Read Data Update Permitted	This Bit is used when using handshake. This displays whether read data exists or not.	0→1: Writing read data is permitted. 1→0: -
0	7	Error Clear Transmission Buffer Clear	The following Bits of Input Assemblies are cleared. • Buffer Overflow Error • General Error • Read Result Ready Count • Result Data Update Count • Read data stored in the transmission buffer of the SR-1000 Series	0→1: Clear 1→0: -

Address 0 Bit 8 to Bit 12 Reading start request/Each operation instruction

Address	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0																

Address	Bit	Name	Description	Data contents
0	8	Reading Start Request	The SR-1000 Series starts reading.	0→1: Reading start 1→0: Reading stop
0	9	Preset Reading Start Request	Preset reading starts.	0→1: Preset reading start 1→0: Preset reading stop
0	10	Preset Data Registration Start Request	Specified preset data is registered to Address 5, 6 and above.* ²	0→1: Preset data registration start 1→0: -
0	11	Tuning Start Request	Tuning starts.* ³	0→1: Tuning start 1→0: Tuning stop
0	12	BLOAD Request	BLOAD starts.* ⁴	0→1: BLOAD start 1→0: -

*1 When specifying a bank, specify "Address 2 Bank number"

*2 Preset data can be deleted by setting "1" for Address 5, setting "0xFF" for Address 6 and then registering the preset data.

*3 Before starting tuning, specify "Address 2 Bank number".

If the bank number is illegal, a tuning error occurs.

*4 Before starting BLOAD, enter the file number (1 to 8) in "Address 2 Bank number."

Address 1 Bit 0 to Bit 7 Completion bit clear

Address	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
1																

Address	Bit	Name	Description	Data contents
1	0	Reading Complete Clear	"Reading Complete" Bit of Input Assemblies is cleared.	0→1: Bit clear
1	1	Preset Reading Complete Clear	"Preset Reading Complete" Bit of Input Assemblies is cleared.	0→1: Bit clear
1	2	Preset Data Registration Complete Clear	"Preset Data Registration Complete" Bit of Input Assemblies is cleared.	0→1: Bit clear
1	3	Tuning Complete Clear	"Tuning Complete" Bit of Input Assemblies is cleared.	0→1: Bit clear
1	4	BLOAD Complete Clear	"BLOAD Complete" Bit of Input Assemblies is cleared.	0→1: Bit clear
1	7	External Instruction Operation Complete Clear	"External Instruction Operation Complete" Bit of Input Assemblies is cleared.	0→1: Bit clear

* When Complete Bits are cleared, Error/Failure Bits of each operation are also cleared.

Address 2

Bank number/BLOAD file number

Address	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
2																

Address	Bit	Name	Description	Data contents	Data type
2		Bank number/ BLOAD file number	Input a bank number here and then start reading. Then, reading is completed with the parameter bank specified. Input a bank number here and then start tuning. Then, the tuning result is stored to the specified parameter bank. Input a file number here and then start BLOAD to switch the settings.	Parameter bank number: 1 to 16* BLOAD file number: 1 to 8*	UINT

- * If inputting a parameter bank number other than 1 to 16 to start reading, then the alternate reading function operates.
- * If inputting a parameter bank number other than 1 to 16 to start tuning, then an error occurs.

Address 5 and above

Preset data

Address	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
5																
6																
⋮																

Address	Bit	Name	Description	Data contents	Data type
5		Preset Data Size	Preset data length	0 and above	UINT
6 and above		Preset Data	Preset data is specified. (Terminator is not necessary.)	Preset data	BYTE[]

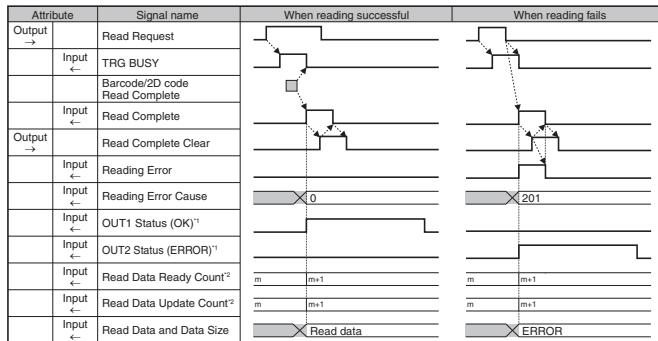
List of error codes

Error code	Type of error	Error description
0	No error	-
100 to 199	Command error	Values with 100 added to the "Error codes" (page 54) are applicable.
201	Reading error	Reading failed.
202	Comparison error	The read data did not match the preset data.
210	Tuning failure	The code could not be found within the field of view while tuning.
213	Tuning failure	Tuning was aborted.
120	Operation instruction error	Another operation instruction was received during operation. In this case, the incoming instruction is not completed.
102	Bank number error	The parameter bank number specification is invalid. Example: A number other than 01 to 16 is specified in tuning operation.
220	Preset data error	The preset data specification is invalid. Example: The specified preset data size is invalid when preset data is registered.
230	EIP data update error	Read data larger than the specified size in the cyclic communication was received.

Operation Examples

Example 1) Trigger method: Level trigger. Handshaking: Disabled.

Input
← : PLC←SR-1000
Output
→ : PLC→SR-1000



● When reading is successful

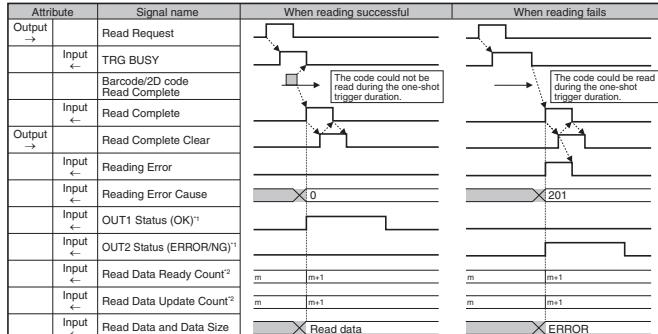
- 1 "Read Request" is set to ON (1).
- 2 When "Read Request" is set to ON (1), the SR-1000 Series starts reading, and then "TRG BUSY" is set to ON (1).
- 3 When the code is read, its data is written into "Read data." "TRG BUSY" is set to OFF (0), and "Read Complete" is set to ON (1).
- 4 "Read Request" is set to OFF (0).
- 5 It is confirmed that "Read Complete" is ON (1), and then "Read Complete Clear" is set to ON (1).
- 6 When "Read Complete Clear" is set to ON (1), "Read Complete" is set to OFF (0).
- 7 It is confirmed that "Read Complete" is OFF (0), and then "Read Complete Clear" is set to OFF (0).

● When reading fails

- 1 "Read Request" is set to ON (1).
- 2 When "Read Request" is set to ON (1), the SR-1000 Series starts reading, and then "TRG BUSY" is set to ON (1).
- 3 "Read Request" is set to OFF (0).
- 4 The code could not be read, so "ERROR" is written to "Read data." "TRG BUSY" is set to OFF (0), and "Read Complete" is set to ON (1).
- 5 It is confirmed that "Read Complete" is ON (1), and then "Read Complete Clear" is set to ON (1).
- 6 When "Read Complete Clear" is set to ON (1), "Read Complete" and "Reading Error" are set to OFF (0).
- 7 It is confirmed that "Read Complete" is OFF (0), and then "Read Complete Clear" is set to OFF (0).

Example 2) Trigger method: One-shot trigger. Handshaking: Enabled.

Attribute
Output → Read Request
Input ← TRG BUSY
Input ← Barcode/2D code Read Complete
Output → Read Complete
Input ← Read Complete Clear
Input ← Reading Error
Input ← Reading Error Cause
Input ← OUT1 Status (OK)¹
Input ← OUT2 Status (ERROR/NG)¹
Input ← Read Data Ready Count²
Input ← Read Data Update Count²
Input ← Read Data and Data Size



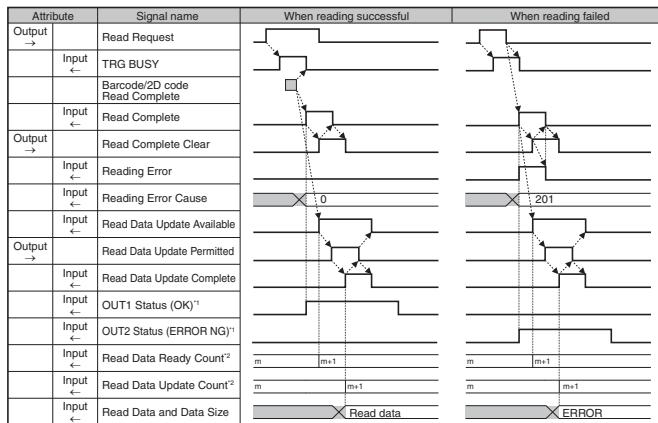
● When reading is successful

- 1 "Read Request" is set to ON (1).
- 2 When "Read Request" is set to ON (1), the SR-1000 Series starts reading, and then "TRG BUSY" is set to ON (1).
- 3 When the "One-shot trigger duration" elapses, reading stops.
- 4 The code could not be read, so "ERROR" is written to "Read data." "TRG BUSY" is set to OFF (0), and "Read Complete" is set to ON (1).
- 5 It is confirmed that "Read Complete" is ON (1), and then "Read Complete Clear" is set to ON (1).
- 6 When "Read Complete Clear" is set to ON (1), "Read Complete" is set to OFF (0).
- 7 It is confirmed that "Read Complete" is OFF (0), and then "Read Complete Clear" is set to OFF (0).

● When reading fails

- 1 "Read Request" is set to ON (1).
- 2 When "Read Request" is set to ON (1), the SR-1000 Series starts reading, and then "TRG BUSY" is set to ON (1).
- 3 When the "One-shot trigger duration" elapses, reading stops.
- 4 The code could not be read, so "ERROR" is written to "Read data." "TRG BUSY" is set to OFF (0), and "Read Complete" is set to ON (1).
- 5 It is confirmed that "Read Complete" is ON (1), and then "Read Complete Clear" is set to ON (1).
- 6 When "Read Complete Clear" is set to ON (1), "Read Complete" and "Reading Error" are set to OFF (0).
- 7 It is confirmed that "Read Complete" is OFF (0), and then "Read Complete Clear" is set to OFF (0).

Example 3) Trigger method: Level trigger. Handshaking: Enabled.



● When reading is successful

- 1 "Read Request" is set to ON (1).
- 2 When "Read Request" is set to ON (1), the SR-1000 Series starts reading, and then "TRG BUSY" is set to ON (1).
- 3 When the code is read, "TRG BUSY" is set to OFF (0), and "Read Complete" and "Read Data Update Available" are set to ON (1).
- 4 "Read Request" is set to OFF (0).
- 5 It is confirmed that "Read Complete" is ON (1), and then "Read Complete Clear" is set to ON (1).
- 6 When "Read Complete Clear" is set to ON (1), "Read Complete" is set to OFF (0).
- 7 It is confirmed that "Read Complete" is OFF (0), and then "Read Complete Clear" is set to OFF (0).
- 8 It is confirmed that "Read Data Update Available" is ON (1), and then "Read Data Update Permitted" is set to ON (1).
- 9 When "Read Data Update Permitted" is set to ON (1), the data is written into "Read data." "Read Data Update Complete" is set to ON (1).
- 10 It is confirmed that "Read Data Update Complete" is ON (1), and then "Read Data Update Permitted" is set to OFF (0).
- 11 When "Read Data Update Permitted" is set to OFF (0), "Read Data Update Available" and "Read Data Update Complete" are set to OFF (0).

● When reading fails

- 1 "Read Request" is set to ON (1).
- 2 When "Read Request" is set to ON (1), the SR-1000 Series starts reading, and then "TRG BUSY" is set to ON (1).
- 3 "Read Request" is set to OFF (0).
- 4 When the code cannot be read, "ERROR" is written to the send buffer, so "Read Complete" and "Read Data Update Available" are set to ON (1). "201" is written to "Reading Error Cause." "TRG BUSY" is set to OFF (0).
- 5 It is confirmed that "Read Complete" is ON (1), and then "Read Complete Clear" is set to ON (1).
- 6 When "Read Complete Clear" is set to ON (1), "Read Complete" is set to OFF (0).
- 7 It is confirmed that "Read Complete" is OFF (0), and then "Read Complete Clear" is set to OFF (0).
- 8 It is confirmed that "Read Data Update Available" is ON (1), and then "Read Data Update Permitted" is set to ON (1).
- 9 When "Read Data Update Permitted" is set to ON (1), "ERROR" is written into "Read data." "Read Data Update Complete" is set to ON (1).
- 10 It is confirmed that "Read Data Update Complete" is ON (1), and then "Read Data Update Permitted" is set to OFF (0).
- 11 When "Read Data Update Permitted" is set to OFF (0), "Read Data Update Available" and "Read Data Update Complete" are set to OFF (0).

Point

- The signal directions are indicated as shown below.

	: PLC ← SR-1000
	: PLC → SR-1000

- The OUT1 and OUT2 operations are described using the factory default configurations of the SR-1000 Series operation settings and multi I/O settings.
 - The "Read Data Ready Count" and "Read Data Update Count" values may differ depending on the operation status and communication frequency.
- For example, when a code is read and then the reading of the next code finishes before the updating of the PLC data finishes, the result data ready count will be larger than the expected value by one.

	<ul style="list-style-type: none"> • If "Read Request" is set to ON/OFF at high speed while the EtherNet/IP cyclic cycle (RPI) is slow, the SR-1000 Series may not be able to detect the change between the rising and falling edge of "Read Request." • The SR-1000 Series is equipped with a 10 KB send buffer. • Because a send buffer is present, even if the data processing on the PLC is unfinished during handshake processing, the next reading operation can be completed. • When read data is still present in the SR-1000 Series during handshake processing, even if "Read Data Update Permitted" of the PLC is OFF (0), "Read Data Update Available" of the SR-1000 Series remains in the ON (1) state. <p>Until "Read Data Update Available" is set to OFF (0), repeatedly switch "Read Data Update Permitted" of the PLC between ON (1) and OFF (0).</p> <ul style="list-style-type: none"> • If the data stored on the SR-1000 Series is unnecessary during handshake processing, you can delete all the data from the send buffer by sending the send buffer clear command (BCLR) from the command port.
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14-3 Message Communication

Message Communication

Message communication is a function that uses objects and services (Service Code) prepared in the EtherNet/IP device and then issues and transmits commands arbitrarily. Message communication is used for applications such as reading and writing adaptor device settings.

There are established standard items, as well as device specific items in the objects and services in message communication.

The SR-1000 Series uses specific objects and services and can perform operations such as parameter reading/writing and resetting.

The SR-1000 Series message communication function is compatible with UCMM (unconnected type) and CLASS 3 (connected type).

■ Objects and services

In message communication, data are sent and received using objects and services.

When services for SR-1000 Series objects are executed, data output, settings reading, and specified operations are executed.

■ Message communication basic format

During message communication, the PLC and the SR-1000 Series communicate by sending and receiving Explicit messages. When an Explicit message command is sent from the PLC, the SR-1000 Series sends a response to the PLC.

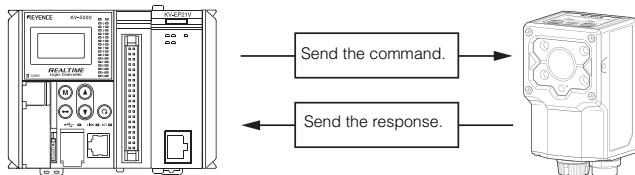
● Commands

Item	Description
Service code	Specifies the Service.
Class ID	Specifies the Class ID according to service.
Instance ID	Specifies the Instance ID according to service.
Attribute ID	Specifies the Attribute ID according to service.
Service data	Specifies the Service Data according to service.

● Responses

Item	Description
General status (1 byte)	Returns the General Status in response to the command. Returns 00H when operation is successful.
Additional status (2 bytes)	Returns Additional Status.
Service response	Returns the result data in response to the command.

■ Message communication operation



Commands are sent from the PLC to execute services on the SR-1000 Series. The SR-1000 Series sends back responses as service execution results. The service code, class ID, instance ID, and attribute ID are specified in the commands that are sent. The setting value (service data) is necessary when writing parameters.

Command
Service code
Class ID
Instance ID
Attribute ID
Service data

Response
General status
Additional status
Service response data

* The attribute ID and service data may not be necessary depending on the command used.

Service response data may not be generated depending on the command used.

SR-1000 Series Settings

1 Open the [Ethernet] tab.

2 Enter the [IP address] and [Subnet Mask] settings to assign to the SR-1000.



3 Start the [Setup Wizard].

4 STEP 1 Select the trigger input method.

5 STEP 2 Select [Field network/PLC].

6 STEP 3 Select [EtherNet/IP].

7 STEP 4 Configure the detailed EtherNet/IP settings.



Data handshake	Set whether to implement handshake processing.
Input assembly data size	Set this to a value that is the maximum amount of read data + 44 bytes or higher. *1
Output assembly data size	Specify a value of 6 bytes or higher. *1
Byte swapping	You can change the order in which data is stored in memory. Disable: Low order to high order Enable: High order to low order

*1 Increase the value according to the number of digits in the read data or pre-set data.

8 Exit the [Setup Wizard].

9 Click [Send Configuration].

Service Objects

■ Object configuration

Class ID	Object name	Description
105 (0x69)	SR AutoID Reader Object*	Object which delivers the SR-1000 Series status and parameter writing/reading.
1 (0x01)	Identity Object	Object which delivers general information, main unit reset, etc.

* The [SR AutoID Reader Object] is not an object within EtherNet/IP standards but rather it is an object that KEYENCE developed to make the SR-1000 Series easier to operate.

■ Reading the object table

● Attribute

(1)	(2)	(3)	(4)
Instance ID	Attribute ID	Name	Response parameter
			Data Type
1 (0x01)	108 (0x6C)	IN/OUT Status	UINT

bit0: IN1 Status
bit1: IN2 Status
bit4: OUT1 Status
bit5: OUT2 Status
bit6: OUT3 Status

Item	Description
(1) Instance ID	The instance ID is shown in decimal (hexadecimal).
(2) Attribute ID	The attribute ID is shown in decimal (hexadecimal).
(3) Name	Denotes the attribute name.
(4) Response parameter	Displays the receiving parameter's data type and each parameters description.

● Service

(1)	(2)	(3)		(4)	(5)
Instance ID	Service code	Service data		Name	Description
		Data type	Data		
1 (0x01)	0x4B	UINT	Bank Number	Read Start	Starts reading.

Item	Description
(1) Instance ID	The instance ID is shown in decimal (hexadecimal).
(2) Service code	The service code is shown in decimal (hexadecimal).
(3) Service data	Displays the type of the service data and service data description.
(4) Name	Displays the service name.
(5) Description	Displays the service function description.

● Data type

The data types are defined as follows.

Data type	Description	Range	
		Min.	Max.
BOOL	Boolean	0: FALSE	1: TRUE
SINT	Short integer	-128	127
INT	Integer	-32768	32767
DINT	Double precision integer	-2 ³¹	2 ³¹ -1
LINT	Long integer	-2 ⁶³	2 ⁶³ -1
USINT	Unsigned short integer	0	255
UINT	Unsigned integer	0	65535
UDINT	Unsigned double precision integer	0	2 ³² -1
ULINT	Unsigned long integer	0	2 ⁶⁴ -1
String	String (1 byte/character)	-	-
SSTRING	String (1 byte/character)	-	-
BYTE	Bit sequence: 8-bit	-	-
WORD	Bit sequence: 16-bit	-	-
DWORD	Bit sequence: 32-bit	-	-
LWORD	Bit sequence: 64-bit	-	-

■ Object details

SR AutoID Reader Object

Class ID: 105 (0x69)

● Attributes

Instance ID	Attribute ID	Name	Response parameter	
			Data	Description
100 (0x64)	Read Status		UINT	bit0 : Error bit1 : Result Data Available bit2 : Result Data Strobe bit3 to 5 : Reserved bit6 : Buffer Overflow Error bit7 : General Error bit8 : BUSY bit9 : TRG BUSY bit10 : LOCK BUSY bit11 : MODE BUSY bit12 : ERR BUSY bit13 : FILE BUSY bit14 to 15 : Reserved
				bit0 : Read Complete bit1 : Read Failure
				bit0 : Unstable bit1 : Matching Level Unstable bit2 : ISO/IEC 15415 Unstable bit3 : AIM DPM Unstable bit4 : SAE AS9132 Unstable
				UINT Read Result Code
				bit0 : Error bit1 : Result Data Available bit2 : Result Data Strobe bit3 to 5 : Reserved bit6 : Buffer Overflow Error bit7 : General Error bit8 : BUSY bit9 : TRG BUSY bit10 : LOCK BUSY bit11 : MODE BUSY bit12 : ERR BUSY bit13 : FILE BUSY bit14 to 15 : Reserved
				bit0 : Preset Complete bit1 : Preset Failure bit2 to 15 : Reserved
				UINT Reserved
				UINT Preset Result Code
				bit0 : Error bit1 : Result Data Available bit2 : Result Data Strobe bit3 to 5 : Reserved bit6 : Buffer Overflow Error bit7 : General Error bit8 : BUSY bit9 : TRG BUSY bit10 : LOCK BUSY bit11 : MODE BUSY bit12 : ERR BUSY bit13 to 15 : Reserved
				UINT Register Preset Data Complete bit1 : Register Preset Data Failure bit2 to 15 : Reserved
102 (0x66)	Register Preset Data Status		UINT	UINT Reserved
				UINT Register Preset Data Result Code
				bit0 : Error bit1 : Result Data Available bit2 : Result Data Strobe bit3 to 5 : Reserved bit6 : Buffer Overflow Error bit7 : General Error bit8 : BUSY bit9 : TRG BUSY bit10 : LOCK BUSY bit11 : MODE BUSY bit12 : ERR BUSY bit13 to 15 : Reserved
				UINT Tune Complete bit1 : Tune Failure bit2 to 15 : Reserved
				UINT Reserved
				UINT Tune Result Code
				bit0 : Error bit1 : Result Data Available bit2 : Result Data Strobe bit3 to 5 : Reserved bit6 : Buffer Overflow Error bit7 : General Error bit8 : BUSY bit9 : TRG BUSY bit10 : LOCK BUSY bit11 : MODE BUSY bit12 : ERR BUSY bit13 to 15 : Reserved
				UINT Tuning Configuration
				UINT Tuning Grade
				UINT Tuning Grade

Instance ID	Attribute ID	Name	Response parameter	
			Data	Description
107 (0x6B)	EXT. Request Status		UINT	bit0 : Error bit1 : Result Data Available bit2 : Result Data Strobe bit3 to 5 : Reserved bit6 : Buffer Overflow Error bit7 : General Error bit8 : BUSY bit9 : TRG BUSY bit10 : LOCK BUSY bit11 : MODE BUSY bit12 : ERR BUSY bit13 to 15 : Reserved
				UINT EXT. Request Complete bit1 : EXT. Request Failure bit2 to 15 : Reserved
				UINT Unstable bit1 : Matching Level Unstable bit2 : ISO/IEC 15415 Unstable bit3 : AIM DPM Unstable bit4 : SAE AS9132 Unstable
				UINT EXT. Request Result Code
				108 (0x6C) IN/OUT Status
				UINT IN1 Status bit1 : IN2 Status bit2 to 3 : Reserved bit4 : OUT1 Status bit5 : OUT2 Status bit6 : OUT3 Status bit7 to 15 : Reserved
				109 (0x6D) Statistics
				UINT Read (Comparison) OK Count UINT Comparison NG Count UINT Read Error Count UINT Stable Reading Count UINT Read Input Count UINT Reserved
				110 (0x6E) Result Data Count
				UINT Result Data Ready Count UINT Result Data Update Count
103 (0x67)	Tune Status		UINT	111 (0x6F) General Error Code
				UINT General Error Code
				112 (0x70) Read(Comparison) OK Count
				UINT Read (Comparison) OK Count
				113 (0x71) Comparison NG Count
				UINT Comparison NG Count
				114 (0x72) Read Error Count
				UINT Read Error Count
				116 (0x74) Read Input Count
				UINT Read Input Count
1 (0x01)	Get_Attribute_Single_14 (0x0E)	144 (0x90) Unstable Inspect Configuration	UINT	128 (0x80) Result Data Ready Count
				UINT Result Data Ready Count
				129 (0x81) Result Data Update Count
				UINT Result Data Update Count
				145 (0x91) Matching Level Threshold
				UINT 99 to 00
				146 (0x92) ISO/IEC15415 Threshold
				UINT 0: Disabled 1(D) to A(4)
				147 (0x93) AIM DPM Threshold
				UINT 0: Disabled 1(D) to A(4)
1 (0x01)	Get_Attribute_Single_14 (0x0E)	152 (0x98) Matching Level	UINT	153 (0x99) ISO/IEC15415 Grade
				UINT 4(A) to 0(F)
				154 (0x9A) AIM DPM Grade
				UINT 4(A) to 0(F)

● Service

Instance ID	Service code	Service data		Name	Description
		Data type:	Data		
1 (0x01)	14 (0x0E)	-	Get_Attribute_Single	Obtains the attribute's one item.	
	16 (0x10)	-	Set_Attribute_Single	Obtains the attribute's one item.	
	75 (0x4B)	UINT: Bank Number	Read Start	Starts reading.	
	76 (0x4C)	-	Read Stop	Stops reading.	
	77 (0x4D)	-	Preset Start	Starts preset data reading.	
	78 (0x4E)	-	Preset Stop	Stops preset data reading.	
	79 (0x4F)	UINT: Preset Data Size BYTE[]: Preset Data	Register Preset Data	Registers preset data. Preset data can be deleted when Size is (1) and Data is (0xFF).	
	80 (0x50)	-	Tune Start	Starts tuning.	
	81 (0x51)	-	Tune Stop	Stops tuning.	
	83 (0x53)	-	Error Clear	Clears the error.	
	84 (0x54)	-	EXT. Request Complete Clear	Clears the operation status from the external command.	
	85 (0x55)	UINT: Result Data Size UINT: Offset	Get Result Data	Acquires read data. Response data UINT : Result Data Size UINT : Rest Result Data Size BYTE[] : Result Data	
	86 (0x56)	-	Sequence Reset	Clears the following information: • Result Data Ready Count • Result Data Update Count • Main unit statistical information • Buffering data • Sequence bit	
	87 (0x57)	-	Lock	Sets the operation lock command.	
	88 (0x58)	-	Unlock	Sets the operation unlock command.	
	90 (0x5A)	-	Read Complete Clear	Clears the Read Complete and Read Failure bits.	
	91 (0x5B)	-	Preset Complete Clear	Clears the Preset Complete and Preset Failure bits.	
	92 (0x5C)	-	Register Preset Data Complete Clear	Clears the Register Preset Data Complete and Register Preset Data Failure bits.	
	93 (0x5D)	-	Tune Complete Clear	Clears the Tune Complete and Tune Failure bits.	

Identity Object

Class ID: 1 (0x01)

● Service

Instance ID	Service code	Service data		Name	Description
		Data (Data type)			
1	5 (0x05)	-	Reset	Reset	Executes hardware reset.

Operation Examples

(1) Start reading (Read Start)

• Command

Class ID	105 (0x69)
Instance ID	1
Service code	75 (0x4B)
Attribute ID	-
Service data	UINT: Data size (2) UINT: Bank number

• Response

General response	-
Additional status	-
Service data	-

(2) Stop reading (Read Stop)

• Command

Class ID	105 (0x69)
Instance ID	1
Service code	76 (0x4C)
Attribute ID	-
Service data	UINT: Bank number

• Response

General response	-
Additional status	-
Service data	-

(3) Preset reading start (Preset Start)

• Command

Class ID	105 (0x69)
Instance ID	1
Service code	77 (0x4D)
Attribute ID	-
Service data	UINT: Bank number

• Response

General response	-
Additional status	-
Service data	-

(4) Preset reading stop (Preset Stop)

• Command

Class ID	105 (0x69)
Instance ID	1
Service code	78 (0x4E)
Attribute ID	-
Service data	UINT: Bank number

• Response

General response	-
Additional status	-
Service data	-

(5) Preset data registration

• Command

Class ID	105 (0x69)
Instance ID	1
Service code	79 (0x4F)
Attribute ID	-
Service data	UINT: Data size BYTE[494]: Data

• Response

General response	-
Additional status	-
Service data	-

(6) Tuning instructions

• Command

Class ID	105 (0x69)
Instance ID	1
Service code	80 (0x50)
Attribute ID	-
Service data	UINT: Bank number

• Response

General response	-
Additional status	-
Service data	-

(7) Tuning stop

• Command

Class ID	105 (0x69)
Instance ID	1
Service code	81 (0x51)
Attribute ID	-
Service data	-

• Response

General response	-
Additional status	-
Service data	-

(8) Get result data

• Command

Class ID	105 (0x69)
Instance ID	1
Service code	85 (0x55)
Attribute ID	-
Service data	UINT: Data size UINT: Offset

• Response

General response	-
Additional status	-
Service data	UINT: Result Data Size UINT: Rest Result Data Size BYTE[]:Result Data
Attribute ID	-
Service data	-

(9) Get attribute (Get Attribute Single)

• Command

Class ID	105 (0x69)
Instance ID	1
Service code	14 (0x0E)
Attribute ID	Attribute ID
Service data	-

• Response

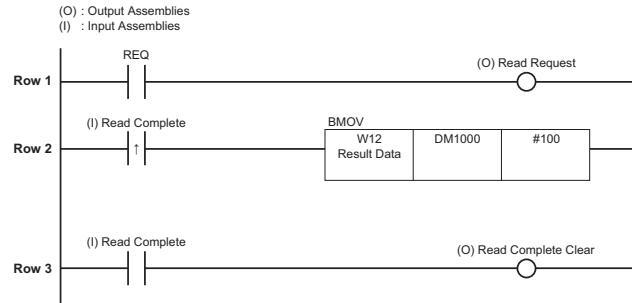
General response	-
Additional status	-
Service data	Attribute parameters
Attribute ID	-
Service data	-

14-4 Reference Programs

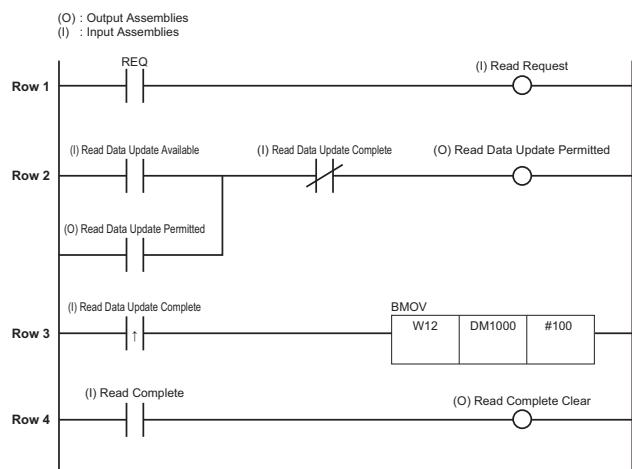
For the KV Series

■ Cyclic communication

● Without handshaking

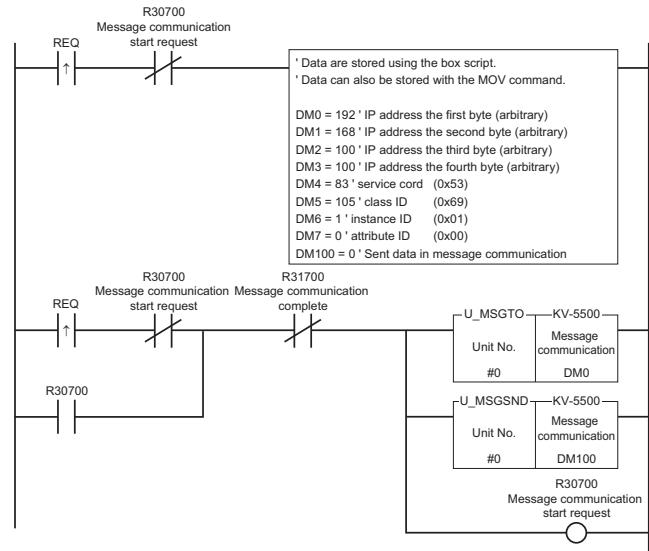


● With handshaking



■ Message communication

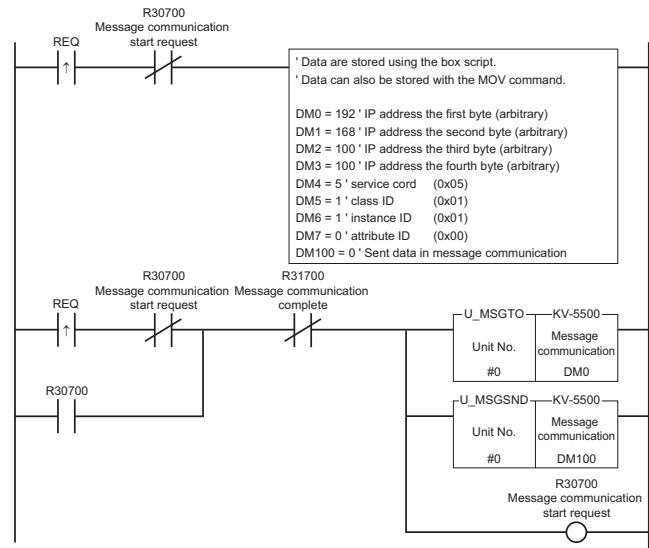
● Error clear operation



The errors on the SR-1000 Series are cleared. The following items are cleared.

- Buffer overflow
- General errors
- Result Data Available
- Read data

● Software reset operation

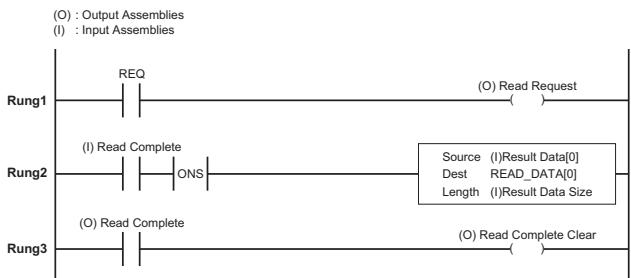


The SR-1000 Series restarts.

Control Logix/Compact Logix (RSLogix 5000)

■ Cyclic communication

● Without handshaking

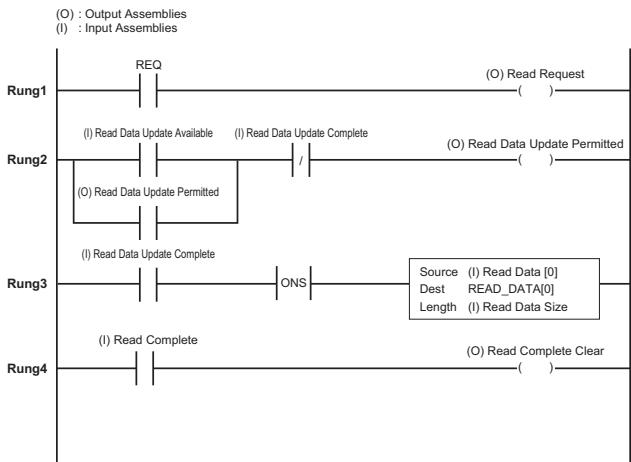


Rung1: This starts Read Request and starts reading.

Rung2: With the rising of Result Complete, the data written to Result Data are copied to READ_DATA.

Rung3: When Read Complete is ON, Read Complete Clear turns ON.

● With handshaking



Rung 1: When the trigger (REQ) signal turns ON, Read Request turns ON.

Rung 2: When Read Data Update Available turns ON and Read Data Update Complete turns OFF, Read Data Update Permitted turns ON.
Read Data Update Permitted is self-retained.

* Read Data Update Available turns ON when read data is buffered in the SR-1000.

Rung3: When Read Data Update Complete turns ON, the read data is transferred to READ_DATA.
* Read Data Update Complete turns ON when the writing of read data from the SR-1000 to the PLC is complete.

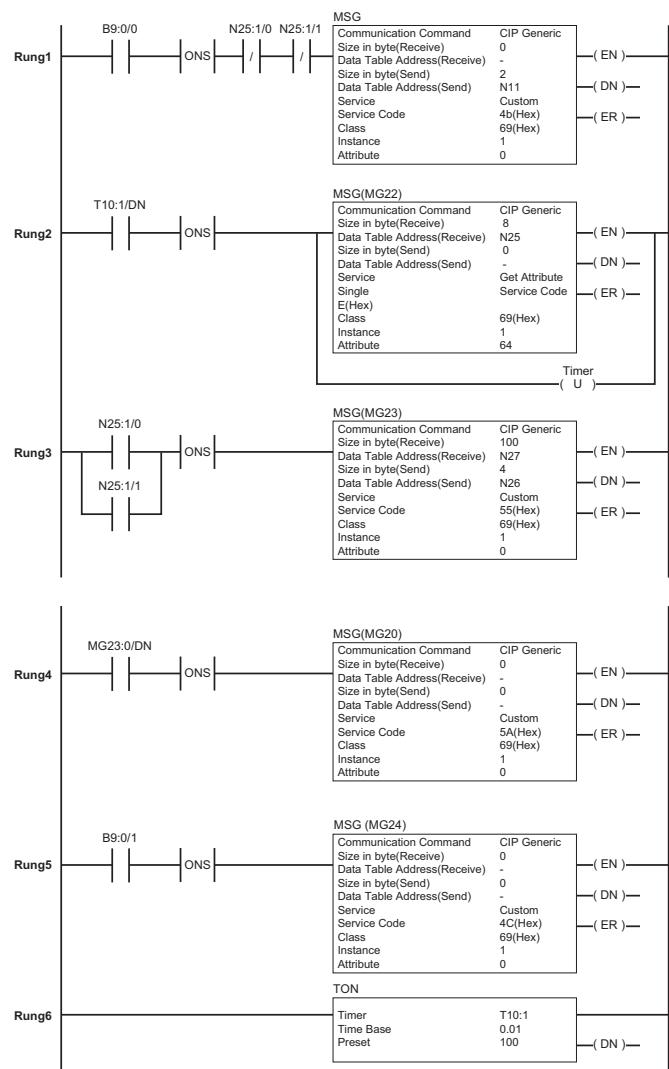
Rung 4: When Read Complete turns ON, Read Complete Clear turns ON.

Description of tags used in the sample

Name	Data type	Description
REQ	BOOL	Bit to order to start/stop reading
READ_DATA	SINT[256]	Memory to store read data

For the Micro Logix (RSLogix 500)

■ Message communication



Description of the reference program

Rung1: When Read Complete and Read Failure are OFF, the read start message is sent at the rising of B9:0:0.

Rung2: For each timeout of the timer, Get Attribute Single is performed for Read Status.

The result is written to Read Status Res.

Rung3: At the rising of either Result Status Res[1].0(Read Complete) or 1(Read Failure), Get Result Data is performed.

The result is written to Read Data Res.

Rung4: Read Complete Clear is performed.

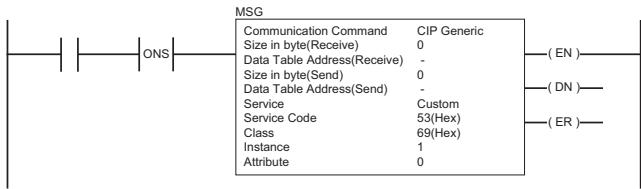
Rung5: This starts B9:0/1 and sends the read end message.

Rung6: The timer is being performed to perform Rung2.

Description of tags used in the sample

Name	Data type	Description
B9:0/0	Binary	Bit to order to start/stop reading
T10	Timer	Timer
N11	Integer	Memory in which the bank number is stored
MG20	Message	Message to perform Read Complete Clear
MG21		Message to perform Read Start
MG22		Message to perform Get Attribute Single for Read Status
MG23		Message to perform Get Result Data
MG24		Message to perform Read Stop
N25	Integer	Memory that stores Get Attribute Single result of MG22
N26	Integer	Message command to receive the result data
N27	Integer	Memory that stores Get Result Data result of MG23
RIX30	Extended Routing Information	Extended Routing Information for MG20
RIX31		Extended Routing Information for MG21
RIX32		Extended Routing Information for MG22
RIX33		Extended Routing Information for MG23
RIX34		Extended Routing Information for MG24

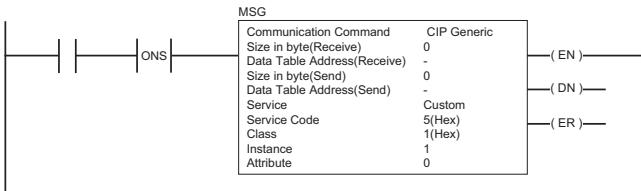
• Error clear operation



The errors on the SR-1000 Series are cleared. The following items are cleared.

- Buffer overflow
- General errors
- Result Data Available
- Read data

• Software reset operation



The SR-1000 Series restarts.

15-1 PROFINET Overview

What Is PROFINET?

PROFINET is the open communication standard specified by PI (PROFIBUS & PROFINET International). PROFINET compatible devices can communicate with each other regardless of vendor. The SR-1000 Series is compliant with Conformance Class A.

List of Supported PLCs

■ Siemens PLCs

PLC series	Software	Version
S7-300/400	STEP 7	V5.5.0.0 and later versions
S7-1200/1500	STEP 7 Professional	TIA Portal V13 or later

SR-1000 Series PROFINET Communication Specifications

Communication type	PROFINET IO
Communication cycle	8 ms or more
GSDML file version	2.3

Usable Functions

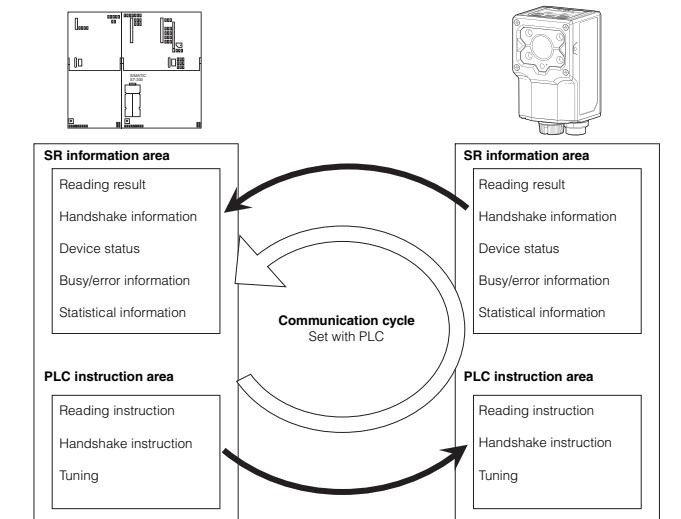
Function	Description
Timing input control	Controls timing input ON/OFF. Timing input with the parameter bank specified is possible.
Preset data control	Read OK data can be set as preset data. Also, preset data can be registered or deleted from PLC.
Tuning	Tuning can be executed by specifying the parameter bank.
Data handshake	Whether to write read data to PLC can be controlled.
Error handling	Errors that occurred on the main unit can be checked. After eliminating error factors, the SR-1000 Series can be restored from the error state.
Statistical information acquisition	Read count and read data update count can be checked.
Operation status acquisition	Read data can be acquired, and I/O status or marking verification result can be checked.

15-2 Cyclic Communication

■ Cyclic communication

Cyclic communication is a high-speed communication method in which data is sent and received periodically at intervals ranging from milliseconds to tens of milliseconds. Also, you can control the SR-1000 Series by referencing and updating variables and devices within the PLC. This makes it easy to write PLC-side programs.

When communicating cyclically via PROFINET with the SR-1000 Series, SR-1000 series functions are assigned to the PLC devices.



Important

- Communication settings such as the communication cycle and data size are set in the PLC. When there is a large load in the network which connects many devices including PROFINET devices, delays or packet loss may occur. Perform thorough verification before operation.
- The maximum read length is 246 digits.

SR-1000 Series Settings

1 Open the [Ethernet] tab.

2 Enter the [IP address] and [Subnet Mask] settings to assign to the SR-1000.



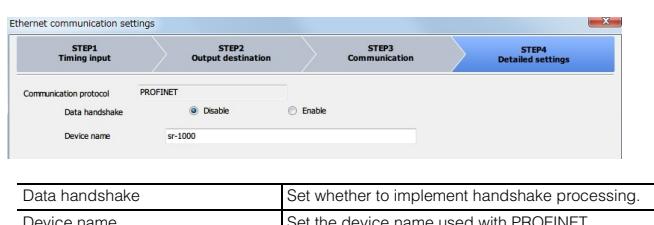
3 Start the [Setup Wizard].

4 STEP 1 Select the trigger input method.

5 STEP 2 Select [Field network/PLC].

6 STEP 3 Select [PROFINET].

7 STEP 4 Configure the detailed PROFINET settings.



Data handshake	Set whether to implement handshake processing.
Device name	Set the device name used with PROFINET.

8 Exit the [Setup Wizard].

9 Click [Send Configuration].

■ PROFINET device name rules

- You cannot use the same device name for multiple devices on the same network.
- Device name length is from 1 to 240 characters.
- Only [a to z] (lowercase alphabet characters) [0 to 9] (numbers), [-] (hyphen), and [.] (period) can be used for device names.
- You cannot use device names in IP address format. (n.n.n.n, n = 0 to 999)
- The length of one label is from 1 to 63 characters.
- The [-] (hyphen) cannot be used at the beginning of labels.
- The [-] (hyphen) cannot be used at the end of labels.
- The first label cannot be named "port-xyz" or "port-xyz-abcd." (a, b, c, d, e, x, y, z = [0 to 9] (numbers)).
- You cannot use labels that start with "xn-."
- You cannot use labels that start with a number.

PLC Settings

S7 Series Settings

We have prepared information regarding connecting the S7 Series and the SR Series.

Download the information from the KEYENCE website.

Memory Maps

I address input address PLC ← SR-1000

● Bit area

In the following areas, information is divided by bit.
Information is represented with 0 or 1.

Slot	Size	Module name	Bit address	Name	Description	Data contents	Remarks
1 1 byte	Handshake and General Error Status Bits		0	Error	Error status indication	0 : No error 1 : Error	
			1	Result Data Available	Read data Transmission buffer retention status indication	0 : No read data 1 : Read data available	Only when data handshake is enabled*1
			2	Result Data Strobe	Read data PLC update complete flag	0→1: Read data update complete 1→0: -	
			6	Buffer Overflow Error	Buffer overflow error Cleared by Error Clear Bit	0 : No error 1 : Error	
			7	General Error	SR operation failure error Cleared by Error Clear Bit	0 : No error 1 : Error	
			0	BUSY	OR of each BUSY signal	0 : No BUSY status 1 : BUSY status	
			1	TRG BUSY	Main unit in TRG BUSY status	0 : No TRG BUSY status 1 : TRG BUSY status	
2 1 byte	BUSY Status Bits		2	LOCK BUSY	Main unit in LOCK BUSY status	0 : No LOCK BUSY status 1 : LOCK BUSY status	
			3	MODE BUSY	Main unit in MODE BUSY status	0 : No MODE BUSY status 1 : MODE BUSY status	
			4	ERR BUSY	Main unit in ERR BUSY status	0 : No ERR BUSY status 1 : ERR BUSY status	Cancellation is required.
			0	Read Complete*2	Read operation completion notification	0 : Incomplete 1 : Complete	This is cleared at the start of Clear Bit in each status or at the start of the next operation.
			1	Preset Complete	Preset read completion notification	0 : Incomplete 1 : Complete	
3 1 byte	Completion Status Bits		2	Register Preset Data Complete	Preset data registration completion notification	0 : Incomplete 1 : Complete	
			3	Tune Complete	Tuning completion notification	0 : Incomplete 1 : Complete	
			4	BLOAD Complete	BLOAD completion notification	0 : Incomplete 1 : Complete	
			7	EXT. Request Complete	External instruction operation completion notification	0 : Incomplete 1 : Complete	
			0	Read Failure	Reading error notification	0 : - 1 : Reading error	
			1	Preset Failure	Preset reading error notification	0 : - 1 : Preset reading error	
			2	Register Preset Data Failure	Preset data registration failure notification	0 : - 1 : Preset data registration failure	
4 1 byte	Error Status Bits		3	Tune Failure	Tuning failure notification	0 : - 1 : Tuning failure	The cause of failure can be checked with Tune Result Code. This is cleared at the start of Tune Complete Clear Bit or at the start of the next operation.
			4	BLOAD Failure	BLOAD failure notification	0 : - 1 : BLOAD failure	The cause of the failure can be checked with BLOAD Result Code. This is cleared at the start of BLOAD Complete Clear or at the start of the next operation.
			7	EXT. Request Failure	External instruction operation failure notification	0 : - 1 : External instruction operation failure	1 is output when "Reading", "Preset reading" and "Tuning" are executed via external terminals or commands and the operation fails. The cause of failure can be checked with EXT.Request Result Code. This is cleared at the start of EXT. Request Complete Clear Bit or at the start of the next operation.

Slot	Size	Module name	Bit address	Name	Description	Data contents	Remarks
5 1 byte	Terminal Status Bits		0	IN1 Status	Input terminal 1 status	0 : OFF 1 : ON	
			1	IN2 Status	Input terminal 2 status	0 : OFF 1 : ON	
			4	OUT1 Status	Output terminal 1 status	0 : OFF 1 : ON	To check the writing of the read data, use not modes OUT 1 to 3, but the "Read Complete" bit or the "EXT. Request Complete" bit. Depending on the communications load, the OUT terminal ON status and completion of reading may not synchronize.
			5	OUT2 Status	Output terminal 2 status	0 : OFF 1 : ON	
			6	OUT3 Status	Output terminal 3 status	0 : OFF 1 : ON	
6 1 byte	Unstable Read Status Bits		0	Unstable	Unstable reading status OR of each Unstable	0 : Stable 1 : Unstable	
			1	Matching Level Unstable	Matching level judgment result unstable	0 : Stable 1 : Unstable	
			2	ISO/IEC 15415 Unstable	ISO/IEC 15415 verification result unstable	0 : Stable 1 : Unstable	
			3	AIM DPM Unstable	ISO/IEC TR 29158 (AIM DPM) verification result unstable	0 : Stable 1 : Unstable	
			4	SAE AS9132 Unstable	SAE AS9132 verification result unstable	0 : Stable 1 : Unstable	

*1 Handshake is a communication procedure to make the permission system for read data writing.

Use handshaking when using the multi head mode of the master/slave function.

*2 In the multi head mode of the master/slave function, the "Read Complete" bit remains OFF.

● Word area/byte area

In the following areas, information is represented with the following units.

- Word areas : Areas where 0 to 65535 is represented as a 2-byte unsigned integer
- Byte area : Areas where a character code such as ASCII code is represented

Slot	Size	Module name	Word address	Name	Description	Data contents	Remarks
7 8 byte	Matching Level and Total Evaluation Grade, Status*1		0	Matching Level	Matching level	100 to 0*1	If multiple codes are read, the smallest value is displayed.
			1	ISO/IEC15415 Grade	ISO/IEC15415 total evaluation grade	4 : A*1 3 : B 2 : C 1 : D 0 : F	
			2	AIM DPM Grade	ISO/IEC TR 29158 (AIM DPM) total evaluation grade	4 : A*1 3 : B 2 : C 1 : D 0 : F	
			0	Read Result Code	Reading operation result code	Error code	
			1	Preset Result Code	Preset data read result code	Error code	
8 20 byte	Operation Result Status		2	Register Preset Data Result Code	Preset data registration result code	Error code	Refer to List of error codes.
			3	Tune Result Code	Tuning operation result code	Error code	
			4	BLOAD Result Code	BLOAD result code	Error code	
			7	EXT. Request Result Code	External instruction operation result code	Error code	
			8	General Error Code	General error code	Error code	
			Slave ID	The ID of the reader to which the most recent data was written is displayed.	0 to 31	This is only used with the master/slave function.	
			0	Result Data Ready Count	Result data reception count		The number returns to 0 if it exceeds 65535.
			1	Result Data Update Count	Result data update count		
8 + (data size) byte			2	Trigger Input Count for Master	The trigger input count for the master unit (ID: 0) is displayed.	0 to 65535	
			3	Result Data Size	Result data size (byte)		
			4	Read Data 32Byte	Byte area 32 bytes		• When append data has been set, the append data is output. • When the silent mode is set, this area is not updated. • NULL (0x00) is appended after result data.
			5	Read Data 64Byte	Byte area 64 bytes		
			6	Read Data 128Byte	Byte area 128 bytes		
			7	Read Data 246Byte	Byte area 246 bytes		
			8	Select one of them.	Result Data	Result data output (Array of bytes)	Result data output

*1 In the multi head mode of the master/slave function, the matching level and the status of the code quality verification function cannot be used.

This returns to 0 when the Output Assemblies "Read Complete Clear" bit is set to ON.

Q address output address PLC → SR-1000

● Bit area

In the following areas, information is divided by bit.
Information is represented with 0 or 1.

Slot	Size	Module name	Bit address	Name	Description	Data contents	Remarks
10	1 byte	Latch and Error Clear Control Bits	0	(Reserved)	Reserved area		
			1	Result Data Latch	Result data update permitted	0→1: Writing to result data device permitted 1→0: -	This functions only when handshake is enabled.
			7	Error Clear	Error clear	0→1: Error clear 1→0: -	The following error statuses and data are cleared. • Buffer Overflow Error • General error • Result data acquisition count • Result data update count • Result data stored in the transmission buffer

11	1 byte	Operation Instruction Control Bits	0	Read Request	Reading start request	0→1: Start reading 1→0: Stop reading	When specifying the bank, specify to Bank Number module.
			1	Preset Request	Preset reading start request	0→1: Preset read start 1→0: Preset read stop	Reading not possible in the specified bank
			2	Register Preset Data Request	Preset data registration request	0→1: Preset data registration 1→0: -	Specify to User Data Size/User Data Module. When deleting preset data, set the user data size to 1, set the user data to 0xFF and register preset data.
			3	Tune Request	Tuning start request	0→1: Start tuning 1→0: Stop tuning	Specify the tuning target bank number to Bank Number module.
			4	BLOAD Request	BLOAD start request	0→1: Start BLOAD 1→0: -	Before starting BLOAD, enter the file number (1 to 8) in the Bank Number module.

12	1 byte	Completion Clear Control Bits	0	Read Complete Clear	Reading complete clear	0→1: Complete clear 1→0: -	Read completion notification and read failure notification clear
			1	Preset Complete Clear	Preset reading complete clear	0→1: Complete clear 1→0: -	Preset read completion notification and preset read failure notification clear
			2	Register Preset Data Complete Clear	Preset data registration complete	0→1: Complete clear 1→0: -	Preset data registration completion notification and preset data registration failure notification clear
			3	Tune Complete Clear	Tuning complete clear	0→1: Complete clear 1→0: -	Tuning completion notification and tuning failure notification clear
			4	BLOAD Complete Clear	BLOAD complete clear	0→1: Complete clear 1→0: -	BLOAD Complete and BLOAD Result Code clear
			7	EXT. Request Complete Clear	External instruction operation complete clear	0→1: Complete clear 1→0: -	External instruction operation completion and external instruction operation failure notification clear

● Word area/byte area

In the following areas, information is represented with the following units.

- Word areas : Areas where 0 to 65535 is represented as a 2-byte unsigned integer
- Byte area : Areas where a character code such as ASCII code is represented

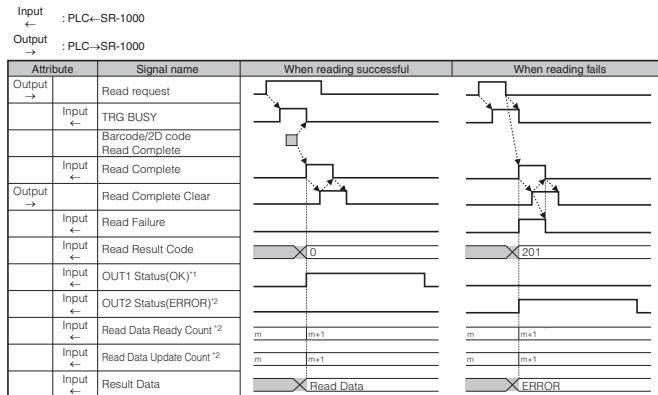
Slot	Size	Module name	Word address	Name	Description	Data contents	Remarks
13	2 byte	Parameter Bank Number	0	Bank Number/BLOAD File Number	Bank Number/BLOAD file number	1 to 16	Bank Number • For reading start request 1 to 16: Bank setting read Other than 1 to 16: Alternate read • For tuning start request 1 to 16: Tuning result storage bank Other than 1 to 16: Error: BLOAD File Number • BLOAD 1 to 8: Specify the BLOAD file number. Other than 1 to 8: Error
14	2 + (user data size) byte	<ul style="list-style-type: none"> User Data 32byte User Data 64byte User Data 128byte User Data 256byte Select one of them. 	0	User Data Size	Preset data size		Specify preset data size.
		Byte area (preset data size)	User Data	Preset data			Specify preset data. (Terminator is not necessary.)

Error List

Error code	Error	Meaning
0	No error	Reading success/operation success
201	Reading error	Reading error
202	Comparison error	The read code does not match the preset data.
210	Tuning failure (Symbol unclear)	The code could not be found within the field of view while tuning.
213	Tuning failure (Aborted)	Tuning was aborted midway.
120	Control instruction reception error	Another operation instruction was received during operation. (Operation instruction is not completed.)
102	Bank No. error	The bank number specification is invalid (other than 1 to 16).
220	Preset data error	Preset data specification is invalid. (Specified size is outside the range.)
230	PROFINET data update error	Shortage of specified size (Result data and present data size is beyond the limit.)

Operation Examples

Example 1) Trigger method: Level trigger. Handshaking: Disabled.



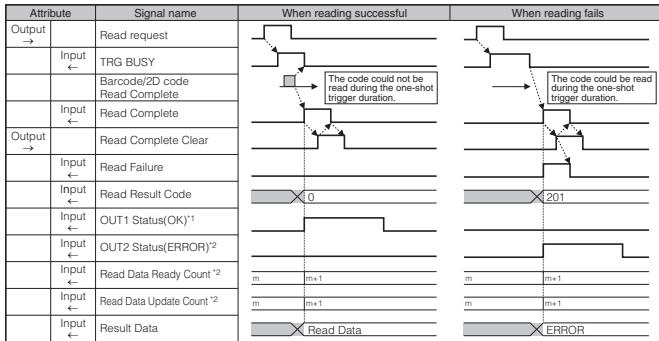
● When reading is successful

- "Read request" is set to ON (1).
- When "Read request" is set to ON (1), the SR-1000 Series starts reading, and then "TRG BUSY" is set to ON (1).
- When the code is read, its data is written into "Read Data." "TRG BUSY" is set to OFF (0), and "Read Complete" is set to ON (1).
- "Read request" is set to OFF (0).
- It is confirmed that "Read Complete" is ON (1), and then "Read Complete Clear" is set to ON (1).
- When "Read Complete Clear" is set to ON (1), "Read Complete" is set to OFF (0).
- It is confirmed that "Read Complete" is OFF (0), and then "Read Complete Clear" is set to OFF (0).

● When reading fails

- "Read request" is set to ON (1).
- When "Read request" is set to ON (1), the SR-1000 Series starts reading, and then "TRG BUSY" is set to ON (1).
- "Read request" is set to OFF (0).
- The code could not be read, so "ERROR" is written to "Result Data." "201" is written to "Read Result Code." "TRG BUSY" is set to OFF (0), and "Read Complete" is set to ON (1).
- It is confirmed that "Read Complete" is ON (1), and then "Read Complete Clear" is set to ON (1).
- When "Read Complete Clear" is set to ON (1), "Read Complete" and "Read Failure" are set to OFF (0).
- It is confirmed that "Read Complete" is OFF (0), and then "Read Complete Clear" is set to OFF (0).

Example 2) Trigger method: One-shot trigger. Handshaking: Disabled.



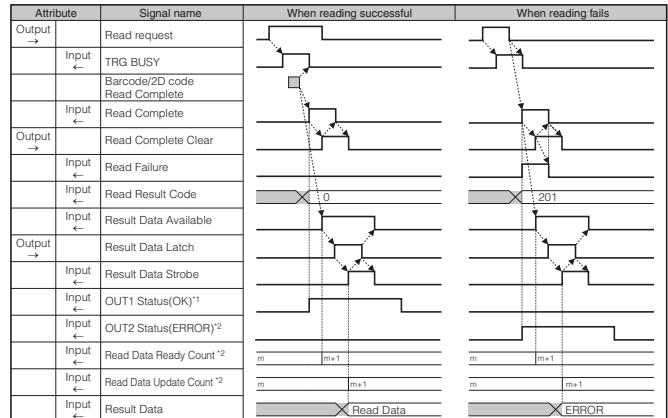
● When reading is successful

- 1 "Read request" is set to ON (1).
- 2 When "Read request" is set to ON (1), the SR-1000 Series starts reading, and then "TRG BUSY" is set to ON (1).
- 3 When the code is read, its data is written into "Read Data." "TRG BUSY" is set to OFF (0), and "Read Complete" is set to ON (1).
- 4 "Read request" is set to OFF (0).
- 5 It is confirmed that "Read Complete" is ON (1), and then "Read Complete Clear" is set to ON (1).
- 6 When "Read Complete Clear" is set to ON (1), "Read Complete" is set to OFF (0).
- 7 It is confirmed that "Read Complete" is OFF (0), and then "Read Complete Clear" is set to OFF (0).

● When reading fails

- 1 "Read request" is set to ON (1).
- 2 When "Read request" is set to ON (1), the SR-1000 Series starts reading, and then "TRG BUSY" is set to ON (1).
- 3 When the "One-shot trigger duration" elapses, reading stops.
- 4 The code could not be read, so "ERROR" is written to "Result Data." "201" is written to "Read Result Code." "TRG BUSY" is set to OFF (0), and "Read Complete" is set to ON (1).
- 5 It is confirmed that "Read Complete" is ON (1), and then "Read Complete Clear" is set to ON (1).
- 6 When "Read Complete Clear" is set to ON (1), "Read Complete" and "Read Failure" are set to OFF (0).
- 7 It is confirmed that "Read Complete" is OFF (0), and then "Read Complete Clear" is set to OFF (0).

Example 3) Trigger method: Level trigger. Handshaking: Enabled.



● When reading is successful

- 1 "Read request" is set to ON (1).
- 2 When "Read request" is set to ON (1), the SR-1000 Series starts reading, and then "TRG BUSY" is set to ON (1).
- 3 When the code is read, "TRG BUSY" is set to OFF (0), and "Read Complete" and "Result Data Available" are set to ON (1).
- 4 "Read request" is set to OFF (0).
- 5 It is confirmed that "Read Complete" is ON (1), and then "Read Complete Clear" is set to ON (1).
- 6 When "Read Complete Clear" is set to ON (1), "Read Complete" is set to OFF (0).
- 7 It is confirmed that "Read Complete" is OFF (0), and then "Read Complete Clear" is set to OFF (0).
- 8 It is confirmed that "Result Data Available" is ON (1), and then "Result Data Latch" is set to ON (1).
- 9 When "Result Data Latch" is set to ON (1), the data is written into "Result Data." "Result Data Strobe" is set to ON (1).
- 10 It is confirmed that "Result Data Strobe" is ON (1), and then "Result Data Latch" is set to OFF (0).
- 11 When "Result Data Latch" is set to OFF (0), "Result Data Available" and "Result Data Strobe" are set to OFF (0).

● When reading fails

- 1 "Read request" is set to ON (1).
- 2 When "Read request" is set to ON (1), the SR-1000 Series starts reading, and then "TRG BUSY" is set to ON (1).
- 3 "Read request" is set to OFF (0).
- 4 When the code cannot be read, "ERROR" is written to the send buffer, so "Read Complete" and "Result Data Available" are set to ON (1). "201" is written to "Read Result Code." "TRG BUSY" is set to OFF (0).
- 5 It is confirmed that "Read Complete" is ON (1), and then "Read Complete Clear" is set to ON (1).
- 6 When "Read Complete Clear" is set to ON (1), "Read Complete" is set to OFF (0).
- 7 It is confirmed that "Read Complete" is OFF (0), and then "Read Complete Clear" is set to OFF (0).
- 8 It is confirmed that "Result Data Available" is ON (1), and then "Result Data Latch" is set to ON (1).
- 9 When "Result Data Latch" is set to ON (1), "ERROR" is written into "Result Data." "Result Data Strobe" is set to ON (1).
- 10 It is confirmed that "Result Data Strobe" is ON (1), and then "Result Data Latch" is set to OFF (0).
- 11 When "Result Data Latch" is set to OFF (0), "Read Complete Clear" and "Result Data Strobe" are set to OFF (0).

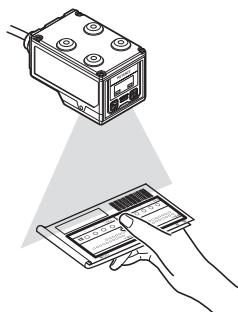
Point

- The signal directions are indicated as shown below.

	: PLC ← SR-1000
	: PLC → SR-1000

- The OUT1 and OUT2 operations are described using the factory default configurations of the SR-1000 Series operation settings and multi I/O settings.
- The "Read Data Ready Count" and "Read Data Update Count" values may differ depending on the operation status and communication frequency.
For example, when a code is read and then the reading of the next code finishes before the updating of the PLC data finishes, the result data ready count will be larger than the expected value by one.

16-1 Reading Operation



With this operation, you can read codes by bringing them in front of the SR-1000 Series.

The configuration procedure and operations vary depending on whether a trigger sensor will be used.

When Using a Sensor

Configure the settings as shown below to have the SR-1000 Series emit light and scan only when the target is detected by the sensor.

■ Settings

[Reading] tab	- [Reading method]	: Smart mode or Custom mode
[Operation] tab	- [Reading Mode]	: Single
[I/O] tab	- [Input Polarity]	: Norm. open
	- [IN1 Function]	: Timing
	- [Power-on trigger]	: Disabled

When Not Using a Sensor

Configure the settings as shown below to enable the SR-1000 Series to scan at all times.

■ Settings

[Reading] tab	- [Reading method]	: Custom mode
[Operation] tab	- [Reading Mode]	: Continuous
[I/O] tab	- [Input Polarity]	: Norm. closed
	- [IN1 Function]	: Timing
	- [Power-on trigger]	: Enabled

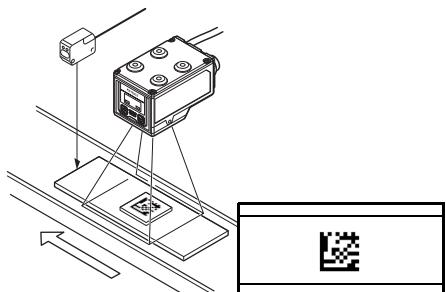
Reference

- If you want to output the read data in keyboard format, use "AutoID Keyboard Wedge."
- For details on "AutoID Keyboard Wedge," refer to the "AutoID Keyboard Wedge User's Manual."

Point

When using "Smart mode" a trigger sensor is required.

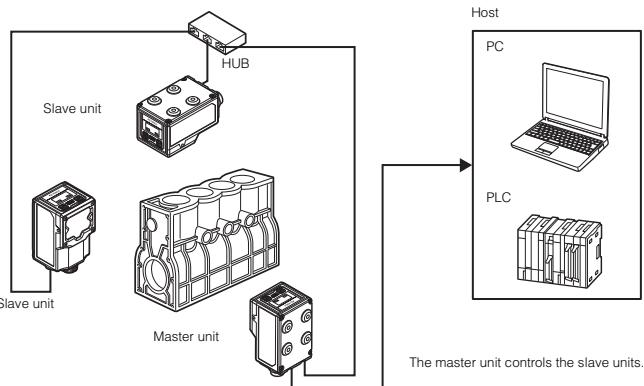
16-2 Reading Moving Codes



With this operation, the SR-1000 reads codes that move along the line.

For details, refer to "6-3 Read Moving Codes" (page 16).

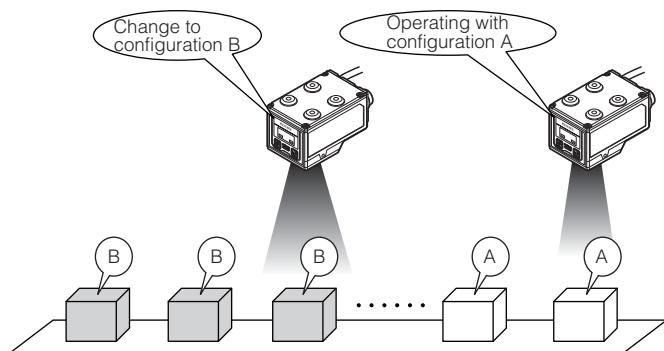
16-3 Reading Codes with Unknown Positions



Use this operation when you do not know the vertical or horizontal position of the codes but you want to read them with multiple readers.

For details, refer to the explanation of multi head mode in "9-6 Master/Slave Function" (page 37).

16-4 Changeover



When the product on the line is switched to a different product, the code type may also change. The changeover operation changes the reading settings required when the product is switched.

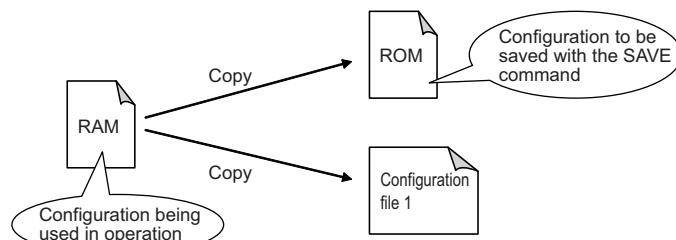
Configuration File Switch Commands

You can switch the settings that are used to operate the SR-1000 Series (for a changeover) by sending commands to the SR-1000. This makes it possible to operate the SR-1000 Series with settings dedicated for reading the product, to read using only the required bank, and to match the data format with the product.

■ Creating changeover configuration files

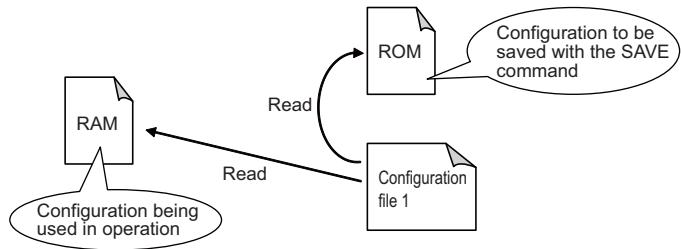
This command creates the configuration file and script file.

The settings in RAM are saved to a configuration file to be saved in ROM.



Command	BSAVE_m
Parameter	m = 1 to 8 ROM configuration file number at copy destination (config1.ptc, config2.ptc ...) ROM script file number at copy destination (FmtSet1.Lua, FmtSet2.Lua ...)
Response	OK,BSAVE

■ Loading changeover configuration files



Command	BLOAD,m
Parameter	m=1-8 Configuration file number to read (config1.ptc, config2.ptc ...) Script file number to read (FmtSet1.Lua, FmtSet2.Lua ...)
Response	OK,BLOAD

■ Setting procedure

- 1 Use AutoID Network Navigator to send the first configuration file to the SR-1000.
- 2 Use the terminal to send "BSAVE,1."
The files config1.ptc and FmtSet1.Lua (the first configuration file) are created.
- 3 Use AutoID Network Navigator to send the second configuration file to the SR-1000.
- 4 Use the terminal to send "BSAVE,2."
The files config2.ptc and FmtSet2.Lua (the second configuration file) are created.
- 5 Repeat the same procedure to create the required number of configuration files.
- 6 Send "BLOAD,m" during operation to use the target settings.

Reference

- The SR-1000 Series can save up to eight configuration file and script file pairs.
- A separate focus position is saved for each configuration file.
- EtherNet/IP or PROFINET can be used for the BLOAD operation.

17-1 Specifications

Model		SR-1000	SR-1000W	SR-1000 + SR-10AH			
Type		Standard	Wide range	High-resolution type			
Receiver	Sensor	CMOS Image Sensor					
	Number of pixels	1280 x 1024 pixels					
	Focus adjustment	Automatic*					
Light emitter	Light source	High-intensity red LED					
	Pointer light source	High-intensity green LED					
	LED class	Exempt group (IEC62471)					
Reading specifications	Supported symbol	2D code	QR, MicroQR, DataMatrix (ECC200), GS1 DataMatrix PDF417, Micro PDF417, GS1 Composite (CC-A, CC-B, CC-C)				
		Barcode	CODE39, ITF, 2of5, Industrial 2of5, COOP 2of5, NW-7, Codabar, CODE128, GS1-128, GS1 DataBar, CODE93, JAN/EAN/UPC, Trioptic CODE39, CODE39 Full ASCII, Pharmacode				
	Minimum resolution	2D code	0.063 mm	0.082 mm	0.025 mm		
		Barcode	0.082 mm	0.082 mm	0.082 mm		
	Reading distance		110 mm to 1000 mm	50 mm to 600 mm	20 mm to 40 mm		
	Reading view range		122 mm x 97 mm (at a distance of 400 mm)	257 mm x 206 mm (at a distance of 400 mm)	19 mm x 15 mm (at a distance of 40 mm)		
	Control input		Points 2				
	Control output		Input type Bidirectional voltage input				
	I/O specifications		Maximum rating 26.4 VDC				
	Ethernet		Minimum ON voltage 15 VDC				
I/O specifications	Control output	Maximum OFF current 0.2 mA or less		Points 3			
		Output type Photo MOS relay output		Input type Bidirectional voltage input			
		Maximum rating 30 VDC		Maximum rating 26.4 VDC			
		Maximum load current 1 output: 50 mA or less, 3-output total: 100 mA or less		Maximum rating 30 VDC			
		Leakage current when OFF 0.1 mA or less		Maximum rating 26.4 VDC			
		Residual voltage when ON 1 V or less		Maximum rating 30 VDC			
	Serial communication	Communication standard IEEE 802.3 compliant, 10BASE-T/100BASE-TX	Control input Points 2				
		Supported protocol TCP/IP, SNTP, FTP, BOOTP, EtherNet/IP, PROFINET, KV Studio, MC Protocol, OMLON PLC link	Control output Points 3				
		Communication standard RS-232C compliant	Control output Points 3				
		Communication speed 9600, 19200, 38400, 57600, 115200 bps	Control output Points 3				
Environmental resistance	Ambient	Supported protocol None, KV STUCIO, MC protocol, SYSWAY	Control output Points 3				
		Communication standard USB 2.0 Full Speed compliant	Control output Points 3				
		Enclosure rating IP65	Control output Points 3				
		Ambient temperature 0 to 45°C	Control output Points 3				
		Ambient storage temperature -10 to +50°C	Control output Points 3				
		Relative humidity 35 to 85% RH (No condensation)	Control output Points 3				
		Storage ambient humidity 35 to 85% RH (No condensation)	Control output Points 3				
		Ambient light Sunlight: 10000 lux, Incandescent lamp: 6000 lux, Fluorescent lamp: 2000 lux	Control output Points 3				
	Operating environment	No dust or corrosive gas present	Control output Points 3				
	Vibration	10 to 55 Hz Double amplitude 0.75 mm/ 3 hours each in X, Y and Z directions	Control output Points 3				
Rating	Power supply voltage	24 VDC±10%	Control output Points 3				
	Current consumption	700 mA	Control output Points 3				
Weight		Approx. 200 g	Control output Points 3				
* The focus position can be adjusted automatically during installation and tuning. No. ROM rewrites: 100,000 times							

■ Setup software (AutoID Network Navigator)

Model	SR-H6W
Supported operating system	Windows 10 Professional or later, 32 bit/64 bit Windows 8 Professional or later, 32 bit/64 bit (excluding Windows RT) Windows 7 Professional or later, 32 bit/64 bit Windows Vista Business/Ultimate SP2 or later, 32 bit*
Running environment	Processor: 2.0 GHz or higher Memory: 1 GB for 32 bit and 2 GB for 64 bit DVD-ROM drive: Required for installation Screen resolution: 1024 x 768 or higher

* The SR-2000/G100 does not support Windows Vista.

- .NET Framework 3.5 SP1 or later must be installed in advance.
- When installing .NET Framework 3.5 on Windows 8/10, an Internet connection is necessary.
- Use Control Panel to install .NET Framework 3.5 on Windows 8/10.

■ Control cable

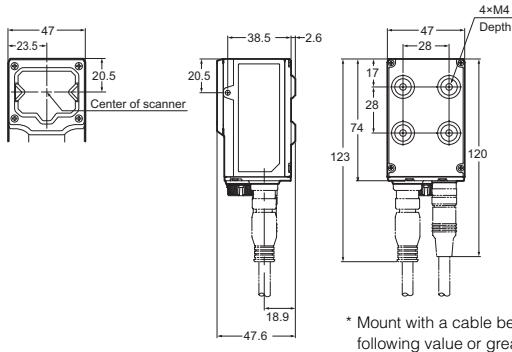
Model	OP-87224 OP-87353 OP-87527 OP-88304 OP-88307	OP-87225 OP-87354 OP-87528 OP-88305 OP-88308	OP-87226 OP-87355 OP-87529 OP-88306 OP-88309
Cable length	2 m	5 m	10 m
Weight	Approx. 250 g	Approx. 400 g	Approx. 700 g

■ Ethernet cable

Model	OP-87230 OP-87301	OP-87231 OP-87302	OP-87232 OP-87303
Cable length	2 m	5 m	10 m
Weight	Approx. 200 g	Approx. 350 g	Approx. 500 g

17-2 Dimensions

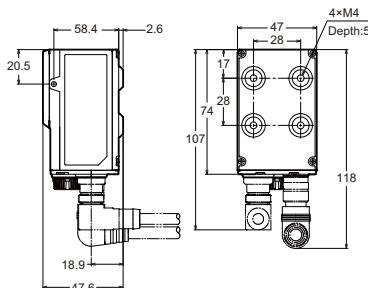
■ SR-1000/1000W



* Mount with a cable bending radius of the following value or greater:
[When not mobile] R = 15 mm
[When mobile] Control cable: R = 20 mm
Ethernet cable: R = 50 mm

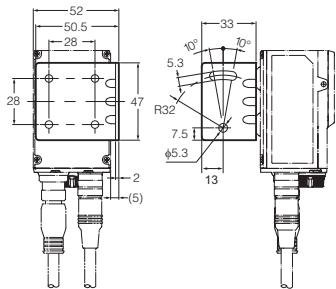
Unit: mm

■ When L-shaped cable connected



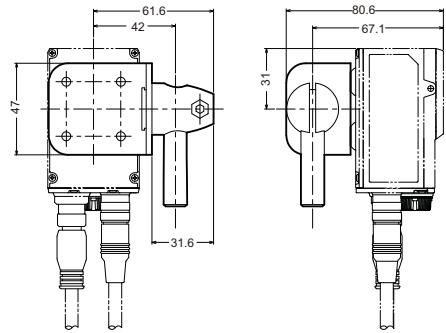
Unit: mm

■ When the mounting bracket (OP-87866) is used



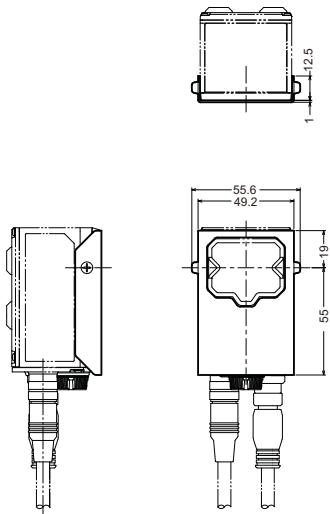
Unit: mm

■ When the adjustable bracket (OP-88002) is used



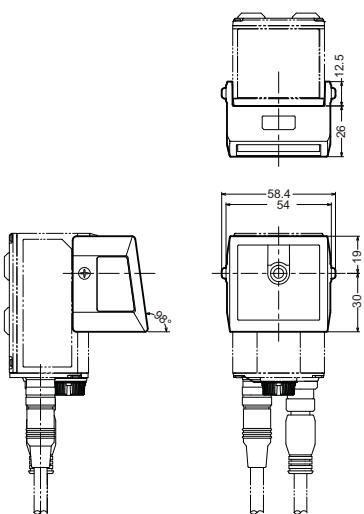
Unit: mm

■ When the SR-10AR is used



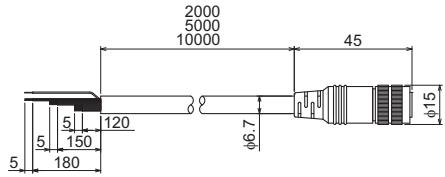
Unit: mm

■ When the SR-10AH is used



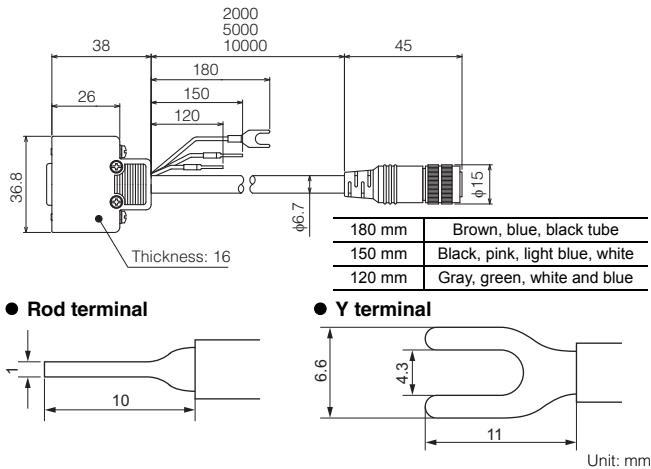
Unit: mm

■ OP-87224/87225/87226/87353/87534/87355

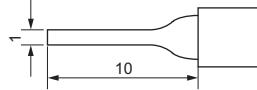


Unit: mm

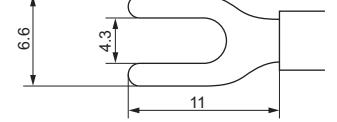
■ OP-87527/87528/87529



● Rod terminal

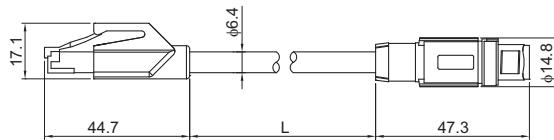


● Y terminal



Unit: mm

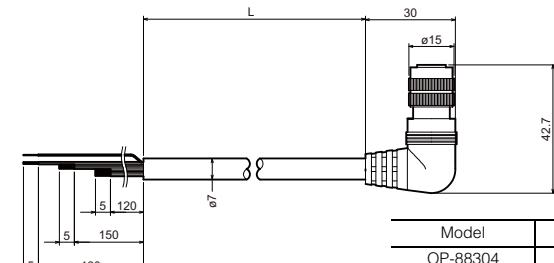
■ OP-87230/87231/87232



Model	L (mm)
OP-87230	2000
OP-87231	5000
OP-87232	10000

Unit: mm

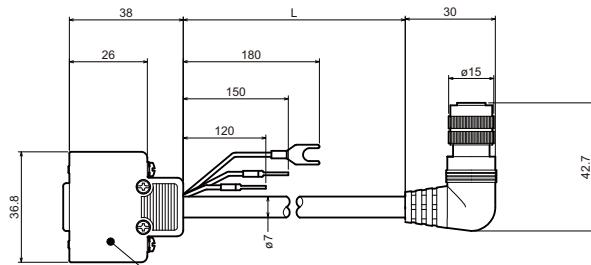
■ OP-88304/88305/88306



Model	L (mm)
OP-88304	2000
OP-88305	5000
OP-88306	10000

Unit: mm

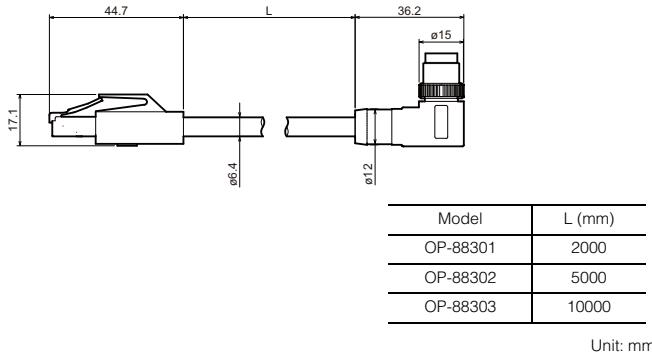
■ OP-88307/88308/88309



180 mm	Brown, blue, black tube
150 mm	Black, pink, light blue, white
120 mm	Gray, green, white and blue

Unit: mm

■ OP-88301/88302/88303



Unable to read codes with the SR-1000 Series

• Tuning options

You have to tune the SR-1000 Series to read codes.

Tuning execution:

- Using the reader
- Using the setup software

Configuration confirmation: "8-1 Checking SR-1000 Series Settings (Page 27)"

• Print quality

It may not be possible to read codes that have a large amount of cracks, chips, stains, or blurring. You may be able to improve the situation by performing maintenance on the printer or marker.

• Mounting distance

It may not be possible to read codes that have small cell sizes when the reader is installed too far away from the codes. Reduce the distance between the reader and the codes, and then adjust focus and tune the reader again.

17-3 Troubleshooting

Error shown on the SR-1000 Series display

Refer to the following table to troubleshoot the error.

● List of errors displayed on the reader

Error number/message	Remedy
E0 FILE SYSTEM	Contact your nearest KEYENCE office.
E1 FACTPARAM	Contact your nearest KEYENCE office.
E2 CHECK SUM	Contact your nearest KEYENCE office.
E2 CONFIG VER	Contact your nearest KEYENCE office.
E3 PROFINET	An error occurred during PROFINET communication. To reconfigure settings, hold down the [SELECT] button for at least 4 seconds to clear the error. Alternatively, send the DFLT command to initialize the settings, and then configure the settings again. Check the communication between the SR-1000 Series and the PLC.
E4 BUFFER OVER	An error occurred because the upper limit of the send buffer was exceeded. Cycle power to the SR-1000 Series or hold down the [SELECT] button for at least 4 seconds to clear the error.
E5 IP DUPLICATE	A duplicate IP address is present on the network. Configure the network settings so that no duplicate IP addresses are present.
E6 FW UPDATE	An error occurred during an SR-1000 Series firmware update. Cycle power to the SR-1000 Series, and then execute update again.
E7 PLC LINK	A PLC link error occurred. Check the communication between the SR-1000 Series and the PLC.
E8 SCRIPT	An error occurred during script execution. Check the SR-1000 Series settings and the script file.
E9 DSP PROG	Contact your nearest KEYENCE office.
E10 CMOS	Contact your nearest KEYENCE office.
E11 AUTO FOCUS	Cycle power to the SR-1000 Series. If the error still occurs, contact your nearest KEYENCE office.
E12 HOST CONNECT	An error occurred during communication with a host device. Check for causes of unstable communication. To reconfigure settings, hold down the [SELECT] button for at least 4 seconds to clear the error.
E13 MOTOR	Contact your nearest KEYENCE office.
E99 MISC	Contact your nearest KEYENCE office.

Unable to install AutoID Network Navigator or the SR-1000 Series driver

Check the following points, and then install the software again.

• Administrator rights

When installing and executing, log in as the user with administrator privileges.

• Security software

The installation may be impeded by security software. Temporarily disable the security software.

Unable to connect to AutoID Network Navigator

• USB connection

- "5-1 Connecting" (page 10)

• Ethernet connection

- "6-14 Connect to AutoID Network Navigator over Ethernet" (page 23)

When you click [Send configuration] in AutoID Network Navigator, the message "Failed executing the command. (20)" is displayed.

An error may have occurred on the SR-1000 Series unit, for example, the IP address may already be in use. Check the error message shown on the display.

Data is not output through the RS-232C interface

• Communication settings confirmation

Check that the communication settings of the SR-1000 Series match those of the host device.

- "5-3 Communication Settings" (page 11)

• Wiring

To communicate via RS-232C, the pin arrangement of the SR-1000 Series must match that of the host device. Check that a cable correctly matching the pin arrangement is being used.

- "2-2 Wiring to a PC" (page 6)

- "2-3 Wiring to a PLC or Peripheral" (page 6)

Data is not output through the Ethernet interface

• Communication settings confirmation

Check that the settings for communication between the SR-1000 Series and the host device are correct.

- "5-3 Communication Settings" (page 11)

• Wiring

If you are using a hub or other intermediary device between the SR-1000 Series and the host device, remove the intermediary device to establish a direct connection, and then check if it is possible to communicate.

• Security settings

Check whether communication is being blocked by the security settings of the network devices.

"ERROR" in the output data

A reading error has occurred on the SR-1000 Series. Check the following points.

• Trigger input time

If the time for receiving trigger input from a switch or sensor is too short, a reading error will occur. Check if making the trigger input time longer improves reading.

If you want to start reading on the rising edge of the trigger input for a specific amount of time, use the "One-shot trigger" setting.

- "6-4 Change Reading Behavior" (page 17)

• Tuning options

You have to tune the SR-1000 Series to read codes.

Tuning execution:

- Using the reader
- "4-1 Tuning (Page 9)"

- Using the setup software
- "5-2 Reading Settings (Page 10)"

Configuration confirmation: "8-1 Checking SR-1000 Series Settings (Page 27)"

• Line speed

If the reader cannot read the codes moving on the line, the reading settings may not be correct.

- "6-3 Read Moving Codes" (page 16)

"ERR**" in the output data

This is displayed when the PC or PLC sends a command to the SR-1000 Series and the processing of the command fails.

• Error details

- "12-1 Command Communication" (page 54)

17-4 ASCII Codes

Low-order 4 bits	Hexadecimal	High-order 4 bits							
		0	1	2	3	4	5	6	7
Binary	0000	0001	0010	0011	0100	0101	0110	0111	
0	0000		DLE (SP)	0	@	P	'	p	
1	0001	SOH	DC1	!	1	A	Q	a	q
2	0010	STX	DC2	"	2	B	R	b	r
3	0011	ETX	DC3	#	3	C	S	c	s
4	0100	EOT	DC4	\$	4	D	T	d	t
5	0101	ENQ	NAK	%	5	E	U	e	u
6	0110	ACK	SYN	&	6	F	V	f	v
7	0111	BEL	ETB	'	7	G	W	g	w
8	1000	BS	CAN	(8	H	X	h	x
9	1001	HT	EM)	9	I	Y	i	y
A	1010	LF	SUB	*	:	J	Z	j	z
B	1011	VT	ESC	+	;	K	[k	{
C	1100	CL	FS	.	<	L	\	l	
D	1101	CR	GS	-	=	M]	m	}
E	1110	SO	RS	.	>	N	^	n	~
F	1111	SI	US	/	?	O	_	o	del

17-5 Precautions on Proper Use

■ CE Marking

Keyence Corporation has confirmed that this product complies with the essential requirements of the applicable EC Directive, based on the following specifications.

Be sure to consider the following specifications when using this product in the Member State of European Union.

● EMC Directive (2004/108/EC)

- Applicable standards EMI : EN61326-1, Class A
EMS : EN61326-1
- The length of cable connected to the power supply connector must be less than or equal to 30 m.
- This product is intended to be used in an industrial electromagnetic environment.

These specifications do not give any guarantee that the end-product with this product incorporated complies with the essential requirements of EMC Directive. The manufacturer of the end-product is solely responsible for the compliance on the end-product itself according to EMC Directive.

● Low-Voltage Directive (2006/95/EC)

- Applicable standard : EN62471
- Indoor use only.

■ CSA Certificate

This product complies with the following CSA and UL standards and has been certified by CSA.

- Applicable standard : CAN/CSA C22.2 No.61010-1
UL61010-1
- Be sure to consider the following specifications when using this product as a product certified by CSA.
- Overvoltage category I
- Use this product under pollution degree 2.
- Use this product at the altitude of 2000 m or less.
- Indoor use only.
- When using this product, use the following power supply.

CSA or UL certified power supply that provides Class 2 output as defined in the CEC (Canadian Electrical Code) and NEC (National Electrical Code), Or CSA or UL certified power supply that has been evaluated as a Limited Power Source as defined in CAN/CSA-C22.2 No. 60950-1/UL60950-1.

■ Radio Waves Act in South Korea

Class A Equipment

This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Note: This caution is effective for the Korean Radio Act only.

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TOPPERS/JSP Kernel

Toyohashi Open Platform for Embedded Real-Time Systems/Just Standard Profile Kernel

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Lua:

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■ BarcodeReader.com

<http://www.barcodereader.com/>

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