

Built-in AI Code Reader

SR-X 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.

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

Indicates cautions and limitations that must be followed during operation.

Indicates additional information on proper operation.

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-X Series Built-in AI Code Reader". Please read this manual thoroughly before using the SR-X Series to ensure optimum performance. Keep this manual handy for quick future reference.

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

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
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General Precautions

	<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. Do not use this product in a hazardous location and/or potentially explosive atmosphere. Do not use this product in an application that may cause death, serious injury or serious property damage due to a failure with this product should occur, such as nuclear power plants, on aircraft, trains, ships, or vehicles, used within medical equipment, playground equipment, roller coasters and other rides, etc.
	<ul style="list-style-type: none"> If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired. You must perform a sufficient risk assessment for the machine where this product is to be installed prior to installing this product. Provide appropriate protective fail-safe measures on the machine independent from this product in case a failure with this product should occur.
	<ul style="list-style-type: none"> You must verify that the SR-X Series are operating correctly in terms of functionality and performance before the start and the operation of the SR-X Series.
	<ul style="list-style-type: none"> KEYENCE never warrants the function or performance of the SR-X Series if it is used in a manner that differs from the SR-X Series specifications contained in this instruction manual of if the SR-X Series are modified by yourself. When the SR-X 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

	<ul style="list-style-type: none"> Do not perform control or adjustment using a procedure other than those specified herein. It may result in hazardous radiation exposure. Follow the instruction mentioned below, otherwise, injury to human body (eyes, skin, etc.) may result. Do not stare at the LED light and specular reflected light. LED emission from this product is not automatically stopped when it is disassembled. Never do disassemble, modify, repair this product. Do not view the LED light with optical instruments (for example, eye loupes, magnifiers, microscopes, telescopes, binoculars, etc.). Do not view the LED light directly with optical instruments (for example, eye loupes, magnifiers, microscopes, telescopes, binoculars, etc.) within a distance of 100 mm. It may pose an eye hazard.
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
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Before Using the Product





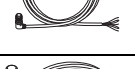


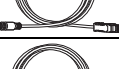







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




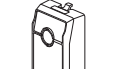
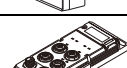
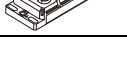
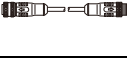

1-1

Checking the Package Contents

Model	Name	Package content	Qty.	Appearance
SR-X300/X300W SR-X100/X100W	Built-in AI Code Reader	Reader unit	1	
		Instruction manual	1	
		Ethernet port cover	1	

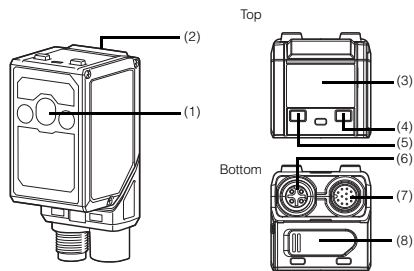
Option

Model	Name	Package content	Qty.	Appearance
SR-H8W	Setup software (AutoID Network Navigator)	DVD-ROM	1	
OP-88678/88679/ 88680	Control cable (NFPA-compliant) M12A female - loose wire type	Cable (2 m/5 m/10 m)	1	
OP-88681/88682/ 88683	Control cable (NFPA-compliant) M12A female - D-sub connector type	Cable (2 m/5 m/10 m)	1	
OP-88684/88685/ 88686	L-shaped control cable* (NFPA-compliant) M12A female - loose wire type	Cable (2 m/5 m/10 m)	1	
OP-88687/88688/ 88689	L-shaped control cable* (NFPA-compliant) M12A female - D-sub connector type	Cable (2 m/5 m/10 m)	1	
OP-87230/87231/ 87232	Ethernet cable (NFPA79-compliant) M12D male - RJ45 type	Cable (2 m/5 m/10 m)	1	
OP-88301/88302/ 88303	L-shaped Ethernet cable* (NFPA-compliant) M12D male - RJ45 type	Cable (2 m/5 m/10 m)	1	
OP-88846	Interchangeable control cable 1	Cable (0.45 m)	1	
OP-88764	Interchangeable control cable 2 (SR-2000/1000)	Cable (0.45 m)	1	
OP-88569	USB cable Type A - Type C cable	Cable (1.5 m)	1	
OP-88696	Mounting bracket	Mounting bracket	1	
		Screw (M3)	2	
OP-88697	Adjustable bracket	Mounting bracket	1	
		Mounting bracket	1	
		Screw (M3)	2	

Model	Name	Package content	Qty.	Appearance
OP-88698	Interchangeable mounting bracket 1	Mounting bracket	1	
		Screw (M3)	2	
OP-88699	Interchangeable mounting bracket 2	Mounting bracket	1	
		Screw (M3)	2	
SR-XESD	ESD attachment	Attachment	1	
SR-XLP	Laser protector	Attachment	1	
SR-XHR	High-resolution lens attachment	Attachment	1	
SR-PN1/SR-EC1	Communication unit	Main unit	1	
OP-88776/88777/ 88778	M12A female - M12A male	Cable (2 m/5 m/10 m)	1	
OP-88782/88783/ 88784	M12L female - strand wires	Cable (2 m/5 m/10 m)	1	
OP-88785/88786/ 88787	M12L male - M12L female	Cable (2 m/5 m/10 m)	1	
OP-88788/88789/ 88790/88791	M12D male - M12D male	Cable (0.3 m/2 m/5 m/10 m)	1	

* L-shaped cables can only be used by the SR-X100/100W.

1-2 Part Names



No.	Name	Description
(1)	Scanner	Section that reads codes.
(2)	Status indicating LED	Indicates whether the reading has succeeded or failed, setup software connection status, etc.
(3)	Display ^{*1}	Shows reading results or reading data.
(4)	ENTER button ^{*2}	Button used to confirm functions.
(5)	SELECT button ^{*1}	Button used to select functions.
(6)	Ethernet port	Port for connecting the Ethernet cable: M12D 4pin (female)
(7)	Control port	Port for connecting the control cable: M12A 12pin (male)
(8)	USB port	Port for connecting USB memory or a USB cable ^{*3} : Type-C

*1 Only SR-X300/X300W is equipped

*2 In the SR-X100/X100W, this will be the [TRG] button.

*3 OP-88569

NOTICE	When not using the Ethernet cable, be sure to attach the Ethernet port cover.
	Attach a USB port cover to meet the protective structural specification.

When the unit is normally operating

Unit state	LED state
Powered off	Turned Off
Immediately after powered on	□ Lit white
IP address unallocated (status BOOTP)	□ Blinking blue
Connected to AutoID Network Navigator	■ Lit blue
Reads successfully	■ Lit green
Reads unsuccessfully or gets unsuccessful result of verification	■ Lit red

When the unit reads a quick setup code

Unit state	LED state
Reading	■ Lit blue
Configures settings successfully	■ Lit green
Configures settings unsuccessfully	■ Lit red

When the unit has an error

Error number/message	LED state (SR-X300/X300W)	LED state (SR-X100/X100W)
E0 FILE SYSTEM	Blinking yellow □	Blinking yellow-red ■
E1 FACTPARAM		Blinking yellow-red ■
E2 CHECK SUM		Blinking yellow-red ■
E2 CONFIG VER		Blinking yellow-red ■
E3 PROFINET		Blinking yellow □
E4 BUFFER OVER		Blinking yellow □
E5 IP DUPLICATE		Blinking yellow □
E6 FW UPDATE		Blinking yellow-red ■
E7 PLC LINK		Blinking yellow □
E8 SCRIPT		Blinking yellow □

Error number/message	LED state (SR-X300/X300W)	LED state (SR-X100/X100W)
E9 DSP PROG	Blinking yellow □	Blinking yellow-red ■
E10 CMOS		Blinking yellow-red ■
E11 AUTO FOCUS		Blinking yellow-red ■
E12 HOST CONNECT		Blinking yellow □
E13 MOTOR		Blinking yellow-red ■
E15 REPLACE FILE		Blinking yellow □
E99 MISC		Blinking yellow-red ■

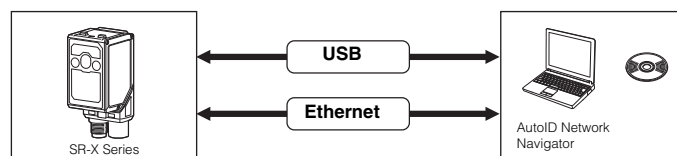
* For details of unit errors, refer to "19-3 Troubleshooting" (Page 150)

1-3 System Configuration and Setup Flow

System Configuration

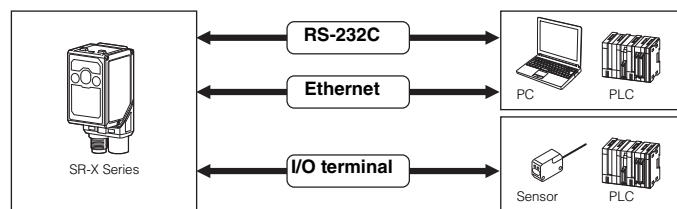
The system configuration of the SR-X series is as shown below.

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 4)

2 Wire the reader and mount it on a surface.



"2-1 Connection and Wiring" (Page 7)

3 Power the reader.



4 Use AutoID Network Navigator to set up the SR-X Series.



"5-1 Connecting" (Page 18)

Start operation.

2

Connection and Wiring

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	Example of wiring the reader to a switch	9

2-1 Connection and Wiring

Control cable pin arrangement

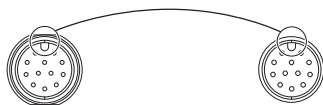


M12A

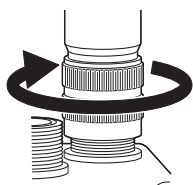
Wire color	Name	Description	Signal direction	Initial assignment
Brown	24 V	24 VDC	Input	-
Blue	0 V	Power GND	-	-
Orange	RXD (RD)	RS-232C Receive	Input	-
Yellow	TXD (SD)	RS-232C Send	Output	-
Purple	SGND	RS-232C GND	-	-
Green	IN1	Input signal 1	Input	Reading start
Gray	IN2	Input signal 2	Input	-
White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

Connecting the control cable and wiring

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



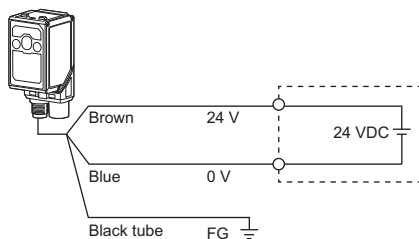
- 2 Tighten the connector screw by turning it clockwise.



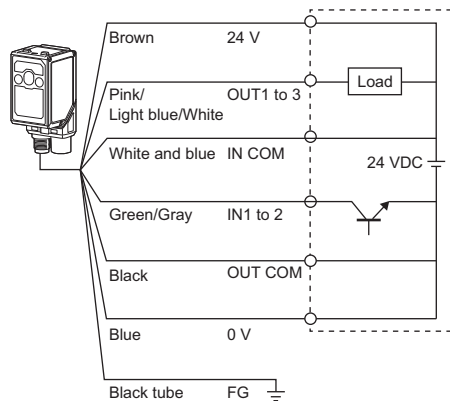
Screw tightening torque:
0.4 to 0.6 N·m

- 3 Connect the wires according to usage.

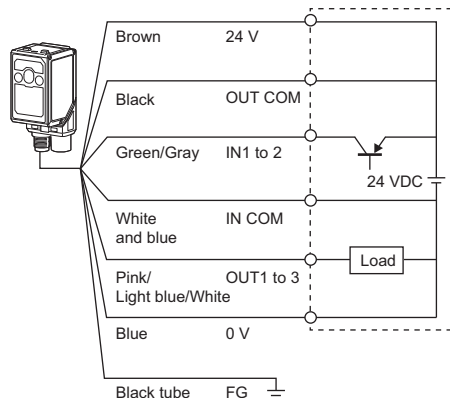
When the I/O terminals are not used



NPN wiring



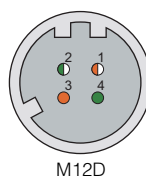
PNP wiring



NOTICE

- 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. Insufficient 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 by 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.

Ethernet cable pin arrangement

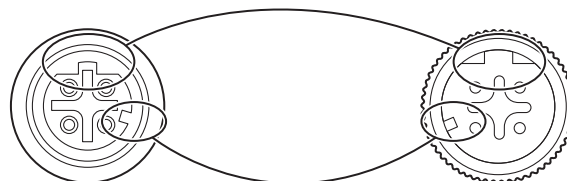


M12D

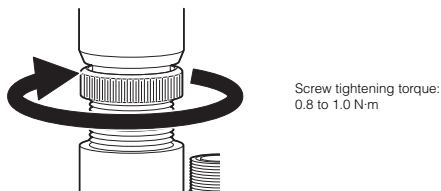
No.	Signal
1	TX+
2	RX+
3	TX-
4	RX-

Connecting the Ethernet cable

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



2 Tighten the connector screw by turning it clockwise.

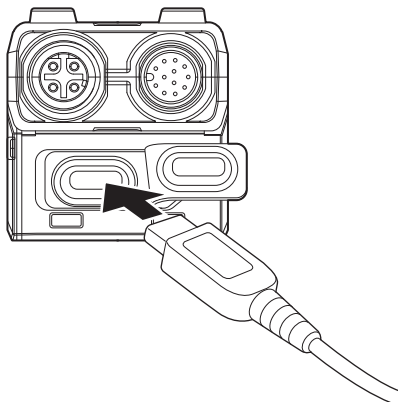


NOTICE

- When connecting the connector, insert it so that it does not tilt, and then push in and tighten the connector securely. Insufficient 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 by 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.
- To extend the Ethernet cable, use an Ethernet HUB instead of a connector.

Connecting the USB cable

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

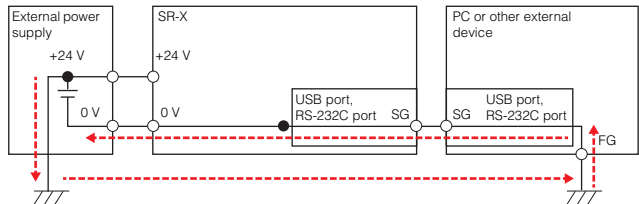


NOTICE

- Connection may not be possible depending on the specifications of the USB cable. (Example: Type C - Type C cable) USB cable whose operation has been confirmed: OP-88569
- When connecting, insert the connector straight so it does not tilt. Otherwise, the connector pin may be damaged.

Precautions when communicating with external devices via USB

There is continuity between 0 V of the SR-X Series power supply, the USB port SG, and the RS-232C SG. Voltage differences with the SG of external equipment may cause damage to the communication unit and/or the external equipment. For example, when using a positive ground (grounding on the 24 V side), if a voltage difference occurs, current will flow in the following circuit, possibly leading to device damage. Do not wire devices as shown below.



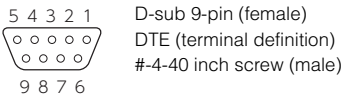
2-2 Wiring to a PC

RS-232C

OP-88681/88682/88683/88687/88688/88689

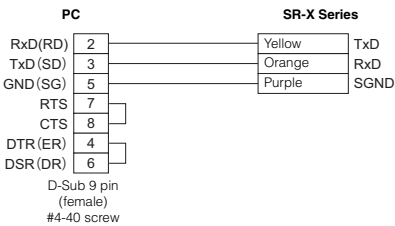
Connect the cable to the RS-232C port of the PC.

OP-88681/88682/88683/88687/88688/88689 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-88678/88679/88680/88684/88685/88686



Ethernet

For the OP-87230/87231/87232/88301/88302/88303

Connect the OP-87230/87231/87232/88301/88302/88303 cable to the Ethernet port of the PC.
For the Ethernet communication settings, refer to "5-4 Communication Settings" (Page 21).

USB

Connect the OP-88569 cable to the USB port of the PC.

Installing the USB driver

The first time that you connect the SR-X to a PC and turn on the SR-X, you will be prompted to install the driver.
Specify the USB driver inside the "SR-H8W" DVD-ROM to install it.

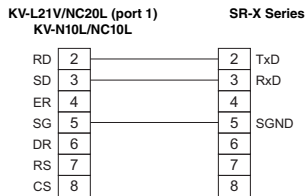
2-3

Wiring to a PLC or Peripheral

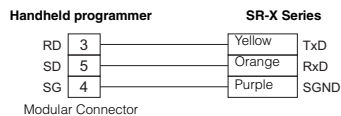
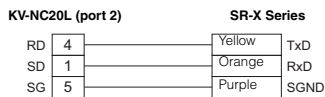
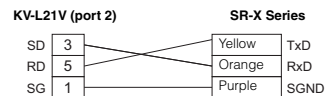
RS-232C

Connecting to the KV Series

OP-88681/88682/88683/88687/88688/88689

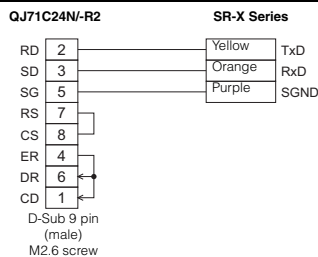


OP-88678/88679/88680/88684/88685/88686



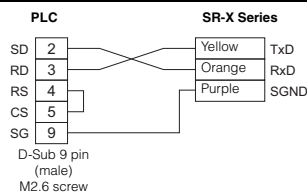
Connecting to the MELSEC Series

OP-88678/88679/88680/88684/88685/88686



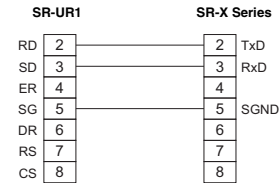
Connecting to the SYSMAC Series

OP-88678/88679/88680/88684/88685/88686

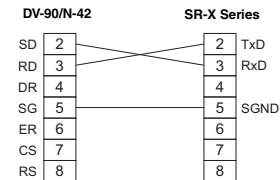


Connecting to a peripheral manufactured by KEY-ENCE

OP-88681/88682/88683/88687/88688/88689



OP-88681/88682/88683/88687/88688/88689



- * 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.

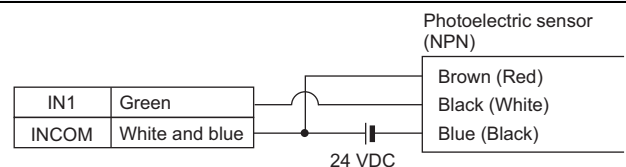
For the Ethernet communication settings, refer to "5-4 Communication Settings" (Page 21).

2-4

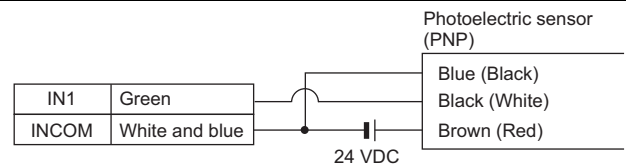
Wiring to a Sensor or Switch

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

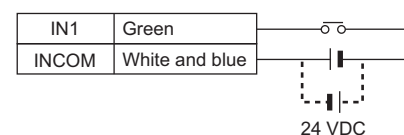
NPN



PNP



Example of wiring the reader to a switch



3

Mounting

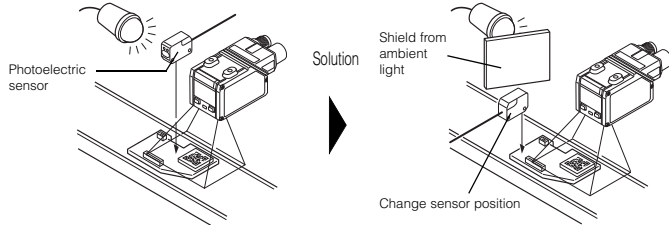
3-1	Before Mounting	11
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	When using the optional mounting bracket	11
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	Mounting of attachment	11
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3-3	Mounting Position Adjustment	12
	Field of View and Installation Distance	12
	Minimum Resolution (Typical)	13

3-1 Before Mounting

Check the mounting conditions according to the following precautions.

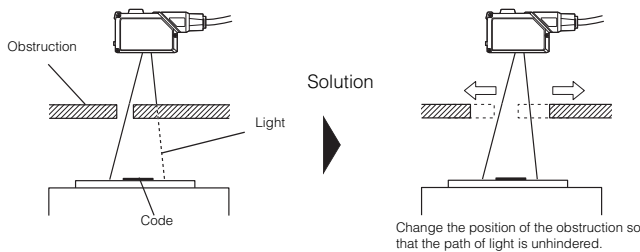
Confirm that ambient light is not affecting the reader.

Prevent ambient light—from sources such as sunlight, other lights, and photoelectric sensors—from entering the light receiving area of the SR-X 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.



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

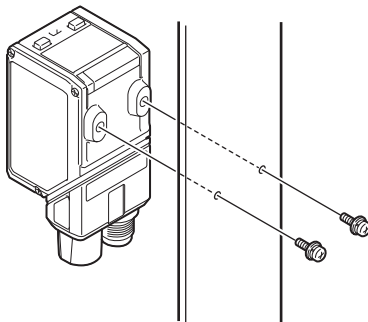
NOTICE

3-2 Mounting Methods

Mounting

1 Secure the SR-X Series unit with screws.

Mounting screws are not included.

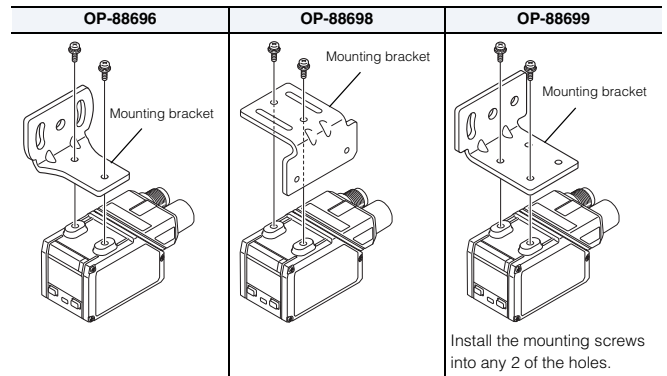


- Mounting screw size : M3
- Tightening torque : 0.4 N·m
- Screw hole depth of the SR-X Series : 3.5 mm

When using the optional mounting bracket

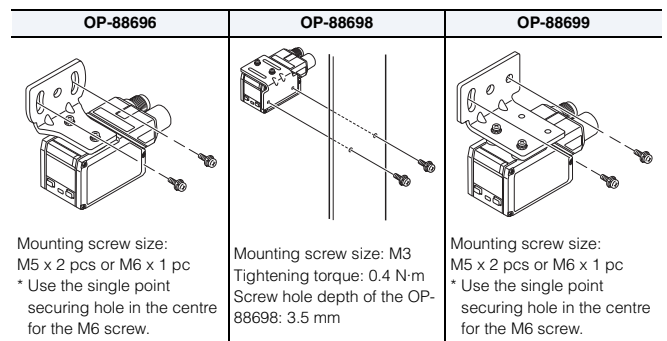
1 Attach the optional mounting bracket to the SR-X Series.

- Supplied screw size: M3
- Tightening torque: 0.4 N·m

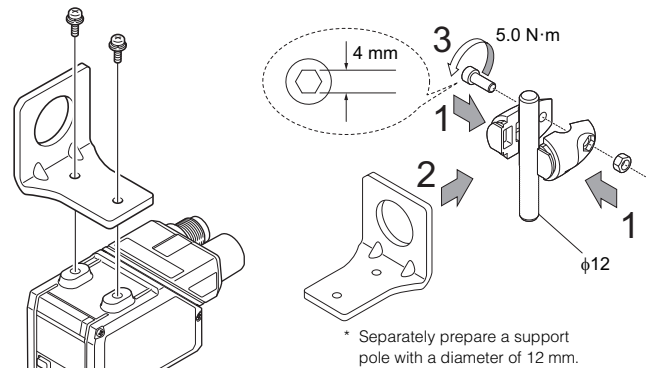


2 Secure the mounting bracket.

Mounting screws are not included.



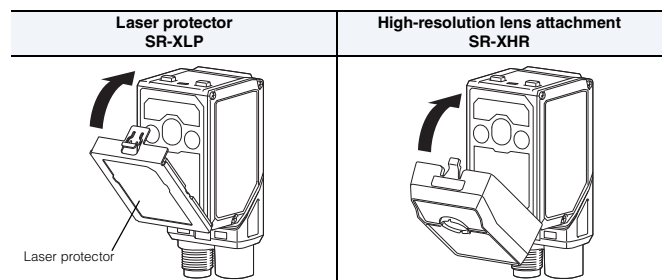
Attaching the OP-88697



- Mounting screw size : M3
- Tightening torque : 0.4 N·m

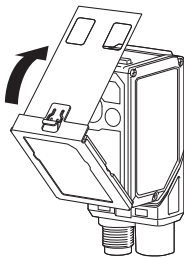
Mounting of attachment

1 Hook the claw section at the bottom of the attachment onto the recess at the bottom of the SR-X main unit to mount it.

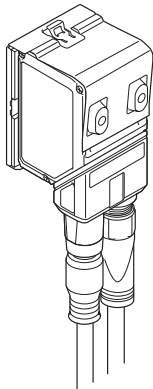


Mounting of ESD attachment (SR-XESD)

- 1 Insert the clips at the bottom of the ESD attachment into the notch at the bottom of the SR-X main unit to mount it.



- 2 Hook the ESD attachment onto the screw hole area on the SR-X main unit.



- 3 Secure the SR-X Series unit with screws.

Mounting screws are not included.

- Mounting screw size: M3
- Tightening torque: 0.4 N·m
- Screw hole depth of the SR-X Series: 3.5 mm

To remove the laser protector (SR-XLP) or the ESD attachment (SR-XESD), lift the top hook.

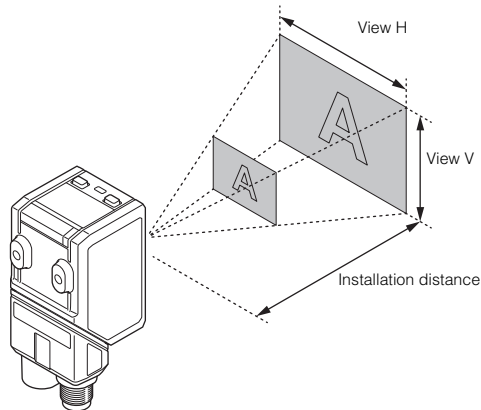


3-3

Mounting Position Adjustment

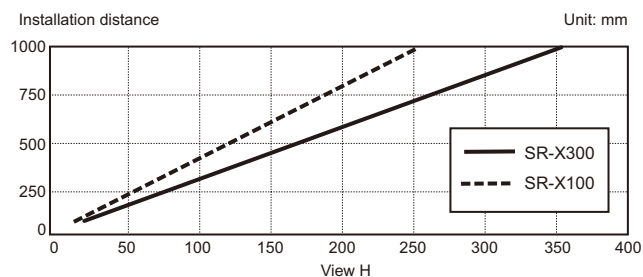
Field of View and Installation Distance

The SR-X 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.



	SR-X300/X300W	SR-X100/X100W
CMOS size (pixels)	1920 x 1200	1360 x 1024
View V	View H x 0.62	View H x 0.75

Field of view of standard type (SR-X300/X100)



Typical example

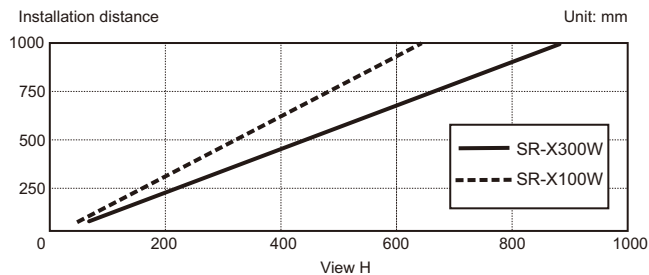
Unit: mm

Installation distance	SR-X300		SR-X100	
	View H	View V	View H	View V
70	21	13	15	11
150	50	31	35	27
300	104	65	74	55
400	141	88	99	75
600	213	133	150	113
800	285	178	201	152
1000	357	223	252	190

NOTICE

The readable distance and angle vary by the print quality or size of a reading target code and the surrounding environment. Use the test mode, etc. to check the installation condition suitable for the environment.

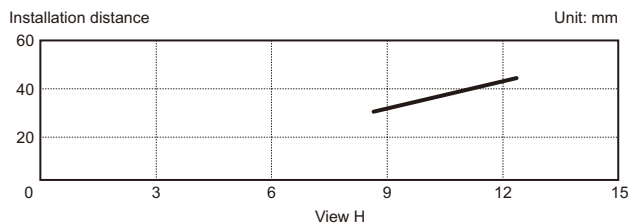
Field of view of wide field of view type (SR-X300W/X100W)



Typical example

Installation distance	SR-X300W		SR-X100W	
	View H	View V	View H	View V
50	44	28	31	23
150	134	83	94	71
300	267	166	189	142
400	355	222	251	189
600	532	333	377	284
800	710	443	503	378
1000	887	554	628	473

Field of view of high resolution type (SR-X300 + SR-XHR)



Typical example

Installation distance	SR-X300 + SR-XHR	
	View H	View V
32	8.7	5.4
40	10.7	6.6
47	12.3	7.7

Minimum Resolution (Typical)

Applicable code type

	Symbol A	Symbol B	Symbol C
2D code	QR, MicroQR, DataMatrix (ECC200), DMRE, GS1 DataMatrix	PDF417, Micro PDF417, GS1 Composite (CC-A, CC-B, CC-C)	DotCode, MaxiCode, AztecCode, Postal
Barcode	CODE39, ITF, NW-7 (Codabar), CODE128, GS1-128, JAN/EAN/UPC, CODE39 Full ASCII	GS1 DataBar, CODE93, 2of5 (Industrial 2of5), COOP 2of5, Trioptic CODE39, Pharmacode	-

Minimum resolution of standard type (SR-X300/X100)

Typical example

Distance	Symbol A		Symbol B		Symbol C	
	2D code	Barcode	2D code	Barcode	2D code	Barcode
70	0.024	0.082	0.040	0.082	0.060	-
150	0.048	0.082	0.066	0.082	0.106	-
300	0.099	0.082	0.137	0.082	0.219	-
600	0.200	0.123	0.278	0.167	0.444	-
1000	0.335	0.205	0.465	0.279	0.744	-

Minimum resolution of wide field of view type (SR-X300W/X100W)

Typical example

Distance	Symbol A		Symbol B		Symbol C	
	2D code	Barcode	2D code	Barcode	2D code	Barcode
50	0.060	0.082	0.100	0.082	0.150	-
150	0.126	0.082	0.175	0.105	0.280	-
300	0.251	0.153	0.348	0.209	0.557	-
600	0.500	0.306	0.694	0.417	1.111	-
1000	0.832	0.509	1.156	0.694	1.849	-

Minimum resolution of high resolution type (SR-X300 + SR-XHR)

Typical example

Distance	Symbol A		Symbol B		Symbol C	
	2D code	Barcode	2D code	Barcode	2D code	Barcode
32	0.010	0.082	0.020	0.082	0.030	-
40	0.010	0.082	0.020	0.082	0.030	-
47	0.012	0.082	0.020	0.082	0.030	-

4

Tuning

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	Operation Procedure (SR-X100/X100W)	15
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	For the SR-X100/X100W	16

4-1 Tuning

What Is Tuning?

With just a simple operation, the SR-X 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.

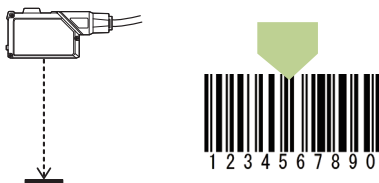
* For details on how to complete tuning using AutoID Network Navigator, refer to "5-3 Reading Settings" (Page 20).

Operation Procedure (SR-X300/X300W)

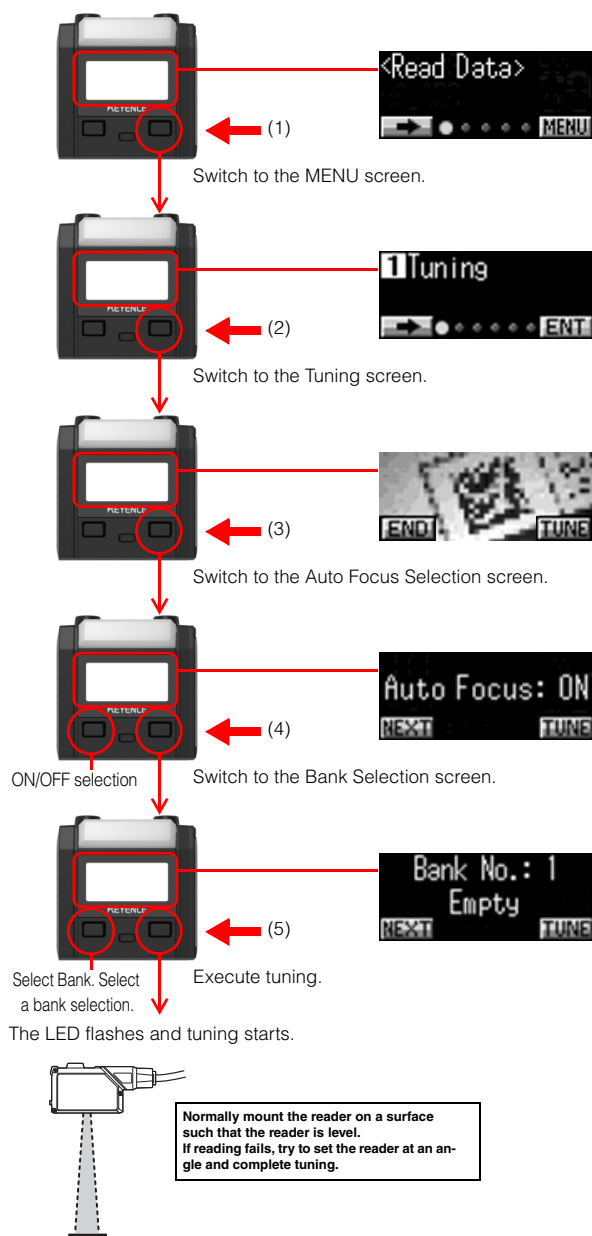
1 Turn on the SR-X Series.

* Refer to "4-3 Initial Power-on Operation" (Page 16) for more information on how to power the reader on for the first time.

2 Place a code at the end of the projected green pointer.



3 Perform the following procedure.



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



This completes the tuning procedure.

Point

- 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.
- 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.

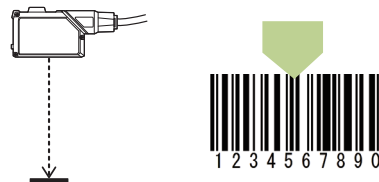


Operation Procedure (SR-X100/X100W)

1 Turn on the SR-X Series.

* Refer to "4-3 Initial Power-on Operation" (Page 16) for more information on how to power the reader on for the first time.

2 Place a code at the end of the projected green pointer.



3 Press the [TRG] button for 3 sec and let go (the status LED will flash in blue once).

Execute tuning.

Point

- The value will be saved in the bank (default value: 16) set in the [Table] - [Read] - [Details] - [Bank number for tuning from the main unit].

4-2 Reading Check

Display (SR-X300/X300W only)



(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
(3)	Live View display	If you press the [ENTER] button on this screen, the live view of the SR-X300 Series will be displayed.



*1 For details on the matching level, refer to "10-7 Matching level" (Page 78).

4-3 Initial Power-on Operation

Display (SR-X300/X300W only)



The SR-X300/X300W Series displays the above information when the power is turned on for the first time.

Use the following methods to configure the IP address.

- (1) Press the [ENTER] button twice to select ENT when the device starts up with an IP address of 192.168.100.100.
- (2) Refer to "5-1 Connecting" (Page 18) to configure the IP addresses via USB.
- (3) Refer to "6-10 Allocate IP Addresses to Multiple Devices" (Page 33) to configure the IP addresses via Ethernet.

For the SR-X100/X100W

- (1) Press the [TRG] button once when the device starts up with an IP address of 192.168.100.100. (Version 1.35 or higher)
- (2) Refer to "5-1 Connecting" (Page 18) to configure the IP addresses via USB.
- (3) Refer to "6-10 Allocate IP Addresses to Multiple Devices" (Page 33) to configure the IP addresses via Ethernet.

5

AutoID Network Navigator (Basic Information)

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5-1

Connecting

Installing AutoID Network Navigator

Execute "Setup.exe" in [AutoID Network Navigator] - [Setup] folder of the SR-H8W, and then install the program by following the instructions on the screen.

* AutoID Network Navigator specifications: □ "19-1 Specifications" (Page 146)

- Important**
- To install the software, log on as a user with Administrator rights.
 - Install ".Net Framework 4.6.1" and "Visual C++ 2017 Runtime (x86)" before you install AutoID Network Navigator. You do not have to install them again if they are already installed.
 - A screen prompting a restart may be displayed during installation. In this case, execute a restart. After restarting, installation resumes automatically. If installation does not resume, execute [Setup.exe] again.
 - 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

- To connect to the reader from AutoID Network Navigator, you can use the following two methods:
 - (1) Connect through the Ethernet interface.
 - (2) Connect through the USB interface.
- When you connect to the reader through the USB interface, you can only connect to one SR-X Series unit per PC. To set up two or more SR-X Series units, connect to one unit at a time.

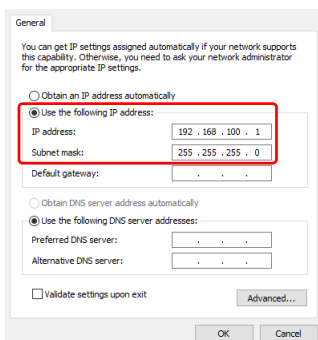
Ethernet Connection

- 1 Connect the Ethernet cable of the SR-X Series to a PC.
- 2 Configure the network settings of the PC.

● Configuring Windows 10 network settings

- (1) Click [Start] - [System Tools] - [Control Panel].
- (2) Click [Network and Internet].
- (3) Click [Network and Sharing Center].
- (4) Click [Change adapter settings].
- (5) Right-click [Ethernet] and then click [Properties(R)].
- (6) Click [Internet Protocol Version 4 (TCP/IPv4)] and then click [Properties(R)].
- (7) 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



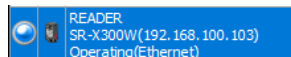
- (8) Click [OK] to close all the windows.

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

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



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



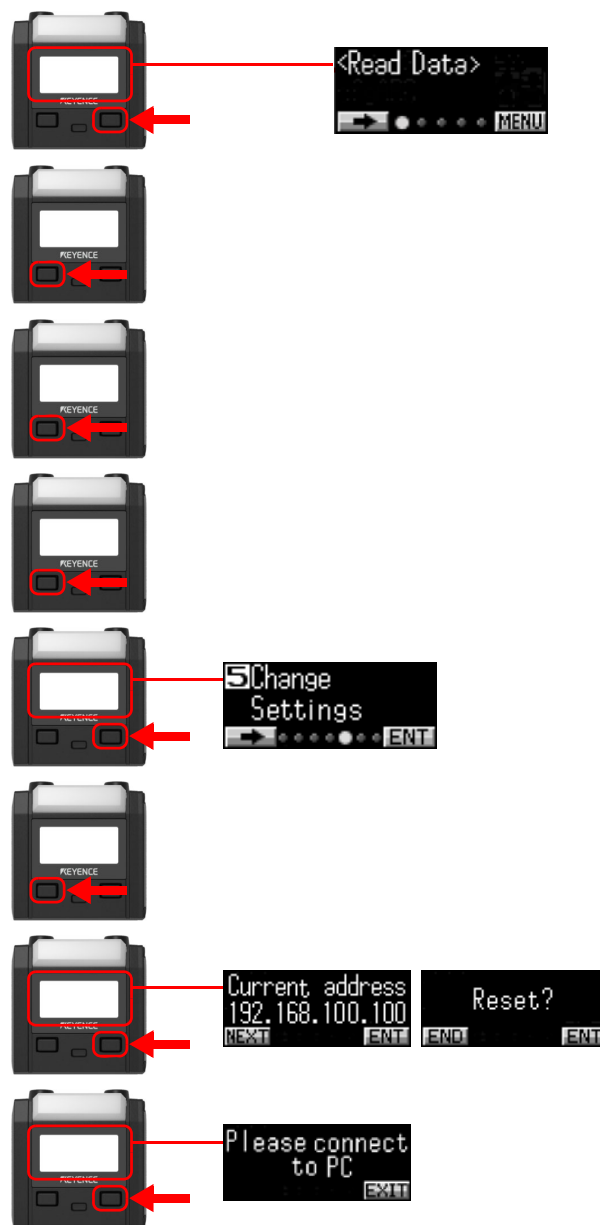
*If the above procedure doesn't detect the SR-X Series

- An IP address other than "192.168.100.xxx" may be assigned to the SR-X Series that you are attempting to connect to. For the SR-X300/X300W, follow the procedure shown below to connect to the reader.

Reference By connecting the SR-X series and AutoID Network Navigator through a USB connection, you can directly change the IP address of the SR-X series. Refer to "USB connection" (Page 19) for details.

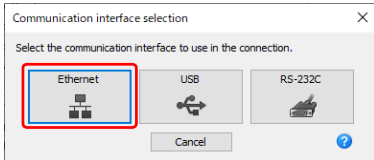
Reset IP Address (SR-X300/X300W only)

- 1 Follow the following button procedure.

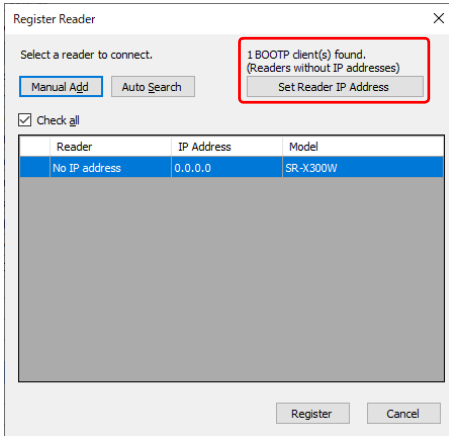


The "Please Connect to PC" message appears after the SR-X Series device is restarted.

2 Click the [Register] button and then click [Ethernet].



3 Click [Set Reader IP Address].



If the following information is displayed, the connection has been established. Click [Edit] to set a desired IP address.

MAC Address	Model	IP Address (Available)	Next Power-On
<input checked="" type="checkbox"/> 00:00:01:01:10:1F	SR-X300W	192.168.100.2	<input type="button" value="Edit"/> <input type="button" value="Static IP"/>

4 Click [OK].

5 Click [Register].

- Reference
- Broadcast packets are sent out into the network when "Please Connect to PC" is displayed on the SR-X Series unit.
 - When the IP address is reset, the SR-X Series will restart and therefore the RAM information will be deleted.

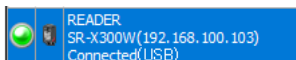
USB connection

1 Connect the OP-88569 cable to the USB port of the PC.

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



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

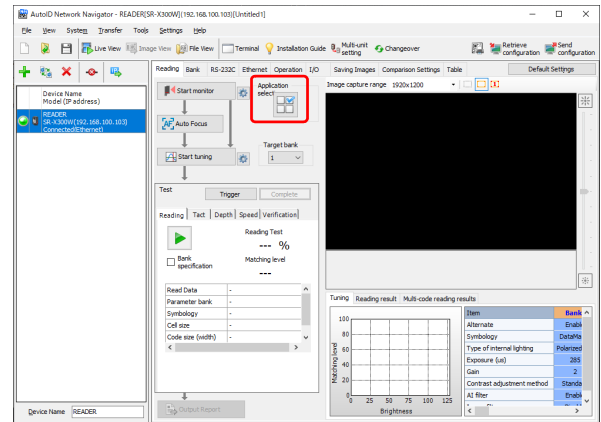


5-2 Application Selection

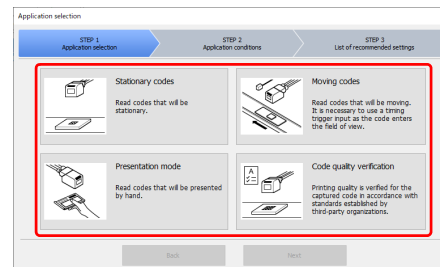
Create optimal reading settings for each application.

Configuration Procedure

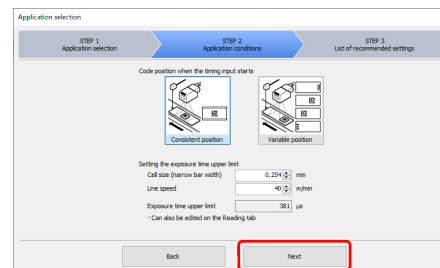
1 Click the [Application Selection] button.



2 Select an application and click the [Next] button.



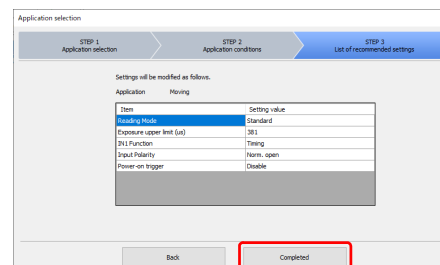
3 Set the read condition and click the [Next] button.



4 Check the configuration conditions.

5 Click [Complete] button.

Configuration is complete.



Application Selection

Settings can be created for the following 4 types of applications.

(1) Stationary codes	Read codes that will be stationary.
(2) Moving codes	Read codes that will be moving. It is necessary to use a timing trigger input as the code enters the field of view.
(3) Hands free	Read codes that will be presented by hand.
(4) Print quality verification	Printing quality is verified for the captured code in accordance with standards established by third-party organizations.

Configuration Settings

Select and enter the required information for each application.

(1) Stationary codes

There are no conditions to select for this application.

(2) Moving codes

Code position when the timing input starts	Select [Fixed] or [Indefinite].
Cell size (Narrow bar width)	Set the minimum cell size.
Line speed	Set the line speed.
Exposure upper limit ^{*1}	Automatically calculated from the minimum cell size and line speed.

^{*1} Editing can also be done with the [Reading] tab

(3) Hands free

Timing	Select [Yes] or [No].
Cell size (Narrow bar width)	Set the minimum cell size.
Line speed	Set the code speed.
Exposure upper limit ^{*2}	Automatically calculated from the minimum cell size and line speed.

^{*2} Editing can also be done with the [Reading] tab

(4) Print quality verification

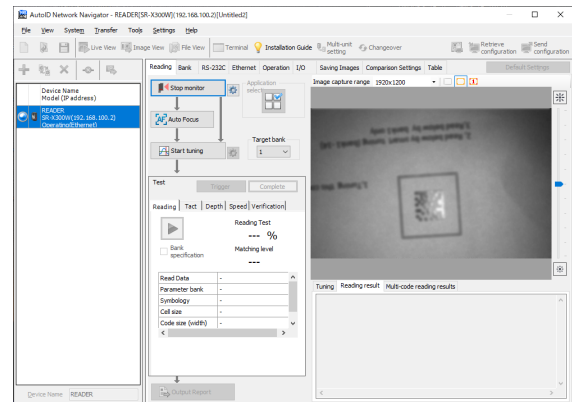
Code quality verification	Select the verification standard.
Calibration	Select [Disable] or [Enable].
Display of calibration card	Display the calibration card.

5-3 Reading Settings

Tuning

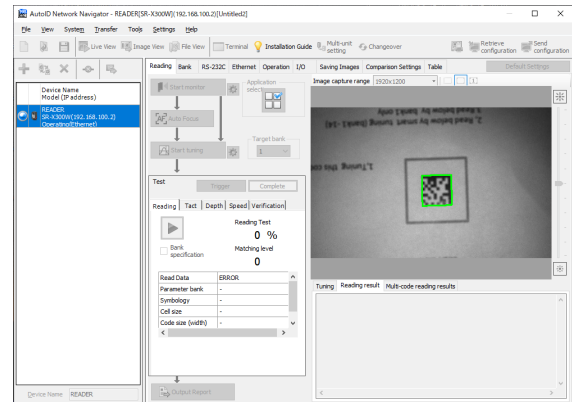
1 Click [Start monitor].

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



2 Click [Auto focus].

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



3 Click [Start tuning].

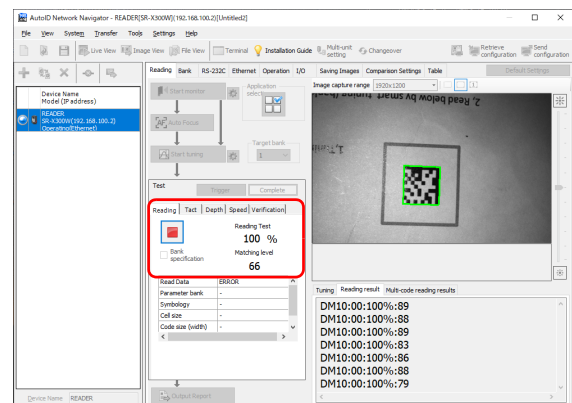
The SR-X Series automatically adjusts the reading parameters to the optimal values based on the target code. Reading settings are adjusted when the tuning complete message is displayed.


Reading Check

Reading rate test

1 Click the start button which is accessible from [Test] - [Reading].

The reading rate is displayed in the location indicated below.



- 2 Move the code within the field of view to check that the code can be read stably.
- 3 Clicking the end button  will finish 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. You can also check the following items. <ul style="list-style-type: none"> • Code type • Cell size (narrow bar size) • Code size • PPC
(2)	Tact Test	Measures and displays the time required for reading
(3)	Depth Test	Displays the estimated reading depth by varying the distance virtually from the current installation distance.
(4)	Speed test	Represents the traceable target speed based on the successful number of continuous reads.
(5)	Code quality verification test	Use the specified parameter bank to display the marking verification result of the captured image.

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

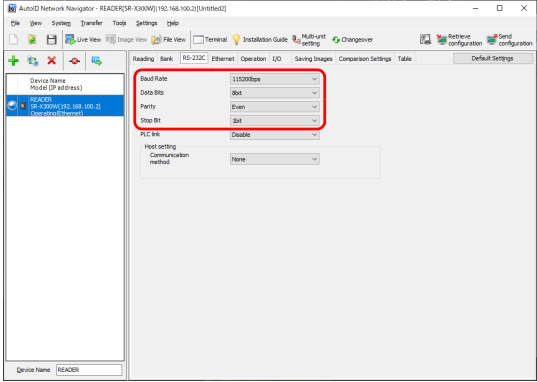
- To widen the field of view:
 - ◻ "7-1 Change Field of View" (Page 36)
- To read multiple types of codes:
 - ◻ "7-2 Read Multiple Codes" (Page 36)

Important The measurement results of the depth test and speed test should be used as guides. Be sure to check the performance with an actual workpiece before starting operation.



5-4 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.

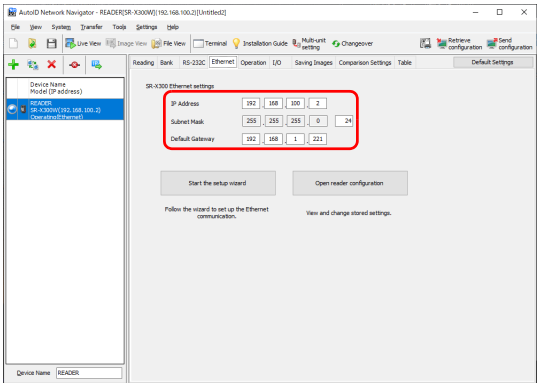


Reference

- For details on RS-232C, refer to  "13-1 Serial Communication" (Page 95).
- If you will use the PLC link function, refer to  "15-1 PLC Link Overview" (Page 115).

Ethernet Connection

- 1 Click the [Ethernet] tab.
- 2 Set the IP address and other values to those assigned to the SR-X 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.

255 . 255 . 255 . 0 24

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.

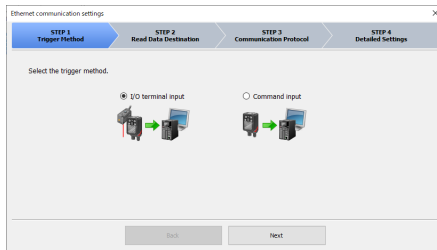
Setup Wizard

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

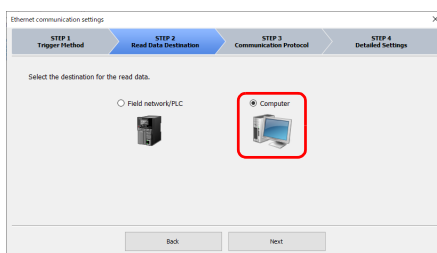
Example) TCP communication with a PC

1 Select the reading trigger input method.

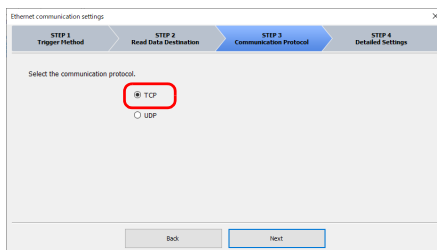
I/O terminal input	The trigger input will be provided by a sensor or switch wired to the SR-X Series.
Command input	The trigger input will be provided by way of commands sent from the host (PC).



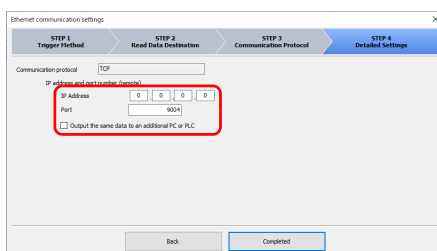
2 Select the destination for the read data.



3 Select the communication protocol.



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



5 Click [Send Configuration].

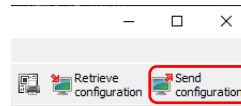
- Reference**
- When you want to change the header or terminator, change it by selecting [Operation Mode] - [Edit Data] or [Table] - [Format].
 - For information on communication other than that described above, refer to the following topics.
 - Detailed Ethernet settings
 - *13-2 Socket Communication (TCP, UDP)" (Page 96)
 - PLC link
 - *15-1 PLC Link Overview" (Page 115)
 - EtherNet/IP
 - *16-1 EtherNet/IP Overview" (Page 123)
 - PROFINET
 - *17-1 PROFINET Overview" (Page 137)
 - TCP settings

5-5 Sending Settings

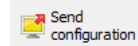
Send the settings that you have selected with AutoID Network Navigator to the SR-X Series. Sending the settings changes the settings on the reader.

Sending Settings

1 Click [Send Configuration].



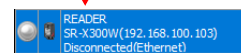
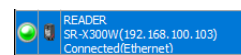
When the settings are being changed, the display of the [Send Configuration] icon changes to that shown below.



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-X Series will be disconnected.



This completes the setting procedure.

Important

- Communication between the SR-X 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-X Series is connected to AutoID Network Navigator.

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

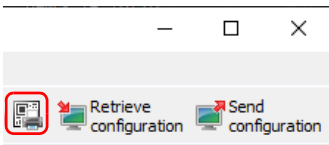
Point

- Reading configuration files "9-2 Restoring Settings" (Page 52)
- 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-X Series by having it read the printed code.

1 Click the [Quick Setup Code Creation] button.

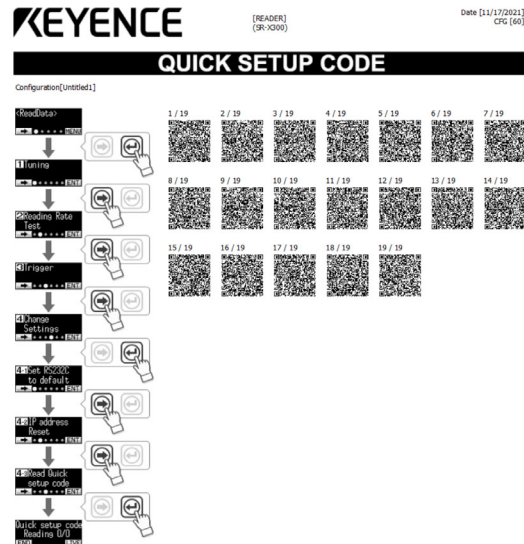


2 If necessary, enter comments.

Remarks	This comment will be added to the quick setup code printout.
---------	--

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 "9-2 Restoring Settings" (Page 52).
- "Quick setup code" does not include preset data.
- "Quick setup code" does not include script files.
- "Quick setup code" does not include command replacement file.
- When the SR-X Series firmware version is updated, the quick setup codes created before the update cannot be used.

6

AutoID Network Navigator (Practical Information)

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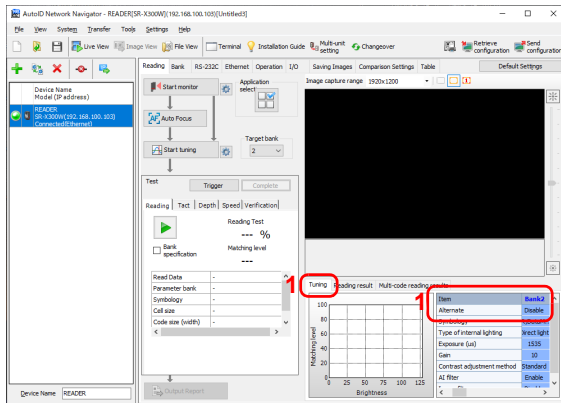
6-1 Add Banks

Add Banks

The addition of banks allows for settings of multiple read conditions. This makes it possible to read codes which cannot be read with a single read condition.

- 1 Click [Tuning] and select a bank in which [Alternate] is set to [Disable].

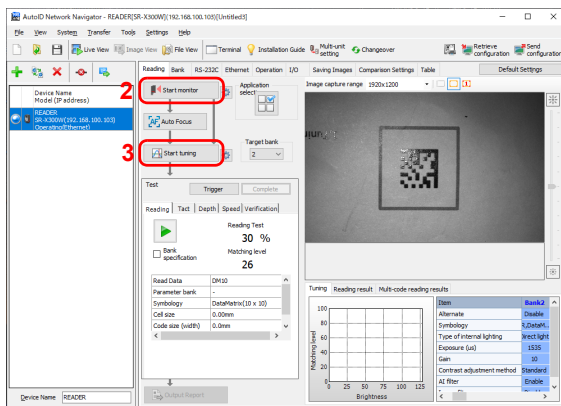
When a bank is selected, [Target bank] will be changed at the same time.



- 2 Click [Start monitor].

- 3 Click [Start tuning].

Addition of the bank is complete when the tuning completion message is displayed.



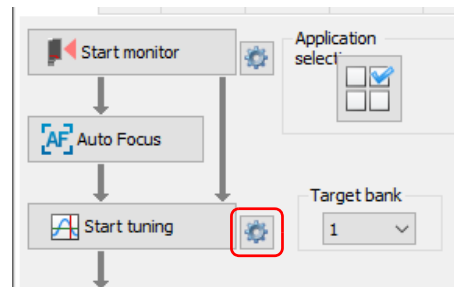
Point For details on the tuning, alternate, and bank, refer to the following page.
 □ "10-4 Read Behavior" (Page 63)

6-2 When you want to improve the reading capacity (AI filter) (SR-X300/X300W only)

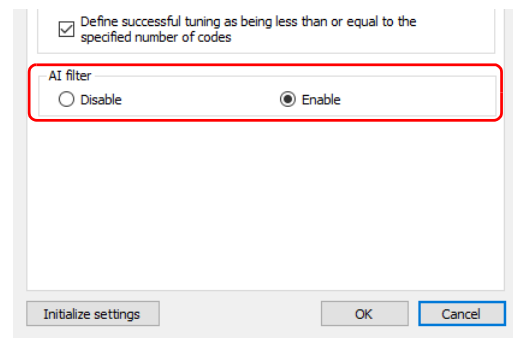
AI filter is a function that the SR-X300/X300W uses to read 2D code (QR, DataMatrix). It can improve the ability to adapt to changes in code quality.

Reading with AI Filter

- 1 Click [AI].



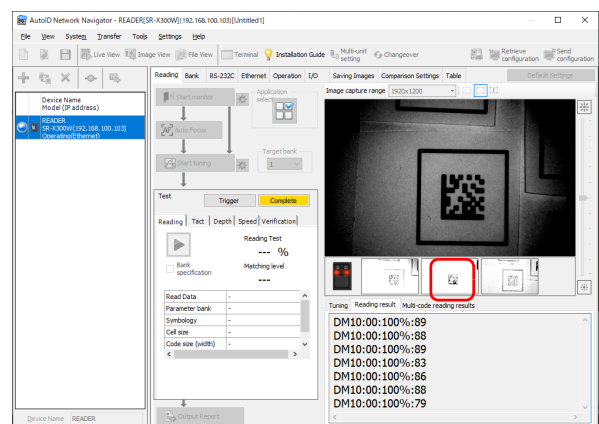
- 2 Set the AI filter to [Enable].



- 3 Click [Start tuning].

- 4 Click [Trigger] to read the code.

If an AI filter is used, the display is as shown below.



Reference The decode time is longer when the "AI filter" is enabled. Complete tuning after enabling the function or set the decode timeout to the value that is required for reading.
 Use the Tact test mode to confirm there are no problems with the read time for operation.

6-3

Increase reading capacity further (X-Link decoding) (SR-X300/X300W only)

X-Link decoding is a function that the SR-X300/X300W uses to read 2D codes (QR, DataMatrix). Code pattern information from another SR-X series in the same network is used if the code is corrupted beyond the error correction capability for the code.

Important

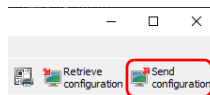
- The SR-X Series using the X-Link decoding function and the referenced SR-X Series must have the same firmware version.
- The code version and the matching count supported by the X-Link decoding function vary depending on the SR-X Series firmware version.

SR-X Series firmware	
Earlier than 1.35	1.35 or later

Supported codes and versions

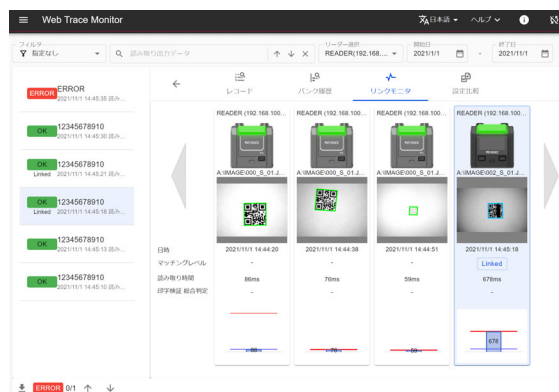
DataMatrix (square)	10 to 80	14 to 26
DataMatrix (rectangle)	All	12x26, 12x36, 16x36, 16x48
Micro QR code	All	(Not supported)
QR code (model 1)	All	(Not supported)
QR code (model 2)	21 to 77	21(M) to 29
Matching count	Up to 100	Up to 10,000

4 Click [Send Configuration].



5 Trigger SR-X series.

If X-Link decoding is used, the display in the link monitor screen of the Web Traceability Tool will be as shown below.



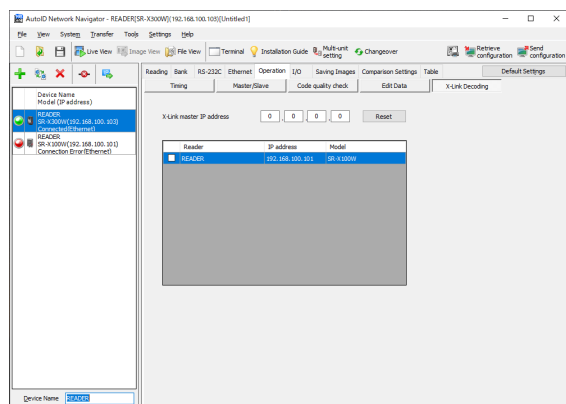
Reading using X-Link Decoding

1 Register the SR-X series.

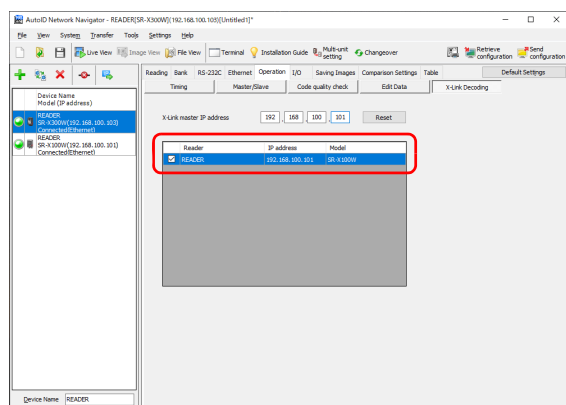
Refer to the following for details on how to register.

☞ "5-1 Connecting" (Page 18)

2 Select [X-Link Decoding] from the [Operation Mode] tab.



3 Select a reader to link.

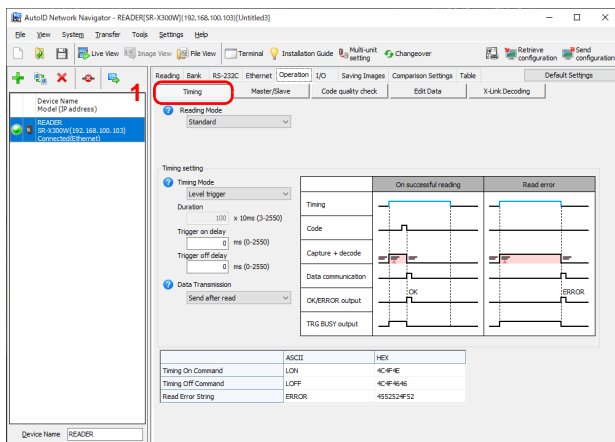


Reference

To link a reader that is not shown in the list of readers, you can also enter the IP address directly in [X-Link master IP address].

6-4 Change Reading Behavior

- 1 Click [Timing].
- 2 Select an item to change.
- 3 Click [Send Configuration].



Reading Mode

Change the reading behavior for a single trigger input.

Standard	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. * You cannot specify any bank. Multiple code settings do not apply to the operation.
Burst read	In this mode, a single code is read by scanning multiple times while the trigger input is on.
Script	In this mode, reading continues according to the script contents while the trigger input is on.

Duplicate Reading Prevention Interval

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 until the specified length of time passes.
---------------------------------------	---

Details on the reading behavior: "10-4 Read Behavior" (Page 63)

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 reading is performed. 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. Reading is attempted during this time. When a code is read, the LED turns off and the data is transmitted.

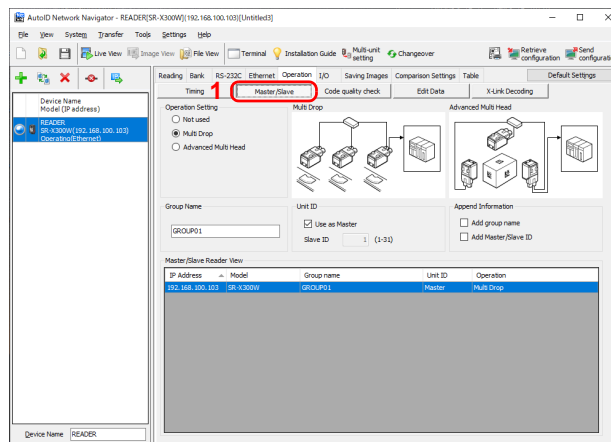
Data Transmission

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.

6-5 Control Multiple Readers

- 1 Click [Master/Slave].
- 2 Select an item to change.
- 3 Click [Send Configuration].



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.
Advanced Multi Head	Usable with the SR-X/SR-5000/SR-2000 Series devices only. This Multi-head mode is capable of reading multiple codes and editing read data scripts for slave units.

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

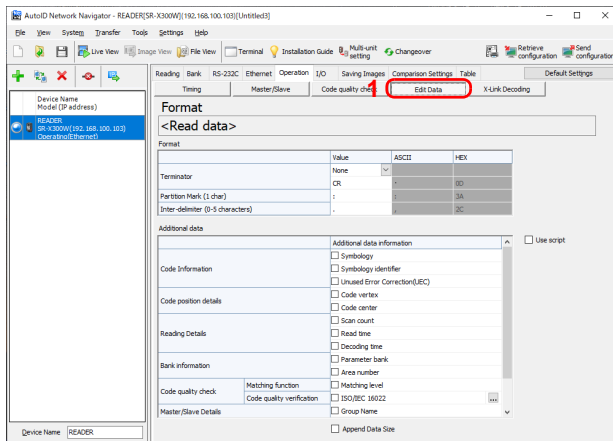
- Specify a unique ID for each slave.
• The ID of the master is 0.

For details on the master/slave function, refer to "10-8 Master/Slave Function" (Page 79).

6-6

Edit Read Data

- 1 Click [Edit Data].
- 2 Select an item to change.
- 3 Click [Send Configuration].



Partition mark [1 character]	The character that is used to delimit the blocks of data when data is appended Default value: " "
Inter-delimiter [0 to 5 characters]	The character that is used to delimit the blocks of data when multiple codes are read Default value: " "

- Reference**
- Limiting the number of read data output digits
Enable [Output Length Limitation] under [Code] in 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



Number of digits output: 5

Additional data

You can append the following items to read data.

Code type	The read code type
Symbol ID	The AIM symbol identifier
Unused Error Correction (UEC)	The unused error correction ratio ^{*1}
Code vertex	The coordinates of the vertex of the read code
Code center	The coordinates of the center of the read code
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
Decoding time	The length of time required for decoding within the read time
Bank number	The number of the parameter bank that was used when reading succeeded
Region number	Region number corresponding to the read data
Group Name	This is the master/slave group name.
Master/Slave ID	This is the master/slave unit ID.
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} The PC time is reflected in the SR-X Series at the time of sending the configuration.

Using Scripts

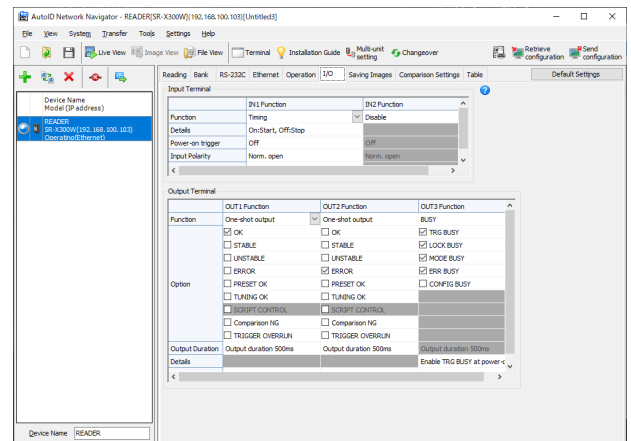
With the SR-X Series, you can edit the read data to output in the desired format by programming scripts.

Reference For details on scripts, refer to "10-10 Scripts" (Page 83).

6-7

Control the I/O Terminals

- 1 Select an item to change.
- 2 Click [Send Configuration].



Input Terminals (IN Terminals) IN1 to IN2

Function

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

Disable	This terminal's function will be disabled.
Timing	Reading start/end will be controlled by turning the signals ON/OFF.
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-X.
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}
Command replacement	Operates in accordance with the configuration of the command replacement function.
Data output	Outputs the read data when the timing signal rises.

^{*1} The trigger signal must be applied continuously until the operation is finished.

Detailed Settings

Detailed settings are available for some terminal functions.

Reference "10-3 List of AutoID Network Navigator Settings" (Page 60)

Power-on Trigger

When this setting is ON, the IN terminal signal will be turned on once at power-on of the SR-X Series.

You can use this setting when "Input Polarity" is set to "Norm. closed" to keep the signal turned on continuously when the SR-X Series turns on.

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.

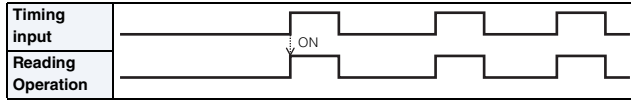
Required Input Duration

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

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

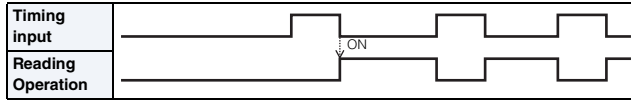
◆ Norm. open (normally open)

- Normal

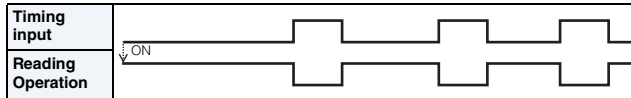


◆ Norm. closed (normally closed)

- Normal



- Power-on trigger setting



Point

- 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 to OUT3

Function/Option

The signals turn on under the following conditions.

[Function]	[Option]	Criteria
Disable	-	-
One-shot output	OK	Reading success
	STABLE	At threshold or higher ^{*1}
	UNSTABLE	Below threshold ^{*1}
	ERROR	Reading error
	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
BUSY	NG (Comparison NG)	NG Comparison in preset comparison
	TRIGGER OVERRUN	When a trigger cannot be received
	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	While quick setup codes are being read, during test mode, while saving to ROM, during the timing automatic adjustment
READY	ERR BUSY	Error occurrence (buffer full or reader error)
	CONFIG BUSY	AutoID Network Navigator control
	READY	Provides notification that timing input is allowed
External lighting	EXT.LIGHT	When reading data with the SR-X series ^{*3}
Heartbeat	HEARTBEAT	Specified period Used for life-and-death monitoring of a code reader.

^{*1} Used for threshold of "Matching level" or "Code quality verification function"

^{*2} While this signal is on, the next reading operation will not be accepted. 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} Used to synchronize with external lighting. Only OUT3 is assigned.

Output Duration

Set the duration for which output will be generated from the OUT terminal.
Default value: 500 ms

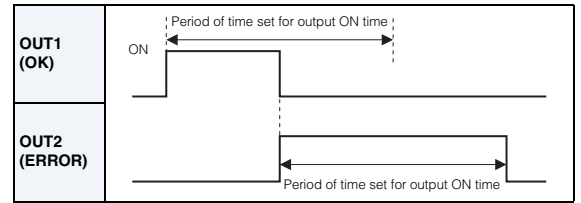
Detailed Settings

Detailed settings are available for some terminal functions.

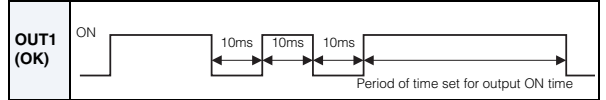
Reference: "10-3 List of AutoID Network Navigator Settings" (Page 60)

Point

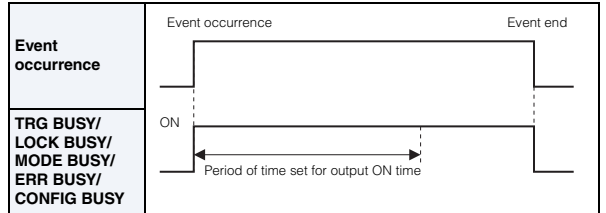
- If a subsequent output instance occurs during the output duration, this output will be given priority.



- 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.



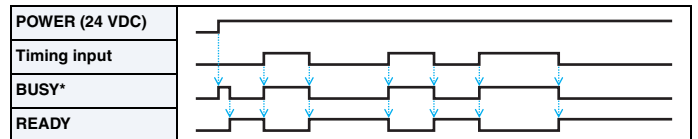
- The BUSY signal (TRG BUSY/LOCK BUSY/ MODE BUSY/ERR BUSY/ CONFIG BUSY) operation is shown below.



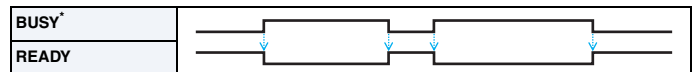
- Regardless of the value set for Output Duration, BUSY signals remain on until the corresponding BUSY operation is finished.
- If multiple BUSY signals are set for a single output terminal, the signal will remain on until all the BUSY operations are finished.

READY signal

The READY signal notifies of the state in which the timing input is possible (state other than BUSY).



* BUSY : TRG BUSY/ LOCK BUSY/ MODE BUSY/ ERR BUSY/ CONFIG BUSY



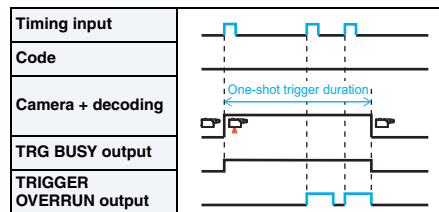
* BUSY : TRG BUSY/ LOCK BUSY/ MODE BUSY/ ERR BUSY/ CONFIG BUSY

TRIGGER OVERRUN signal

This signal notifies of the situation that another trigger is input during TRG BUSY and the trigger cannot be received.

The TRIGGER OVERRUN signal turns off when the output duration passes or the next read result is output.

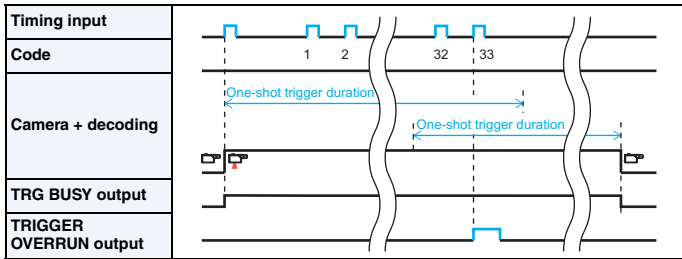
Example) Timing mode: One-shot trigger



TRIGGER OVERRUN signal while trigger buffering is enabled

When trigger buffering is enabled, a maximum of 32 triggers can be received even in the TRG BUSY state.

In this case, TRIGGER OVERRUN occurs when 33 or more triggers are received.



6-8 Save Captured Images

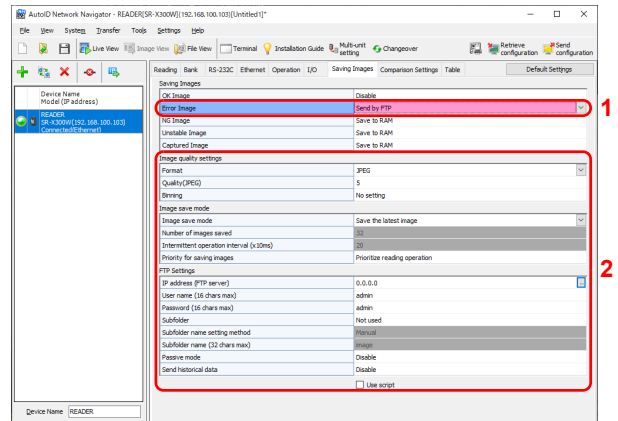
Saving Images in Real Time

Send by FTP

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

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

- 1 Change [Error Image] setting to [Send by FTP].
- 2 Change image quality settings as needed.
- 3 Click [Send Configuration].



Saving Images in SR-X Series

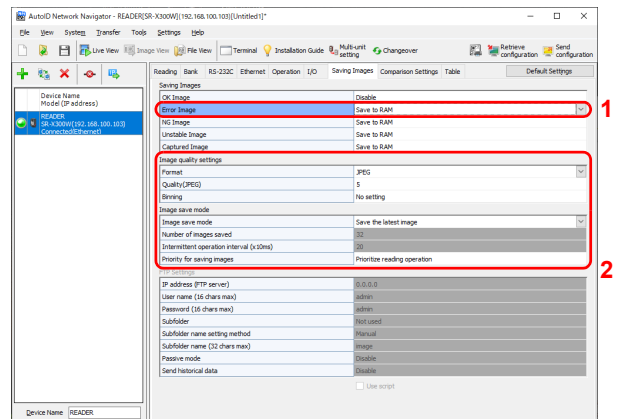
Save to RAM • Save USB • Save to ROM

Images captured by the SR-X Series will be saved in the SR-X series.

* "Save to ROM" is available for SR-X300/X300W only.

Example) Saving images to RAM when a reading error occurs

- 1 Change [Error Image] setting to [Save to RAM].
- 2 Adjust image quality settings as needed.
- 3 Click [Send Configuration].



Reference

When you want to save an image in real time and in the SR-X series, use [Save to ROM + Send by FTP] or [Save to USB + Send by FTP].

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 cut out pixels 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 the latest image	The last image captured during reading will be saved. Normally use this mode.
Save images after timing input on	The specified number of images will be saved counting from the time when the trigger turns on.* ¹
Save images before timing input off	The specified number of images will be saved counting backwards from the time when the trigger turns off.* ¹
Save images after timing input on (intermittent operation)	The specified number of images will be saved counting from the time when the trigger turns on. You can specify the interval for acquiring the targeted images for saving.
Save images before timing input off (intermittent operation)	The specified number of images will be saved counting from the time when the trigger turns off. You can specify the interval for acquiring the targeted images for saving.

*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 reading failed
Timing input		
Code		
OK/ERROR		
Scan bank		

● Save specified number of images after timing ON

- Standard/ Specify capture count

Timing input	
Code	
OK/ERROR	
Scan bank	

After the timing input is turned on, images are saved continuously for the set number of saved images.

- Continuous

Timing input	
Code	
OK/ERROR	
Scan image	

These images are intended images to save as 1 read operation. The images are saved depending on the settings.

The image was scanned while the duplicate reading prevention function was enabled. This image is not saved.

These images are intended images to save as 1 read operation. The images are saved depending on the settings.

● Save specified number of images before timing OFF

- Standard/ Specify capture count

Timing input	
Code	
OK/ERROR	
Scan bank	

The set number of images to save is saved retroactively, starting with the image last scanned after the trigger input was turned off.

- Continuous

Timing input	
Code	
OK/ERROR	
Scan image	

The 1st code

The 2nd code

OK

Reading ERROR

Reading ERROR

Reading success

Reading success (Same code)

Reading success (Same code)

Reading ERROR

Reading ERROR

Reading success

...

These images are intended images to save as 1 read operation. The images are saved depending on the settings.

The image was scanned while the duplicate reading prevention function was enabled. This image is not saved.

These images are intended images to save as 1 read operation. The images are saved depending on the settings.

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

Point

FTP save:

- You can use script programming to change the names of saved image files.
- "10-10 Scripts" (Page 83)

Save to RAM:

- The saved file number is from 000 to 999. The next 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.

Save to USB/Save to ROM:

- A storage folder from "000" to "999" is assigned.
- File no. saved in each folder is from 000 to 099.

Compare the Read Data (Preset Data Comparison)

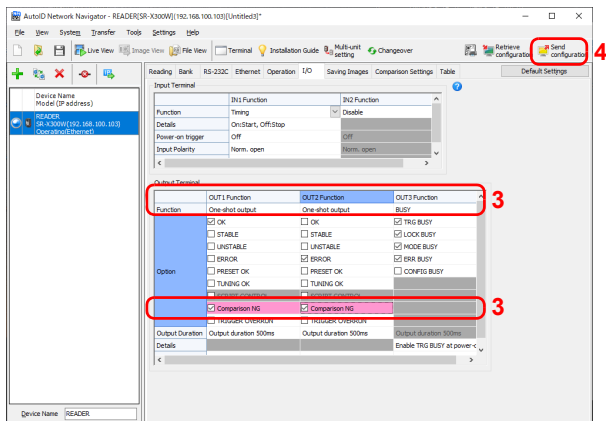
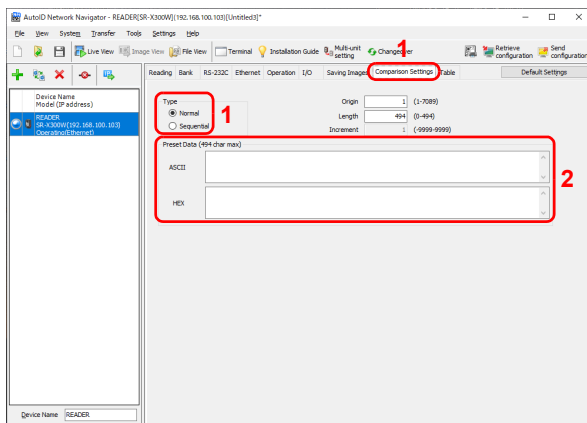
You can compare the read data to give OK and NG outputs. The master data for this comparison is called "preset data."

● Output terminal operation

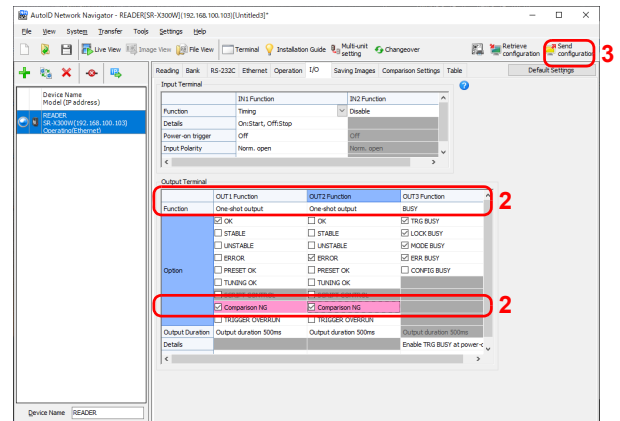
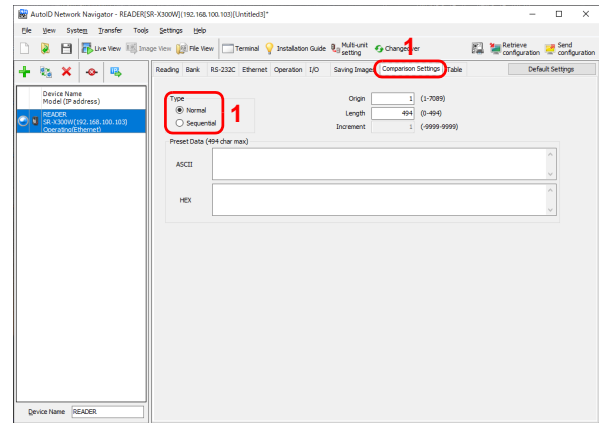
Reading successful and the read data matches the "preset data"	OK
Reading successful and the read data does not match the "preset data"	Comparison NG
Reading error	ERROR

Compare Read and Registered Data

- 1 On the [Comparison Settings] tab, change [Type] to [Normal].
- 2 Under [Preset Data], register the master data against which to compare the read data.
- 3 For any of [OUT1] to [OUT3] in the [I/O] tab, select [One-shot output] for [Function] and then select [Comparison NG] for [Option].
- 4 Click [Send Configuration].
- 5 Exit AutoID Network Navigator.

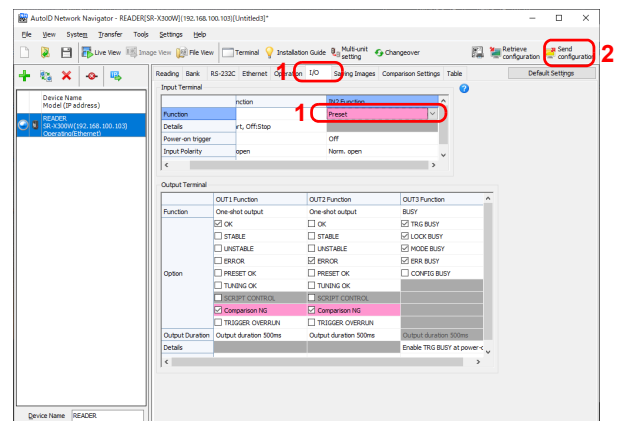


4 Exit AutoID Network Navigator.



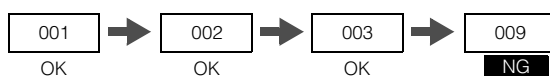
Read a Code to Register Comparison Data (Preset Data)

- 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.



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 [Comparison Settings] tab, change [Type] to [Sequential].
- 2 For any of [OUT1] to [OUT3] in the [I/O] tab, select [One-shot output] for [Function] and then select [Comparison NG] for [Option].
- 3 Click [Send Configuration].

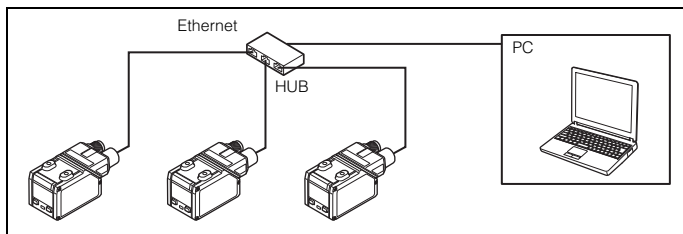
Reference

- Details on the preset data comparison:
 - "10-9 Preset Data Comparison" (Page 82)
- You can also use commands to register the preset data.
 - "14-2 Reading and Tuning Commands" (Page 99)

6-10 Allocate IP Addresses to Multiple Devices

Multiple units of the SR-X Series device can be connected to an Ethernet hub in their default state. IP addresses can be configured as a batch process.

Device Configuration

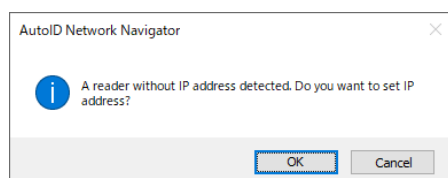


Configuration Procedure

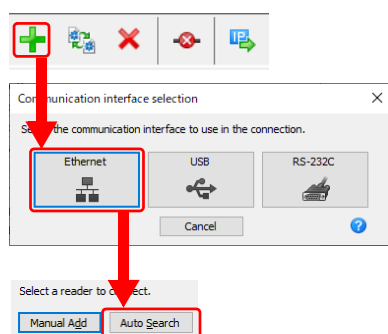
1 As illustrated in the device configuration figure, connect the SR-X Series devices to a PC.

2 Start AutoID Network Navigator.

The following message appears. Click [Yes].

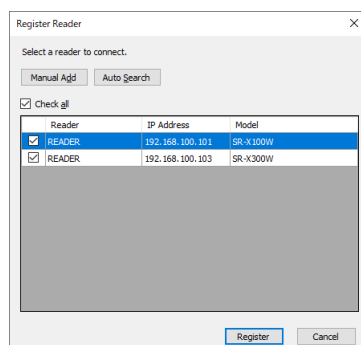


* If a USB device is detected first, click [+ (plus button)] - [Ethernet] - [Auto Search].

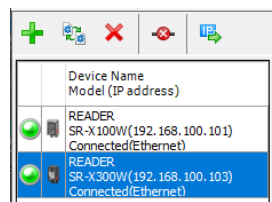


3 The following message appears. Click [OK].

Click [Edit] to change an IP address.



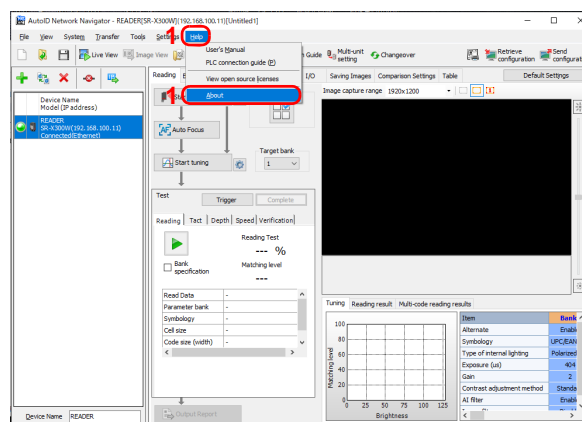
The IP address allocation is complete once the following screen appears.



6-11 Check Version

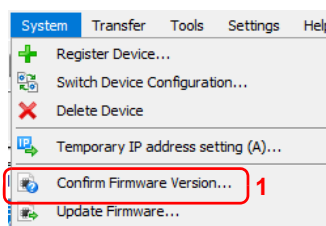
Check the AutoID Network Navigator Version

1 Click [Help (H)] - [About] on the menu bar.



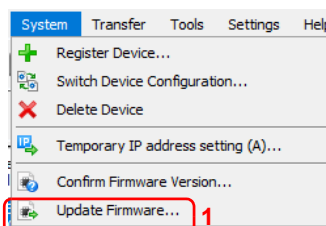
Check the SR-X Version

1 Click [System (M)] - [Confirm Firmware Version (V)] on the menu bar.

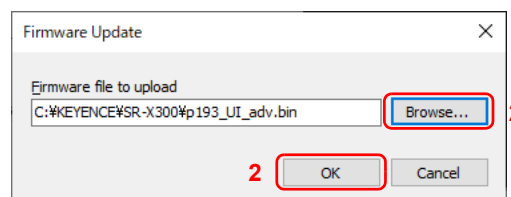


Update the Firmware

1 Click [System (M)] - [Update Firmware (U)] on the menu bar.



2 Click [Browse], select the firmware file, and then click [OK].



3 Select the target reader for the firmware update and then click [OK].

Update Target Selection

Select readers to update.

☒ Check all

Reader	IP Address	Model	File Version	Reader Version
<input checked="" type="checkbox"/> READER	192.168.100.104	SR-X300	1.00/*****	1.00/7.200

3

3

OK

Cancel

Important

- Do not turn off the power of the reader while the firmware is being updated. Ignoring this may cause a failure.
- Do not update the firmware with the combination of new firmware and old AutoID Network Navigator. An E2 error will occur. Be sure to prepare the new AutoID Network Navigator to update the firmware.

6-12

Identify the reader

Reading

Bank

RS-232C

Ethernet

Operation

I/O

Saving Images

Comparison Settings

Table

There are 2 settings for reader identification.

- Reader
- Reader explanation

Reading

Bank

RS-232C

Ethernet

Operation

I/O

Saving Images

Comparison Settings

Table

Search settings

☒ Open all

Item	Value
<input checked="" type="checkbox"/> Master/Slave	
<input checked="" type="checkbox"/> Code quality check	
<input checked="" type="checkbox"/> Comparison	
<input checked="" type="checkbox"/> I/O	
<input checked="" type="checkbox"/> Saving Images	
<input checked="" type="checkbox"/> SR Web Tool	
<input checked="" type="checkbox"/> System	
Presentation mode	Disable
Silent Mode	-
<input checked="" type="checkbox"/> Reader	READER
Reader explanation 1	
Reader explanation 2	
Reader explanation 3	
Reader explanation 4	
<input checked="" type="checkbox"/> Device operation	
ENTER button	Unlock
Printer lighting	Auto lighting
Rotate display image	Do not rotate
Display LED lighting	Enable
Output data with ENTER button	Enable
Write BLOAD to ROM	Disable
<input checked="" type="checkbox"/> SNTP	

● Reader name

Used as the configuration file name of AutoID Network Navigator.

Device Name

Model (IP address)

READER

SR-X300W(192.168.100.11)

Connected(Ethernet)

● Reader description

Used for the following.

- Identifying the reader with the setting command response
- Appending the reader description with scripts
- Identifying the reader with the SR Web Tool.

7

Setting Example

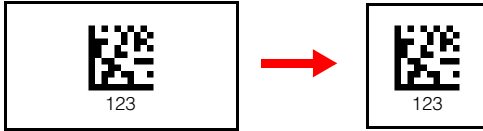
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7-1 Change Field of View

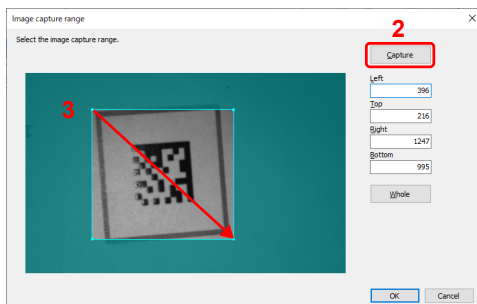
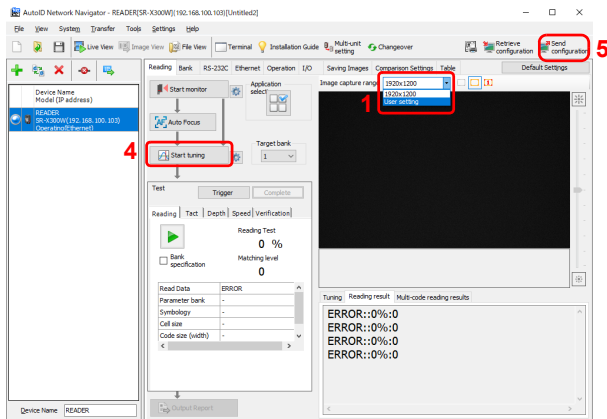
Image capture range of the SR-X Series

	SR-X300/X300W	SR-X100/X100W
Default value	1920×1200	1360×1024
Minimum value	96×96	
Maximum value	1920×1200	1360×1024

Limiting the Field of View



- 1 Change [Image capture range] to "User setting."
- 2 The image capture range window will be displayed. Click [Capture].
- 3 Use the mouse to limit the image capture range by dragging it, and then click [OK].
- 4 Click [Start tuning].
- 5 Click [Send Configuration].



- 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.

7-2 Read Multiple Codes

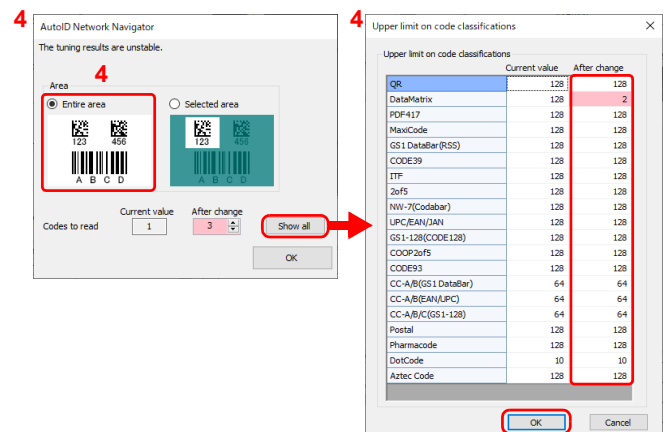
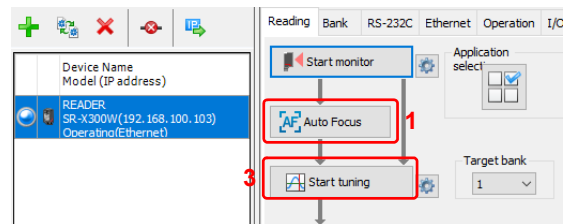
Reading Multiple Codes with One Bank

- 1 Click [Auto Focus].
- 2 Drag the mouse to draw a region for each code.
- 3 Click [Start tuning].
- 4 The following message appears once the tuning process is completed.

Select [Entire area] to read the codes in the entire image region.

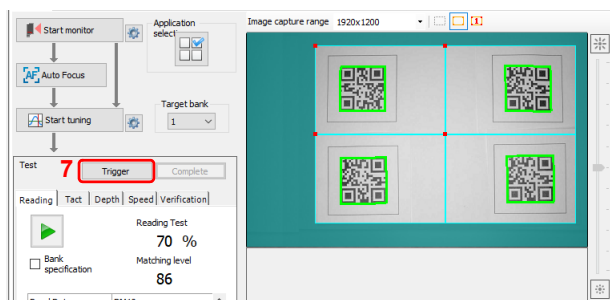
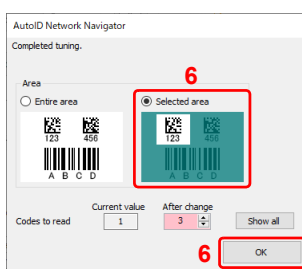
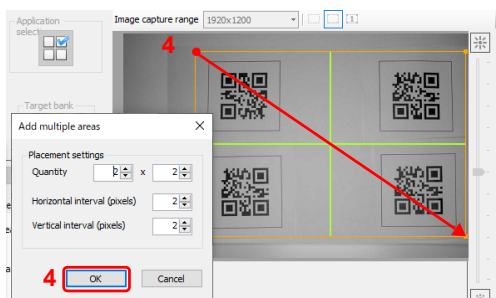
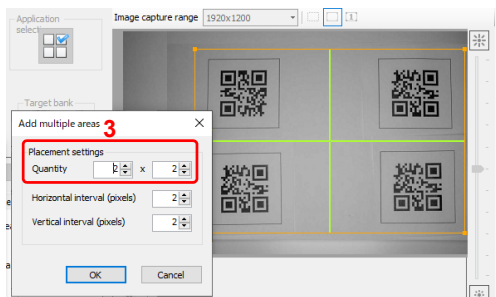
Click [Detailed Display] to display the maximum number of reads for each code. Change the values in the right-most column and click OK to change the maximum number.

- 5 Click [Send Configuration].



Reading Multiple Codes in a Grid with One Bank

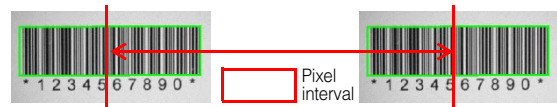
- 1 Click [Auto Focus].
- 2 Right-click the on-screen image and click [Add multiple areas].
- 3 Enter a value into [Quantity] under [Placement settings].
- 4 Drag the mouse to adjust the region so that all codes are included. After that, click [OK].
- 5 Click [Start tuning].
- 6 Select [Selected area] and then click [OK].
- 7 Click [Trigger] and check reading.



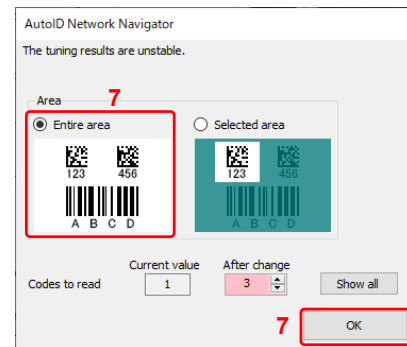
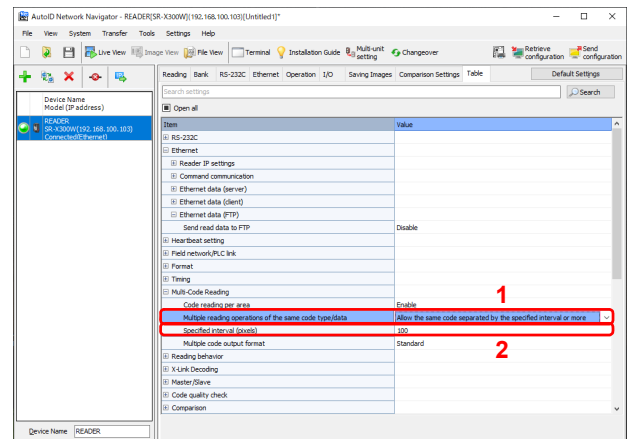
Read Codes of the Same Type/Data

There are following two ways to read codes of the same type/data.

(1) Distinguish by coordinate



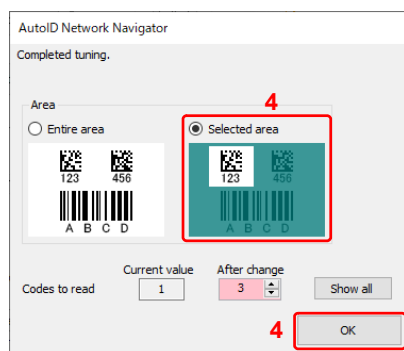
- 1 Select the [Table] tab - [Multiple reading operations of the same code type/data] and then select [Allow the same code separated by the specified interval or more].
- 2 Enter a minimum pixel value indicating the distance between codes to allow reading in [Specified interval (pixels)].
- 3 Click [Send Configuration].
- 4 Click the [Reading] tab - [Auto Focus].
- 5 Drag the mouse to draw a region for each code.
- 6 Click [Start tuning].
- 7 Select [Entire area] and then click [OK].
- 8 Click [Trigger] and check reading.



(2) Distinguish by decoding region



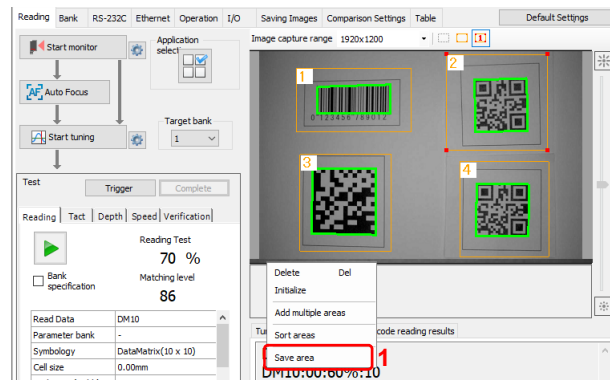
- 1 Click [Auto Focus].
- 2 Drag the mouse to draw a region for each code.
- 3 Click [Start tuning].
- 4 Select [Selected area] and then click [OK].
- 5 Click [Trigger] and check reading.



Changing the Sort Order of Region Numbers

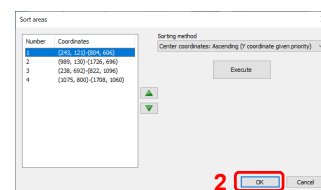
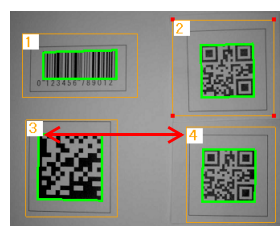
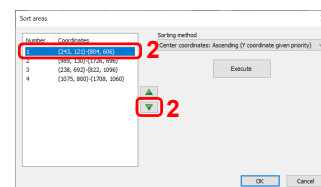
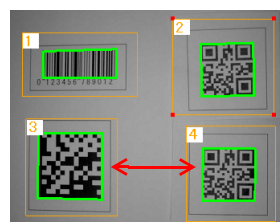
- 1 Right-click the on-screen image. Click [Sort areas]. Sort areas using method 2-1 or 2-2 below.

* Execute this operation when the test mode or trigger is not active.



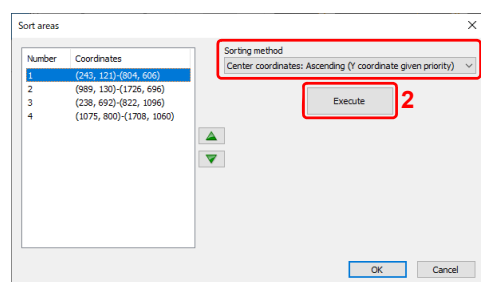
- 2-1 Click the desired region number. Click [△] or [▽] to move to the desired number. Click [OK].

For example, to change from number 3 to number 4, click [3] and then [▽].

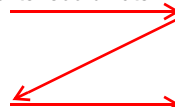


- 2-2 Select the sort method and click [Execute] to change the sort order.

* Use the center coordinate for sorting. You can do this easier by using the procedure described in "Reading Multiple Codes in a Grid with One Bank" (Page 37) together.



■ Ascending order using Y center coordinate



■ Descending order using Y center coordinate



■ Ascending order using X center coordinate



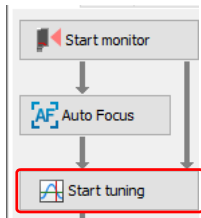
■ Descending order using X center coordinate



7-3

Change Sort Order of Multiple Codes

- 1 Click [Auto Focus].
- 2 Draw a region around each code.
- 3 Click [Start tuning].

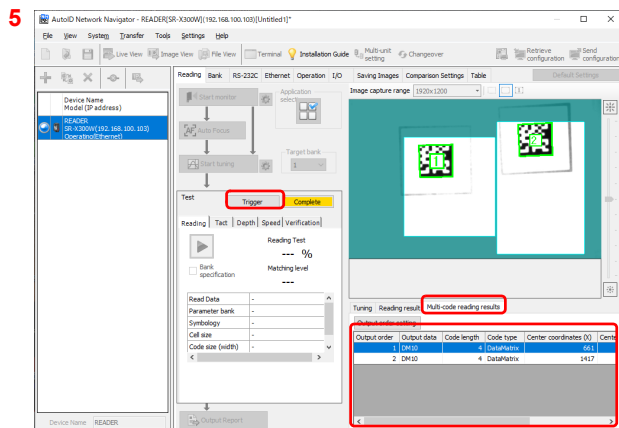
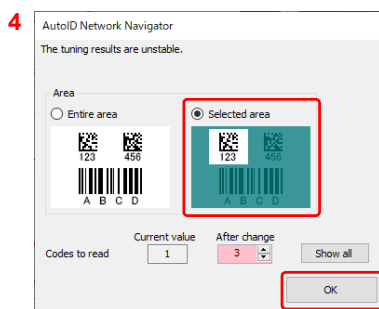
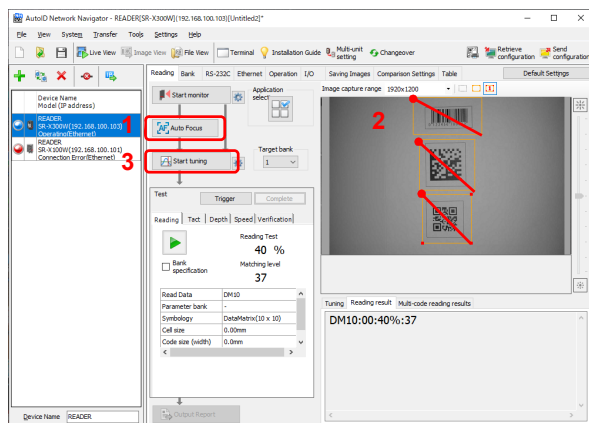


- 4 The following message appears once the tuning process is completed.

Select [Selected area] and then click [OK].

- 5 Select [Multi-code reading results] and click [Trigger].

Reading data is displayed in the bottom right.



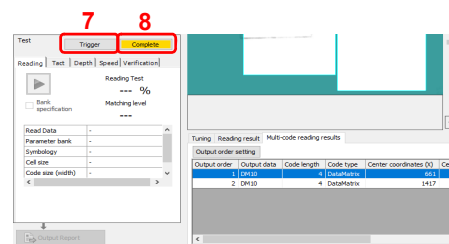
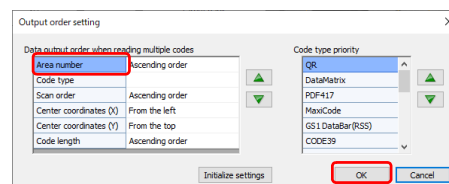
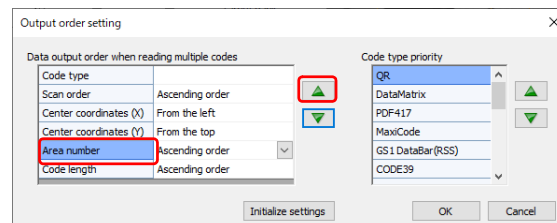
- 6 Click [Output order setting].

When you want to output data in order of area, click [Area number] -> [△] several times to move [Area number] to the top.

- 7 Click [Trigger] to confirm that the sequence has changed.


- 8 Click [Complete].

Output order	Output data	Code length	Code type	Center coordinates (X)	Center coordinates (Y)
1	DM10	4	DataMatrix	661	661
2	DM10	4	DataMatrix	1417	1417



7-4

Determine the Success/ERROR of Reading for Each Area

- 1 Enable multiple code reading according to the 7-2 procedure.
- 2 Click .
- 3 Go to the [Table] tab and set [Multi-Code Reading] - [Multiple code output format] to [Per area].
- 4 Click [Send Configuration].

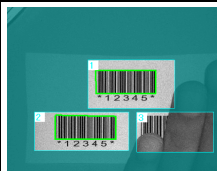


Reading	Bank	RS-232C	Ethernet	Operation	I/O	Saving Images	Comparison Settings	Table
Search settings								
<input checked="" type="checkbox"/> Open all								
Item	Value							
<input checked="" type="checkbox"/> RS-232C								
<input checked="" type="checkbox"/> Ethernet								
<input checked="" type="checkbox"/> Heartbeat setting								
<input checked="" type="checkbox"/> Field network/PLC link								
<input checked="" type="checkbox"/> Format								
<input checked="" type="checkbox"/> Timing								
<input checked="" type="checkbox"/> Multi-Code Reading								
Code reading per area	Enable							
Multiple reading operations of the same code type/data	Disable							
Multiple code output format	Per area							
<input checked="" type="checkbox"/> Reading behavior								

Output result



12345,ERROR,12345[CR]



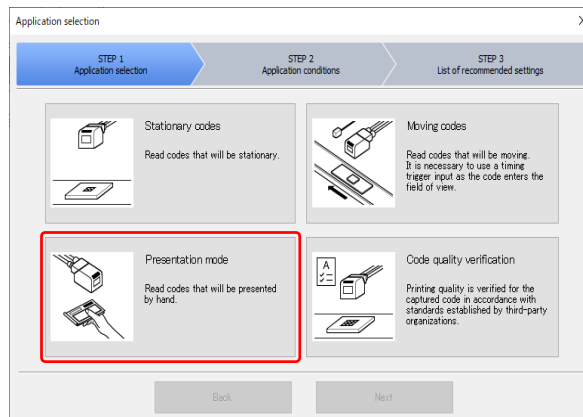
12345,12345,ERROR[CR]

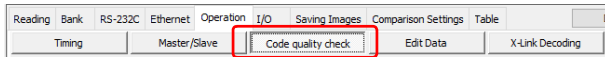
7-5

Read Codes in Presentation Mode (Hands-free)

Enabling Presentation Reading

- 1 Click [Presentation Mode] from [Application Selection].
Refer to "5-2 Application Selection" (Page 19) for details.





Matching Level

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



98



74

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>

Reference For details on the matching level, refer to "10-7 Matching level" (Page 78)

Code Quality Verification

The code quality verification function verifies the 2D code scanned with the SR-X 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)
- ISO/IEC 29158:2020
- ISO/IEC 15416
- SAE AS9132
- SEMI T10-0701
- ISO/IEC 16022

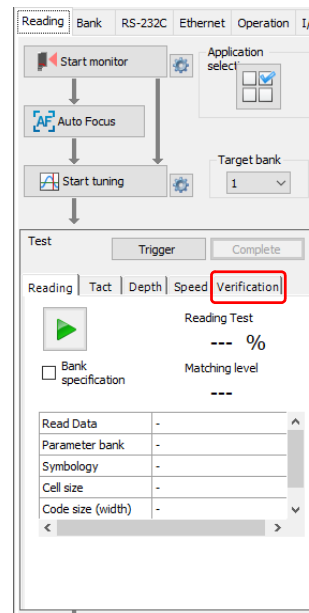
Verification threshold	Set the threshold for the verification result. The UNSTABLE signal can be output from the OUT terminal when the reading results are below the threshold.
Append grade	The verification grade will be appended to the read data. Example) <Read data>:<verification grade>
Select expression 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.

Important 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-X Series. This function cannot be used as an official 2D code verification device.

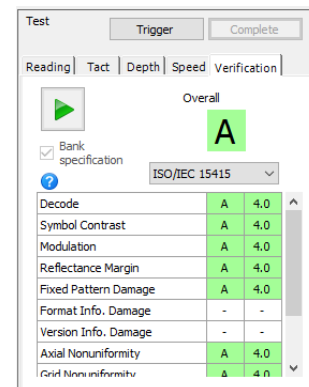
Reference For details on the code quality verification function, refer to "10-6 Code Quality Verification" (Page 67)

Code Quality Verification Measurement Test Mode

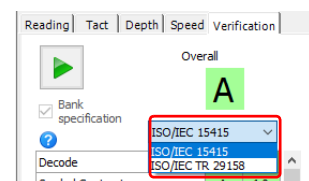
- 1 Select the applicable bank for which the tuning has completed.
- 2 Click [Verification].



- 3 Click . Once reading is performed, the following display will appear if the code quality verification is successful.



- 4 The verification result display for a DataMatrix code and QR code can be switched to that of a code quality verification standard selected from the following list.



Point To perform a more accurate code quality verification measurement test, use a bank for which tuning has been performed with the code quality verification function enabled.

- Important**
- The code quality verification measurement test mode supports the following standards.
ISO/IEC 15415, ISO/IEC TR 29158(AIM DPM-1-2006), ISO/IEC 29158:2020, ISO/IEC 15416
Code verification of ethical drugs in Japan
 - Code quality verification results vary depending on the settings for the selected bank, installation condition of the SR-X Series, etc.

7-7 Suppress Data Output

Silent Mode

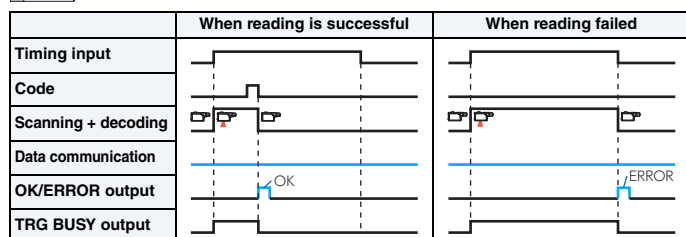
By using "silent mode," you can suppress the output of read data in the following situations.

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.

Comparison OK, reading success
Reading error
Stable reading
Unstable reading
Preset result
Test mode
Tuning
Comparison NG

- 1 On the [Table] 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.

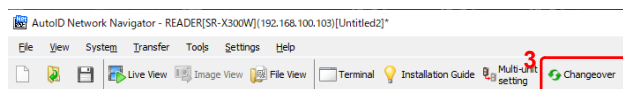
Reference Timing diagram



7-8 Changeover

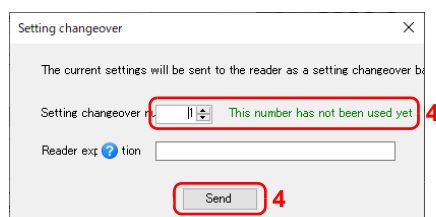
Creating Changeover Backup Files

- 1 After completing tuning, check the communication settings and any other settings to be registered in the first file.
- 2 Click [Send Configuration].
- 3 Click [Changeover].

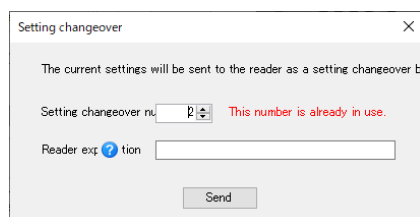


- 4 Select an unused number from the setting changeover numbers and click [Send].

The first file is created at this point.



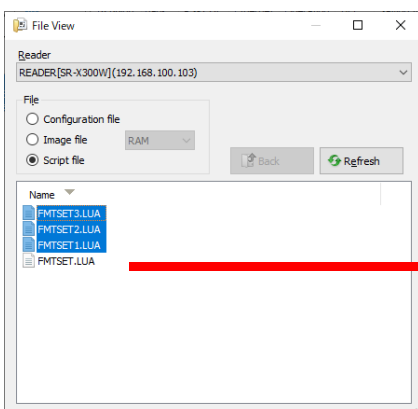
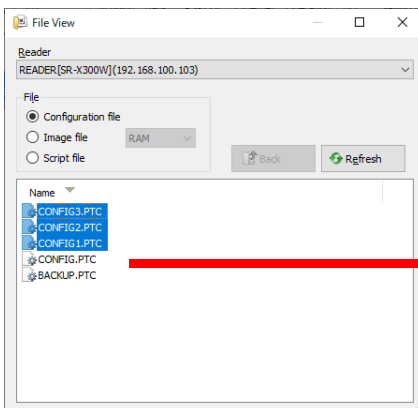
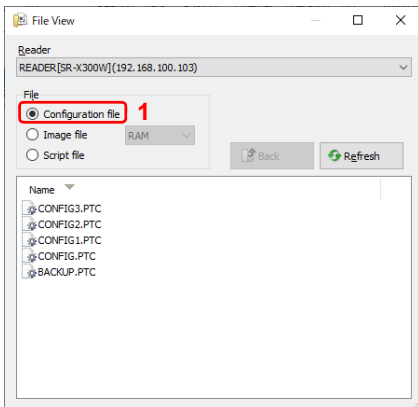
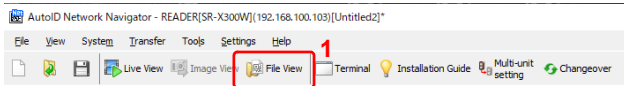
If the selected setup change number is already in use, the following message will be displayed.



- 5 After completing tuning, check the communication settings and any other settings to be registered in the second file.
Change only the parameters necessary from the first file.
* To change only the bank, select only the [Bank Settings] check box under [Reset settings to defaults] and then click [Yes].
- 6 Click [Send Configuration].
- 7 Select an unused number from the setting changeover numbers and click [Send].
The second file is created at this point.
- 8 Repeat the steps 5 to 7.
Up to 256 files can be created.

Saving Changeover Backup Files

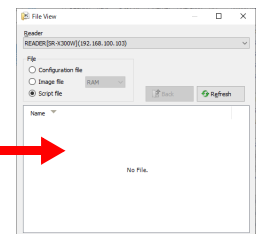
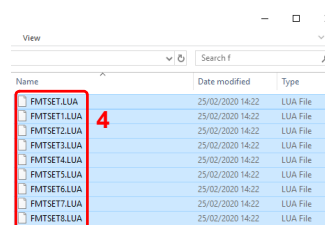
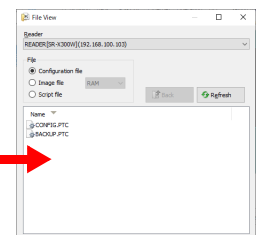
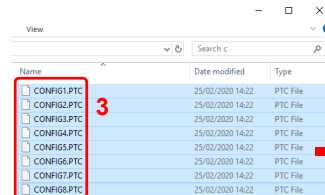
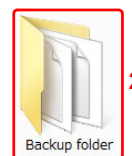
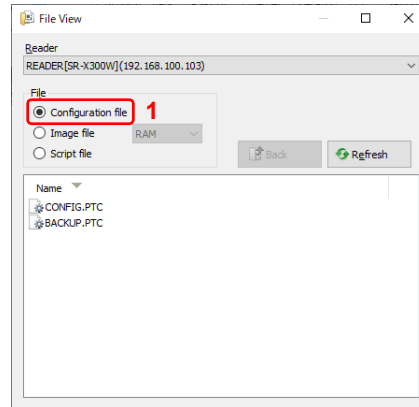
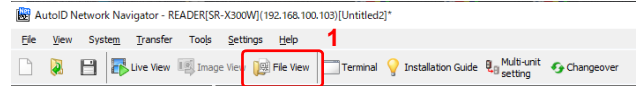
- 1 Open [File View] and then [Configuration file].
- 2 Create a folder to store the files on the PC.
- 3 Select [CONFIG1.PTC] through [CONFIG256.PTC] under [File View] - [Configuration file].
Drag and drop the files to the created folder.
- 4 For scripts, select [FMTSET1.LUA] through [FMTSET256.LUA] under [Script file] in the [File View].
Drag and drop the files to the created folder.



Do not change the names of saved files. Manage files through different folders.

Uploading Changeover Backup Files

- 1 Open [File View] and then [Configuration file].
- 2 Open the folder on the PC where the files are stored.
- 3 Select [CONFIG1.PTC] through [CONFIG256.PTC] in the folder.
Drag and drop files to the File View.
- 4 Script files can also be uploaded.
Select [FMTSET1.LUA] to [FMTSET256.LUA] in the folder.
Drag and drop files to File View.

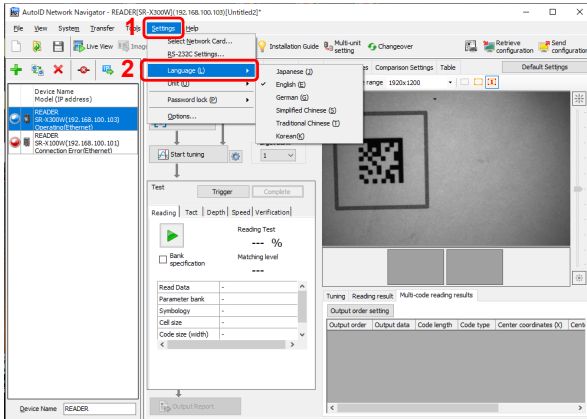


7-9

Change Language or Units Displayed by AutoID Network Navigator

Changing the Display Language

- 1 Click [Settings (S)] - [Language (L)] on the menu bar.
- 2 Select a language.
- 3 Restart AutoID Network Navigator.



7-10

Lock SR-X Series Buttons

By locking the [ENTER] button ([TRG] button in the SR-X100/X100W) of the SR-X300/X300W series main unit, you can limit the operation of the main unit.

- 1 Set the [Table] - [System] - [Device operation] - [ENTER button] to [Lock].
- 2 Click [Send Configuration].
- 3 Exit AutoID Network Navigator.

When you specify this setting as shown above, the following image will be shown on the SR-X Series display, and the [ENTER] button (or [TRG] button) will be locked.



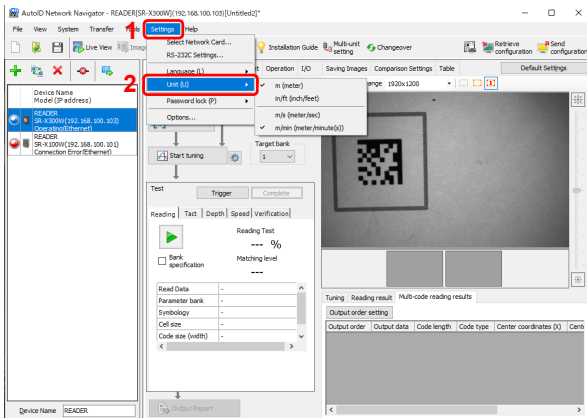
Point

To unlock the button on the SR-X300/X300W Series directly, hold down the [ENTER] button and the [SELECT] button for at least 4 seconds. Hold down the [ENTER] button and the [SELECT] button for at least 4 seconds again to lock the [ENTER] button.

Changing the Units for Length/Speed

- 1 Click [Settings (S)] - [Unit (U)] on the menu bar.
- 2 Select a unit.

The displayed units will be changed.

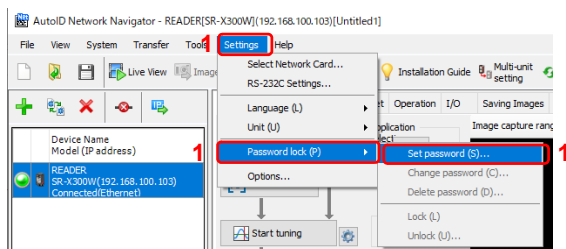


7-11 Password Lock

To prevent users other than Administrator from changing the settings of the SR-X Series, a password can be used to restrict the functions.

Setting Password Lock

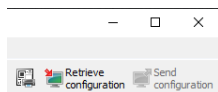
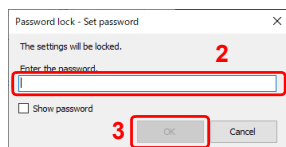
- 1 Click [Settings (S)] - [Password lock (P)] - [Set password (S)] on the menu bar.



- 2 Enter a password.

- 3 Click [OK].

[Send Configuration] will be grayed out and disabled.



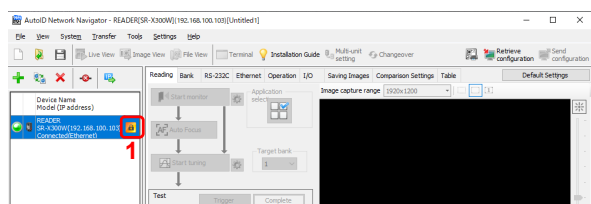
Releasing Lock Temporarily

- 1 Click [] beside the icon of the device to release the lock.

- 2 Enter a password and click [OK].

The symbol beside the device icon will change to [], and [Send Configuration] will be enabled.

Point Restarting the AutoID Network Navigator returns to the state where password lock is enabled.



Releasing Password Lock Completely

- 1 Click [Setting (S)] - [Password lock (P)] - [Delete password (D)] on the menu bar.

- 2 Enter a password and click [OK].

- 3 Click [Yes(Y)].

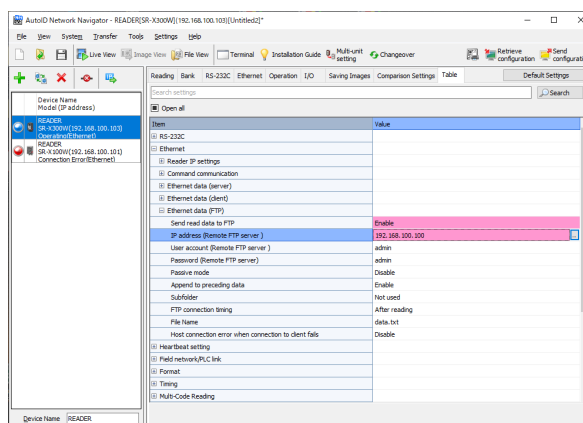
The password lock will be released completely.

7-12 Save Read Data in 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, open [Ethernet] - [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].
- 4 Click [Send Configuration].
- 5 Exit AutoID Network Navigator.

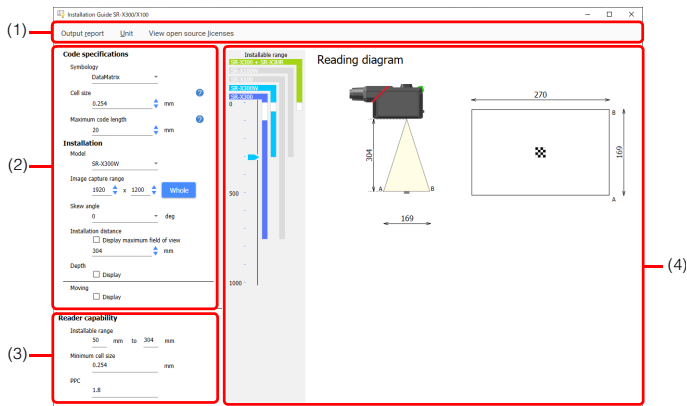
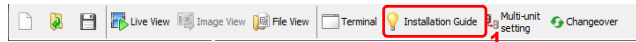


7-13 Check Field of View by Mounting Distance (Installation Guide)

1 Click [Installation Guide].

2 Enter parameters.

The [Installable range] display will be updated.



(1)	Menu bar	Used to output a report or change the unit.
(2)	Conditions	Input the symbol, mounting, speed and other conditions.
(3)	Calculation results	The calculation results under the entered conditions are displayed.
(4)	Field of view/depth/distance display	The field of view, depth, and distance under the entered conditions are displayed.

Report Output

1 Click [Output report] on the menu bar.

2 Select the save location.

7-14 Read Barcodes in Specific Orientations

Ex.: Configure the software to read barcodes only when in a vertical orientation.

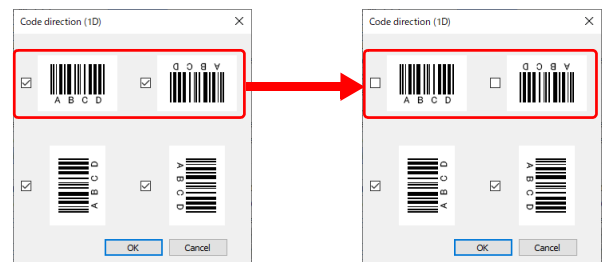
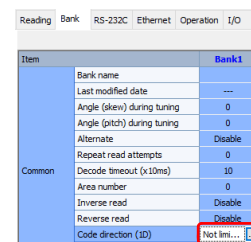


1 Click [Bank] - [Common] - [Code direction (1D)] for target bank.

Deselect the horizontal barcode check box.

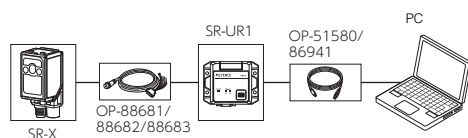
2 Click [Send Configuration].

- Point**
- When 1 to 3 boxes are checked among 4 boxes, reading is performed at $\pm 45^\circ$ from the setting direction.
 - When all 4 boxes are checked, reading is performed at 360° .



7-15 Output Read Data to Excel (SR-UR1)

Connecting the SR-UR1 to the SR-X Series



Configuration Procedure

SR-X Series settings

The RS-232C communication settings are enabled on the SR-X Series by factory default.

There is no need to change the factory default communication settings.

SR-UR1 settings

1 Connect the SR-UR1 to the PC with the USB cable (OP-51580/86941).

2 Start AutoID Network Navigator.

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



3 Open the [Table] tab - [USB communication] - [USB keyboard] - [Country-specific keyboard] and select the keyboard of target language.

Default setting: English (US)

* To use a keyboard setting of a language other than English (Japanese, German, etc.), change the country-specific keyboard setting.

4 Click [Send Configuration].

5 Exit AutoID Network Navigator.

Operation Method

Use trigger input to the SR-X Series

Start up an application like Excel and move the cursor to a position where you want to input data.

Input a trigger to the SR-X Series.

Use the SR-X Series in presentation mode

Refer to [□](#) "7-5 Read Codes in Presentation Mode (Hands-free)" (Page 40).

Point For details on the SR-UR1, refer to its instruction manual.

7-16 Read DotCode

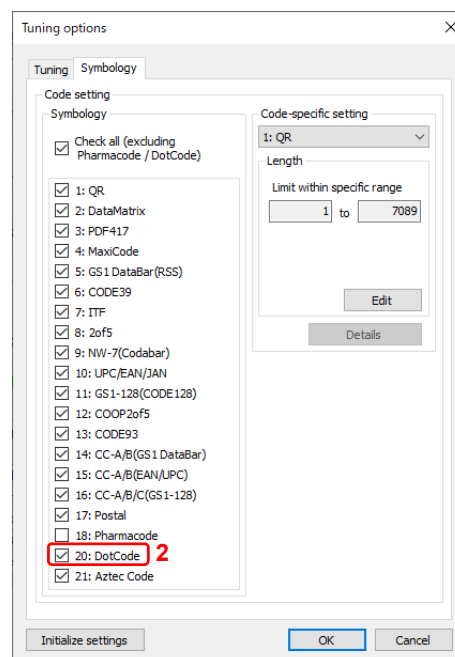
1 Click the [] button and open the [Symbology] tab.

2 Select the "20:DotCode" check box and click [OK].



3 Execute tuning.

After tuning, check that the code can be read stably in the test mode.



Point

- If reading multiple DotCodes, up to 10 codes can be read.
- Be sure to specify the area for each code before reading multiple DotCodes ([Selected area]). With [Entire area] selected, reading cannot be performed properly.
- For details on how to read multiple codes, refer to [□](#) "7-2 Read Multiple Codes" (Page 36).

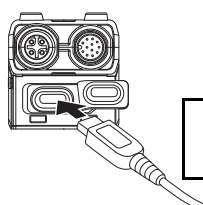
7-17 Adding an Ethernet port

Setting USB- Ethernet

An Ethernet port can be added to the SR-X Series by connecting a commercially sold USB (Type-C)-Ethernet conversion adapter.

Connection

- 1 Make sure the orientation is correct, and insert the conversion adapter straight not to allow the connector to incline.



USB(Type-C)-Ethernet
conversion adapter

Default values

IP address	192.168.101.100
Subnet mask	255.255.255.0 (24bit)
Default gateway	0.0.00

SR-X Series setup

- 1 Select the [Table] tab, and open [Ethernet] - [USB-Ether].
- 2 Enter [IP address] and [Subnet mask] to be assigned to the SR-X Series.

Compatibility chart

The following is the compatibility chart when the USB (Type-C)-Ethernet conversion adapter is used.

● Communication

TCP/UDP	✓
FTP	✓
PLC link	-
EtherNet/IP	-
PROFINET	-

● Function

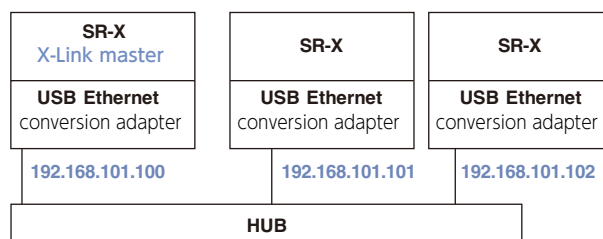
AutoID Network Navigator	✓
Web Navigator	✓
X-Link decoding	✓
Multiple units setting tool	-

Point

- Do not allow the network address set for the USB-Ethernet conversion port to overlap the network address set for the Ethernet port of the SR-X Series.
- Note that when the AutoID Network Navigator remains connected via the USB-Ethernet conversion port, connection via other USB or Ethernet cannot be made. After use, be sure to disconnect from the AutoID Network Navigator.

X-Link decoding configuration when USB-Ethernet is used

System configuration



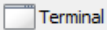
8

Checking Reading Results and Operations

8-1	Check the Read Data	50
	Terminal	50
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8-3	View Live Images (MultiMonitor)	50
	Using SR Web Tool	50
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	Using SR Web Tool	50
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	Outputting Test Results from AutoID Network Navigator	50

8-1 Check the Read Data

Terminal



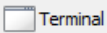
- 1 Click [Terminal].
- 2 Turn on the sensor (switch) wired to the SR-X Series.*¹

When reading is successful, the read data is displayed.

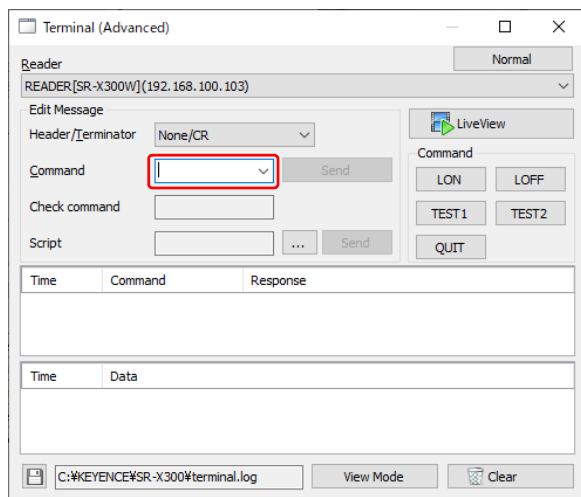
*¹ You can also start reading by clicking [LON] in the terminal.

8-2 Send Commands

Terminal



- 1 Click [Terminal].
- 2 Type a command in the command input field and then click the [Send] button.



* For details on commands, refer to "14-1 Command Communication" (Page 98).

8-3 View Live Images (Multi-Monitor)

Using SR Web Tool

By launching the SR Web Tool and using the Web Multi Monitor, you can check Live View images of multiple units of the SR-X series.

Refer to "12-1 Details of SR Web Tool" (Page 90).

8-4 Acquire Images Captured by the SR-X Series

Using SR Web Tool

By launching the SR Web Tool and using the Web Traceability Tool, you can display and save files of images captured by the SR-X series on the SR Web Tool.

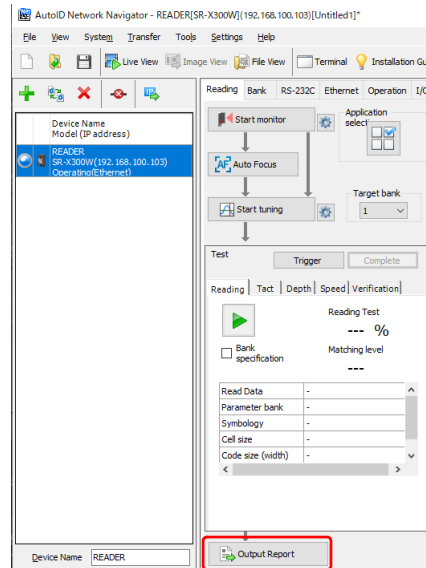
Refer to "12-1 Details of SR Web Tool" (Page 90).

8-5 Output Read Results as a Report

Outputting Test Results from AutoID Network Navigator

Report output

- 1 Start AutoID Network Navigator, connect the SR-X Series and then click [Reading] - [Output Report].



- 2 Select a report to output and then click [OK].
- 3 Select a saving destination and target.

A report will be output.

9

Checking and Restoring Settings

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	Receiving Settings	52
9-2	Restoring Settings	52
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9-1 Checking SR-X Series Settings

Receiving Settings

USB connection

- 1 Use a USB cable (OP-88569) to connect the SR-X Series and a PC.
- 2 Start AutoID Network Navigator.

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

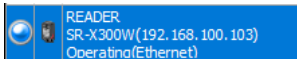


Reference For details on saving settings, refer to "5-6 Saving Settings/Quick Setup Codes" (Page 23).

Ethernet connection

- 1 Use the Ethernet cable to connect the SR-X Series to a PC.
- 2 Start AutoID Network Navigator.

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



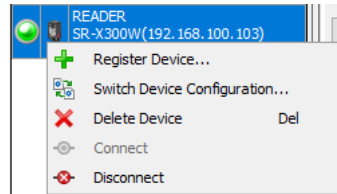
Reference For details on the Ethernet connection, refer to "5-1 Connecting" (Page 18).

9-2 Restoring Settings

Restoring Using a Configuration File

Send configuration to a new SR-X Series

- 1 Follow steps in [5-1] to connect to the 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."

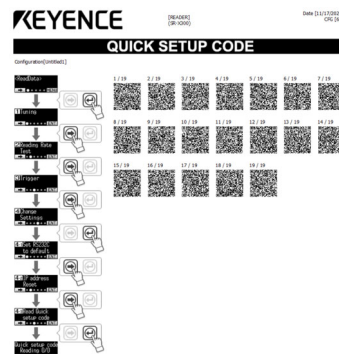
When the completion message is displayed, the configuration is complete.

Reference Refer to "7-9 Change Language or Units Displayed by AutoID Network Navigator" (Page 44) for more information on using the changeover function.

Restoring Using Quick Setup Codes (SR-X300/X300W)

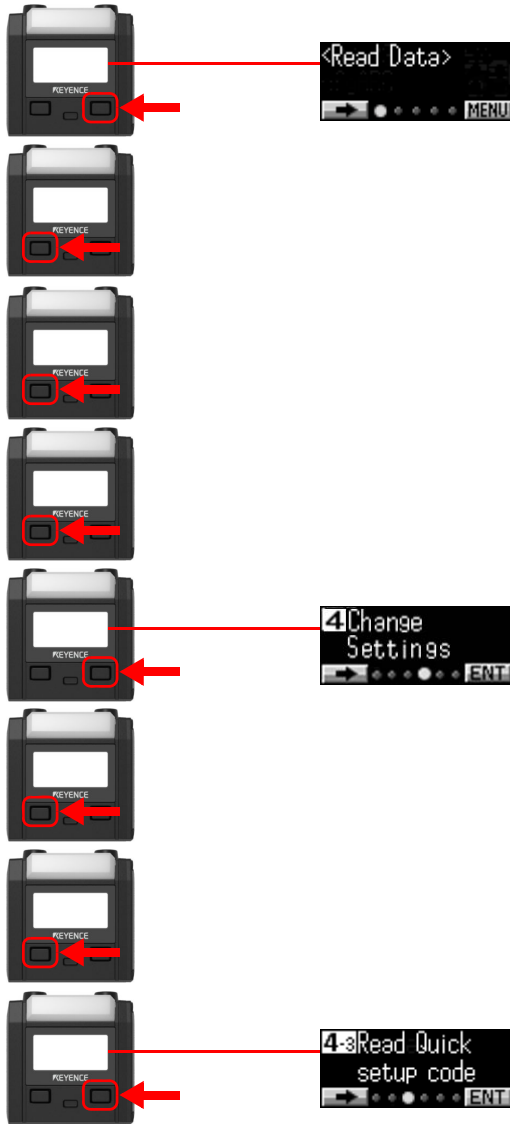
Reading quick setup codes

- 1 Prepare the printed quick setup codes.

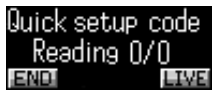


- 2 Turn on the SR-X Series.

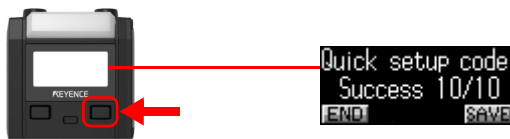
3 Press the SR-X Series buttons as shown below.



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



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



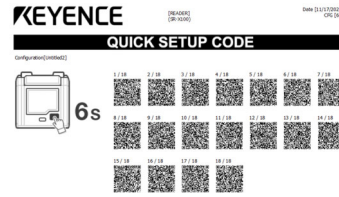
- Point**
- For details on how to print quick setup codes, refer to "5-6 Saving Settings/Quick Setup Codes" (Page 23).
 - If it is difficult to read the codes, select [LIVE] in the step 4, and then configure the settings while viewing the captured images.



Restoring Using Quick Setup Codes (SR-X100/X100W)

Reading quick setup codes

1 Prepare the printed quick setup codes.



2 Turn on the SR-X Series.

3 Press and hold the [TRG] button on the main unit for 6 sec.

The blue LED flashes once when 3 sec and 6 sec pass.

4 Scan all the quick setup codes.

When reading ends, the status LED turns green, ending the configuration.

5 After the setting is complete, press [TRG] again.

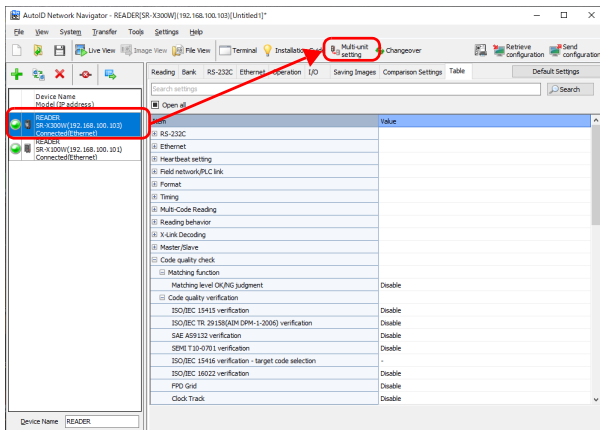
9-3

Setting Multiple SR-X Units (Multi-Unit Setting Tool)

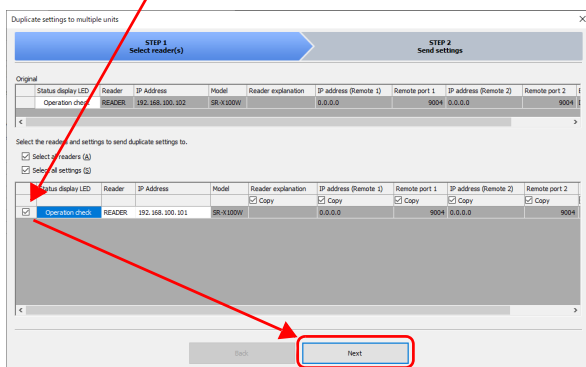
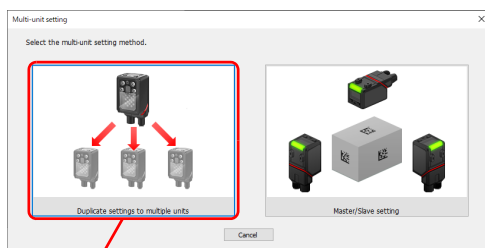
Duplicating Settings to Multiple SR-X Series Units

After configuring settings for a single SR-X Series unit, perform the following procedure to copy the settings other than network settings to other SR-X Series units.

- 1 Connect multiple SR-X Series units to AutoID Network Navigator.
- 2 Select the SR-X Series to copy settings from then click [Multi-unit setting].



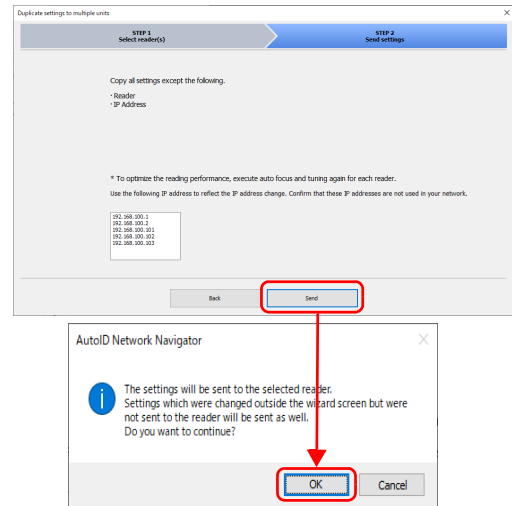
- 3 Select a setting method.



When [Operation check] is clicked, the LED indicator of the corresponding SR-X Series will flash in blue. Click this button to check the selected reader.

- 4 Select the reader(s) to send duplicate settings to and then click [Next].

- 5 Click [Send]. When a confirmation message appears, click [Yes].

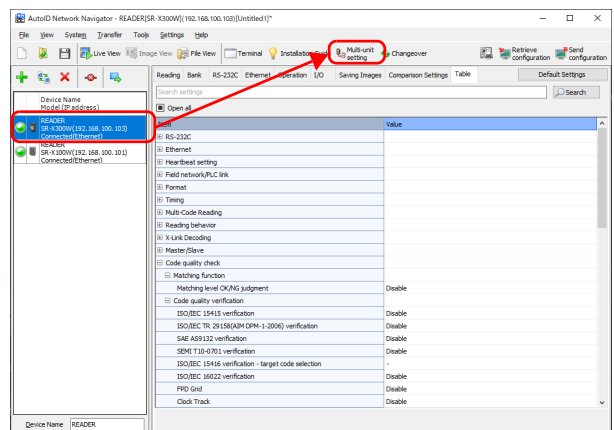


- 6 After completing the settings, exit the AutoID Network Navigator.

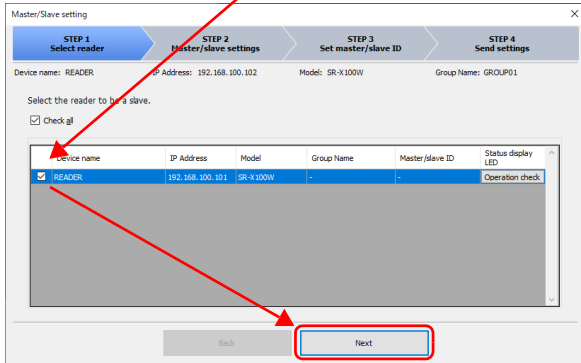
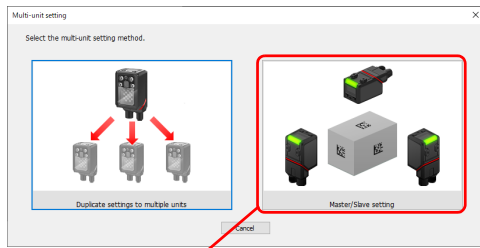
Master/Slave Settings

In configuring the master/slave settings, perform the following procedure to set a slave based on the settings of the reader handled as a master unit.

- 1 Connect multiple SR-X Series units to AutoID Network Navigator.
- 2 Select the SR-X Series unit to be configured as the master unit and then click the [Multi-unit setting] button.

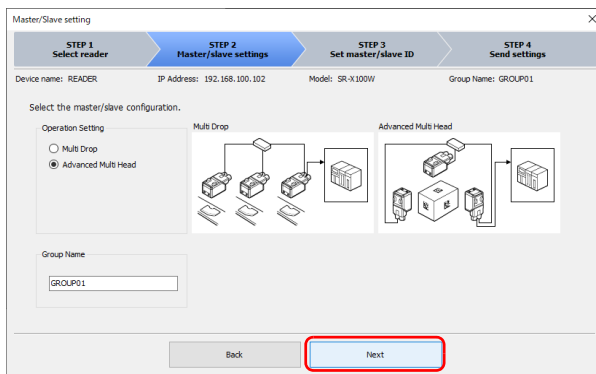


- 3 After selecting the setting method, select the reader(s) to be handled as a slave unit and then click [Next].

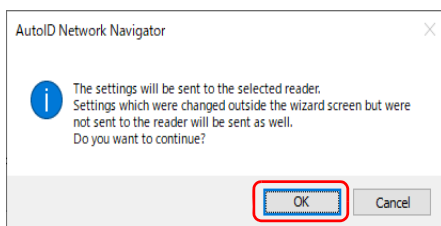


When the [Operation check] button is clicked, the LED indicator of the corresponding SR-X Series will flash in blue. Click this button to check the selected reader.

- 4 Select the master/slave configuration and then click [Next].



- 5 When a confirmation message appears, click [Yes].



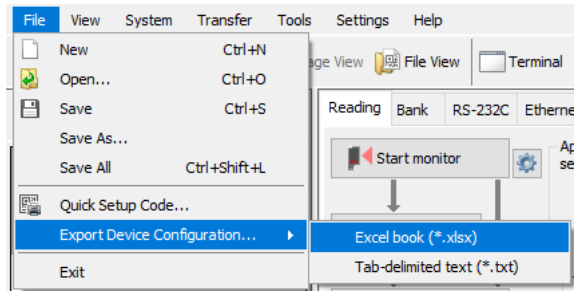
- 6 After completing the settings, exit the AutoID Network Navigator.

9-4 Comparing Settings of Multiple SR-X Units

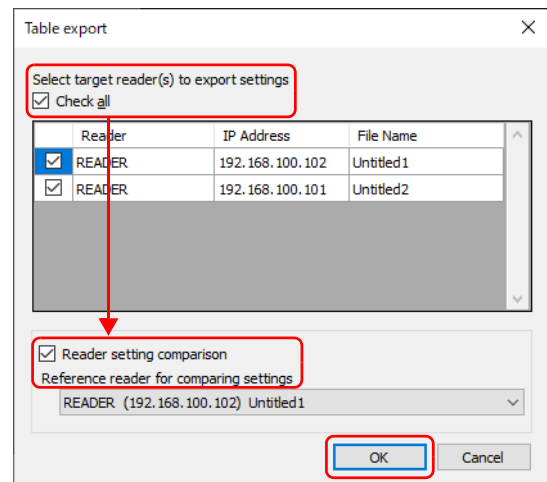
Export Reader Configuration

Perform the following procedure to output the settings of multiple SR-X Series units connected to AutoID Network Navigator to Excel file for comparison.

- 1 Connect multiple SR-X Series units to AutoID Network Navigator.
- 2 Click [File] - [Export Reader Configuration] - [Excel book (*.xlsx)].



- 3 Select a target reader, select [Reader setting comparison] and then click [OK].



- 4 Compare the settings output in the Excel file.

	A	B	C	D	E	F	G
1		Reader	READER	READER			
2		Model	SR-X100W	SR-X100W			
3		File Name	Untitled1	Untitled2			
4							
5							
6	Bank1	Common	Bank name				
7	Bank1	Common	Last modified date				
8	Bank1	Common	Alternate	Enable	Disable		
9	Bank1	Common	Repeat read attempt	0	0		
10	Bank1	Common	Decode timeout (x10)	0	0		
11	Bank1	Common	Area number	0	0		
12	Bank1	Common	Inverse read	Disable	Disable		
13	Bank1	Common	Reverse read	Disable	Disable		
14	Bank1	Common	Code direction (1D)	Not limited	Not limited		
15	Bank1	Common	Base tilt angle	0	0		
16	Bank1	Common	Tilt angle range	180	180		
17	Bank1	Code	QR	Enable	Enable		
18	Bank1	Code	DataMatrix	Enable	Enable		
19	Bank1	Code	PDF417	Enable	Enable		
20	Bank1	Code	MaxCode	Enable	Enable		
21	Bank1	Code	GS1 DataBar(RSS)	Enable	Enable		
22	Bank1	Code	CODE39	Enable	Enable		
23	Bank1	Code	ITF	Enable	Enable		
24	Bank1	Code	Zof5	Enable	Enable		
25	Bank1	Code	NW-7(Codabar)	Enable	Enable		
26	Bank1	Code	UPC-EAN/JAN	Enable	Enable		

The settings that differ from the reader used as comparison reference will be highlighted.

10

Detailed Explanation

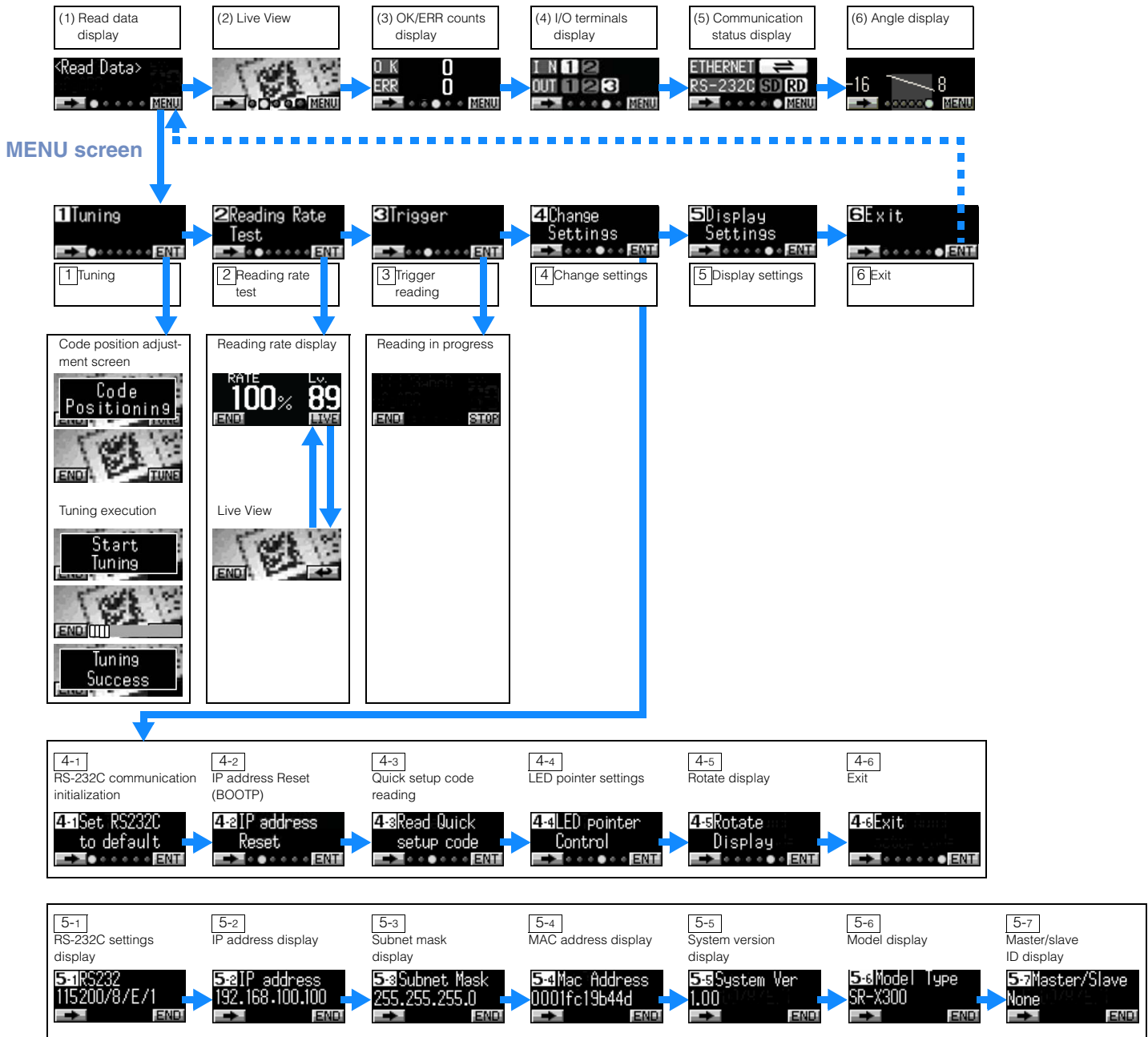
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10-1 Details of main unit operation

For the SR-X300/X300W (Reader display)

Operation screen

When the SR-X300/X300W Series is turned on, the start screen is displayed, and then the read data display (1) appears.



(1) Read data display	This is the normal display screen. It displays the read data of the SR-X Series.*1
(2) Live View	This screen displays the captured image of the SR-X 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-X 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.
(6) Angle display	Displays the angle of the SR-X series relative to ground level.

*1 Data that exceeds 20 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] Configuration change	Use this menu to read quick setup codes or initialize RS-232C communication.
[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."

When power is first turned on, the system waits for an IP address to be assigned, and the message "Please connect to PC" appears.
Refer to □ "4-3 Initial Power-on Operation" (Page 16) for details on how to assign an IP address.

For the SR-X100/X100W

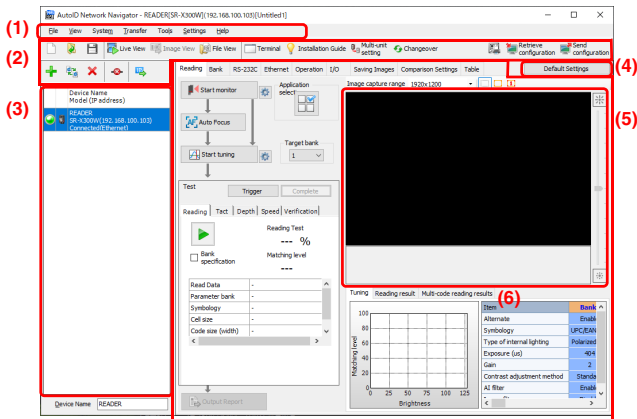
When the SR-X100/X100W is turned on, the status LED is lit in green (once).
The [TRG] button can be used to perform the following operations.

[TRG] button (when powering on the reader for the first time)	Sets the IP address to 192.168.100.100.
[TRG] button	Check the reading.
Press and hold the [TRG] button (3 sec)	Perform tuning.
Press and hold the [TRG] button (6 sec)	Reading quick setup codes.

 When power is first turned on, the system standbys for an IP address to be assigned, and the LED flashes in blue (continuously).

10-2 AutoID Network Navigator Details

Screen



(1)	Menu bar	Open configuration files and view the version of the SR-X 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	Initialize the SR-X Series selected from (3) Reader list. To initialize an SR-X Series reader, click this button, select the items to initialize, and then send the settings.
(5)	Settings view	Configure the settings of the SR-X Series selected from (3) Reader list.
(6)	Monitor screen	After you click [Start monitor], which displays the live image captured by the SR-X Series, you can perform the following operations. Use the slider on the right to change the brightness. The scaling of the screen can be adjusted with the mouse wheel. Right-click the mouse to edit the area.

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

Icon Explanation

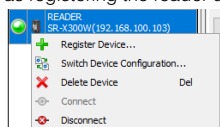
	New	Create a new configuration file for the selected model.
	Open	Open a configuration file.
	Save	Save a configuration file.
	Register	Register a reader.
	Switch settings	Switch the settings of the selected reader to the settings in a configuration file.
	Delete	Delete a registered reader.
	Disconnect	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. * This is used only by the SR-1000/750 Series.
	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-X Series and a PLC or other PC.

- Point**
- You can disconnect a reader by clicking its lamp icon.
 - Right-click an SR-X 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 an xls/bxt file.
Exit	End AutoID Network Navigator.
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	Display the live view.
Image View	Display the image view.
File View	"8-4 Acquire Images Captured by the SR-X Series" (Page 50)
Terminal	"8-1 Check the Read Data" (Page 50)
Multi-unit setting	Configure settings of multiple SR-X Series units. "9-3 Setting Multiple SR-X Units (Multi-Unit Setting Tool)" (Page 54)
Installation Guide	From the code size, you can check the reading distance and field-of-view size of the reader being used.
Configuration command creation tool	Tool to create configuration commands for the SR-G100 Series. * Not used for the SR-X Series.
Settings	
Select Network Card	Select the network card to use when establishing an Ethernet connection with AutoID Network Navigator.
RS-232C settings	Configure the communication settings when connecting the SR-700 Series to the AutoID Network Navigator via RS-232C. * Not used for the SR-X Series.
Language	Change the language displayed on the AutoID Network Navigator.
Unit	Change the unit displayed on the AutoID Network Navigator.
Password lock	Enable password lock on the SR-X Series. On SR-X Series units with password lock enabled, a password needs to be entered to change the settings.
Options	Set the options for AutoID Network Navigator.
Help	
Manual	This is a link to the manual.
PLC connection guide	This is a link to the web site where PLC connection guides can be downloaded. * Internet connection is required.
Display open source license	-
Version information	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.
Multi-byte text string encoding method	Selects the encoding method used when codes contain multi-byte text strings.
PC buzzer (SR-X300/X100/5000/2000)	Set whether to make the PC buzzer sound at the time of read operation. (SR-X300/X100/5000/2000 Series only)
Notification for report information deletion	Used to notify of the deletion of report information when a reader is changed.
Synchronize time at configuration change (SR-X300/X100/5000)	Set the PC time as the reader time when sending the settings. (SR-X300/X100/5000 Series only)

10-3

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	600 to 115200 bps	-
Data Bits	8bit	7 bit or 8 bit	-
Parity	Even parity	None, Even parity, or Odd parity	-
Stop Bit	1bit	1 bit or 2 bit	-
Communication method	None	None, PASS/RTRY, or ACK/NAK	-
Heartbeat transmission	Do not send	Do not send or Send	Send a heartbeat message at regular intervals.

Ethernet

Reader IP settings

Item name	Default value	Setting range	Details
IP address	192.168.100.100		The IP address of the SR-X 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	Refer to "13-2 Socket Communication (TCP, UDP)" for details.
Command communication			
Communication method	TCP	Not used, TCP, or UDP	The communication method used to receive commands.
Port (Waiting)	9004	1024 to 65535 ^{*1}	-
Login authentication	Disable	Disable or Enable	-
User name	admin		-
Password			-

Ethernet data (server)

Communication method	TCP	Not used or TCP	The server operation setting for socket communication.
Port (Waiting)	9004	1024 to 65535 ^{*1}	-
Heartbeat transmission	Do not send	Do not send or Send	Send a heartbeat message at regular intervals.

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	-
TCP client connection timing	After reading	After reading, Immediately after power up	
Host connection error due to client connection failure	Disable	Disable or Enable	The "Host Connection Error (E12)" appears when a connection fails.
Heartbeat	Do not send	Do not send or Send	Send a heartbeat message at regular intervals.

Ethernet data (FTP)

Send read data to FTP	Disable	Disable or Enable	Save the read data as a file on the FTP server.
IP address (Remote FTP server)	0.0.0.0		Destination IP address
User account (Remote FTP server)	admin		-
Password (Remote FTP server)	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.
Subfolder	Not used	Not used, Use	-
Subfolder name	data		-
FTP connection timing	After reading	After reading, Immediately after power up	-
File name	data.txt		-
Host connection error due to client connection failure	Disable	Disable or Enable	The "Host Connection Error (E12)" appears when a connection fails.

USB

RNDIS	Enable	Disable or Enable	-
-------	--------	-------------------	---

USB-Ether

IP address	192.168.101.100		IP address of the conversion adapter
Subnet Mask	24	8 to 30	
Default Gateway	0.0.0.0	0.0.0.0 to 255.255.255.255	

*1 9013, 9014, 9015, 9016, 9017, 9018, 9020, 5900, 5920, and 44818 are excluded.

Heartbeat settings

Item name	Default value	Setting range	Details
Heartbeat send interval (sec)	30	1 to 600	Interval for sending heartbeat signals and messages.
Reset	Reset	Reset, Do not reset	
Heartbeat character string	486561727442656174 (HeartBeat)	(1 to 32 characters)	
Heartbeat header	None		
Heartbeat terminator	0D ((CR))		

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 1000	-
Bit Monitoring Period (x10 ms)	10	1 to 99	-
Retry interval (sec)	5	1 to 10	-
Generate PLC Link error when a PLC Link failure occurs	Enable	Disable, Enable	When enabled, after PLC Link error occurs, the error is automatically cleared and recovery is attempted.

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-x1h3h		-
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, PROFINET

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

*3 9013, 9014, 9015, 9016, 9017, 9018, 9020, 5900, 5920, and 44818 are excluded.

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
Delimiter character (for additional data)	3A	(1 character)	The delimiting characters to use when adding data
Intermediate delimiter (for multi-code reading)	2C	(0 to 5 characters)	The delimiting character to use when multiple codes are read
Composite delimiter		(0 to 5 characters)	-
Append data size	Disable	Disable or Enable	-
Append checksum	Disable	Disable or Enable	-
Edit data by script	Disable	Disable, Enable	Select whether to use scripts.
Script data output to 2 destinations	-	*	-
Additional data			
Symbology	Disable	Disable or Enable	-
Symbology identifier	Disable	Disable or Enable	-
Unused Error Correction(UEC)	Disable	Disable or Enable	-
Matching level	Disable	Disable or Enable	-
ISO/IEC 15415 verification result	Disable	Disable or Enable (Overall Grade)	-
ISO/IEC TR 29158(AIM DPM-1-2006) verification result	Disable	Disable or Enable (Overall Grade)	-
SAE AS9132 verification result	Disable	Disable or Enable (Overall)	-
SEMI T10-0701 verification result	Disable	Disable or Enable	-
ISO/IEC 15416 verification results	Disable	Disable or Enable (Overall Grade)	-
ISO/IEC 16022 verification result	Disable	Disable or Enable (Overall Grade)	-
Code vertex	Disable	Disable or Enable	-
Code center	Disable	Disable or Enable	-
Scan count	Disable	Disable or Enable	-
Read time	Disable	Disable or Enable	-
Decoding time	Disable	Disable or Enable	-
Parameter bank	Disable	Disable or Enable	-
Area number	Disable	Disable or Enable	-
Group Name	Disable	Disable or Enable	-
Master/Slave ID	Disable	Disable or Enable	-
Time	Disable	Disable or Enable	-
Image file name	Disable	Disable or Enable	-
Filling size	0	0 to 999	-
Filling character	20		-
Specify command response string			

Item name	Default value	Setting range	Details
Basic command response character string	Not specified	Not specified, Detailed response, User setting, Echo back, Command replacement	-
Success response character	4F4B	(1 to 8 characters)	-
Failure response character	4552	(1 to 8 characters)	-

* Check all, RS-232C, Ethernet (Server), Ethernet (Client 1),Ethernet (Client 2), FTP data, PLC (EtherNet/IP, PROFINET, PLC Link)

Timing

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	-
Duration (x10ms)	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.
Trigger on delay (x1 ms)	0	0 to 2550	Configures the delay time from when the timing signal turns on until when the read starts.
Trigger off delay (x1 ms)	0	0 to 2550	Configures the delay time from when the timing signal turns off until when the read stops.
Trigger buffering	Disable	Disable or Enable	

Multi-Code Reading

Item name	Default value	Setting range	Details
Code reading per area	Enable	Disable, Enable	-
Multiple reading operations of the same code type/data	Disable	Disable, Allow the same code within the same capture, Allow the same code separated by the specified interval or more	-
Specified interval (pixels)	100		-
Multiple code output format	Standard	Standard, Per bank, Per area	-

Reading behavior

Item name	Default value	Setting range	Details
Reading Mode	Standard	Standard, Continuous, Burst read, or Script	
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.
Standard duplicate reading prevention	Do not prevent	Reset by time or Reset by time or another code or Do not prevent	
Duplicate reading prevention buffer	Disable	Disable, Enable	-
Duplicate Reading Prevention Interval (x 100 ms)	10	0 to 255	-
Duplicate reading prevention buffer release time (x100ms)	0	0 to 255	-
Scan interval (x1ms)	0	0 to 255	-
Capture count	32	1 to 32	-
Read Error String	4552524F52 (ERROR)	(0 to 32 characters)	The code to output when a reading error occurs.
Standard duplicate reading prevention	Do not prevent	*1	Set whether to read an already read code.
Trigger buffer overrun			
Trigger overrun output setting	Disable	Disable or Enable	
Trigger overrun string	4F5645525254E (OVERRUN)	(0 to 32 characters)	
Details			
Bank alternate setting	Begin with successful bank	Begin with successful bank, Sequential	-
PPC search	Do not limit	Do not limit, Limited	-
Auto internal lighting adjustment for tuning	Enable	Disable, Enable	-
Contrast adjustment method	Standard	Standard, HDR, HDR2, Contrast zoom	-
Auto contrast adjustment	Disable	Disable, Enable	-
Code search	Limited	Do not limit, Limited	-
Bank number for tuning from the main unit (SR-X100/X100W only)	16	1 to 16	-
Bank alternate setting	Begin with successful bank	Begin with successful bank, Sequential	-

*1 Reset by time, Reset by time or another code, Do not prevent

X-Link Decoding

Item name	Default value	Setting range	Details
X-Link master IP address	0.0.0.0		-

Master/slave

Item name	Default value	Setting range	Details
Operation Setting	Not used	Not used, Multi Drop, Advanced Multi Head	Master/slave operation setting.
Group name	GROUP01	(1 to 16 characters)	-
Unit ID	0	0 to 31	-

Code quality check

Matching function

Item name	Default value	Setting range	Details
Matching function			-
Matching level OK/NG judgment	Disable	Disable, Enable	-
Matching level threshold	70	0 to 99	-

Code quality verification

ISO/IEC 15415 verification	Disable	Disable, Enable	-
ISO/IEC 15415 verification threshold	Disable	Disable, D, C, B, A	
ISO/IEC TR 29158(AIM DPM-1-2006) verification	Disable	Disable, Enable	-
ISO/IEC 29158 revision	ISO TR 29158:2011	ISO TR 29158:2011, ISO 29158:2020	-
ISO/IEC TR 29158(AIM DPM-1-2006) verification threshold	Disable	Disable, D, C, B, A	
ISO/IEC TR 29158 (AIM DPM-1-2006) minimum reflectance calculation	Disable	Disable, Enable	-
SAE AS9132 verification	Disable	Disable, Enable	-
SAE AS9132 verification threshold	Disable	Disable, Enable	-
SEMI T10-0701 verification	Disable	Disable, Enable	-
ISO/IEC 15416 verification - target code selection	-		-
ISO/IEC 15416 verification threshold	Disable	Disable or D or C or B or A	
ISO/IEC 16022 verification	Disable	Disable, Enable	-
ISO/IEC 16022 verification threshold	Disable	Disable, D, C, B, A	
Grade expression	Alphabet	Alphabet or Numeric	
Append detailed verification result	Disable	Disable or Enable	
Append values	Disable	Disable or Enable	
FPD Grid	Disable	Disable, Enable	-
Clock Track	Disable	Disable, Enable	-

Code verification calibration

Code verification calibration	Disable	Disable, Polarized light, Direct light, Diffused light	-
Calibration brightness	40	0 to 125	-

Comparison

Item name	Default value	Setting range	Details
Type	Normal	Normal, Sequential	-
Origin	1	1 to 7089	
Length	494	0 to 494	-
Preset Data		(0 to 494 characters)	
Increment	1	~9999 to 9999	

I/O

IN1 Function

Item name	Default value	Setting range	Details
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.
Power-on trigger	OFF	OFF, ON	-
Input Polarity	Norm. open	Norm. open or Norm. closed	-
Required Input Duration	1ms	1 ms, 2 ms, or 10 ms	The length of time that trigger input must be left on until reading starts.

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.
Power-on trigger	OFF	OFF, ON	-
Input Polarity	Norm. open	Norm. open or Norm. closed	-
Required Input Duration	1ms	1 ms, 2 ms, or 10 ms	The length of time that trigger input must be left on until reading starts.

Output terminal common

TRG BUSY at Power-On	Enable	Disable or Enable	-
Output Duration (x 10 ms)	50	1 to 255	-
Heartbeat transmission interval (sec)	30	1 to 600	-

OUT1 Function

Function	OK	*2	-
Output polarity	Norm. open	Norm. open or Norm. closed	-

OUT2 Function

Function	ERROR	*2	-
----------	-------	----	---

Item name	Default value	Setting range	Details
Output polarity	Norm. open	Norm. open or Norm. closed	-
OUT3 Function			
Function	TRG BUSY, LOCK BUSY, MODE BUSY, ERR BUSY	*2, *3	-
Output polarity	Norm. open	Norm. open or Norm. closed	-
*1	Disable, Timing input, Preset input, Test mode startup, Capture image, Clear PLC link error, Trigger lock, Batch reading of codes, Execute tuning, Timing input start, Timing input stop, Command replacement, Data output OK, STABLE, UNSTABLE, ERROR, PRESET OK, TUNING OK, SCRIPT CONTROL, NG (Comparison NG), TRIGGER OVERRUN, TRG BUSY, LOCK BUSY, MODE BUSY, ERR BUSY, CONFIG BUSY, READY, HEARTBEAT		
*2	EXT.LIGHT		
*3			

Saving images

Saving images

Item name	Default value	Setting range	Details
OK Image	Disable	*1	Method for saving images with the "OK" output function.
Error Image	Save to RAM	*1	Method for saving images with the "ERROR" output function.
NG Image	Save to RAM	*1	Method for saving images with the "NG" output function.
Unstable Image	Save to RAM	*1	-
Captured Image	Save to RAM	*2	Method for saving images when they are captured.
Format	JPEG	Bitmap or JPEG	-
Quality (JPEG)	5	1 to 10	-
Binning	Not set	Full, 1/4, 1/16, or 1/64	-
Image save mode	Save the latest image	-	Save the latest image, Save images after timing input on, Save images before timing input off, Save images after timing input on (intermittent operation), or Save images before timing input off (intermittent operation)
Number of images saved	32	1 to 32	-
Intermittent operation interval (x10ms)	20	2 to 300	-
Priority for saving images	Prioritize reading operation	Prioritize saving images or Prioritize reading operation	Set whether to give priority to reading or saving at the time of image save. Prioritize saving images: Reading request is not accepted during image save. Prioritize reading operation: When reading request is received during image save, the image save will be canceled, and the reading operation will be given priority.
Edit image file name by script (FTP transmission only)	Disable	Disable or Enable	Select whether to use scripts.
Host Connection Error When Image Storage Failed	Disable	Disable, Enable	-
FTP settings³			
IP address	0.0.0.0	0.0.0.0 to 255.255.255.255	Destination IP address
Username (16 chars max)	admin	-	-
Password	admin	-	-
Subfolder	Not used	Not used, Use	-
Subfolder name setting method	Manual	Manual or Auto	-
Subfolder name	image	1 to 32 characters	-
Passive mode	Disable	Disable or Enable	-
Send historical data	Disable	Disable or Enable	-
FTP connection timing	After reading	After reading, Immediately after power up, Always disconnect after reading + data transmission	-

- *1 Disable, Save to RAM, Send by FTP, Save USB (SR-X100/X100W only), Save USB + send FTP (SR-X100/X100W only), Save to ROM (SR-X300/X300W only), Save ROM + send FTP (SR-X300/X300W only)
- *2 Save to RAM, Send by FTP, Save USB (SR-X100/X100W only), Save USB + send FTP (SR-X100/X100W only), Save to ROM (SR-X300/X300W only), Save ROM + send FTP (SR-X300/X300W only)
- *3 This item is set when you assign "Send by FTP" to one of the image saving methods.

SR Web Tool

Item name	Default value	Setting range	Details
SR Web Tool	Enable	Disable, Enable	-
Password authentication	Disable	Disable, Enable	-
Web port number	80	-	-
Account login settings			
Administrator username	admin	-	-
Administrator password	admin	-	-
User n username	-	Specify up to 12 alphanumeric characters	-
User n password	-	Specify up to 12 alphanumeric characters	-
Available applications for User n	-	Web Navigator, Web Traceability Tool, Web Multi Monitor	-
Web Traceability Tool			
Reader n IP address	0.0.0.0	-	-

System

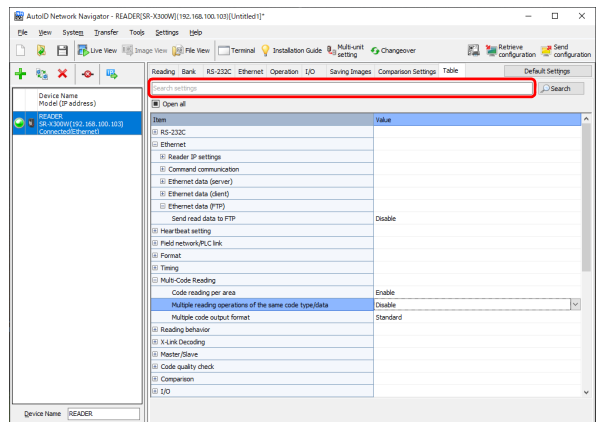
Item name	Default value	Setting range	Details
Presentation mode	Disable	Disable, Polarized light, Direct light, Diffused light	-
Silent Mode	-	-	-
Reader	READER	(1 to 32 characters)	-
Reader description 1	-	(0 to 32 characters)	Used for the following. <ul style="list-style-type: none"> Identifying the reader with the setting command response Appending the reader description with scripts
Reader description 2	-	(0 to 32 characters)	
Reader description 3	-	(0 to 32 characters)	
Reader description 4	-	(0 to 32 characters)	-
Device operation			
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 0 degrees, Rotate 180 degrees	-
Status LED lighting	Enable	Enable or Disable	-
Output data with ENTER button	Enable	Disable, Enable	-
Write BLOAD to ROM	Disable	Disable, Enable	-
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	-
LiveView			
Displayed image	After image filter	After image filter, Before image filter	-
Rotate image	Do not rotate	Rotate 0 degrees, Rotate 180 degrees	-
VNC			
VNC server	Enable	Disable, Enable	-

Security

Item name	Default value	Setting range	Details
AI-NET connection	Enable	Disable, Enable	-
SFTP	Disable	Disable, Enable	-
FTP Remote port	21	-	-
SFTP Remote port	22	-	-

Search Settings

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



10-4 Read Behavior

Tuning

Tuning

This function uses either SR-X Series button operations or AutoID Network Navigator operations or I/O terminal 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

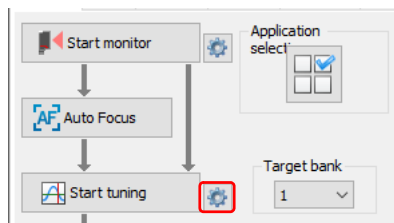
The following three operation methods are available.

- (1) SR-X Series button operations: "4-1 Tuning" (Page 15)
- (2) AutoID Network Navigator operations: "5-3 Reading Settings" (Page 20)
- (3) Operations with the corresponding function assigned to an input terminal:
 "6-7 Control the I/O Terminals" (Page 28)

Point 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.

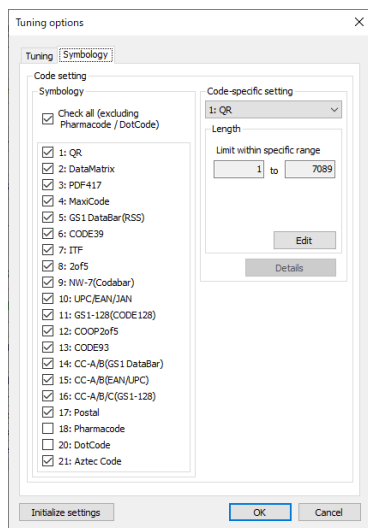


• Tuning options

[Tuning]

Exposure upper limit	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."
Criteria	Select the radio button to enable successful tuning determination when the code number is at or less than the specified number.
AI filter	When using an AI filter, select [Enable].

[Symbology]

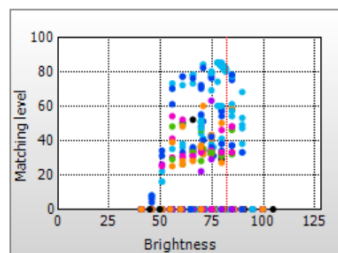


Symbology	Select the codes for which the reader will be tuned. You can shorten the tuning time by limiting the types of codes.
Code-specific setting	Set the conditions to read during tuning for each type of code. Examples of these conditions are "Length" and "Quiet zone scale factor."

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	Expand	0,130,58
•: Light blue	Shrink	0,183,238
•: Blue	Open	0,67,238
•: Purple	Close	171,0,242
•: Pink	Median	241,0,198
•: Orange	Unsharp Mask	255,138,0

Alternate

Parameter bank

The parameter bank is used to configure read parameters such as the exposure time and enabling/disabling the use of image processing filter. These parameters are stored in items called "parameter banks" or "banks." The SR-X Series has 16 parameter banks.

The following are the main items stored in parameter banks.

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

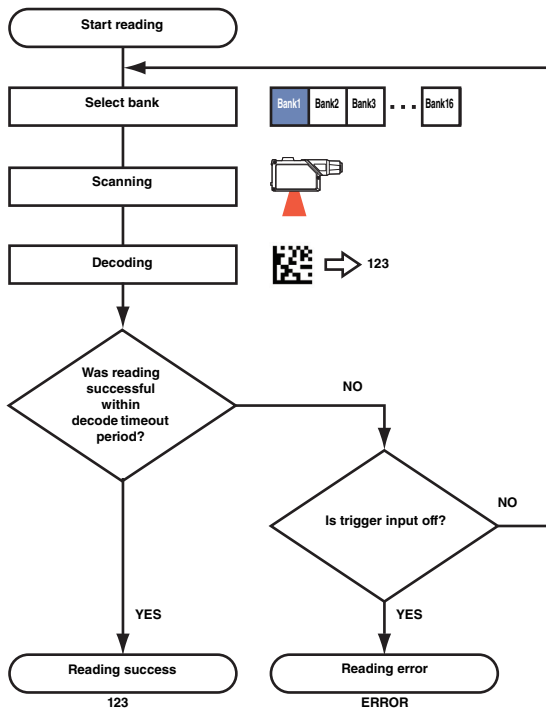
Alternate function

The SR-X Series automatically switches between and reads multiple registered parameter banks.

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 when:
 - 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

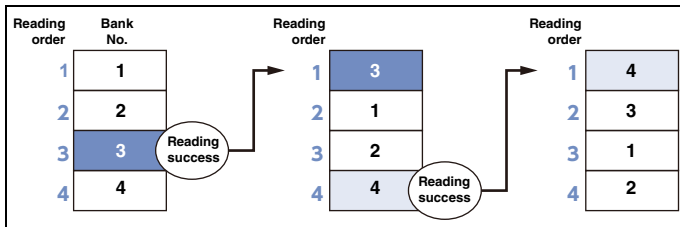
• Sequential

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	Bank3
Bank name			
Last modified date	10/29/2021	---	---
Angle (skew) during tuning	-3	0	0
Angle (pitch) during tuning	3	0	0
Alternate	Enable	Disable	Disable
Repeat read attempts	0	0	0
Decode timeout (x10ms)	27	10	10
Area number	0	0	0
Inverse read	Disable	Disable	Disable
Reverse read	Auto	Disable	Disable
Code direction (1D)	Not limited	Not limited	Not limited
Base tilt angle	0	0	0
Tilt angle range	180	180	180
Code detail setting	UPC/EAN/J...	QR,DataM...	QR,DataM...
Output length limitation	Disable	Disable	Disable
Mode	Forward	Forward	Forward
Output length	7089	7089	7089
Starting position	1	1	1
ECI output	Disable	Disable	Disable
Use internal lighting	Enable	Enable	Enable

Setting name

Common	
Bank name	Give an arbitrary name to a bank. (Up to 32 one-byte alphanumeric characters) Once a bank is named, the name remains after re-executing tuning.
Last modified date	The last update date registered in the bank will be displayed.
Angle (skew) during tuning	Displays the skew angle.
Angle (pitch) during tuning	Displays the pitch angle.
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 be completed within this period, the next scan will begin.
Region number	Configures the region number used with a bank. If 0 is specified, the bank is use in all regions.
Inverse read	Set whether to read codes with black/white inversion.
Reverse read	Set whether to read codes that have been flipped right to left.
Code orientation (1D)	Configures the orientation in which barcodes are read.
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 a value within the range of ± 0 to 180 degrees relative to the base tilt angle.
Code	
Code detail setting	Advanced configuration of code types, number of read digits, and settings per 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.
ECI output	Add "I" and "ECI (6-digit number)" in the beginning of the read data.
Light	
Use internal lighting	Use the built-in LED of the SR-X Series.
Use external lighting	If you connect an external light to the SR-X Series, enable this setting.
Type of internal lighting	Select the type of LED lighting to be built into the SR-X series.
Scan	
Exposure (μ s)	Set the exposure time that is used when scanning images.
Gain	Set the gain that is used when scanning images.
Contrast adjustment method	Configures the contrast adjustment method.
AI filter	Set the AI filter.
Advanced	Configures advanced imaging parameters.
Image filter	
Image filter n	Set the image filter type.
Image filter n count	Set the image filter count.

Multiple code settings

Codes to read	Configures the maximum number of codes to read during one cycle of timing signal input.
Detailed settings	Configures the code read limit per code type, successful read determination when the code number is at or less than the specified number.

Presentation mode

Enables/disables Always On mode. When enabled, execute tuning after setting.

Read Behavior

The SR-X Series performs the following processes for read operation:

(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:

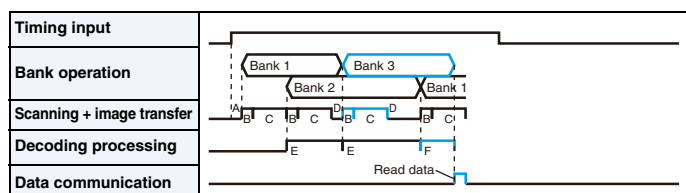
Timing Mode	Choose from level trigger or one-shot trigger.
Timing to send data	Choose from Send after read or Send after trigger input OFF.
Read mode	Choose from Standard, Continuous, Burst read, and Script.

Timing diagram

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

Operating conditions are as follows:

- Timing Mode : Level trigger
- Timing to send data : Send after read
- Read mode : Standard
- Parameter bank : 3 banks



A: Input time constant + Trigger on delay
 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, the next scan processing starts at the same time as the decoding processing.

To protect the body, there is an operational limit that restricts the exposure time per unit of time to 5% or less.

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

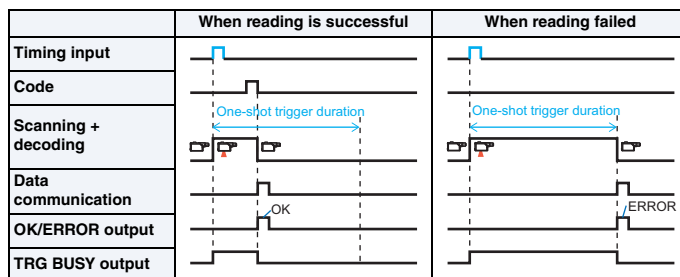
One-shot trigger

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}



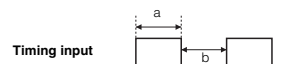
Differences between the level trigger and the one-shot trigger

	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 Trigger on delay 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-X 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

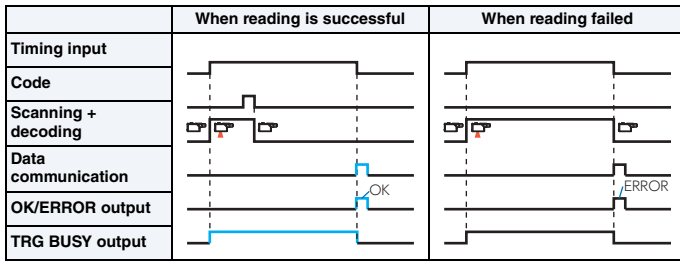
The details are the same as those explained under "Timing Mode."

Send after timing off

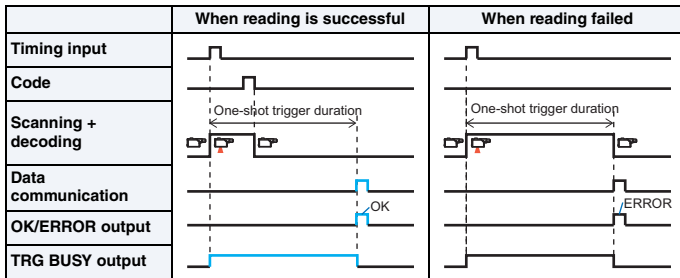
The read data and the OK/ERROR signal will be output when the trigger input turns off, not immediately after the code is read.

● Timing diagrams^{*1}

- Level trigger



- One-shot trigger



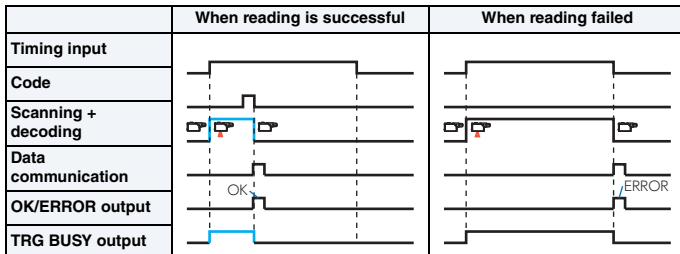
^{*1} The timing diagrams indicate examples with the factory default configuration of the "Reading Mode" setting. For the sake of simplicity, the input time constant and the Trigger on delay have been omitted.

Reading Mode

Standard

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

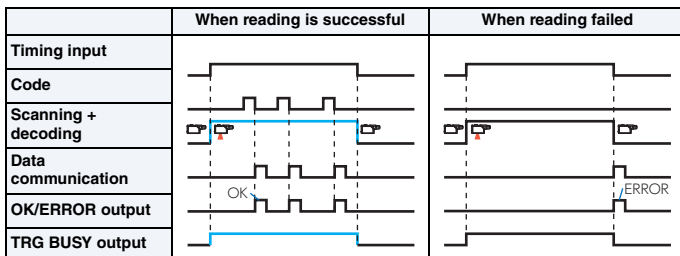
● Timing diagram^{*1}



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.

● Timing diagram^{*1}



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", reading with bank designation is not allowed.
- With "Continuous", multiple code settings do not apply to the operation.

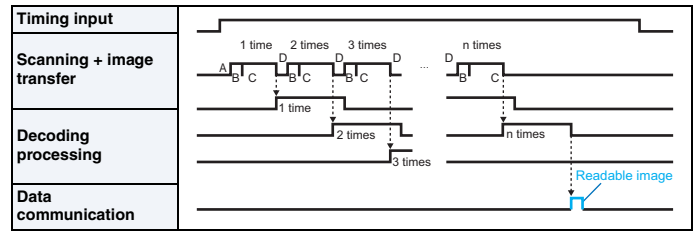
Burst read

In this mode, multiple codes are first scanned and then processed while the trigger input is on. Use this mode to improve the reading capability of moving codes that require a long decoding processing time.

- Scan count: 32 max.
- Scan interval: Can be set to a value between 0 and 255 ms

^{*1} The actual scan interval is the scan interval plus the image transfer time.

● Timing diagram^{*1}



A: Input time constant + Trigger on delay
B: Exposure time
C: Time to transfer image
D: Burst interval
E: Pre-decoding image buffer

- 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 Trigger on delay have been omitted.

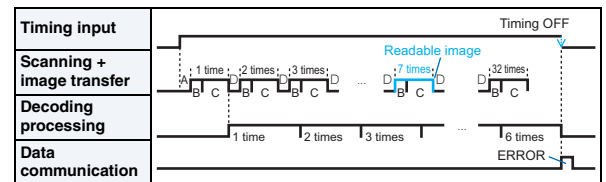
Reference

Regarding the trigger input time for the "Burst read" read mode.

In the "Burst read" 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.

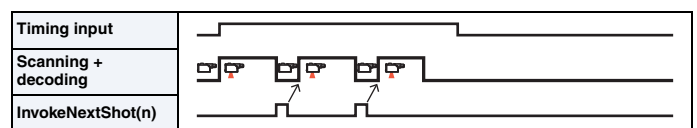


Script

In this mode, reading continues according to the script contents while the trigger input is on. As an example, use this mode when controlling to continue or stop reading according to the data output.

^{*1} A read error is not judged.

● Timing diagram



Refer to the attachment "SR-X series Script Reference" for details.

10-5 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

- AutoID Network Navigator [Reading] tab
- 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=a _{ms}	:	max=b _{ms}	:	min=c _{ms}
-----------	---	-------------	---	---------------------	---	---------------------	---	---------------------

a: Latest read time

b: Maximum read time

c: Minimum read time

● Operation

- AutoID Network Navigator [Takt] tab
- 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.
The measurement result of the depth test is only a guide. Perform performance conformation with actual work before operation certainly.

● Operation

- AutoID Network Navigator [Depth] tab

Speed Test Mode

This test mode is used to measure the simulated potential target speed by performing continuous reads with the selected bank.
The measurement result of the speed test is only a guide. Perform performance conformation with actual work before operation certainly.

● Operation

- AutoID Network Navigator [Speed] tab

Reference • When a test mode starts, the data addition function is disabled.

Code Quality Verification Measurement Test Mode

This test mode is used to perform the code quality verification with the selected bank and display the verification result according to the standard.
Applicable standards: ISO/IEC15415, ISO/IEC TR 29158, ISO/IEC 15416 and Code verification of ethical drugs in Japan

● Operation

- AutoID Network Navigator [Code quality verification] tab

10-6 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-X Series according to the marking quality evaluation specified by a third-party institution.
The SR-X Series provides the following 2D code verifications according to the Code quality verification standards.

Standards	Description	Code type
ISO/IEC 15415	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/IEC 15415. This was also standardized by International Organization for Standardization in 2011.	QR DataMatrix
ISO/IEC 29158:2020	Standard for evaluating 2D code print quality of direct parts marking prescribed by the International Organization for Standardization in 2020 based on ISO/IEC TR 29158 (AIM DPM-1-2006).	QR DataMatrix
ISO/IEC 15416	These standards evaluate barcode print quality as defined by the International Organization for Standardization. These standards are primarily used to evaluate barcodes printed for labels.	CODE39 ITF 2of5(Industrial 2of5) COOP 2of5 NW-7(Codabar) CODE128 GS1-128 GS1 DataBar CODE93 JAN/EAN/UPC Pharmacode GS1 Composite
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
ISO/IEC 16022	This is a DataMatrix code marking quality evaluation function. It makes reference to ISO/IEC 16022:2000.	DataMatrix

► Important

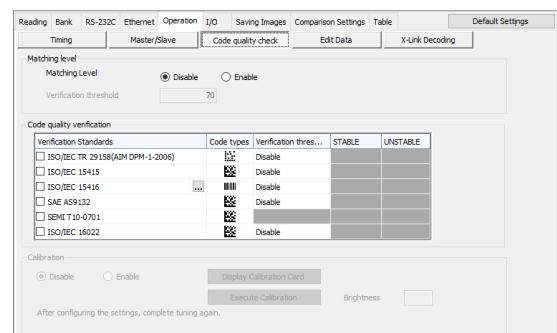
Note that this Code quality verification function is designed to evaluate marking quality of the standards-compliant 2D codes of the images scanned with the SR-X Series, but cannot be used as an official 2D code verification device.

Code Quality Verification Function Settings

Configuration procedure

1 On the [Operation] tab, click [Code quality check].

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



3 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. • 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-X 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 [Appended values] check boxes.
 - When using code verification function of Japanese Prescription Medications, after enter a check in a verification item, by selecting the subjected code type enables limitation of the code type to be verified.
 - When the print verification function is used with the Light always on setting, the print verification grade may deteriorate depending on the read timing.
 - When the contrast adjustment is set to a setting other than "standard", print verification output may be incorrect. If tuning is implemented after validation of the print verification function, the contrast adjustment method set to the bank is "Standard" regardless of other settings.

Calibration

The calibration is a correction function of the reflectance to acquire an accurate verification result when performing the code quality verification. Performing the calibration determines the reference values of brightness for black and white. Therefore, tuning suitable for the code quality verification can be performed.

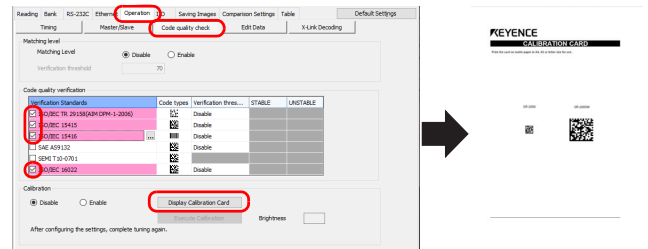
Preparation of the calibration card

Prepare the card with either of the following methods.

- Purchase a commercially sold calibration card.
- Print the card using AutoID Network Navigator.

<Printing method>

- On the [Operation] tab, click [Code quality check], then select any of the following standards.
• ISO/IEC 15415 • ISO/IEC TR 29158 • ISO/IEC 15416 • ISO/IEC 16022
- Press [Calibration card display], and print the displayed PDF.

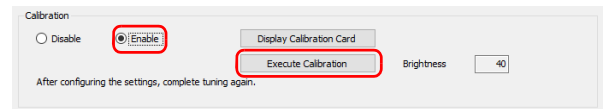


Important

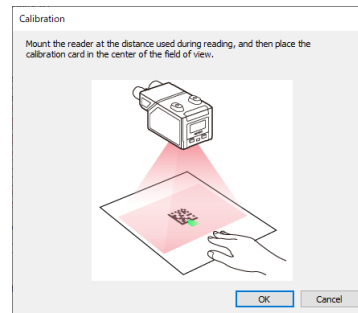
Print the card on matte paper in A4, A5 or letter size for use.

Performing the calibration

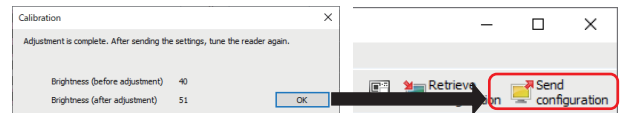
- Set the calibration to [Enable], and press [Perform calibration].



- Mount the reader at the appropriate distance at which the code quality verification is performed, and place the code of the calibration card in the center of the field of view.



- When the calibration has completed, the following display appears. Press [OK] and send the configuration.



Procedure to perform the code quality verification

- Determine the lighting configurations and installation conditions to perform the code quality verification**

- For DPM: Use the SR-X Series main unit only
- For label: Use the SR-X Series main unit only or LDL-S5015/LDL-S7227 (Manufactured by NISSIN ELECTRONICS CO.,LTD.)
- * Refer to "Installation Points" in the next paragraph for the installation conditions.
- * DPM (Direct Parts Marking) is the technique to directly mark codes on products by using methods such as laser marking or stamping.

- Determine the code quality verification standard.**

- Perform the calibration under the determined installation condition.**

Criterion

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

Evaluation standards are as follows.

- ISO/IEC 15415, ISO/IEC TR 29158 (AIM DPM-1-2006), ISO/IEC 29158:2020, ISO/IEC 15416, ISO/IEC 16022

STABLE	Verification result ≥ threshold
UNSTABLE	Verification result < threshold

- SAE AS9132

STABLE	Verification result = PASS
UNSTABLE	Verification result = FAIL

- SEMI T10-0701

There is no overall assessment grade in SEMI T10-0701 so it is not possible to assess the grade. Therefore, functions that can be used by performing an assessment will also not be available in the SEMI T10-0701.

Functions that Use Judgment Results

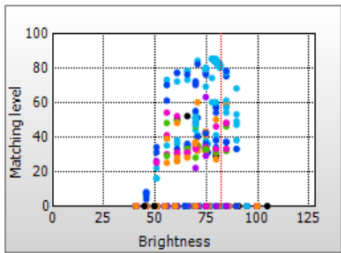
Functions that can use code quality verification evaluation results

[1]	I/O terminal output	Output the OUT terminal according to the STABLE/UNSTABLE status.
[2]	Saving images	Save the image when UNSTABLE.
[3]	Silent Mode	Control the data output according to the STABLE/UNSTABLE status.
[4]	Additional data	Append the marking verification result to the read data.

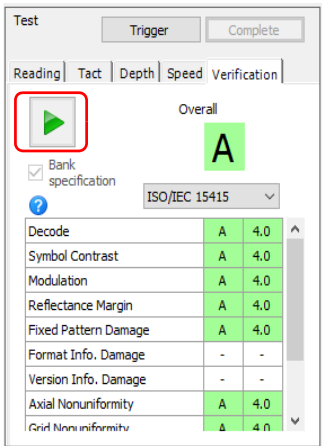
- Reference**
- "6-7 Control the I/O Terminals" (Page 28)
 - "6-8 Save Captured Images" (Page 30)
 - "7-7 Suppress Data Output" (Page 42)
 - "11-2 Data Communication Format" (Page 87)

4 Execute tuning, and create the parameter bank for the code quality verification.

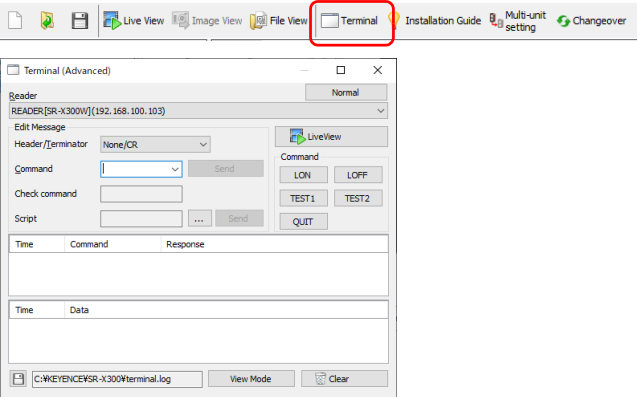
* When the calibration is enabled, the brightness is fixed, and the tuning plot is shown as follows.
Applicable standards: • ISO/IEC 15415 • ISO/IEC 15416 • ISO/IEC 16022



5 Use the code quality verification measurement test mode to confirm the verification result.

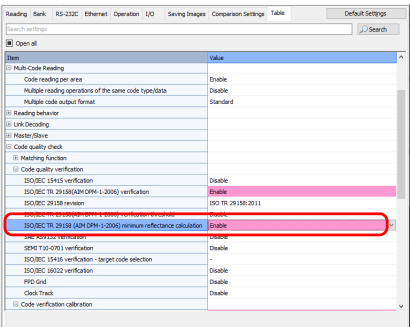


6 The output data when the code quality verification result is appended to the read data can be confirmed by pressing the LON button on the Terminal tab and reading the code.



* Output Order of Code Quality Verification Results* (Page 71)

* When appending MR (Minimum Reflectance) of ISO/IEC TR 29158 (AIM DPM-1-2006), ISO/IEC 29158:2020 to the appended data, enable the calibration, and set [Table]-[Code quality verification]-[ISO/IEC TR 29158 (AIM DPM-1-2006) Minimum reflectance calculation] to [Enable].

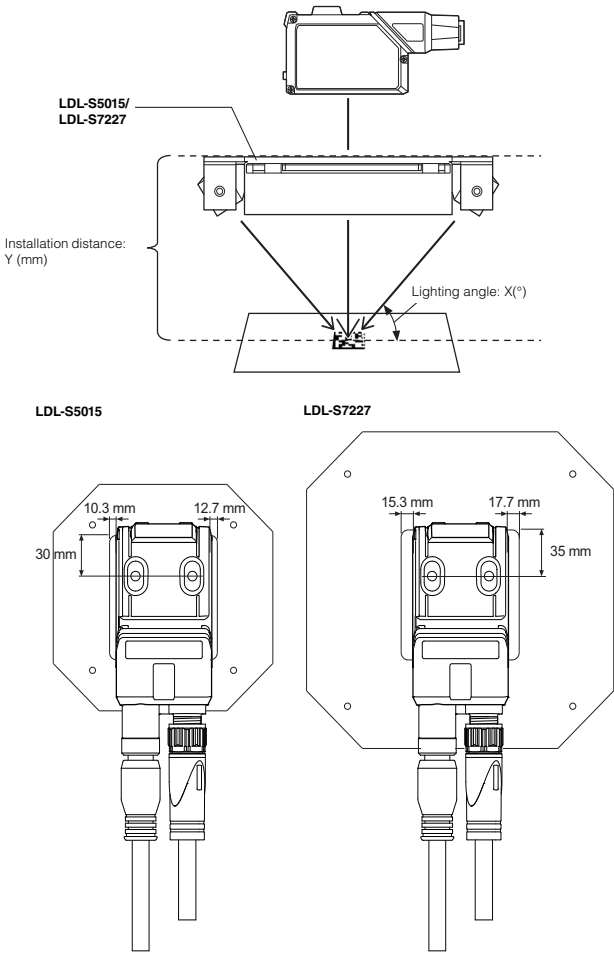


Key Points for Installation

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

Installation method (LDL-S5015/LDL-S7227)

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-X Series internal lighting.



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

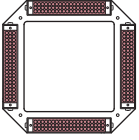
Lighting angle: X(°)	LDL-S5015	LDL-S7227
45°	66 mm	90 mm
30°	44.7 mm	61.2 mm

Recommended lighting

Manufacturer: NISSIN ELECTRONIC CO., LTD.

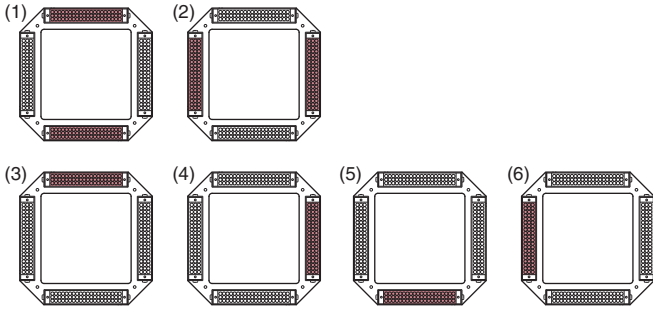
	Model	Description
LED illumination	LDL-S5015	108 mm squared, 26 mm deep
	LDL-S7227	162 mm squared, 34 mm deep
LED illumination power supply	LPRD-30W	24 VDC power supply input, 2 channels
Branch cable	L-2BK	2 branches, 1 channel - 2 light
	L-4BK	4 branches, 2 channels- 4 light

● Standard lighting pattern



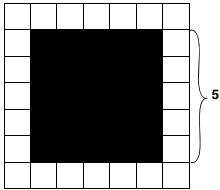
● Special lighting patterns

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.

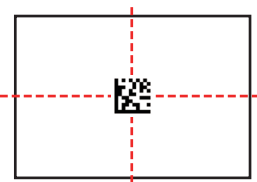


Other precautions

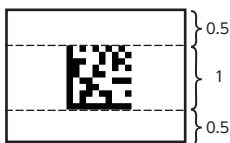
- Ensure that there are five or more pixels per cell.
If there are less than five pixels per cell, reduce the distance between the SR-X Series and the codes, and then adjust the focus and tune the reader again.



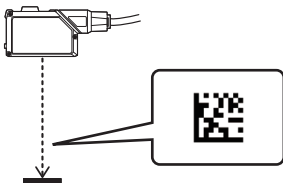
- Position codes so that they are in the center of the field of view.



- 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/IEC 15415

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/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/-/-/4.0/4.0/4.0/3.0/4.0
Numeric	✓	✓	Read data: 2.0(-)/4.0(-)/4.0(0.733)/2.0(-)/2.0(-)/3.0(-)/(-)/(-)/4.0(0.002)/4.0(0.002)/4.0(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/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/-/-/4.0/4.0/4.0/3.0/4.0
Numeric	✓	✓	Read data: 2.0(-)/4.0(-)/4.0(0.733)/2.0(-)/2.0(-)/3.0(-)/(-)/(-)/4.0(0.002)/4.0(0.002)/4.0(1.000)/3.0(-0.646)/4.0(-0.289)

● ISO/IEC 29158:2020

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/A/B/C/B/-/-/A/A/C/D/F
Alphabet	✓	✓	Read data: C(-)/A(-)/A(0.846)/B(-)/C(-)/B(-)/(-)/(-)/A(0.027)/A(0.237)/C(0.340)/D(-0.919)/F(-1.834)
Numeric			Read data: 2.0
Numeric		✓	Read data: 2.0(-)
Numeric	✓		Read data: 2.0/4.0/4.0/3.0/2.0/3.0/-/-/4.0/4.0/2.0/1.0/0.0
Numeric	✓	✓	Read data: 2.0(-)/4.0(-)/4.0(0.846)/3.0(-)/2.0(-)/3.0(-)/(-)/(-)/4.0(0.027)/4.0(0.237)/2.0(0.340)/1.0(-0.919)/0.0(-1.834)

* Detailed value is displayed rounded to the third decimal.

● ISO/IEC 15416

Setting			Data format example
Append grades	Append detailed verification result	Append values	
Alphabet			Read data: C
Alphabet		✓	Read data: C(-)
Alphabet	✓		Read data: A/A/A/A/A/A/A/A/A
Alphabet	✓	✓	Read data: A(-)/A(1.000)/A(1.000)/A(0.938)/A(0.059)/A(0.871)/A(0.930)/A(1.000)/A(0.797)/A(0.031)
Numeric			Read data: 4.0
Numeric		✓	Read data: 4.0(-)
Numeric	✓		Read data: 4.0/4.0/4.0/4.0/4.0/4.0/4.0/4.0/4.0/4.0
Numeric	✓	✓	Read data: 4.0(-)/4.0(1.000)/4.0(1.000)/4.0(0.934)/4.0(0.063)/4.0(0.867)/4.0(0.930)/4.0(1.000)/4.0(0.805)/4.0(0.031)

● SAE 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: F(-)/P(-)/P(0.632)/F(0.852)/P(0.005)

● SEMI T10-0701

* 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

	Setting		Data format example
Append grades	Append detailed verification result	Append values	
Alphabet			Read data:C:A:C
Alphabet		✓	Read data:C(-)A(-)C(-)
Alphabet	✓	✓	Read data:C/A/A/A/A/A/C/C/C/A/A/A/C/C/A/A/A/A
Alphabet	✓	✓	Read data:B(-)A(-)/A(1.000)/A(1.000)/A(0.938)/C(A.059)/ A(0.871)/A(0.930)/A(1.000)/A(0.797)/A(0.031)B(-)/ B(0.711)B(0.711)/A(0.945)/A(0.055)/A(0.895)/A(0.945)/ B(0.711)/A(0.633)/A(0.012)/A(0.914)/B(0.750)/A(0.750)
Number			Read data:2.8;4.0:2.8
Number		✓	Read data:2.8(-);4.0(-)-2.8(-)
Number	✓		Read data:2.1;4.0/4.0/4.0/4.0/4.0/4.0/4.0/4.0/4.0/4.0/4.0/2.1/ 3.0/3.0/4.0/4.0/4.0/4.0/3.0/4.0/4.0/4.0/4.0/4.0
Number	✓	✓	Read data:3.4(-);4.0(-)/4.0(1.000)/4.0(1.000)/4.0(0.934)/ 4.0(0.063)/4.0(0.867)/4.0(0.930)/4.0(1.000)/4.0(0.805)/ 4.0(0.031);3.4(-)/4.0(1.000)/4.0(1.000)/4.0(0.941)/ 4.0(0.055)/4.0(0.793)/4.0(0.840)/4.0(1.000)/4.0(0.832)/ 4.0(0.066)/4.0(0.914)/4.0(0.750)/4.0(0.750)

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/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)

	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	VID
(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

	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
(14)	Minimum Reflectance	MR

	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
(14)	Minimum Reflectance	MR

	Evaluation item names	Abbreviated names
(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

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

	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

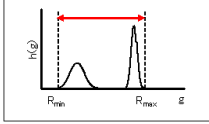
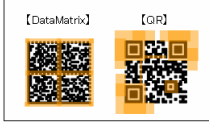

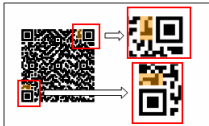
	Evaluation item names	Abbreviated names	
(1)	Overall Composite Symbol	ALL	} 1D & 2D
(1)	Overall	ALL	
(2)	Decode	DEC	
(3)	EdgeDetermination	EDGE	} 1D
(4)	Symbol Contrast	SC	
(5)	Minimum Reflectance	MINR	
(6)	Minimum Edge Contrast	MINE	
(7)	Modulation	MOD	
(8)	Quiet Zone	QZ	
(9)	Decodability	DCD	
(10)	Defects	DEF	} 2D
(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	

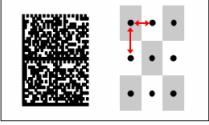
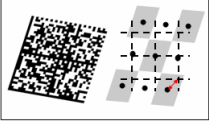


	Evaluation item names	Abbreviated names
(1)	Overall	ALL
(2)	Decode	DEC
(3)	Symbol Contrast	SC
(4)	Axial Nonuniformity	AN
(5)	Unused Error Correction	UEC
(6)	Print Growth Horizontal	PGH
(7)	Print Growth Vertical	PGV

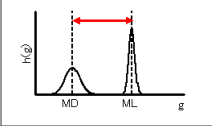


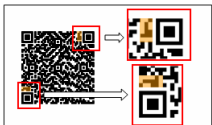
GB SR-X UM

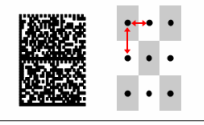
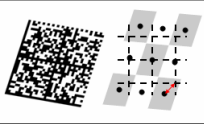


Verification Items

ISO/IEC 15415

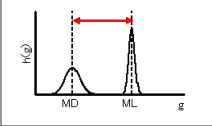



Decode success/failure		DEC (Decode)
Description	Evaluates whether decoding is possible or not.	-
Calculation formula	-	
Criterion	-	
Symbol contrast		SC (Symbol Contrast)
Description	Evaluates the difference between the maximum brightness value (Rmax) and minimum brightness value (Rmin) in the code area.	
Calculation formula	$SC = (R_{max} - R_{min}) / 255$ Rmax : Maximum brightness value Rmin : Minimum brightness value	
Criterion	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	—
Calculation formula	Each cell's MOD = $2 * (\text{abs}(R - GT) / SC)$ R : Brightness value GT : Binarization threshold value SC : Symbol contrast	
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] $R \geq GT \rightarrow \text{MARGIN} = 2 * (R - GT) / SC$ $R < GT \rightarrow \text{MARGIN} = 0$ [Black cell] $R < GT \rightarrow \text{MARGIN} = 2 * (GT - R) / SC$ $R > GT \rightarrow \text{MARGIN} = 0$ MARGIN : Margin of each cell R : Brightness value GT : Binarization threshold value SC : Symbol 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	-	

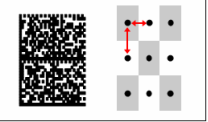
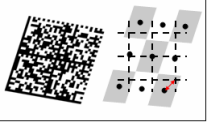


Axial nonuniformity		AN (Axial Nonuniformity)
Description	Evaluates the distortion degree in vertical and horizontal size of the code.	
Calculation formula	$AN = \text{abs}(X_{avg} - Y_{avg}) / ((X_{avg} + Y_{avg}) / 2)$ Xavg : Average cell size in horizontal direction Yavg : Vertical cell size in horizontal 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	$GN = H_{max} / X$ 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	
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 : On the vertical clock pattern 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	

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 : Average brightness value of bright cell MD : 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] $CM = (R - GT) / (ML - GT)$ (When $R \geq GT$) [Black cell] $CM = (GT - R) / (GT - MD)$ (When $R < GT$) R : Brightness value GT : Binarization threshold value ML : Average brightness value of bright cell MD : 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] $R \geq GT \rightarrow MARGIN = (R - GT) / (ML - GT)$ $R < GT \rightarrow MARGIN = 0$ [Black cell] $R < GT \rightarrow MARGIN = (GT - R) / (GT - MD)$ $R \geq GT \rightarrow MARGIN = 0$ MARGIN : Margin of each cell R : Brightness value GT : Binarization threshold value CC : 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	$AN = \text{abs}(X_{avg} - Y_{avg}) / ((X_{avg} + Y_{avg}) / 2)$ X_{avg} : Average cell size in horizontal direction Y_{avg} : 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} : 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	
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 : On the vertical clock pattern 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	
Minimum reflectance		MR (Minimum Reflectance)
Description	Evaluates the minimum reflectance of the code.	-
Calculation formula	$R_{cal} \times (SR_{cal} / SR_{target}) \times (ML_{target} / ML_{cal})$ R_{cal} : Reflectance of the calibration card SR_{cal} : Brightness during calibration (Exposure time \times Gain) SR_{target} : Brightness when reading the actual workpiece ML_{target} : Average white level when reading the actual workpiece ML_{cal} : Average white level during calibration	
Criterion	A : $\geq 5\%$ F : $< 5\%$	

* Appended if both Calibration and Minimum reflectance calculation are set to Enable.

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 : Average brightness value of bright cell MD : Average brightness value of dark cell	
Criterion	A : more than 0.2725 B : 0.2225 to 0.2725 C : 0.1725 to 0.2225 D : 0.1225 to 0.1725 F : less than 0.1225	
Cell modulation		CM (Cell Modulation)
Description	Evaluates the variation degree in cell brightness	-
Calculation formula	[White cell] $CM = (R - GT) / (ML - GT)$ (When $R \geq GT$) [Black cell] $CM = (GT - R) / (GT - MD)$ (When $R < GT$) R : Brightness value GT : Binarization threshold value ML : Average brightness value of bright cell MD : 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] $R \geq GT \rightarrow MARGIN = (R - GT) / (ML - GT)$ $R < GT \rightarrow MARGIN = 0$ [Black cell] $R < GT \rightarrow MARGIN = (GT - R) / (GT - MD)$ $R \geq GT \rightarrow MARGIN = 0$ MARGIN : Margin of each cell R : Brightness value GT : Binarization threshold value CC : 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	-	


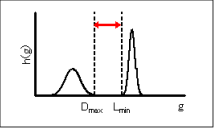

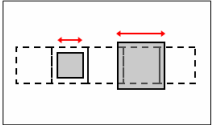
Axial nonuniformity		AN (Axial Nonuniformity)
Description	Evaluates the distortion degree in vertical and horizontal size of the code.	
Calculation formula	$AN = \text{abs}(X_{avg} - Y_{avg}) / ((X_{avg} + Y_{avg}) / 2)$ X_{avg} : Average cell size in horizontal direction Y_{avg} : Vertical cell size in horizontal direction	
Criterion	A : less than 0.071 B : 0.071 to 0.091 C : 0.091 to 0.111 D : 0.111 to 0.131 F : more than 0.131	
Grid nonuniformity		GN (Grid Nonuniformity)
Description	Evaluates the maximum position slip of each cell	
Calculation formula	$GN = H_{max} / X$ H_{max} : Maximum position slip amount X : Cell size	
Criterion	A : less than 0.44375 B : 0.44375 to 0.56875 C : 0.56875 to 0.69375 D : 0.69375 to 0.81875 F : more than 0.81875	
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 0.55625 B : 0.43125 to 0.55625 C : 0.30625 to 0.43125 D : 0.18125 to 0.30625 F : less than 0.18125	
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	
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 : On the vertical clock pattern 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	
Minimum reflectance		MR (Minimum Reflectance)
Description	Evaluates the minimum reflectance of the code.	-
Calculation formula	$R_{cal} \times (SR_{cal} / SR_{target}) \times (ML_{target} / ML_{cal})$ R_{cal} : Reflectance of the calibration card SR_{cal} : Brightness during calibration (Exposure time \times Gain) SR_{target} : Brightness when reading the actual workpiece ML_{target} : Average white level when reading the actual workpiece ML_{cal} : Average white level during calibration	
Criterion	A : more than 0.1475 B : 0.0975 to 0.1475 C : 0.04833 to 0.0975 D : 0.015 to 0.04833 F : less than 0.015	

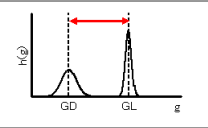
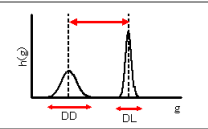




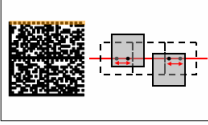
* Appended if both Calibration and Minimum reflectance calculation are set to Enable.

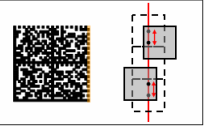

Decode success/failure		DEC(Decode)
Description	Evaluates whether decoding is possible or not.	-
Calculation formula	-	
Criterion	A : Success F : Failure	
Number of edges		EDGE (EdgeDetermination)
Description	Determines whether the read number of edges is equal to the assumed number of edges.	-
Calculation formula	-	
Criterion	A : Match F : Mismatch	
Symbol contrast		SC (Symbol Contrast)
Description	Evaluates the difference between the maximum brightness value (Rmax) and minimum brightness value (Rmin) in the code area.	-
Calculation formula	$SC = Rmax - Rmin$	
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 : $Rmin \leq 0.5 Rmax$ F : $Rmin > 0.5 Rmax$	
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	$EC = Rs - Rb$ $ECmin = \min(EC)$ Rs : Reflectance of space Rb : Reflectance of bar	
Criterion	A : $ECmin \geq 15\%$ F : $ECmin < 15\%$	
Modulation		MOD (Modulation)
Description	Ratio between the minimum edge contrast and the symbol contrast	-
Calculation formula	$MOD = ECmin / SC$	
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	The 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 = $ERNmax / SC$ $ERN = (\text{Gap between the maximum and minimum values of reflectance in an element})$ $ERNmax = \max(ERN)$	
Criterion	A : Defects ≤ 0.15 B : Defects ≤ 0.20 C : Defects ≤ 0.25 D : Defects ≤ 0.30 F : Defects > 0.30	

Quiet zone		QZ (Quiet Zone)
Description	Evaluates if multiple cells of quiet zone exist around the code.	
Calculation formula	-	
Criterion	-	
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	-	
Criterion	Pass : -7 to 7 Fail : less than -7 or more than 7	
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	

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	$(GL - GD)/\text{Max}(DL, DD)$ 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	$\text{Med}(\text{MCW})/(\text{Med}(\text{MCW}) + \text{Med}(\text{SCW}))$ 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	$\text{Med}(\text{MCH})/(\text{Med}(\text{MCH}) + \text{Med}(\text{SCH}))$ 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	$\sum \text{MH}_i/(N * \text{DMCW})$ MH _i : 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	$\sum \text{MV}_i/(M * \text{DMCH})$ MV _i : 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	$\text{UEC} = 1.0 - ((e + 2t)/(d - p))$ 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.	

ISO/IEC 15416 (GS1 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 (Rmax) and minimum brightness value (Rmin) in the code area.	-
Calculation formula	SC = Rmax - Rmin	
Criterion	A : SC ≥ 70 % B : SC ≥ 55 % C : SC ≥ 40 % D : SC ≥ 20 % F : SC < 20 %	
Minimum reflectance		MINR (Minimum Reflectance)
Description	Minimum reflectance among scanned waveforms	-
Calculation formula	-	
Criterion	A : Rmin ≤ 0.5 Rmax F : Rmin > 0.5 Rmax	
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 = Rs - Rb ECmin = Min(EC) Rs : Reflectance of space Rb : Reflectance of bar	
Criterion	A : ECmin ≥ 15% F : ECmin < 15%	
Modulation		MOD (Modulation)
Description	Ratio between the minimum edge contrast and the symbol contrast	-
Calculation formula	MOD = ECmin / SC	
Criterion	A : MOD ≥ 0.70 B : MOD ≥ 0.60 C : MOD ≥ 0.50 D : MOD ≥ 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 = ERNmax / SC ERN = (Gap between the maximum and minimum values of reflectance in an element), ERNmax = 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 ≥ 71% B : CY ≥ 64% C : CY ≥ 57% D : CY ≥ 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 ≥ 0.62 B : UEC ≥ 0.50 C : UEC ≥ 0.37 D : UEC ≥ 0.25 F : UEC < 0.25	

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

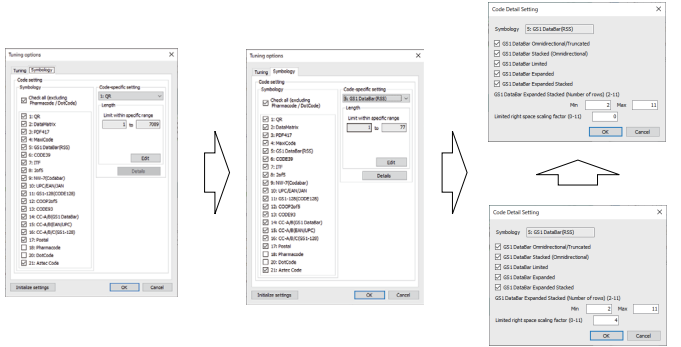
GS1 DataBar Limited (including GS1 DataBar Limited as a part of CC-A/B) is characterized by being closely similar to some portion of other barcodes in terms of the bar structure.
Accordingly, the standard regarding GS1 DataBar Limited was amended in 2011.

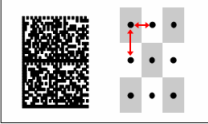


The amended standard requires that a trailing space five times the width of the narrow bar is maintained to the right of GS1 DataBar Limited.



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-X 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.

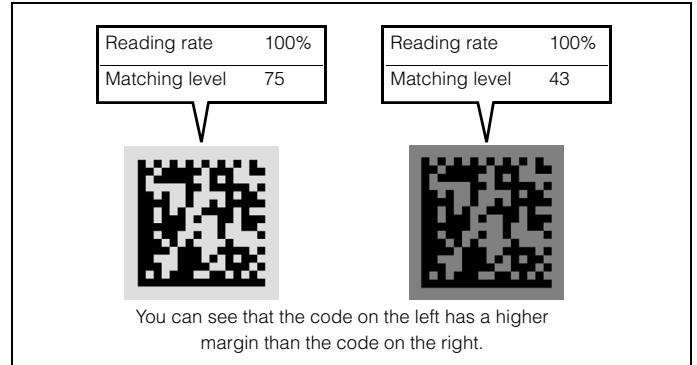


Decode		DEC (Decode)
Description	Evaluates whether decoding is possible or not.	
Calculation formula	-	
Criterion	A : Approved F : Failed	
Symbol Contrast		SC (Symbol Contrast)
Description	Evaluates the difference between the code region brightness top 10% average (RL) and bottom 10% average (RD).	
Calculation 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	$AN = \text{abs}(X_{avg} - Y_{avg}) / (X_{avg} + Y_{avg}) / 2$ 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	

10-7 Matching level

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

STABLE	Matching level \geq threshold
UNSTABLE	Matching level $<$ threshold

Functions that use matching level OK/NG judgments

[1]	I/O terminal output	Output the OUT terminal according to the STABLE/UNSTABLE status.
[2]	Saving images	Save the image when UNSTABLE.
[3]	Silent Mode	Control the data output according to the STABLE/UNSTABLE status.
[4]	Additional data	Append the matching level to the read data.

- Reference
- "6-7 Control the I/O Terminals" (Page 28)
 - "6-8 Save Captured Images" (Page 30)
 - "7-7 Suppress Data Output" (Page 42)
 - "11-2 Data Communication Format" (Page 87)

Setting the matching level judgment function

"7-6 Check Print Quality" (Page 41)

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.

Precautions

Notes when using the code quality verification function

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

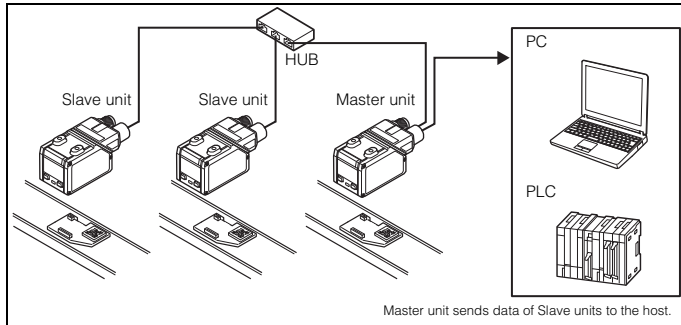
- If the colors of the code and background change, set the parameter bank used as standard, and then verify code quality.

10-8 Master/Slave Function

Multi drop

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

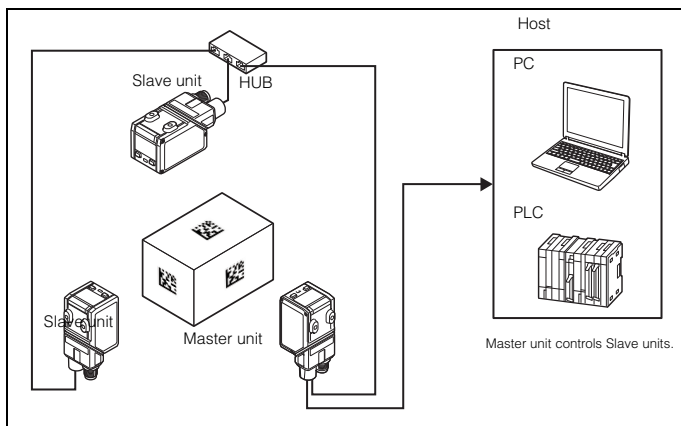
Because the host only has to communicate with the SR designated as Master, the host does not need to consider communication with multiple units. Thus, the system load is reduced with the simple program. Also for PLC, only one communication unit is necessary to control multiple units. This enables the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



Advanced multi-head

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 32 units) of SR-X 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	Advanced multi-head
Standard	✓	✓
Continuous	-	✓
Burst read	✓	✓
Script	-	✓

Protocols

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

SR Series compatibility chart

Series	Multi drop	Advanced multi-head
SR-X	✓	✓
SR-5000	✓	✓*
SR-2000	✓	✓
SR-1000	✓	-
SR-750	✓	-

* There are restrictions when the advanced multi-head is used with a mixture of SR-5000 and SR-X.

Restrictions on use with a mixture of SR-X and SR-5000

- The SR-X data cannot be acquired by the SR Management Tool.
- When saving Images by FTP using a SR-X series as the master and a SR-5000 as a slave, images from the slave will not be sent. When saving images, set the SR-5000 series as the master.

Point

- 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.
- Slave data cannot be received when the master is in the LOCK BUSY state.
Ex.: MENU screen appears on the display of the master unit
- Delay or packet loss may occur if a network on which many devices are connected is under a large load. Perform a thorough verification before operation.
- When using the master/slave function, the maximum size of the data that can be sent from a slave to the master is 1024 bytes.

Reference

- 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

Control methods

(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)	When using PLC link Trigger area	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	Parameter	Response
Start reading	%T _m -LON	m=00-31 : ID	-
Start reading (bank specification)	%T _m -LON,b	m=00-31 : ID b: 01 to 16	-
Stop reading	%T _m -LOFF	m=00-31 : ID	-
Version confirmation	%T _m -KEYENCE	m=00-31 : ID	%T _m -OK,KEYENCE, x, v m=00-31 : ID x=SR-X100, SR-X300: Model v: Version
Cancel reading	%T _m -CANCEL	m=00-31 : ID	%T _m -OK,CANCEL m=00-31 : ID

Master setting procedure

(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

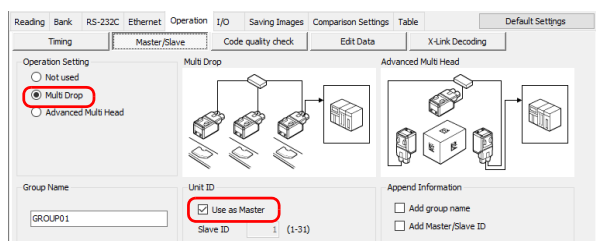
- 1 Open the [Ethernet] tab, and then start the [Setup Wizard].
- 2 STEP 1 Select the trigger input method.
- 3 STEP 2 Select the output destination.
- 4 STEP 3 Select the communication protocol.
- 5 STEP 4 Configure connection destination settings such as [IP Address] and [Port].
- 6 Exit [Setup Wizard].

• 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].

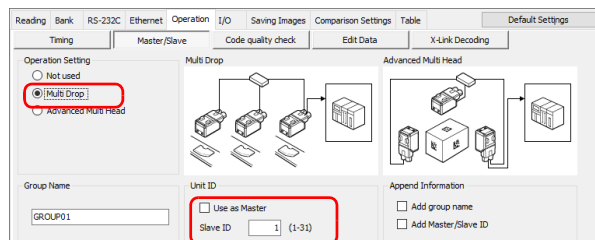
Slave settings

(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].

Point

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. Communication settings such as TCP and RS-232C are not necessary for slaves.

Advanced Multi-head

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)	When using PLC link Trigger area	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, x, v x=SR-X100, SR-X300: Model v: Version
Cancel reading	CANCEL	-	OK,CANCEL

Master setting procedure

(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

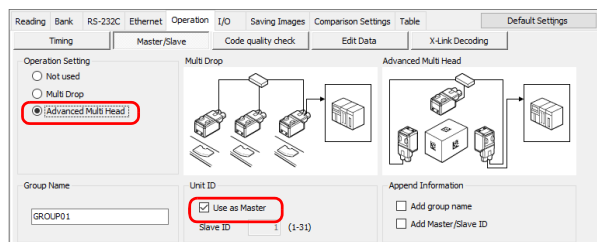
- 1 Open the [Ethernet] tab, and then start the [Setup Wizard].
- 2 STEP 1 Select the trigger input method.
- 3 STEP 2 Select the output destination.
- 4 STEP 3 Select the communication protocol.
- 5 STEP 4 Configure connection destination settings such as [IP Address] and [Port].
- 6 Exit [Setup Wizard].

● 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].

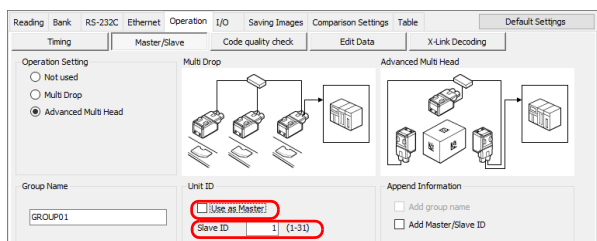
Slave settings

(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.



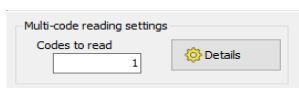
- 3 Click [Send Configuration].

Point

- 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.
- Communication settings such as TCP and RS-232C are not necessary for slaves.
- When using Advanced Multi-head mode, the following data cannot be obtained from slaves.
Image file name
Read time
Time

● Multiple code read setting

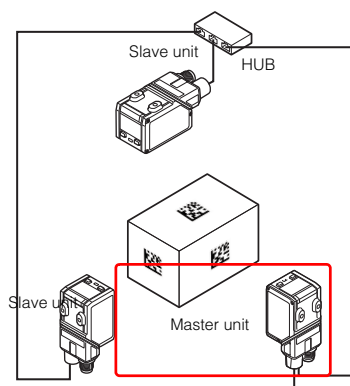
The total number of codes to be read by master and slave units must be configured on the master only with the Codes to read setting.



The read data is output when the reading finishes (operation same as that by a single unit reading more than one code).

● Scripts

Configure script settings on the master only. Slave data can be edited on the master.



● PLC links

Read data will be in the same region for both master and slave units.

D+04	Digits 1 and 2 of output data *4	2 ASCII code characters *2 *3	✓	
D+05	Digits 3 and 4 of output data *4	2 ASCII code characters *2 *3	✓	
...				
D+503	Digits 999 and 1000 of output data *4	2 ASCII code characters *2 *3	✓	

● OUT terminal (OK/ERROR)

OK/ERROR judgment set in the Advanced Multi-head mode on the master unit can be output from the OUT terminal.

10-9 Preset Data Comparison

Preset Data Function

This function allows the SR-X 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-X Series to detect different codes simply without a trigger sensor or other devices.

One set of preset data can be stored in the SR-X 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-X Series preset data for comparison.

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

- "6-9 Compare the Read Data (Preset Data Comparison)" (Page 32)

(2) Use commands to register the data.

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

```
WP:402,313233[CR]
```

- "14-3 SR-X Series Configuration Commands" (Page 101)

(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.			[null]
03	The number of digits of read data is less than the number of digits for preset start.			
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 □ "6-7 Control the I/O Terminals" (Page 28).

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.

Example)

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.

When a code is read to be registered as the preset data, the operation will be the same as that for the first reading.

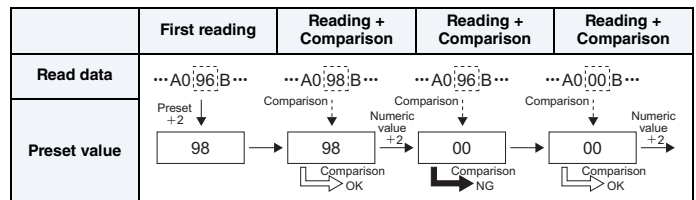
Settings

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.

10-10 Scripts

With the SR-X 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. Refer to the attachment "SR-X series Script Reference" for details.

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

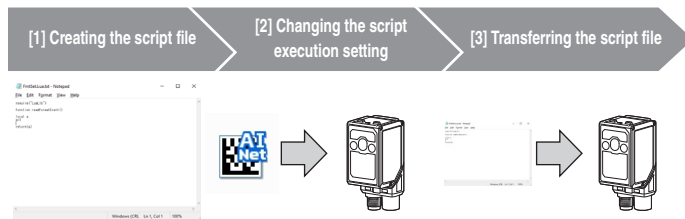
(3) Edit image file names.

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

(4) Control triggers

- Continuous scanning is possible according to conditions.

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 setting

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

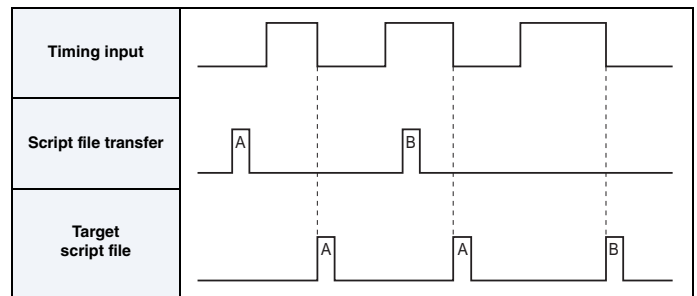
• Transfer methods

- 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 through the FTP interface.

Script file application timing

Even while the SR-X 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.



Point

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

Handling Script Files

This section describes how to handle script files when restoring the SR-X 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.
Reading quick setup codes		Remains.
Send command	SAVE	Remains.
	LOAD	Remains.
	DFLT	Remains.
	BSAVE	Creates backup files.
	BLOAD	Loads backup files.

Check Information Using Commands

Function	Command name	Parameter	Response
Obtaining the script processing time ^{*1}	SCPTIME	-	OK, SCPTIME, now= <u>A</u> us, max <u>B</u> us, min= <u>C</u> us A: The most recent script processing time B: The maximum processing time C: The minimum processing time
Script debug setting ^{*2}	SCPDBG, <u>n</u>	<u>n</u> = 1: Debugging on 0: Debugging off	OK, SCPDBG
Obtaining the script error results	SCPERR	-	OK, SCPERR, <u>m</u> <u>m</u> : Script error details
Obtaining the script file version	SCPVER	-	OK, SCPVER, <u>m</u> , <u>n</u> <u>m</u> : Script library version <u>n</u> : 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.

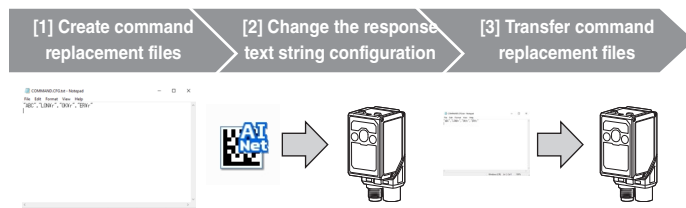
10-11 Command Replacement

This function replaces commands (text strings) received by SR-X Series units.

Target Command

	Target command
(1) Replacing a received text string with another command	All commands
(2) Replacing IN terminal input with a command	RESET BCLR HCLR LON (LON, [Bank number]) LOFF

Configuration Procedure



[1] Create command replacement files.

Use notepad.exe or some other text editor to create COMMAND.CFG command replacement files and corresponding program files.

[2] Change the response text string configuration.

Use AutoID Network Navigator to change the [Response Text String Configuration] setting in the SR-X Series unit to "Command Replacement." To replace the IN terminal input, change the [IN* Terminal Function] to [Command Replacement].

• Setting locations

(1) Response text string configuration

[Table] – [Format] – [Specify command response string] – [Basic command response string] – [Command replacement]

(2) IN* terminal settings

[I/O] – [IN* Function] – [Function] – [Command replacement]

[3] Transfer command replacement files.

Send the COMMAND.CFG command replacement file to the SR-X Series unit.

• Transfer methods

- Send using the [Send Configuration] option in "AutoID Network Navigator."
- Send via FTP.

Creating Command Replacement Files

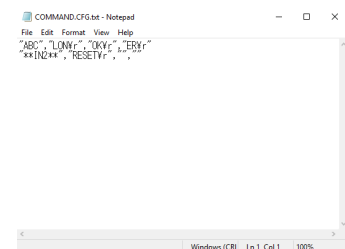
Format

"[Custom command string]", "[SR's command string]", "[OK response]", "[Error response]"

Ex.1: Replace "ABC" with "LON[CR]."
"ABC", "LON\r", "OK\r", "ER\r"

Ex.2: Assign "RESET[CR]" to the IN 2 terminal.
"***IN2***", "RESET\r", "", ""

• Configuration file example



Save the character codes of command replacement files in ANSI format.

Syntax

- Each command replacement is separated with one of the following line break codes: [CR], [LF], or [CR][LF].
- The [Custom command string] can be up to a maximum of 128 bytes in size.
- [STX], [ETX], and [CR] codes cannot be used in the [Custom command string].
- The [Custom command string] has priority if it includes standard SR-X Series commands.
- If there are two or more [Custom command string] statements, the top statement is enabled.
- Use the syntax "***IN[?]*" to assign the [Custom command string] to the IN terminal. (Enclose the parameter in double asterisks.)
- Up to 64 statements can be registered.
- The [SR's command string] must include termination codes.
- The [Custom command string] must be defined for suffix matching.
Ex.: The text string "ABC" is the [Custom command string].
If the text string received is "123ABC", the matching text is "123ABC". The "123" text is discarded.
- Comments are made by enclosing text between two hyphens and a line break code.
- [OK response] and [Error response] can be disabled by enclosing them in double quotation marks.
- Adding an asterisk to the end of a statement causes the command function specified in the [SR's command string] to operate only for the [Custom command string].

Escape Sequence

Pattern	Meaning
\r	[CR](0x0D)
\n	[LF](0x0A)
\a	[BEL](0x07)
\b	[BS](0x08)
\f	[CL](0x0C)
\t	[HT](0x09)
\v	[HM](0x0B)
\\	\
\'	'
\000	Specifies character codes in decimal numbers

Command Replacement Error Debugging

The "CMDCFG_ERR" message can be sent from the terminal for error confirmation when command replacement files are not recognized correctly.

Response	Meaning
No Error	No error
error: file COMMAND.CFG line xxx	Error in row xxx
error: file COMMAND.CFG not found	File error or no file exists
error: Command not supported.	Command not supported by IN terminal command replacement was specified.

Point

- The changeover function is not supported.
- This function is applicable only to the master when using the master-slave function.
- The single character recognition setting for the timing of the ON/OFF command operates exclusively.
- This function is disabled when RS-232C communication is initialized by pressing the corresponding button on the device.
- This function is disabled by the AutoID Network Navigator terminal.

11

Communication Types

11-1	SR-X Series Communication Types	86
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11-1 SR-X Series Communication Types

The SR-X 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" (Page 7)

Assigning functions to the I/O terminals

☞ "6-7 Control the I/O Terminals" (Page 28)

(2) RS-232C

With the RS-232C interface of the SR-X 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-X Series in a procedureless manner and use commands to start reading.

- ☞ "13-1 Serial Communication" (Page 95)
 ☞ "14-1 Command Communication" (Page 98)

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

PLC link

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

☞ "15-1 PLC Link Overview" (Page 115)

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

(3) Ethernet

With the Ethernet interface of the SR-X 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-X Series. You can use commands to control the operations and change the settings of the SR-X Series.

- ☞ "13-2 Socket Communication (TCP, UDP)" (Page 96)
 ☞ "14-1 Command Communication" (Page 98)

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

PLC link

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

☞ "15-1 PLC Link Overview" (Page 115)

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

EtherNet/IP

☞ "16-1 EtherNet/IP Overview" (Page 123)

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

PROFINET

☞ "17-1 PROFINET Overview" (Page 137)

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

FTP

The SR-X 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-X Series as an FTP server, operate the FTP server in anonymous mode.

SNTP

The SR-X 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.
Master/slave function: UDP

- ☞ **Point**
- 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	23, 1024 to 65535 ^{*1}
Ethernet data (server)	Listen port	TCP	23, 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, 9017, 9018, 9020, 5900, 5920, and 44818 cannot be set as they are reserved for the reader system.

Port Number Details

The following table shows the port numbers used by the AutoID Network Navigator. Use this for reference when a specific port needs to be opened by security software, etc.

Protocol	Port number		Communication direction	Description
	SR-X	PC/Host		
UDP	9015	any	SR <-	Reader search
UDP	9015	any	SR ->	Reader search
FTP	any	21	SR <-	AutoID Network Navigator
FTP	21	any	SR ->	AutoID Network Navigator
TCP, UDP	9013	any	SR <-	AutoID Network Navigator
TCP, UDP	9013	any	SR ->	AutoID Network Navigator
TCP	9014	any	SR ->	AutoID Network Navigator
TCP	5900	any	SR ->	AutoID Network Navigator
TCP	5920	any	SR ->	AutoID Network Navigator
UDP	9016	-	SR ->	For SR communication
UDP	9018	-	SR ->	For SR communication
NTP	any	123	SR ->	When using SNTP
HTTP	80 ^{*1}	any	SR <-	SR WEB Monitor

^{*1} This can be changed.

11-2 Data Communication Format

The SR-X 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 / **[ETX]** (0x02) / **[ESC]** (0x1B)

● Terminator

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

Read Error Codes

If the code cannot be read, the SR-X 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 changed to any string of text, up to 32 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

(1)	(2)	:	(3)	:	(4)	Read data
-----	-----	---	-----	---	-----	-----------

:	(5)	:	(6)	:	(7)	:	(8)	:	(9)	:	(10)	:	(11)	:	(12)	:	(13)	:	(14)	:	(15)
---	-----	---	-----	---	-----	---	-----	---	-----	---	------	---	------	---	------	---	------	---	------	---	------

:	(16)	:	(17)	:	(18)	:	(19)
---	------	---	------	---	------	---	------

- (1) Data size
- (2) Time
- (3) Code type
- (4) Symbol ID
- (5) Bank number
- (6) Scan count
- (7) Decoding time
- (8) Region number
- (9) Code vertex coordinates
- (10) Code center coordinates
- (11) Unused ECC ratio
- (12) Matching level
- (13) Code quality verification result
- (14) Image file name
- (15) Group name^{*1}
- (16) Master/Slave ID^{*1}
- (17) Read time
- (18) Angle (skew/pitch)
- (19) Checksum

^{*1} When the advanced Multi-head is valid, the order is "Master Slave ID": "Group name."

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."

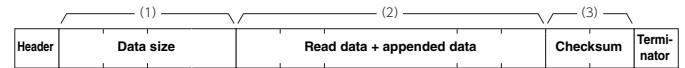
Precautions when appending data

- 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.



Time

Appends the time the data was output.

Appended data range: YYYYMMDDhhmmss

(Year-Month-Day-Hour-Minute-Second)

- 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
4	MaxiCode
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(EAN/UPC)
16	CC-A/B/C(GS1-128)
17	Postal
18	Pharmacode
20	DotCode
21	Aztec Code

Symbol ID

Appends the symbology identifier, specified by AIM, before the read data.

It is not appended when a reading fails.

- 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), GS1 DataMatrix	jd2
	: ECC 200, FNC1 (2nd)	jd3
	: ECC 200, ECI applied	jd4
	: ECC 200, ECI applied, FNC1 (1st)	jd5
	: ECC 200, ECI applied, FNC1 (2nd)	jd6
	DMRE	jd7
	DMRE, FNC1 (1st or 5th)	jd8
	DMRE, FNC1 (2nd or 6th)	jd9
	DMRE, ECI	jdA
	DMRE, ECI, FNC1 (1st or 5th)	jdB
MaxiCode	DMRE, ECI, FNC1 (2nd or 6th)	jdC
	Mode 4 or Mode 5	JU0
	Mode 2 or Mode 3	JU1
	Mode 4 or Mode 5, ECI	JU2
CODE39	Mode 2 or Mode 3, ECI	JU3
	No check digit validation	JA0
	Check digit is validated and transmitted.	JA1
	Check digit is validated but not transmitted.	JA3

Code type	Detail	Symbol ID
ITF	No check digit validation	J]0
	Check digit is validated and transmitted.	J]1
	Check digit is validated but not transmitted.	J]3
NW-7 (Codabar)		J]F0
JAN/EAN/UPC	UPC-A, UPC-E, JAN/EAN13	J]E0
	JAN/EAN8	J]E4
	UPC-A, UPC-E, JAN/EAN13 Addon 2, addon 5	J]E3
CODE128	FNC1 not included.	J]C0
	FNC1 on the first digit (GS1-128).	J]C1
	FNC1 on the second digit.	J]C2
GS1 Databar		J]e0
PDF417, MicroPDF417	Standard	J]L0
	Extended channel interpretation	J]L1
	Basic channel interpretation	J]L2
CODE93		J]G0
2of5		J]S0
COOP2of5		J]X0
Trioptic CODE39		J]A8
Postal		J]X0
DotCode	Generic data	J]J0
	GS1 format (GS1 DotCode)	J]J1
	Application Specific	J]J2
	Generic data + ECI	J]J3
	GS1 format (GS1 DotCode) + ECI	J]J4
	Application Specific + ECI	J]J5
Aztec Code		J]z0
	FNC1(1 st)	J]z1
	FNC1(An initial letter or pair of digits)	J]z2
	ECI	J]z3
	FNC1(1 st) + ECI	J]z4
	FNC1(An initial letter or pair of digits) + ECI	J]z5
	Aztec Rune	J]zC

• Data format for composite codes

- Composite code (GS1/CODE128 + PDF)

J]e0	Barcode data	a	2D code data
------	--------------	---	--------------

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

J]Em	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.)

Bank number

Appends the bank number that was read.
It is not appended when a reading fails.

- Data format

Read data	:	nn
-----------	---	----

nn = Parameter bank number (01 - 16)

Scan count

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

Failed reading operations are also counted.

- Data format

Read data	:	nnnnn
-----------	---	-------

nnnnn = Scan count (1 - 65535)

Region number

The region number used for the read can be added.
This information cannot be added if the read fails.

- Data format

Read data	:	nnn
-----------	---	-----

nnn = 000 - 128

* 000: No region specification

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						

- SR-X300/X300W

X1/Y1 to X4/Y4: Code vertex coordinates (Xn = 0 - 1919, Yn = 0 - 1199)

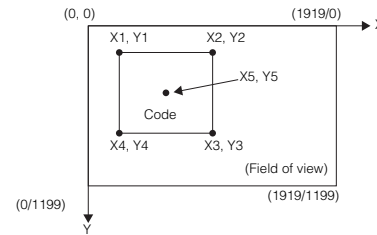
X5/Y5: Code center coordinates (X5 = 0 - 1919, Y5 = 0 - 1199)

- SR-X100/X100W

X1/Y1 to X4/Y4: Code vertex coordinates (Xn = 0 - 1359, Yn = 0 - 1023)

X5/Y5: Code center coordinates (Xn = 0 - 1359, Yn = 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 vertex coordinate is out of the capture range, the coordinate value is minus displayed.
(Even though all vertexes are not in the capture range, reading is possible.)

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 "10-6 Code Quality Verification" (Page 67)

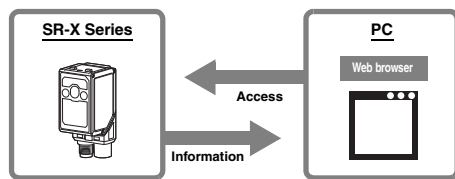
12

SR Web Tool

12-1	Details of SR Web Tool	90
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12-1 Details of SR Web Tool

SR Web Tool is a tool that can manage multiple units of the SR-X series centrally by using a Web browser.



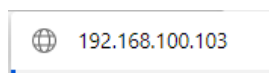
Operating Environment

Web browser	Google Chrome 84 or higher Microsoft Edge 93 or higher Safari 15 or higher
Communication port	Ethernet USB (only supported on units whose version is 1.35 or later)
Maximum number of simultaneous connections	5 units

* Log in with Administrator rights to use.

Connecting with an Ethernet Cable

- 1 Use the Ethernet cable to connect the SR-X Series to a PC.
- 2 Launch the Web browser.
- 3 Input the IP address of the SR-X series in the URL input field of the Web browser.



- 4 The SR Web Tool starts.

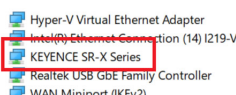
Reference To restrict the number of users and applications used, set [Password authentication] to [Enable] by selecting [Table] followed by [SR Web Tool] from the AutoID Network Navigator, then configure the [Account login settings].

Connecting with a USB Cable (RNDIS)

- 1 Connect the SR-X Series to the PC with a USB cable. When the connection is established, the SR-X is recognized as a USB drive as shown in the following figure.



- 2 Move the .zip file from the USB drive to the local drive and unzip the file.
- 3 Run the .exe file in the RNDIS folder under SR_X_Series_USB_Driver to install the driver.
- 4 Disconnect and reconnect the USB cable. The SR-X is recognized as a network adapter as shown in the following figure.



- 5 Launch a web browser and enter "http://keyenceautoid" to start SR Web Tool.

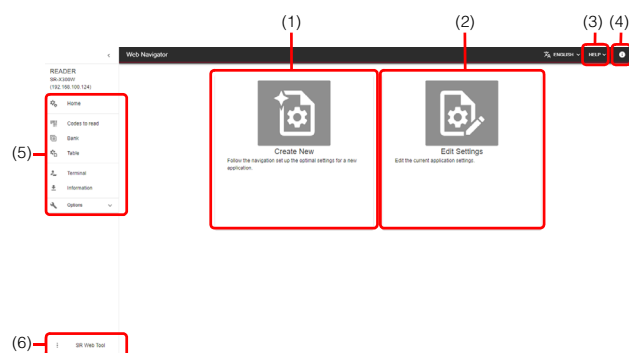
Screens

Launch screen



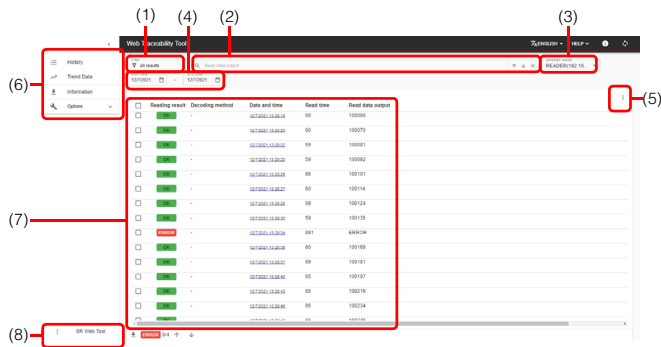
- | | |
|-----|--|
| (1) | Configure the settings of the SR-X series. |
| (2) | Check the history of the most recent reading results in the SR-X series. |
| (3) | Check the screens of multiple SR-X series at the same time. |
| (4) | Change the language. |

Web Navigator



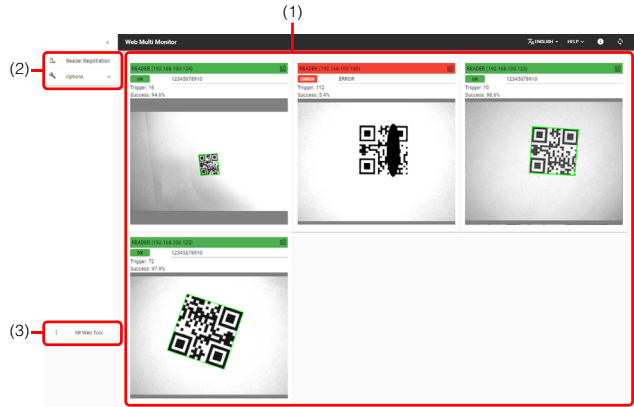
- | | | | | | | | | | | | | | | | |
|------------------------|--|------|---|------------------------|---|------|-------------------------------|-------|---------------------------------|----------|---|---------|---|---------|---|
| (1) | Follow the navigator to create optimal settings according to the objective. | | | | | | | | | | | | | | |
| (2) | Partially edit the details already configured in the reader. | | | | | | | | | | | | | | |
| (3) | Check the various manuals. | | | | | | | | | | | | | | |
| (4) | Check the reader information. | | | | | | | | | | | | | | |
| (5) | <table border="1"> <tr> <td>Home</td> <td>Return to the home screen of the Web Navigator.</td> </tr> <tr> <td>Multiple code settings</td> <td>Configure the setting to read multiple codes at one go.</td> </tr> <tr> <td>Bank</td> <td>Configure the read parameter.</td> </tr> <tr> <td>Table</td> <td>Configure the other parameters.</td> </tr> <tr> <td>Terminal</td> <td>Read data can be verified. Command log can be verified.</td> </tr> <tr> <td>Utility</td> <td>Upload and download configuration files inside the main unit.</td> </tr> <tr> <td>Options</td> <td>Configure the optional settings of the Web Navigator.</td> </tr> </table> | Home | Return to the home screen of the Web Navigator. | Multiple code settings | Configure the setting to read multiple codes at one go. | Bank | Configure the read parameter. | Table | Configure the other parameters. | Terminal | Read data can be verified. Command log can be verified. | Utility | Upload and download configuration files inside the main unit. | Options | Configure the optional settings of the Web Navigator. |
| Home | Return to the home screen of the Web Navigator. | | | | | | | | | | | | | | |
| Multiple code settings | Configure the setting to read multiple codes at one go. | | | | | | | | | | | | | | |
| Bank | Configure the read parameter. | | | | | | | | | | | | | | |
| Table | Configure the other parameters. | | | | | | | | | | | | | | |
| Terminal | Read data can be verified. Command log can be verified. | | | | | | | | | | | | | | |
| Utility | Upload and download configuration files inside the main unit. | | | | | | | | | | | | | | |
| Options | Configure the optional settings of the Web Navigator. | | | | | | | | | | | | | | |
| (6) | Move to another function. | | | | | | | | | | | | | | |

● Web Traceability Tool



(1)	Extract a history of the reading results matching the following conditions. "Not specified", "Successful reading(AI)" "Successful reading(Linked)", "Error"	
(2)	Jump to a history of the reading results having read output data including the entered keyword.	
(3)	Select a reader to check the reading result.	
(4)	Filter a history of the reading results by the specified date.	
(5)	Select an item to display.	
(6)	History	Check the history of the most recent reading results.
	Trend Data	Displays the change in the number of readings, time and bank usage ratio over time.
	Utility	Download the configuration file in the main unit, and get or delete a variety of logs.
	Options	Configure the optional settings of the Web Traceability Tool.
(7)	Displays the data of the reading results. Click the date and time to check the detailed information.	
(8)	Move to another function.	

● Web Multi Monitor



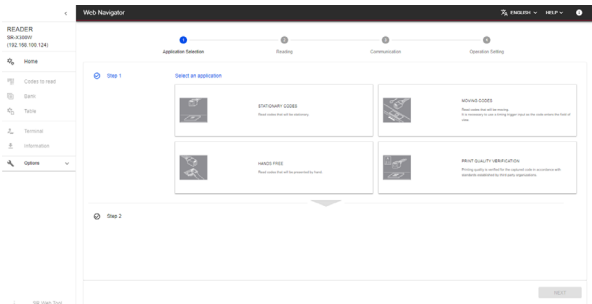
(1)	Displays the screen of the registered reader.	
(2)	Reader Registration	Register a reader.
	Options	Configure the optional settings of the Web Multi Monitor.
(3)	Move to another function.	

12-2 Details of Web Navigator

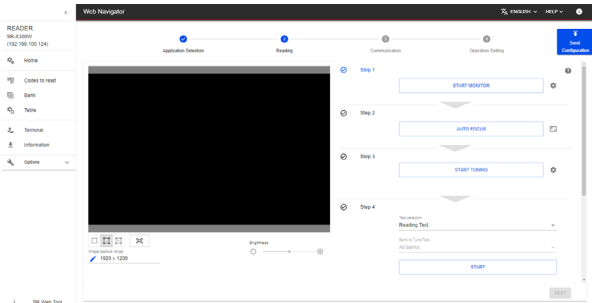
Use the Web browser to configure the settings of the SR-X series.

Create New

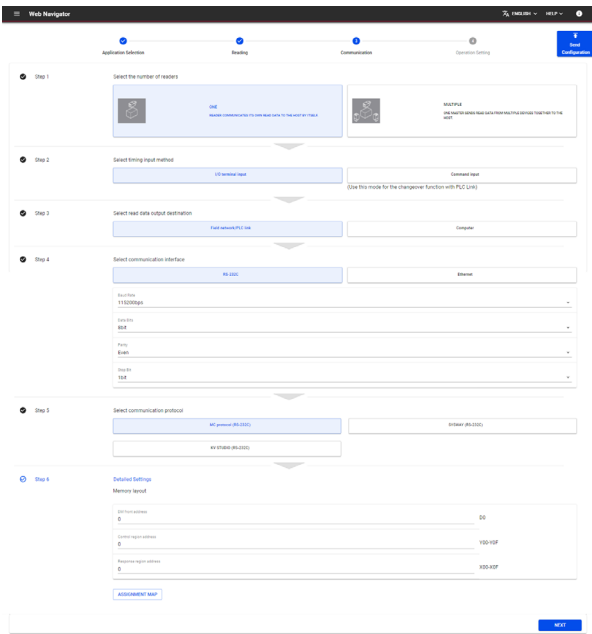
1 Select an application.



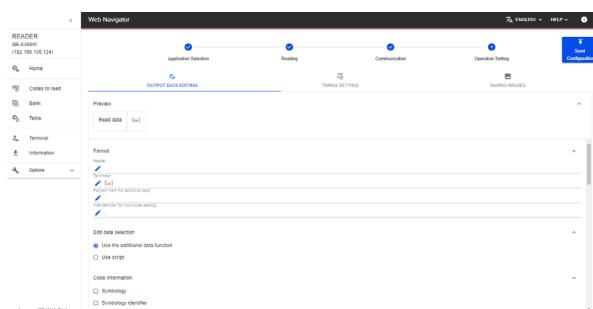
2 Configure the read setting.



3 Select a communication method.

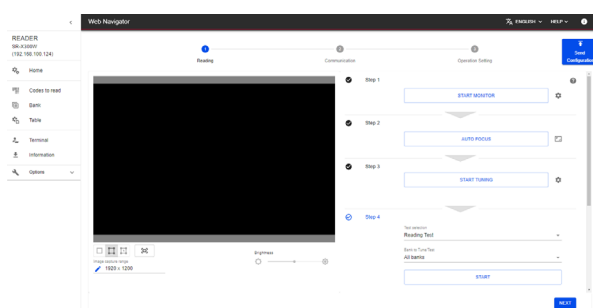


4 Configure the various operation settings.

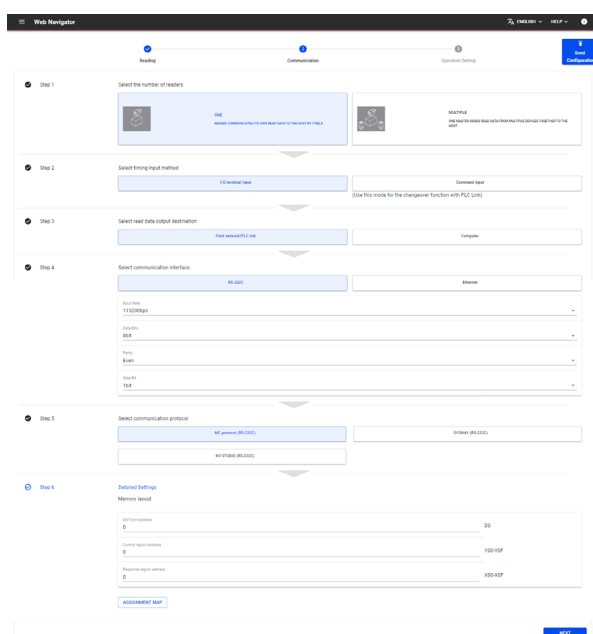


Edit Settings

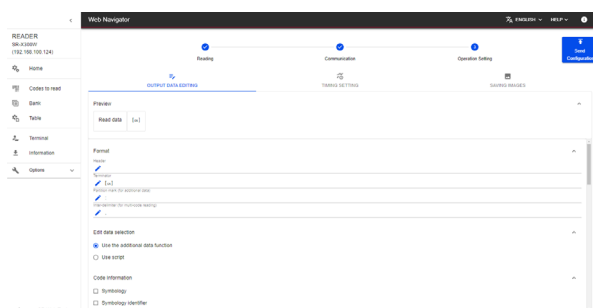
1 Configure the read setting.



2 Select a communication method.



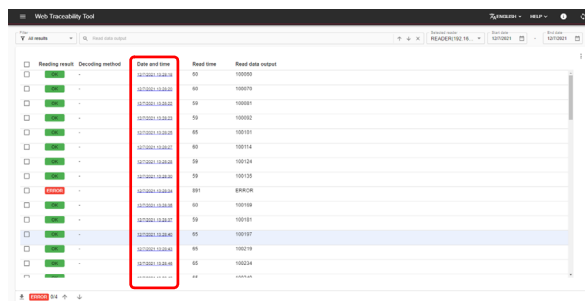
3 Configure the various operation settings.



12-3 Details of Web Traceability Tool

Use a Web browser to check a history of the most recent reading results in the SR-X series.

1 Click the [Date Time] of the data that you wish to check the reading result.

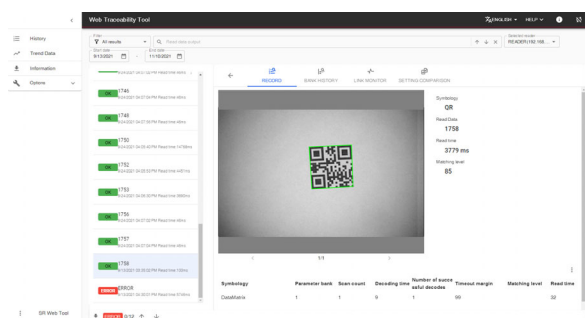


2 Check each type of data.

• [Record] screen

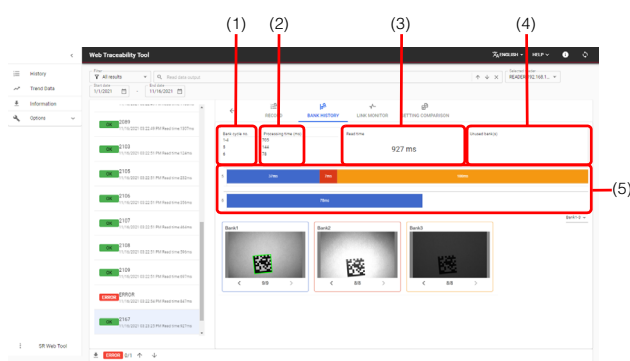
Displays the details of the selected reading result.

Maximum record count	4000
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• [Bank history] screen

Displays the bank details of the selected reading result.

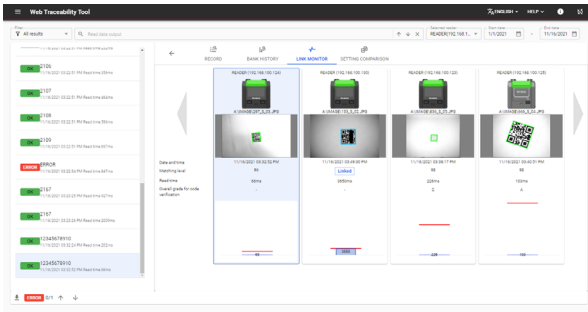


(1)	Displays how many cycles the registered bank has switched.
(2)	Displays the time for every cycle that the registered bank has switched.
(3)	Displays the time required for reading.
(4)	Displays the banks that are not in use, if any, among the registered banks.
(5)	Displays the switching order and time of the registered bank.

● [Link monitor] screen

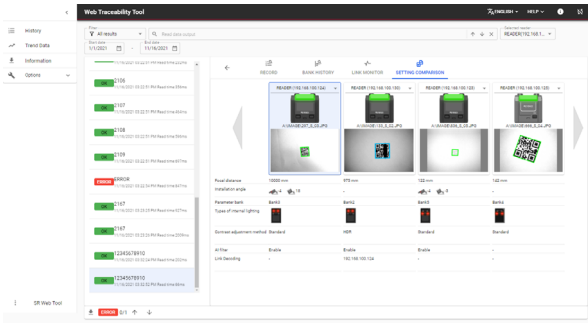
Multiple registered SR-X series can be used to read the same code.
Sort and display multiple SR-X series. Check the details of the selected reading result.

Registration upper limit	16
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● [Setting Comparison] screen

Sort and display multiple SR-X series that have been registered. Check the read setting.



Point

- To sort and display multiple SR-X series,
- At least 1 unit of SR-X300/X300W needs to exist inside the same network.
- The following settings need to be configured in the SR-X300/X300W. [Table] - [SR Web Tool] - [Web Traceability Tool] - [Reader 1 IP address] - [Reader 16 IP address]
- The Web Traceability Tool of the SR-X300/X300W configured as shown above needs to be launched.

For the following combination of settings, data will not be displayed correctly in the Web Traceability Tool.

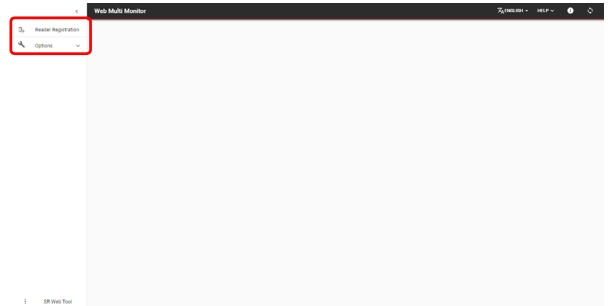
- Advanced Multi-head mode
- Reading Mode: "Continuous"
- Use Reading Mode "Standard".

12-4 Details of Web Multi Monitor

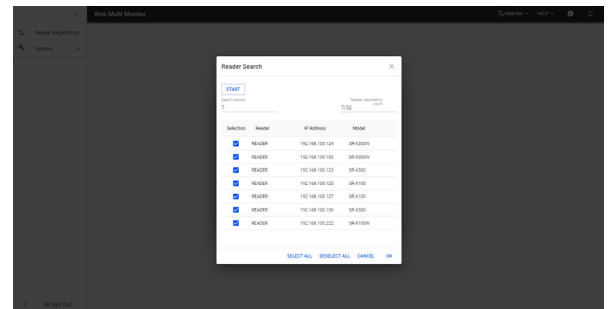
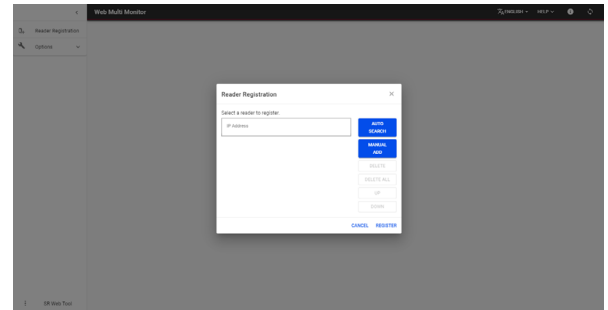
Use a Web browser to check multiple screens of the SR-X series at the same time.

1 Click [Register Reader].

Registration upper limit	32
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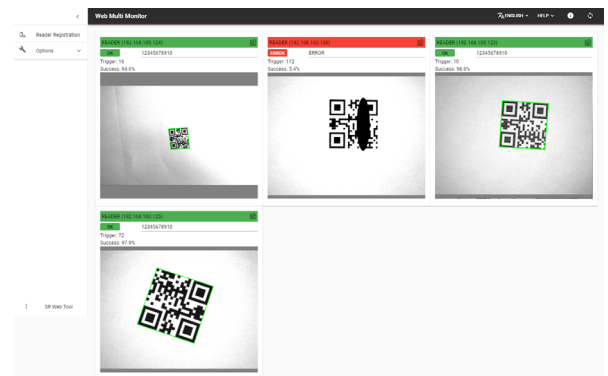


2 Register a reader.



3 Check the screen of the registered reader.

To check the details, click [Details].



13

Serial / Socket Communication

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	UDP Settings	96
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13-1 Serial Communication

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

RS-232C Communication Settings Defaults

Baud Rate	115200bps
Data Bits	8bit
Parity	Even parity
Stop bit length	1bit


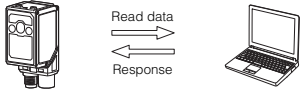

Serial Communication (RS-232C) Settings

- 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-X 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/NAK (0x06/0x15) instead of "PASS" 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

• Precautions for using PASS/RTRY and ACK/NAK

- The SR-X Series can read codes while it is waiting for a response. Data read in this situation is stored in the send buffer.
- The SR-X Series can receive commands while it is waiting for a response.
- A send buffer overflow will occur if the SR-X Series attempts to store more data than its send buffer can hold.

• Send buffer capacity

Send buffer capacity	20 KB
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• Operation when a send buffer overflow occurs

- "E4 BUFFER OVER" is shown on the SR-X Series display.
- ERR BUSY is output.
- All data stored in the buffer is discarded.

• Recovering from a send buffer overflow

- Restart the SR-X Series.
- Send the buffer clear command "BCLR" to the SR-X Series.
- Send the reset command "RESET" to the SR-X Series.
- Send PASS (ACK) to the SR-X Series. If PASS (ACK) is sent to the SR-X Series when a buffer error occurs, the character string "OVER" is output, resulting in an error. Restore the operation by sending the next PASS (ACK).
- If you restart the SR-X Series, send the buffer clear command, or send the reset command it when a buffer overflow has not occurred, all the data in the send buffer will be cleared.

13-2 Socket Communication (TCP, UDP)

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

- TCP
- UDP

Ethernet Communication Settings Defaults

BOOTP state

The following are the default settings when BOOTP is disabled.

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-X Series.
- 3 Start [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 [IP Address] and [Port].
- 8 Exit [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-X Series.
- 3 Start [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 [IP Address] and [Port].
- 8 Exit [Setup Wizard].
- 9 Click [Send Configuration].

Settings During Socket Communication

TCP client connection timing

After reading	TCP communication does not start when power is turned on. After reading, TCP connections are established.
Immediately after power up	TCP communication starts when power is turned on. If TCP communication is not established, try to establish TCP communication at a period of 10 sec.

Keep Alive

This function checks whether the connection established with a remote device is still alive. This is used to discard the old communication session when a half-open connection state is entered.

● 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: If there is no response to the Keep packet, a retry is performed at an interval of 10 sec. If no response is received after 2 retries, the connection is cut off.

14

Command Communication

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14-1 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-X 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.

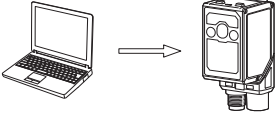
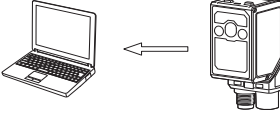
- Operation commands: Commands used to control operations such as reading and tuning.
- Configuration commands: Commands used to change or check the settings.

Command Communication Format

Format

Header	Command	Terminator
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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[CR]

Point

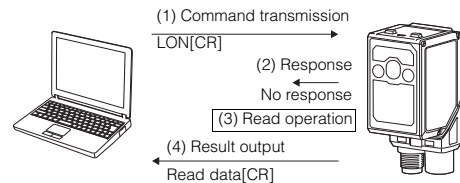
- Commands are sent and received in ASCII code.
- If `[ESC]` is appended at the beginning of the command, `[ESC]` will clear the receive buffer of the SR-X Series. If communication cannot be completed correctly due to the presence of unnecessary characters in the receive buffer of the SR-X Series, append `[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-X Series. If 10 seconds elapse, the SR-X Series will delete all received characters from the buffer.

Command Communication Process

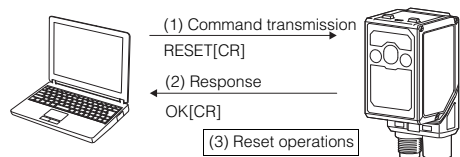
1 The host (PC or PLC) sends a command to the SR-X Series.

The SR-X Series sends a response and operates according to the command.

Example 1) Operation command "LON"



Example 2) Operation command "RESET"



Return of Command Error Code

After receiving a command, if the corresponding processing fails, the SR-X Series returns an error code 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]

Command 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 cannot be received because reader is connected to AutoID Network Navigator.
99	SR-X Series may be faulty. Please contact your nearest KEYENCE sales office.

Point

- 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 [Format], and then set "Basic command response string."
- For the following commands, the response is "OK" if the command is processed successfully or "ER" if an error occurs.
"TUNE," "QUIT," "RESET," and "BCLR"

14-2 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	-
Stop 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* ¹
Start tuning	TUNE,b (TUNEb)	b=01 to 16 Bank number	OK* ²
Finish tuning	TQUIT	-	OK

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

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,ims,00000x00

When tuning fails: Tuning FAILED,ims,00000x0y

t: Tuning time

x: Advice

0: None

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

4: The brightness is insufficient.

y: Failure reason

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 "10-9 Preset Data Comparison" (Page 82).

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

I/O terminal control

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

Checking the reading history

Function	Command name	Parameter	Response
Check the reading history	NUM	-	OK,NUM,a,b,c,d,e 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,SHOT,A:¥IMAGE¥a a: Image file name

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
Obtain the trigger lock status* ²	RLOCK	-	OK,RLOCK,m m:LOCK 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	<u>t</u> *	OK,TMSET
Check the time	TMGET	-	OK,TMGET, <u>t</u> *
* <u>t</u> : YYYY = Year (4 bytes) MM = Month (2 bytes) DD = Day (2 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	SCPTIME	-	OK,SCPTIME, now= <u>A</u> us, max= <u>B</u> us, min= <u>C</u> us <u>A</u> : The execution time of the immediately previous script <u>B</u> : The maximum processing time <u>C</u> : The minimum processing time
Script debugging	SCPDBG,n	<u>n</u> =0: Debuggi ng off 1: Debuggi ng on	OK,SCPDBG
Obtain the script error	SCPERR	-	OK,SCPERR, <u>m</u> <u>m</u> : Error character string
Obtain the script version	SCPVER	-	OK,SCPVER, <u>m</u> , <u>n</u> <u>m</u> : Script library version <u>n</u> : 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, <u>x</u> , <u>y</u> <u>x</u> = SR-X100, SR-X300: Model <u>y</u> : Version
Obtain the command status	CMDSTAT	-	OK,CMDSTAT, <u>m</u> <u>m</u> = none: No processing wait: Wait for setting application update: Updating
Obtain the MAC address	EMAC	-	OK,EMAC, <u>n</u> <u>n</u> = MAC address (12 bytes)
Obtain the error status	ERRSTAT	-	OK,ERRSTAT, <u>m</u> <u>m</u> = none: No error system: System error update: Update error cfg: Set value error ip: IP address duplication over: Buffer overflow plc: PLC link error profinet: PROFINET error lua: Script error hostconnect:Host connection error
Obtain the BUSY status	BUSYSTAT	-	OK,BUSYSTAT, <u>m</u> <u>m</u> = 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,n	<u>n</u> : 1 - 256 (SR-X300/X300W) <u>n</u> : 1 - 8 (SR-X100/X100W) (config1.ptc - config256.ptc)	OK,BSAVE

Function	Command name	Parameter	Response
Load backup settings	BLOAD,n	<u>n</u> : 1 - 256 (SR-X300/X300W) <u>n</u> : 1 - 8 (SR-X100/X100W) (config1.ptc - config256.ptc)	OK,BLOAD
Copy bank configuration	BCOPY,m,n	<u>m</u> : Copy source <u>n</u> : Copy destination	OK,BCOPY
Set the calibration brightness value	VCALIB,m	<u>m</u> =1:Polarized light 2:Direct light 3:Diffused light (SR-X300/ X300W only)	OK,VCALIB*1

*1 Executing this command will output the result in the following formats.
 Success:VCALIB SUCCEEDED,m,n
 Failure:VCALIB FAILED,m,n
n:Calibration brightness

14-3 SR-X Series Configuration Commands

Configuration Commands

The following six types of configuration commands are available.

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

- Point**
- 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-X 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 changes

Send command		WB,b _m ,n
Response	Successful	OK,WB
	Error	ER,WB,ee

● Settings confirmation

Send command		RB,b _m
Response	Successful	OK,RB,n
	Error	ER,RB,ee

b: Parameter bank (01-16)

m: Command number, n: Setting

ee: Error code

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

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

Configuration confirmation	Send command	RB,01100
	Response (Normal process)	OK,RB,0300

Bank name

Function	Command number	Setting value	Explanation	Default
Bank name	625	aaaa...	ASCII setting (max. 32 characters)	

Scan condition setting

Function	Command number	Setting value	Explanation	Default
Lighting	Internal lighting use	000	0: Do not use 1: Use	1
	External lighting use	004	0: Do not use 1: Use	0
Type of internal lighting		010	0: Direct light 1: Polarized light 2: Diffused light (SR-X300/X300W only)	0
Scanning	Exposure time	100	12 to 10000	1535
	Gain	101	0 to 50	10
Contrast adjustment method		108	0: Standard 1: HDR 2: HDR2 3: Contrast zoom	0
AI filter		519	0: Disable 1: Enable	1

Function	Command number	Setting value	Explanation	Default
Contrast threshold correction		506	0: Disable 1: Enable	0
Filter setting	1st filter type	200	0 to 7 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	1 to 7 Specify with count	1
	2nd filter count	211		
	3rd filter count	212		
	4th filter count	213		

Code settings

Function	Command number	Setting value	Explanation	Default
Code type	300	1 to 11FFFF	Specify codes using bit assignment and set as HEX values 1st bit: QR 2nd bit: Data Matrix 3rd bit: PDF417 (microPDF 417) 4th bit: MaxiCode 5th bit: GS1 DataBar(RSS) 6th bit: CODE 39 (Trioptic CODE 39) 7th bit: ITF 8th bit: 2 of 5 9th bit: NW-7 (Codebar) 10th bit: JAN/EAN/UPC 11th bit: CODE 128 12th bit: COOP 2 of 5 13th bit: CODE 93 14th bit: CC-A/B (GS1 DataBar) 15th bit: CC-A/B (EAN/UPC) 16th bit: CC-A/B/C (GS-128) 17th bit: Postal 18th bit: Pharmacode 20th bit: DotCode 21st bit: Aztec Code	11FFFF
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		7089
Starting index of output	309	1 to 7089		1
ECI output	310	0,1	0: Disable 1: Enable	0
QR code length limitation method	700	0,1	0: Specify range 1: Specify value	0
QR code length limitation value specification	701	a:b:c:d:e	a: 0 (Disable), 1 to 7089 b: 0 (Disable), 1 to 7089 c: 0 (Disable), 1 to 7089 d: 0 (Disable), 1 to 7089 e: 0 (Disable), 1 to 7089	0:0:0:0:0
QR code setting	321	1 to 7089	Maximum read length	7089
	322	1 to 7089	Minimum read length	1
QR code version settings	Model 1	0000 to 3FFF	Specifies version 1 to 14 with bit assign and set with HEX.	3FFF
	Model 2 (1 - 20) specification	00000 to FFFFF	Specifies version 1 to 20 with bit assign and set with HEX.	FFFFF
	Model 2 (21 - 40) specification	00000 to FFFFF	Specifies version 21 to 40 with bit assign and set with HEX.	FFFFF
	Micro QR (M1 - M4)	0 to F	Specifies version M1 to M4 with bit assign and set with HEX.	F
Grid correction	500	0, 1	0: Disable 1: Enable 2: Automatic	2
DataMatrix length limitation method	702	0,1	0: Specify range 1: Specify value	0
DataMatrix length limitation value specification	703	a:b:c:d:e	a: 0 (Disable), 1 to 3116 b: 0 (Disable), 1 to 3116 c: 0 (Disable), 1 to 3116 d: 0 (Disable), 1 to 3116 e: 0 (Disable), 1 to 3116	0:0:0:0:0
Data Matrix setting	323	1 to 3116	Maximum read length	3116
	324	1 to 3116	Minimum read length	1

Function	Command number	Setting value	Explanation	Default
Specify the reading target size of DataMatrix code	410	0000000 to 3FFFFFFF	Specifies the code size of DataMatrix code with bit assign and set with HEX. ■Square 1st bit: 10x10 2nd bit: 12x12 3rd bit: 14x14 4th bit: 16x16 5th bit: 18x18 6th bit: 20x20 7th bit: 22x22 8th bit: 24x24 9th bit: 26x26 10th bit: 32x32 11th bit: 36x36 12th bit: 40x40 13th bit: 44x44 14th bit: 48x48 15th bit: 52x52 16th bit: 64x64 17th bit: 72x72 18th bit: 80x80 19th bit: 88x88 20th bit: 96x96 21st bit: 104x104 22nd bit: 120x120 23rd bit: 132x132 24th bit: 144x144 ■Rectangle 25th bit: 8x18 26th bit: 8x32 27th bit: 12x26 28th bit: 12x36 29th bit: 16x36 30th bit: 16x48	3FFFFFFF
DMRE code reading target size specification	820	0 to 3FFFF	Specify the code size of DMRE code using bit assignment and set as HEX values 1st bit: 8x48 2nd bit: 8x64 3rd bit: 8x80 4th bit: 8x96 5th bit: 8x120 6th bit: 8x144 7th bit: 12x64 8th bit: 12x88 9th bit: 16x64 10th bit: 20x36 11th bit: 20x44 12th bit: 20x64 13th bit: 22x48 14th bit: 24x48 15th bit: 24x64 16th bit: 26x40 17th bit: 26x48 18th bit: 26x64	0
PDF417 length limitation method	704	0.1	0: Specify range 1: Specify value	0
PDF417 length limitation value specification	705	a:b:c:d:e	a: 0 (Disable), 1 to 2710 b: 0 (Disable), 1 to 2710 c: 0 (Disable), 1 to 2710 d: 0 (Disable), 1 to 2710 e: 0 (Disable), 1 to 2710	0:0:0:0:0
PDF417 settings	420	1 to 3	PDF417 read code type settings 1: PDF417 only 2: MicroPDF only 3: PDF417 and MicroPDF	3
	325	1 to 2710	Maximum read length	2710
	326	1 to 2710	Minimum read length	1
	658	2 to 8	Number of decode matches	2
MaxiCode length limitation method	734	0.1	0: Specify range 1: Specify value	0
MaxiCode length limitation value specification	735	a:b:c:d:e	a: 0 (Disable), 1 to 138 b: 0 (Disable), 1 to 138 c: 0 (Disable), 1 to 138 d: 0 (Disable), 1 to 138 e: 0 (Disable), 1 to 138	0:0:0:0:0
MaxiCode settings	475	1 to 138	Maximum read length	138
	476	1 to 138	Minimum read length	1
GS1 DataBar length limitation method	706	0.1	0: Specify range 1: Specify value	0
GS1 DataBar length limitation value specification	707	a:b:c:d:e	a: 0 (Disable), 1 to 77 b: 0 (Disable), 1 to 77 c: 0 (Disable), 1 to 77 d: 0 (Disable), 1 to 77 e: 0 (Disable), 1 to 77	0:0:0:0:0





Function	Command number	Setting value	Explanation	Default
GS1 DataBar settings	327	1 to 77	Maximum read length	77
	328	1 to 77	Minimum read length	1
	659	2 to 8	Number of decode matches	2
	681	0 to 11	Limited right space ratio	4
	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
CODE39 length limitation method	708	0.1	0: Specify range 1: Specify value	0
CODE39 length limitation value specification	709	a:b:c:d:e	a: 0 (Disable), 3 to 50 b: 0 (Disable), 3 to 50 c: 0 (Disable), 3 to 50 d: 0 (Disable), 3 to 50 e: 0 (Disable), 3 to 50	0:0:0:0:0
CODE39 settings	329	3 to 50	Maximum read length	50
	330	3 to 50	Minimum read length	3
	660	2 to 8	Number of decode matches	2
	682	1 to 11	Quiet zone ratio	4
	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 length limitation method	710	0.1	0: Specify range 1: Specify value	0
ITF length limitation value specification	711	a:b:c:d:e	a: 0 (Disable), 2 to 50 b: 0 (Disable), 2 to 50 c: 0 (Disable), 2 to 50 d: 0 (Disable), 2 to 50 e: 0 (Disable), 2 to 50	0:0:0:0:0
ITF settings	331	2 to 50	Maximum read length	50
	332	2 to 50	Minimum read length	6
	661	2 to 8	Number of decode matches	3
	683	1 to 11	Quiet zone ratio	5
	385	0.1	Inspect check-digit 0: Disable 1: Enable	0
2of5 settings	386	0.1	Send check-digit 0: Disable 1: Enable	1
	712	0.1	0: Specify range 1: Specify value	0
2of5 length limitation value specification	713	a:b:c:d:e	a: 0 (Disable), 1 to 50 b: 0 (Disable), 1 to 50 c: 0 (Disable), 1 to 50 d: 0 (Disable), 1 to 50 e: 0 (Disable), 1 to 50	0:0:0:0:0
2 of 5 settings	333	1 to 50	Maximum read length	50
	334	1 to 50	Minimum read length	4
	662	2 to 8	Number of decode matches	3
	684	1 to 11	Quiet zone ratio	4
NW7 (CodaBar) length limitation method	714	0.1	0: Specify range 1: Specify value	0
NW7 (CodaBar) length limitation value specification	715	a:b:c:d:e	a: 0 (Disable), 3 to 50 b: 0 (Disable), 3 to 50 c: 0 (Disable), 3 to 50 d: 0 (Disable), 3 to 50 e: 0 (Disable), 3 to 50	0:0:0:0:0

Function	Command number	Setting value	Explanation	Default
NW-7 (Codabar) settings	335	3 to 50	Maximum read length	50
	336	3 to 50	Minimum read length	4
	663	2 to 8	Number of decode matches	2
	685	1 to 11	Quiet zone ratio	5
	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	664	2 to 8	Number of decode matches	2
	686	1 to 11	Quiet zone ratio	3
	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
	358	0.1	GTIN compatible 14-digit output 0: Disable 1: Enable	0
CODE128 length limitation method	716	0.1	0: Specify range 1: Specify value	0
CODE128 length limitation value specification	717	a:b:c:d:e	a: 0 (Disable), 1 to 100 b: 0 (Disable), 1 to 100 c: 0 (Disable), 1 to 100 d: 0 (Disable), 1 to 100 e: 0 (Disable), 1 to 100	0:0:0:0:0
CODE128 settings	337	1 to 100	Maximum read length	100
	338	1 to 100	Minimum read length	1
	665	2 to 8	Number of decode matches	2
	687	1 to 11	Quiet zone ratio	3
	366	0.1	GS1-128 0 : Disable 1 : Enable	1
COOP 2of5 length limitation method	718	0.1	0: Specify range 1: Specify value	0
COOP 2of5 length limitation value specification	719	a:b:c:d:e	a: 0 (Disable), 1 to 50 b: 0 (Disable), 1 to 50 c: 0 (Disable), 1 to 50 d: 0 (Disable), 1 to 50 e: 0 (Disable), 1 to 50	0:0:0:0:0
COOP 2 of 5 settings	339	1 to 50	Maximum read length	50
	340	1 to 50	Minimum read length	4
	666	2 to 8	Number of decode matches	3
	688	1 to 11	Quiet zone ratio	4
CODE93 length limitation method	720	0.1	0: Specify range 1: Specify value	0
CODE93 length limitation value specification	721	a:b:c:d:e	a: 0 (Disable), 1 to 50 b: 0 (Disable), 1 to 50 c: 0 (Disable), 1 to 50 d: 0 (Disable), 1 to 50 e: 0 (Disable), 1 to 50	0:0:0:0:0

Function	Command number	Setting value	Explanation	Default
CODE 93 settings	341	1 to 50	Maximum read length	50
	342	1 to 50	Minimum read length	1
	667	2 to 8	Number of decode matches	2
	689	1 to 11	Quiet zone ratio	4
GS1 composite CC-A/B (GS1 DataBar) length limitation method	722	0.1	0: Specify range 1: Specify value	0
GS1 composite CC-A/B (GS1 DataBar) length limitation value specification	723	a:b:c:d:e	a: 0 (Disable), 1 to 338 b: 0 (Disable), 1 to 338 c: 0 (Disable), 1 to 338 d: 0 (Disable), 1 to 338 e: 0 (Disable), 1 to 338	0:0:0:0:0
GS1 composite CC-A/B (GS1 DataBar) settings	343	1 to 338	Maximum read length	338
	344	1 to 338	Minimum read length	1
GS1 composite CC-A/B (EAN/UPC) length limitation method	724	0.1	0: Specify range 1: Specify value	0
GS1 composite CC-A/B (EAN/UPC) length limitation value specification	725	a:b:c:d:e	a: 0 (Disable), 1 to 338 b: 0 (Disable), 1 to 338 c: 0 (Disable), 1 to 338 d: 0 (Disable), 1 to 338 e: 0 (Disable), 1 to 338	0:0:0:0:0
GS1 composite CC-A/B (EAN/UPC) settings	345	1 to 338	Maximum read length	338
	346	1 to 338	Minimum read length	1
GS1 composite CC-A/B (GS1-128) length limitation method	726	0.1	0: Specify range 1: Specify value	0
GS1 composite CC-A/B (GS1-128) length limitation value specification	727	a:b:c:d:e	a: 0 (Disable), 1 to 2361 b: 0 (Disable), 1 to 2361 c: 0 (Disable), 1 to 2361 d: 0 (Disable), 1 to 2361 e: 0 (Disable), 1 to 2361	0:0:0:0:0
GS1 composite CC-A/B/ C (GS1-128) settings	347	1 to 2361	Maximum read length	2361
	348	1 to 2361	Minimum read length	1
CC-A/B/C (GS1-128) reading	437	0.1	CC-C code reading 0: Disable 1: Enable	1
Postal length limitation method	728	0.1	0: Specify range 1: Specify value	0
Postal length limitation value specification	729	a:b:c:d:e	a: 0 (Disable), 1 to 31 b: 0 (Disable), 1 to 31 c: 0 (Disable), 1 to 31 d: 0 (Disable), 1 to 31 e: 0 (Disable), 1 to 31	0:0:0:0:0
Postal settings	447	1 to 31	Maximum read length	31
	448	1 to 31	Minimum read length	1
	446	0.1	Japan Postal code reading 0: Disable 1: Enable	1
	443	0.1	Intelligent Mail Barcode 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
Pharmacode settings	669	2 to 8	Number of decode matches	2
	690	1 to 11	Quiet zone ratio	9
	530	0 to 3	Read direction 0: Left to right 1: Right to left 2: Downward 3: Upward	0
	442	0.1	Output in binary format 0: Disable 1: Enable	0
DotCode length limitation method	730	0.1	0: Specify range 1: Specify value	0
DotCode length limitation value specification	731	a:b:c:d:e	a: 0 (Disable), 1 to 1124 b: 0 (Disable), 1 to 1124 c: 0 (Disable), 1 to 1124 d: 0 (Disable), 1 to 1124 e: 0 (Disable), 1 to 1124	0:0:0:0:0
DotCode	460	1 to 1124	Maximum read length	1124
	461	1 to 1124	Minimum read length	1
	462	5 to 124	Number of rows (maximum)	124
	463	5 to 124	Number of rows (minimum)	6
	464	5 to 124	Number of columns (maximum)	124
	465	5 to 124	Number of columns (minimum)	6
Aztec Code length limitation method	732	0.1	0: Specify range 1: Specify value	0
Aztec Code length limitation value specification	733	a:b:c:d:e	a: 0 (Disable), 1 to 3832 b: 0 (Disable), 1 to 3832 c: 0 (Disable), 1 to 3832 d: 0 (Disable), 1 to 3832 e: 0 (Disable), 1 to 3832	0:0:0:0:0

Function	Command number	Setting value	Explanation	Default
Aztec Code settings	470	1 to 3832	Maximum read length	3832
	471	1 to 3832	Minimum read length	1

Reading operation settings

Function	Command number	Setting value	Explanation	Default
Alternate	600	0, 1	0: Disable 1: Enable	0
Internal bank retry count	601	0 to 32		0
Decode timeout duration	602	1 to 1000	Specify in units of 10 ms	10
Region number specification	604	0 to 128	Specifies the region number for decoding 0: Entire region 1 to 128: Region number	0
Inverse	605	0 to 2	0: Disable 1: Enable 2: Automatic	0
Reverse	606	0 to 2	0: Disable 1: Enable 2: Automatic	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 \pm Tilt angle range will be enabled.	180
Code orientation (1D)	613	0 to F	Allows reads in the following orientations. First bit:  Second bit:  Third bit:  Fourth bit: 	F

Function	Command number	Setting value	Explanation	Default
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
MaxiCode settings	1924	1 to 138	Maximum read length	138
	1925	1 to 138	Minimum read length	1
GS1 DataBar settings	0500	1 to 77	Maximum read length	77
	0501	1 to 77	Minimum read length	1
	0502	0 to 11	GS1 DataBar Limited right quiet zone scale factor setting	4
	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	3 to 50	Maximum read length	50
	0601	3 to 50	Minimum read length	3
	0602	1 to 11	Quiet zone ratio	4
	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
ITF settings	0607	0.1	Full ASCII conversion [*] 0: Disable 1: Enable	0
	0700	2 to 50	Maximum read length	50
	0701	2 to 50	Minimum read length	2
	0702	1 to 11	Quiet zone ratio	5
NW-7 (Codabar) settings	0703	0.1	Inspect check-digit 0: Disable 1: Enable	0
	0704	0.1	Send check-digit 0: Disable 1: Enable	1
NW-7 (Codabar) settings	0900	3 to 50	Maximum read length	50
	0901	3 to 50	Minimum read length	3
	0902	1 to 11	Quiet zone ratio	5
	0903	0.1	Send start/stop characters 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
	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

Tuning Code Setting Command Format (WC/RC)

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

Configuration changes

Send command		WC,m,n
Response	Successful	OK,WC
	Error	ER,WC,ee

Settings confirmation

Send command		RC,m
Response	Successful	OK,RC,n
	Error	ER,RC,ee

m: Command number, n: Setting

ee: Error code

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	1 to 7089	Maximum read length	7089
	0101	1 to 7089	Minimum read length	1
DataMatrix code settings	0200	1 to 3116	Maximum read length	3116
	0201	1 to 3116	Minimum read length	1
	1926	0,1	DMRE read	1

Function	Command number	Setting value	Explanation	Default
JAN/EAN/UPC settings	1002	1 to 11	Quiet zone ratio	3
	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
	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
CODE128	1100	1 to 100	Maximum read length	100
	1101	1 to 100	Minimum read length	1
	1102	1 to 11	Quiet zone ratio	3
	1103	0.1	GS1-128 0: Disable 1: Enable	1
2 of 5 (Industrial 2of5) settings	0800	1 to 50	Maximum read length	50
	0801	1 to 50	Minimum read length	1
	0802	1 to 11	Quiet zone ratio	4
COOP 2 of 5 settings	1200	1 to 50	Maximum read length	50
	1201	1 to 50	Minimum read length	1
	1202	1 to 11	Quiet zone ratio	4
CODE 93 settings	1300	1 to 50	Maximum read length	50
	1301	1 to 50	Minimum read length	1
	1302	1 to 11	Quiet zone ratio	4
Postal settings	1909	1 to 31	Maximum read length	31
	1910	1 to 31	Minimum read length	1
	1908	0.1	Japan Postal code reading 0: Disable 1: Enable	1
	1905	0.1	Intelligent Mail Barcode reading 0: Disable 1: Enable	1
	1920	1 to 1124	Maximum read length	1124
DotCode	1921	1 to 1124	Minimum read length	1
	1800	2 to 16	Maximum number of bars	16
Pharmacode settings	1801	2 to 16	Minimum number of bars	9
	1802	1 to 11	Quiet zone ratio	9
	1803	0 to 3	Code direction 0: Left to right 1: Right to left 2: Downward 3: Upward	0
	1805	0.1	Binary output 0: Disable 1: Enable	0
	1903	1 to 3832	Maximum read length	3832
Aztec Code settings	1904	1 to 3832	Minimum read length	1

* 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.
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Operation Configuration Commands (WP/RP)

Operation configuration command is sent in the following format:

● Configuration changes

Send command		WP,m,n
Response	Successful	OK,WP
	Error	ER,WP,ee

● Settings confirmation

Send command		RP,m
Response	Successful	OK,RP,n
	Error	ER,RP,ee

m: Command number, n: Setting

ee: Error code

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

IN terminal settings

Function	Command number	Setting value	Explanation	Default
IN1 terminal function	000	0 to 20	0: Disable 1: Trigger input (start and stop) 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 9: Timing input start 10: Timing input stop 14: Command replacement 15: Data output	1
				0
IN1 terminal test mode assignment	002	1 to 2	1: Reading rate test 2: Tact test	1
IN2 terminal test mode assignment	003			1
Bank to assign to the IN1 terminal captured image	004	1 to 16	Bank number	1
Bank to assign to the IN2 terminal captured image	005			1
IN1 terminal input at power-on	006	0, 1	0: Disable 1: Enable	0
IN2 terminal input at power-on	007	0, 1	0: Disable 1: Enable	0
IN1 terminal Input polarity	040	0.1	0: Normal open point 1: Normal close point	0
IN2 terminal Input polarity	041	0.1	0: Normal open point 1: Normal close point	0
IN1 terminal input pulse width	043	0 to 2	0: 1 ms 1: 2 ms 2: 10 ms	0
IN2 terminal input pulse width	044	0 to 2	0: 1 ms 1: 2 ms 2: 10 ms	0

OUT terminal settings

Function	Command number	Setting value	Explanation	Default
OUT1 terminal function	020	0 to 65536	0: Disable 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 16384: READY 32768: Trigger overrun error 65536: Heartbeat signal	1
OUT2 terminal function	021			4
OUT3 terminal function	022			480
BUSY output on startup	024	0, 1	0: Disable 1: Enable	1
Output duration	025	1 to 255	Specify in units of 10 ms	50
OUT1 terminal Input polarity	050	0, 1	0: Normal open point 1: Normal close point	0
OUT2 terminal Input polarity	051	0, 1	0: Normal open point 1: Normal close point	0
OUT3 terminal Input polarity	052	0, 1	0: Normal open point 1: Normal close point	0
Heartbeat send interval (sec)	027	1 to 600		30

*1 EXT.LIGHT can be assigned only to the OUT3 terminal.

Timing mode settings


Function	Command number	Setting value	Explanation	Default
Test mode on startup	100	0 to 2	0: None 1: Reading rate test 2: Read time test	0
Timing mode	101	0, 1	0: Level trigger 1: One-shot trigger	0
One-shot trigger duration	102	3 to 2550	Specify in units of 10 ms	100
Trigger input ON command character string	103	hhhhhhh h...	Specify up to 32 characters (16 HEX bytes) from HEX (0x00 to 0xFF).	4C4F4E (LON)
Trigger input OFF command character string	104	hhhhhhh h...	Specify up to 32 characters (16 HEX bytes) from HEX (0x00 to 0xFF).	4C4F4646 (LOFF)
Trigger input ON/OFF recognition with one character	105	0, 1	0: Disable 1: Enable *1	0
Trigger on delay (x 1 ms)	106	0 to 2550	Specified in increments of 1 ms	0
Trigger off delay (x 1 ms)	107	0 to 2550	Specified in increments of 1 ms	0

*1 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	q
2	STX	DC2	*	2			b	r
3	ETX	DC3		3			c	s
4	EOT	DC4	\$	4			d	t
5	ENQ			5			e	u
6		SYN	&	6			f	v
7	BEL	ETB		7			g	w
8	BS	CAN	(	8			h	x
9	HT	EM	)	9			i	y
A		SUB	*	:			j	z
B	VT		+	:		[	k	{
C	CL	FS	,	<		\	l	|
D		GS	-	=		]	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.

Reading behavior settings

Function	Command number	Setting value	Explanation	Default
Reading mode setting	200	0 to 4	0: Standard 1: Continuous 3: Burst read 4: Script	0
Data transmission	201	0, 1	0: Send after read 1: Send after timing off	0
Standard duplicate reading prevention	239	0 to 2	0: Reset by time 1: Reset by time or another code 2: Do not prevent	2
Duplicate reading prevention buffer	247	0, 1	0: Disable 1: Enable	0
Duplicate reading prevention buffer release time	296	0 to 255	Specify by the 100 ms	0
Duplicate reading prevention interval	202	0 to 255	Specify by the 100 ms	10
Specifying alternate order	204	0, 1	0: Order of parameter bank number 1: Begin with successful bank	1
Read error character string	205	hhhhhhh h...	Specify a maximum of 32 characters (HEX 16 bytes) with HEX (0x00 to 0xFF). Set FF if error codes are not output.	4552524F52 (ERROR)
Matching level OK/NG judgment	206	0, 1	0: Not use 1: Enable	0
Matching level threshold	207	0 to 99		70
Automatic pointer lighting setting	209	0 to 2	0: Do not light automatically 1: Light automatically 2: Only light when capturing images	1
Capture interval	208	0 to 255	Specified in increments of 1 ms	0
Capture count	210	1 to 32	Capture count	32
Shorten bank transition	214	0, 1	0: Disable 1: Enable 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.	1
Image capture range specification	215	abcd	Depends on the model. • The number of pixels in the x direction must be a multiple of 4. The number of pixels in the y direction must be a multiple of 4. • "a" and "b" are multiples of 4. Example) If a = 0000 and c = 0319, the number of dots is 320, which is a multiple of 4. (a, b)  (c, d)	*2
Code reading per area	241	0, 1	0: Disable 1: Enable	1
Multiple reading operations of the same code type/data	243	0 to 2	0: Disable 1: Allow the same code within the same capture 2: Allow the same code separated by specified interval or more	0
Specified interval	246	1 to 1000000	Specify by pixel	100
Trigger overrun string	361	hhhhh...	Specify a maximum of 32 characters (HEX 16 bytes) with HEX (0x00 to 0xFF).	4F5645525 2554E (OVERRUN)
Trigger overrun output	362	0, 1	0: Disable 1: Enable	0

*2 Image capture range specification

	SR-X300/X300W	SR-X100/X100W
a	0000-1919	0000-1359
b	0000-1199	0000-1023
c	0000-1919	0000-1359
d	0000-1199	0000-1023
Default	0000000019191199	0000000013591023

Settings for the number of read codes

Function	Command number	Setting value	Explanation	Default
Codes to read	250	1 to 128	-	1
Allow reduced detection count	251	0, 1	0: Do not allow 1: Allow	0

Maximum number of read codes

Function	Command number	Setting value	Explanation	Default
QR	252	1 to 128	-	128
DataMatrix	253	1 to 128	-	128
PDF417 (micro PDF)	254	1 to 128	-	128
MaxiCode	452	1 to 128	-	128
GS1 DataBar	255	1 to 128	-	128
CODE39	256	1 to 128	-	128
ITF	257	1 to 128	-	128
2of5	258	1 to 128	-	128
NW-7 (Codabar)	259	1 to 128	-	128
JAN/EAN/UPC	260	1 to 128	-	128
CODE128	261	1 to 128	-	128
COOP2of5	262	1 to 128	-	128
CODE93	263	1 to 128	-	128
CC-A/B (GS1 DataBar)	264	1 to 64	-	64
CC-A/B (EAN/UPC)	265	1 to 64	-	64
CC-A/B (GS1 128)	266	1 to 64	-	64
Postal	269	1 to 128	-	128
Pharmacode	267	1 to 128	-	128
DotCode	278	1 to 10	-	10
Aztec Code	451	1 to 128	-	128

Output data order settings

Function	Command number	Setting value	Explanation	Default
Code type number order priority	270	1 to 6	Priority = 1 (high), Priority = 6 (low) ^{*1}	2
Scanning order priority	271			3
Code center X coordinate priority	272			4
Code center Y coordinate priority	273			5
Region priority	274			1
Code digits priority	275			6
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
Region sequence setting	284			0
Code digits sequence setting	285			0
Multiple-code output format	290	0 to 2	0: Standard 1: Per bank 2: Per area ^{*2}	0
Code type number sequence setting	286	-	01: QR 02: DM 03: PDF417 (Micro PDF) 04: MaxiCode 05: GS1DataBar(RSS) 06: CODE39(Trioptic CODE 39) 07: ITF 08: 2of5 09: NW7(Codebar) 0A: JAN/EAN/UPC 0B: CODE128 0C: COOP2of5 0D: CODE93 0E: CC-A/B(GS1 DataBar) 0F: CC-A/B(EAN/UPC) 10: CC-A/B/C(GS-128) 11: Postal 12: Pharmacode 13: Reserved 14: DotCode 15: Aztec Code	010203040 506070809 0A0B0C0D 0E0F1011 12131415

*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 > region > number of code digits.

*2 Read data is output in ascending order of the bank number or the region number. Error codes are output for banks that were not read successfully.

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
Decoding time	304	0, 1	0: Do not append 1: Append	0
Number of successful decodes	370	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
File name appending (full path display)	313	0, 1	0: Do not append 1: Append	0
Add region number	318	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
Angle (skew/pitch) addition	371	0, 1	0: Do not append 1: Append	0
Data edit function (Data edit by script)	360	0, 1	0: Disable 1: Enable	0
Script data output to 2 destinations	365	0 to 63	0: Disable 1: RS-232C 2: Ethernet (Server) 4: Ethernet (Client 1) 8: Ethernet (Client 2) 16: FTP data 32: PLC (EtherNet/IP, PROFINET, PLC Link)	0

Preset data comparison settings

Function	Command number	Setting value	Explanation	Default
Number of verification start digits	400	1 to 7089		1
Number of verification digits	401	0 to 494	Maximum value for sequential value verification = 9	494
Preset data registration	402	hhhhhhhh...	Up to 494 characters (HEX 988 bytes) can be specified from HEX (0x00 to 0xFF). 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 6	0: Disable 1: Save to RAM	0
Saving destination of verification NG images	501		2: Save to ROM (SR-X300/X300W only)	1
Saving destination of read error images	502		3: Send by FTP 4: Save USB (SR-X100/X100W only)	1
Saving destination of unstable images	503		5: Save ROM + send FTP (SR-X300/X300W only)	1
Saving destination of capture images	504	1 to 6	6: Save USB + send FTP (SR-X100/X100W only)	1
Image saving mode	505	0 to 4	0: Latest bank image 1: Specified number of images after trigger input ON 2: Specified number of images after trigger input OFF 3: Specified number of images after trigger input ON (intermittent operation) 4: Specified number of images after trigger input OFF (intermittent operation)	0
Intermittent operation interval (x10 ms)	514	2 to 300		20
Specify the number of images to save from trigger input ON/OFF	506	1 to 32		32
Image save priority	530	0.1	0: Prioritize saving images 1: Prioritize reading operation	1
Image saving continuation	458	0.1	0: Disable 1: Enable	0
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.	5
Binning	513	0,1,3,4	0: Full 1: 1/4 3: 1/16 4: 1/64	0

Other settings

Function	Command number	Setting value	Explanation	Default
Output data with ENTER button	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	0 to 999		0
Data filling character	604	hh	Specify 1 character (2 HEX characters) from HEX (0x00 to 0x7F)	20
Composite delimiter	605	hhhhhhh .	Specify up to 5 characters (10 HEX bytes) from HEX (0x00 to 0x7F).	FF
Silent Mode	606	0 to 255	0: Not set 1: Verification OK, Read OK 2: Verification NG 4: Read ERROR 32: Preset result 64: Test Mode 128: Tuning Specify the setting by sum of the values of the items.	0
Reader name	607	hhhhhhh...	Specify up to 32 characters (64 HEX bytes) from UNICODE (UTF-16 BigEndian). FFFF: Not set	005200450 041004400 450052 (READER)
Reader description 1	620	sssss...	Specify up to 32 characters with ASCII codes (Characters that can be specified: 0x20 to 0x7E)	(Not set)
Reader description 2	621			
Reader description 3	622			
Reader description 4	623			
Trigger command response string	610	0 to 4	0: Not specified 1: Detailed response 2: User setting 3: Echo back 4: Command replacement	0

Function	Command number	Setting value	Explanation	Default
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 (SR-X300/X300W only)	615	0, 1	0: Do not rotate 1: 180 degrees rotation	0
Presentation mode	616	0 to 3	0: Disable 1: Polarized light 2: Direct light 3: Diffused light (SR-X300/X300W only)	0
Status LED lighting	721	0.1	0: Disable 1: Enable	1
LiveView display image	900	0, 1	0: Before image filter 1: After image filter	1
LiveView display rotation	901	0, 1	0: Do not rotate 1: 180 degrees rotation	0
Write BLOAD to ROM	630	0, 1	0: Disable 1: Enable	0

Tuning options

Function	Command number	Setting value	Explanation	Default
Exposure time	802	15 to 10000	Exposure time (μs)	10000
Image filter	805	0, 1	0: Disable 1: Enable	0
Allow reduced detection count while tuning	806	0, 1	0: Do not allow 1: Allow	1
Type of internal lighting	811	0 to 2	0: Direct light 1: Polarized light 2: Diffused light (SR-X300/X300W only)	1
Automatic adjustment of internal lighting	812	0, 1	0: Disable ^{*1} 1: Enable	1
Code search	813	0, 1	0: Do not limit 1: Limit	1
Bank number for tuning from the main unit (SR-X100/X100W only)	816	0 to 16	Parameter bank	16
Tuning target code	820	1 to 11FFFF	Specify codes using bit assignment and set as HEX values 1st bit: QR 2nd bit: Data Matrix 3rd bit: PDF417 (microPDF 417) 4th bit: MaxiCode 5th bit: GS1 DataBar(RSS) 6th bit: CODE 39 (Trioptic CODE 39) 7th bit: ITF 8th bit: 2 of 5 9th bit: NW-7 (Codebar) 10th bit: JAN/EAN/UPC 11th bit: CODE 128 12th bit: COOP 2 of 5 13th bit: CODE 93 14th bit: CC-A/B (GS1 DataBar) 15th bit: CC-A/B (EAN/UPC) 16th bit: CC-A/B/C (GS-128) 17th bit: Postal 18th bit: Pharmacode 20th bit: DotCode 21st bit: Aztec Code	11FFFF
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
Contrast adjustment method	825	0 to 3	0: Standard 1: HDR 2: HDR2 3: Contrast zoom	0
Auto contrast adjustment	826	0, 1	0: Disable 1: Enable	1

*1 "0: Enable" mode. Execute tuning under the conditions set in WP,811

Code quality verification function

Function	Command Number	Setting value	Explanation	Default
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/IEC 15415 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
Execution of ISO/IEC 15416 verification	234	0 to 3F	0: Not set 1: GS1-128 2: GS1 DataBar Limited 4: GS1 DataBar Stacked 8: CC-A(GS1-DataBar Limited) 16: CC-A(GS1-DataBar Stacked) 32: All code types 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
Threshold for ISO/IEC 15416 verification result	235	0 to 4	0: Disable 1: D 2: C 3: B 4: A	0
ISO/IEC 16022 code quality verification execution	236	0, 1	0 : Disable 1 : Enable	0
ISO/IEC 16022 code quality verification execution	237	0 to 4	0: Disable 1: D 2: C 3: B 4: A	0
ISO/IEC 15415 code quality verification result appending setting	340	0, 1	0: Do not append 1: Append	0
ISO/IEC TR 29158 (AIM DPM-1-2006) code quality verification result appending setting	341	0, 1	0: Do not append 1: Append	0
SAE AS9132 code quality verification result appending setting	342	0, 1	0: Do not append 1: Append	0
SEMI T10-0701 code quality verification result appending setting	343	0, 1	0: Do not append 1: Append	0
Japanese pharmaceutical code quality verification result appending setting	344	0, 1	0: Do not append 1: Append	0
ISO/IEC 16022 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
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

Code quality verification calibration

Function	Command Number	Setting value	Explanation	Default
Code verification calibration	890	0 to 3	0 : Disable 1 : Polarized light 2 : Direct light 3 : Diffused light (SR-X300/X300W only)	0
Calibration brightness (Polarized light)	891	0 to 125	-	40
Calibration brightness (Direct light)	892	0 to 125	-	40
Calibration brightness (Diffused light) (SR-X300/X300W only)	893	0 to 125	-	40

Region Configuration Commands (WD/RD)

Send region configuration commands in the following format.

Configuration changes

Send command		WD,m,n
Response	Successful	OK,WD
	Error	ER,WD,ee

Settings confirmation

Send command		RD,m
Response	Successful	OK,RD,n
	Error	ER,RD,ee

m : Command number, n: Setting

ee : Error code

Region configuration commands

Function	Command number	Setting value	Explanation	Default
Region	001 to 128	abcd	*1 • Minimum size: 96 dot x 96 dot (a, b) (c, d)	0000000000000000

*1

	SR-X300/X300W	SR-X100/X100W
a	0000-1919	0000-1359
b	0000-1199	0000-1023
c	0000-1919	0000-1359
d	0000-1199	0000-1023
Default	0000000019191199	0000000013591023

The command number represents the region number.

Example) Configuring the region corresponding to region number 2 to (a,b)=(0,0) and (c,d)=(239,239):

Configuration change	Send command	WD,002,0000000002390239
	Response (Normal process)	OK,WD

Configuration confirmation	Send command	RD,002
	Response (Normal process)	OK,RD,0000000002390239

Communication Configuration Commands (WN/RN)

Communication configuration command is sent in the following format:

Configuration changes

Send command		WN,m,n
Response	Successful	OK,WN
	Error	ER,WN,ee

Settings confirmation

Send command		RN,m
Response	Successful	OK,RN,n
	Error	ER,WN,ee

m : Command number, n: Setting

ee: Error code

Example) Changing SR-X Series IP address to "192.168.100.1"

Configuration change	Send command	WN,200,192.168.100.1
	Response (Normal process)	OK,WN

Configuration confirmation	Send command	RN,200
	Response (Normal process)	OK,RN,192.168.100.1



To change and apply the communication configuration, make sure to send a SAVE command.

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	105	0 to 4	0: Disable 1: 600 bps 2: 1200 bps 3: 2400 bps 4: 4800 bps	0
Baud rate setting	100	0 to 4	0: 9600 bps 1: 19200 bps 2: 38400 bps 3: 57600 bps 4: 115200 bps	4
Data length setting	101	0, 1	0: 7 bit 1: 8 bit	1
Parity check setting	102	0 to 2	0: Disable 1: Even 2: Odd	1
Stop bit length setting	103	0, 1	0: 1 bit 1: 2 bit	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
Heartbeat send	111	0, 1	0: Do not send 1: Send	0

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	23, 1024 to 65535 *1	-	9004
Login authentication	220	0, 1	0: Disable 1: Enable	0
User name	221	aaaa...	ASCII setting (max. 32 characters)	admin
Password	222	aaaa...	ASCII setting (max. 32 characters)	
Ethernet data (server) setting	205	0, 1	0: Not used 1 : TCP	1
Ethernet data (server) standby port number	206	23, 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

Function	Command number	Setting value	Explanation	Default
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
TCP client connection timing	213	0, 1	0: After reading 1: Immediately after power up	0
Keep alive setting	214	0, 1	0: Disable 1: Enable	1
Host connection error due to client connection failure	215	0, 1	0: Disable 1: Enable	0
Heartbeat send Ethernet data (server)	225	0, 1	0: Do not send 1: Send	0
Heartbeat send Ethernet data (client)	226	0, 1	0: Do not send 1: Send	0
RNDIS	120	0, 1	0: Not used 1: Used	0

*1 You cannot specify 9013, 9014, 9015, 9016, 9017, 9018, 9020, 5900, 5920, or 44818.

Heartbeat settings

Function	Command number	Setting value	Explanation	Default
Heartbeat send interval (sec)	230	1 to 600		30
Reset heartbeat send interval at data transmission	231	0, 1	0: Do not reset 1: Reset	1
Heartbeat string	232	hhhhh...	Specify a maximum of 32 characters (HEX 16 bytes) with HEX (0x00 to 0x7F).	486561727 442656174 (HeartBeat)
Heartbeat header	233	hhhhh...	Specify a maximum of 5 characters (HEX 16 bytes) with HEX (0x00 to 0x7F).	FF
Heartbeat terminator	234	hhhhh...	Specify a maximum of 5 characters (HEX 16 bytes) with HEX (0x00 to 0x7F).	0D

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 TCP 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 65534 SYSWAY: 0 to 65534 KV: 0 to 65534		0
Control region address	305	MC: 0 to 599 SYSWAY: 0 to 6143 KV: 1 to 599		0
Response region address	306	MC: 0 to 599 SYSWAY: 0 to 6143 KV: 1 to 599		0
Output length	307	1 to 1000	1000 * Set the upper limit of writing length.	64

Function	Command number	Setting value	Explanation	Default
PLC link timing input	308	0, 1	0: Disable 1: Enable	0
Bit Monitoring Period	309	1 to 99	by the 10 ms	10
Retry interval (sec)	310	1 to 10	by the second	5
Generate PLC link error when a PLC link failure occurs	334	0, 1	0: Disable 1: Enable	1
EtherNet/IP data handshake setting	321	0, 1	0: Do not handshake 1: Handshake	0
EtherNet/IP Input assembly data size setting	322	40 to 1400	by 1	500
EtherNet/IP Output assembly data size setting	323	4 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-abcde cannot be the name of the first label. abcde 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-x1h3h
PROFINET handshake	331	0, 1	0: Do not handshake 1: Handshake	0

FTP communication settings

- Image transmission

Function	Command number	Setting value	Explanation	Default
IP address of the connection destination Remote FTP server IP	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
Subfolder	403	0, 1	0: Disable 1: Enable	0
Subfolder name	404	aaaa...	ASCII setting (max. 32 characters)	image
FTP connection timing	405	1 to 2	0: After reading 1: Immediately after power-up 2: Always disconnect after reading + data transmission	0
Passive mode	408	0, 1	0: Disable 1: Enable	0
Host connection error when image storage failed	409	0.1	0: Disable 1: Enable	0

- FTP transmission of read data

Function	Command number	Setting value	Explanation	Default
FTP transmission of Send by FTP	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 setting (max. 16 characters)	admin
Password	423		ASCII setting (max. 16 characters)	admin
Subfolder	424	0.1	0: Disable 1: Enable	0
Subfolder name	425		ASCII setting (max. 32 characters)	data
FTP connection timing	426	0.1	0: After reading 1: Immediately after power-up	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
Host connection error due to client connection failure	432	0.1	0: Disable 1: Enable	0

- FTP folder settings

Function	Command number	Setting value	Explanation	Default
Subfolder name setting method	411	0.1	0: Manual 1: Auto	0
FTP history data transmission	412	0.1	0: Disable 1: Enable	0

Master/slave function

Function	Command number	Setting value	Explanation	Default
Master/Slave operation configuration	500	0 to 3	0: Disable 1: Multi drop link 3: Advanced Multi-head	0
Master/Slave ID during operation	501	0 to 31	If 0 is set, it operates as Master.	0
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

SR Web Tool settings

Function		Command number	Setting value	Explanation	Default
SR Web Tool		530	0,1	0: Disable 1: Enable	1
Password authentication		535	0,1	0: Disable 1: Enable	0
Port number		536	80, 1024 to 65535		80
Administrator	Username	560	ssssss...	Specify up to 12 characters with ASCII codes (Characters that can be specified:0x20 to 0x7E)	admin
	Password	561	ssssss...	Specify up to 12 characters with ASCII codes (Characters that can be specified:0x20 to 0x7E)	admin
User 1	Username	562	ssssss...	Specify up to 12 characters with ASCII codes (Characters that can be specified:0x20 to 0x7E)	(No setting)
	Password	563	ssssss...	Specify up to 12 characters with ASCII codes (Characters that can be specified:0x20 to 0x7E)	(No setting)
	Available applications	564	0 to 7	Specify Application using bit assignment and set as HEX values 1st bit: Web Multi Monitor 2nd bit: Web Traceability Tool 3rd bit: Web Navigator	0
User 2	Username	565	ssssss...	Specify up to 12 characters with ASCII codes (Characters that can be specified:0x20 to 0x7E)	(No setting)
	Password	566	ssssss...	Specify up to 12 characters with ASCII codes (Characters that can be specified:0x20 to 0x7E)	(No setting)
	Available applications	567	0 to 7	Specify Application using bit assignment and set as HEX values 1st bit: Web Multi Monitor 2nd bit: Web Traceability Tool 3rd bit: Web Navigator	0

Function		Command number	Setting value	Explanation	Default
User 3	Username	568	ssssss...	Specify up to 12 characters with ASCII codes (Characters that can be specified:0x20 to 0x7E)	(No setting)
	Password	569	ssssss...	Specify up to 12 characters with ASCII codes (Characters that can be specified:0x20 to 0x7E)	(No setting)
	Available applications	570	0 to 7	Specify Application using bit assignment and set as HEX values 1st bit: Web Multi Monitor 2nd bit: Web Traceability Tool 3rd bit: Web Navigator	0
User 4	Username	571	ssssss...	Specify up to 12 characters with ASCII codes (Characters that can be specified:0x20 to 0x7E)	(No setting)
	Password	572	ssssss...	Specify up to 12 characters with ASCII codes (Characters that can be specified:0x20 to 0x7E)	(No setting)
	Available applications	573	0 to 7	Specify Application using bit assignment and set as HEX values 1st bit: Web Multi Monitor 2nd bit: Web Traceability Tool 3rd bit: Web Navigator	0

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	0-32 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

VNC settings

Function	Command number	Setting value	Explanation	Default
VNC server	550	0, 1	0: Disable 1: Enable	1

Security settings

Function	Command number	Setting value	Explanation	Default
AI-NET connection	010	0, 1	0: Enable 1: Disable	0
SFTP	440	0, 1	0: Disable 1: Enable	0
SFTP Remote port	441	1 to 65535		22
FTP Remote port	442	1 to 65535		21
HTTPS	538	0, 1	0: Disable 1: Enable	0
HTTPS Remote port	536	1 to 65535		80

Setting/Confirmation Command Batch Transmission (WA/RA)

The SR-X Series has a dedicated command for batch transmission of multiple setting/confirmation commands (WB/RB, WC/RC, WD/RD, WP/RP, WN/RN). Use this to reduce the number of setting commands to send.

Batch transmission command format

● Configuration changes

Send command	WA, [command1] [command2] ...
Response	Successful OK, WA
Error	ER, WA, <u>n</u> , <u>ec</u> , <u>ee</u>

● Settings confirmation

Send command	RA, [command1] [command2] ...
Response	Successful OK, RA, [Response of command1] [Response of command2] ...
Error	ER, RA, <u>n</u> , <u>ec</u> , <u>ee</u>

n: Number of command with error (beginning with 1)

ec: Type of command with error, ee: Error code

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.

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 commands

● Configuration changes

Send command	B, <u>b</u> , <u>m</u> , <u>n</u>
--------------	-----------------------------------

● Settings confirmation

Send command	B, <u>b</u> , <u>m</u>
Response	Successful B, <u>b</u> , <u>n</u>

b: Parameter bank (01-16)

m: Command number, n: Setting

Tuning configuration command

● Configuration changes

Send command	C, <u>m</u> , <u>n</u>
--------------	------------------------

● Settings confirmation

Send command	C, <u>m</u>
Response	Successful C, <u>n</u>

m: Command number, n: Setting

Region configuration commands

● Configuration changes

Send command	D, <u>m</u> , <u>n</u>
--------------	------------------------

● Settings confirmation

Send command	D, <u>m</u>
Response	Successful D, <u>n</u>

m: Command number, n: Setting

Operation configuration command

● Configuration changes

Send command	P, <u>m</u> , <u>n</u>
--------------	------------------------

● Settings confirmation

Send command	P, <u>m</u>
Response	Successful P, <u>n</u>

m: Command number, n: Setting

Communication command

● Configuration changes

Send command	N, <u>m</u> , <u>n</u>
--------------	------------------------

● Settings confirmation

Send command	N, <u>m</u>
Response	Successful N, <u>n</u>

m: Command number, n: Setting

[Ex.] Sending of WB and WP commands together

Configuration change	Send command	WA, B, 01700, 2, P, 200, 0, P, 201, 1
	Response (Normal process)	OK, WA

Configuration confirmation	Send command	RA, B, 01700, P, 200, P, 201
	Response (Normal process)	OK, RA, B, 2, P, 0, P, 1

15

PLC Link

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15-1 PLC Link Overview

PLC Link

The PLC link enables the SR-X 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-X 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 changeover function can be used through the PLC link. The following restrictions are imposed regarding the use of the PLC link:

- You cannot use the PLC link to change the SR-X 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 1000. (Default output data length is 64 digits.)
- No header and terminator are output.

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/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-CIF01/11/12
	Serial communication unit	CJ1W-SCU□□(-V1)
	Communication board	CS1-SUB□□-V1

* A serial option board is necessary, depending on the model.

Ethernet

KEYENCE

Series name	Connection method	Model
KV Series	CPU built-in port	KV-5000/5500/7500/8000
	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 R04/08/16/32/120CPU iQ-F FX5U
	Ethernet unit	QJ71E71-100/-B5/-B2

OMRON

Series name	Connection method	Model
SYSMAC Series	CPU built-in port	CJ2M-CPU3 Series

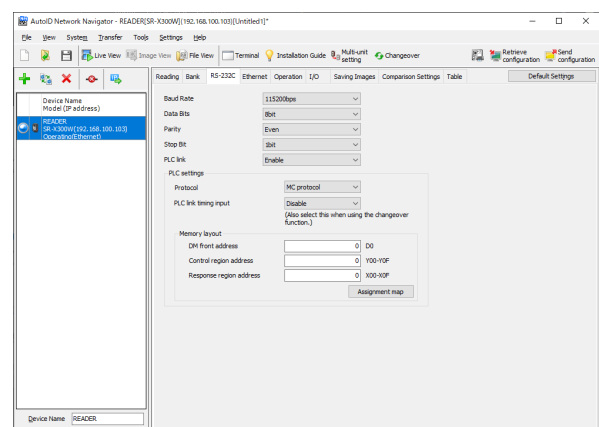
15-2 Settings

We have prepared information regarding connecting PLCs to the SR Series. Download the information from the KEYENCE website.

SR-X 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 [Protocol].
- 5 Set [PLC link timing input] to "Enable."
 - * This is not necessary when you are using the IN1 terminal of the SR-X 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-X Series.
- 3 Start [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 [IP Address] and [Port].
- 8 Exit [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/CS flow control	Disable

*1 To use the port 2, 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

● 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	8bit
Parity bit	Present
Odd/even parity	Odd (o)
Stop bit length	1bit
Checksum code	Present
Writing during RUN	Allowed
Configuration change	Allowed
Communication rate configuration	9600bps
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)

Communication data code configuration	Binary code communication
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-X Series must be specified in decimal number while the Q Series port number with Ethernet module installed is specified in hexadecimal number.

Example)

Hexadecimal number	⇒	Decimal number
232C		9004

● 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 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

Point

When using MELSEC, ASCII code communication cannot be used for the communication data code configuration.

SYSMAC Series

● RS-232C

Set communication conditions with the CX-Programmer.

● CPU built-in port

PLC system configuration→Upper link port (serial port)

Communication configuration	User setting
Baud rate	9600bit/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	7bit
Stop bit	2bit
Parity	Even
Transmission rate	9600bps
CTS control	None
Upper link ID No.	0

Ethernet

Set communication conditions with the 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-X Series.

*2 Specify the IP address of the SR-X 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 Y599F ^{*2}
	Response region	Output device	X0 to X599F ^{*2}
	Data region	Data register	D0 to D65534
SYSMAC Series	Control region	CIO, internal auxiliary relay	0 to 6143ch
	Response region	relay	
	Data region	Data memory	D0 to D65534

- 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.

	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
1																
2																
3																
4																
5																

← Front address

15-3 Memory Maps

To use the SR-X Series over the PLC link, the functions of the SR-X Series need to be assigned to the PLC devices. For the SR-X 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-X Series
Data region	Device used to write the reading result data of the SR-X Series*

* It is also used to 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.

Address	Description	Data description	SR-X 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 "m" 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.

Reference: m=1-8 (SR-X100/X100W), 1-256 (SR-X300/X300W)

Response region

When the response region address B is specified, functions are assigned in order as shown below starting with the specified beginning address.

Address	Description	Data description	SR-X 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 (single/advanced multi-head)

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-X Write	PLC Write
D+00	Read bank instruction/ BLOAD file number (single/master only)	0: Do not specify bank (Alternate) 1 to 16: Specify bank n 1 to 256 (SR-X300/X300W): BLOAD file number 1 to 8 (SR-X100/X100W): BLOAD file number		✓
D+01	Reserved area			
D+02	Output data length	Length of data (read data + append data) output from the SR-X Series	✓	
D+03	Data writing process count	The count of read data written to the PLC from the SR-X Series.*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+503	999th and 1000th digits of output data*4	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-X Series depends on the data output length set in the SR-X Series. (Default: 64 digits, Maximum value with up to 1,000 digits)
0-byte data is output as data with a length of 0.

 Point	<ul style="list-style-type: none"> If output data cannot fit in the output data region, starting with that digit, the remaining data will be discarded. The output data length of SR-X is written in the data length of D+02.
--	---

Data region (used with multi-drop)

When you use the multi-drop function, the following functions are assigned.

Address	Description	Data description	SR-X Write	PLC Write
D+00	Read bank instruction/ 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. 0 to 31: ID		✓
D+02	Output data length	Previously output data length	✓	
D+03	Data writing process count	The count of read data written to the PLC from the SR-X Series.*1	✓	
D+04 to D+53	1st to 100th digits of output data*4	Read data of ID: 0*2*3	✓	ID:0
D+54	Data writing ID	ID of the reader to which the most recent data was written	✓	
D+55	Trigger input count for the master unit (ID: 0)	Trigger input count for ID: 0	✓	?
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*4	Read data of ID: 2*2*3	✓	ID:2
....				
D+1560 to D+1609	1st to 100th digits of output data*4	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-X Series depends on the data output length set in the SR-X Series. (Default: 64 digits, Maximum value with up to 100 digits)
0-byte data is output as data with a length of 0.

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-X Series starts reading.
B+00: When the SR-X 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" or "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-X 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-X Series writes read data into "D+04 to D+503."
When this bit is set to OFF (0), the SR-X 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 to specify banks of the SR-X Series.

Address	Description	Data description	Data format
D+00	Specify read bank	0: Bank not specified (alternate) 1 to 16: 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

Address	Description	Data description	Data format
D+02	Output data length	Length of data output from the SR-X Series	Binary code

Output data

Address	Description	Data description	Data format
D+04 to D+503	Output data	2 characters of ASCII code/ address *1 *2 *3	ASCII code

Point

- If "A+00" is switched between ON and OFF at high speed, the SR-X 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-X 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-X Series.
- The SR-X 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+503." (This is a send buffer overflow.)
- When a send buffer overflow occurs, the SR-X 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.

15-4 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 failed
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-X 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+503."
- "A+00" is set to OFF (0).
- When the SR-X 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-X 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-X 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+503."

Example 2) Trigger method: One-shot trigger, Data writing method: Real time processing.

Memory layout	Signal name	Address	When reading is successful	When reading failed
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-X 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+503."
- 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-X 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+503."

Example 3) Trigger method: Level trigger, Data writing method: Sequential processing.

Memory layout	Signal name	Address	When reading is successful	When reading failed
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-X 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+503."
- 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-X 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+503."
- 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+503" 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+503." If necessary, delete the data stored in "D+04 to D+503" after this data is sent.
- Timing with which to transfer the data stored in "D+04 to D+503" 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).

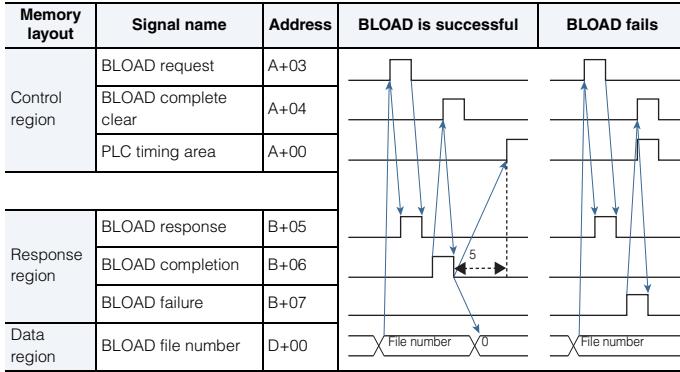
Example 4) Using the changeover function

■ Configuration

Set the Timing Signal Input via PLC Link to On.

Memory layout		
DM front address	<input type="text" value="0"/>	D0
Control region address	<input type="text" value="0"/>	Y00-Y0F
Response region address	<input type="text" value="0"/>	X00-X0F
Assignment map		

■ Timing chart



● 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 the SR-X Series units 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 fails

- 1 D+00 describes the file number in binary.
- 2 A+03 is turned on (1).
- 3 Turn on B+05 (1) to enable the SR-X Series units 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.

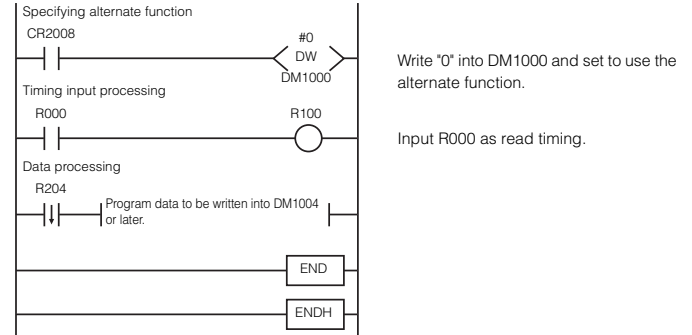
SR-X Series configuration

It is assumed that the SR-X Series is configured as follows:

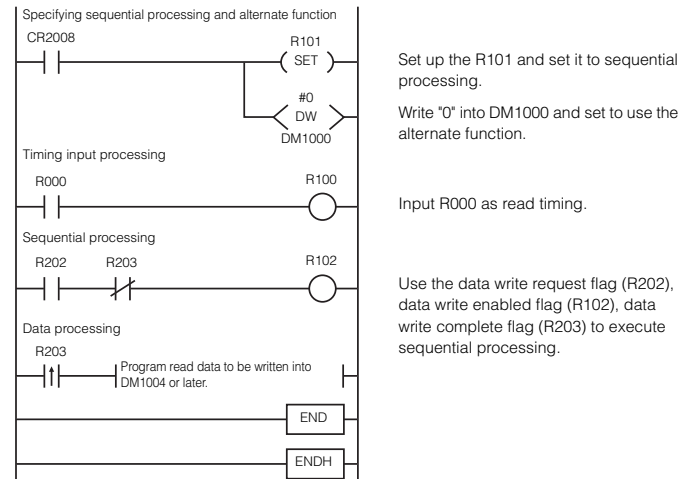
- Timing : Level trigger
- Read mode : Standard
- Memory assignment : DM front address: DM1000
Control region address: R100
Response region address: R200
- PLC link timing input : Yes

* To use on a trial basis, specify the PLC communication interface to the SR-X Series and configure communication for the KV Series.

Real time processing



Sequential processing



15-5 PLC Link Error

When a PLC Link Error Occurs

When a PLC link error occurs, the SR-X Series exhibits the following behavior:

- "E7 PLC LINK" is shown on the SR-X300 Series display.
- For the SR-X100 series, the status LED will flash in yellow.
- "ERR BUSY" is output from the output terminals.
- The status LED flashes in yellow.



Check Points

When a PLC link error occurs, check the following points:

● Wiring

- Is the cable between the SR-X 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-X 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-X Series.
- For the SR-X300/X300W series, press and hold the [SELECT] button on the main unit for 3 sec.
- When "Clear PLC link error" is assigned to IN terminal, turn on the IN terminal.
- Send the clear PLC link error command (PCLR) to the SR-X Series.
- Send the reset command (RESET) to the SR-X 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.

16

EtherNet/IP

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16-1 EtherNet/IP Overview

What Is EtherNet/IP?

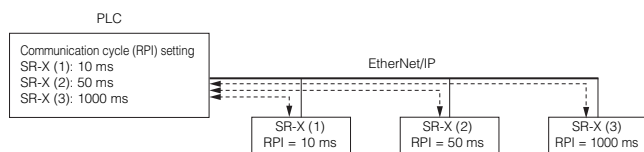
EtherNet/IP is an industrial communications network managed by the ODVA (Open DeviceNet Vendor Association, Inc.). EtherNet/IP communication can share the network with normal Ethernet communication.

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. Typically cyclic communication is used.

Cyclic communication

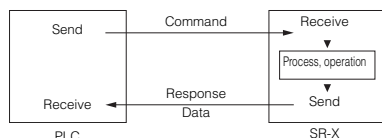
In cyclic communication, RPI (communication cycle) can be set according to the priority of data that is sent and received. Overall communication load adjusted data can be sent and received.



The communication cycle (RPI) put together in order of priority can be set and network load can be adjusted.

Message communication

In message communication, timing is controlled through commands/responses.



SR-X Series EtherNet/IP Communication Specifications

Cyclic communication (Implicit message)	Number of connections	16*	
	Communication size	KEYENCE KV Series	4 to 1444 bytes
		Rockwell Automation ControlLogix CompactLogix	4 to 496 bytes
		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-X 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	Execute 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-X Series software reset.

About the exclusion process

The SR-X 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.

List of Supported PLCs

PLC manufactured by KEYENCE

PLC model	EtherNet/IP Communication unit	Software used
KV-3000	KV-EP21V	KV STUDIO
KV-5000	KV-EP21V	
KV-8000/7500/5500	- (built-in port or KV-EP21V)	
KV-N24/N40/N60/NC32T	KV-NC1-EP	

PLC manufactured by Rockwell Automation

• Control Logix / Compact Logix

PLC model	EtherNet/IP Communication unit	Firmware version	Software used	Version of software used
1756 ControlLogix	1756-ENBT	Ver. 13 or later	RsLogix5000	Ver. 13 or later
1769 CompactLogix	- (built-in)			

• Micro Logix1100/1400

PLC model	EtherNet/IP Communication unit	Firmware version	Software used	Version of software used
1761/1766 MicroLogix	- (built-in port)/1761-NET-ENI	Series A, Revision A, FRN1	RsLogix500	Ver. 7.10 or later
1762/1763/1764 MicroLogix	1761-NET-ENI			

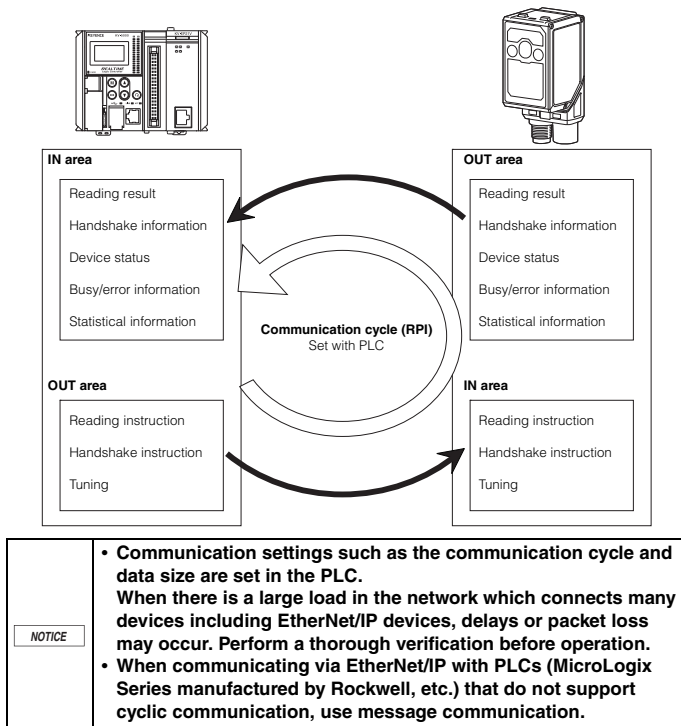
PLC manufactured by OMRON

PLC model	EtherNet/IP Communication unit	Software used
SYSMAC CJ2	- (built-in port or CJ1W-EIP21)	Cx-One
SYSMAC CJ1	CJ1W-EIP21	
SYSMAC CS1	CS1W-EIP21	

16-2 Cyclic Communication

Cyclic Communication

This communication can be used to execute reading or tuning by setting bits to ON or OFF.



PLC Settings

When you use cyclic communication, configure the following settings on the PLC.

(1) Connection settings

(2) 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-X 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-X 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	10-10000
	Control data (Output Assemblies)	0x65 (101)	8 to 1400	
Input Only (Data transmission only)	Result data (Input Assemblies)	0x64 (100)	40 to 1400	10-10000
	Control data (Output Assemblies)	0xFE (254)	0	

Exclusive Owner	<ul style="list-style-type: none">• SR-X -> PLC: Data transmission• PLC -> SR-X: Control instruction
	Use this connection to send data from the SR-X Series and to enable the PLC to send control instructions, such as starting reading, to the SR-X.
Input Only	<ul style="list-style-type: none">• SR-X -> PLC : Data transmission
	Use this connection to only send data from the SR-X Series. You can use multiple connections with a single SR-X Series. (To a maximum of 16 connections.)

Point

- 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-X 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)

KV-8000/7500/5500 Series settings

We have prepared information regarding connecting the KV-8000/7500/5500 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-Developer, make the communication settings of PLC's IP address, etc.

2 Set the EtherNet/IP network configuration for PLC and SR-X.

Using Network Configurator, set the network configuration.

* The EDS file for SR-X is in the EDS folder on disc1 of SR-H8W.

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-X 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-X)	
Input tag set	E0_00000 - [500byte]	Output tag set	Input_100 - [500byte]
Connection type	Multi-cast connection	Input tag set	Output_101 - [500byte]
Output tag set	D00000 - [500byte]		
Connection type	Point to Point connection		

* For operation details of CX-Developer and Network Configurator, refer to "SYS-MAC CS/CJ Series EtherNet/IP Unit User's Manual" published by Omron.

SR-X Series Settings

1 Open the [Ethernet] tab.

2 Enter the [IP address] and [Subnet Mask] settings to assign to the SR-X.

3 Start [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 (send)	Set this to a value that is the maximum amount of read data + 45 bytes or higher. *1
Output assembly data size (receive)	Specify a value of 12 bytes or higher. * 1
Byte swapping	You can change the order in which data is stored in memory (read data or preset data). 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 preset data.

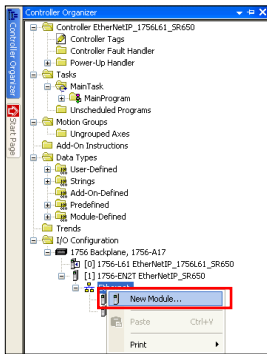
8 Exit [Setup Wizard].

9 Click [Send Configuration].

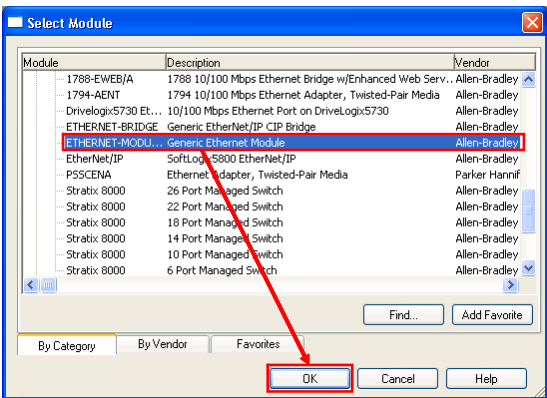
● Control Logix/Compact Logix Series settings

We have prepared information regarding connecting the Control Logix/Compact Logix Series and the SR Series.
Download the information from the KEYENCE website.

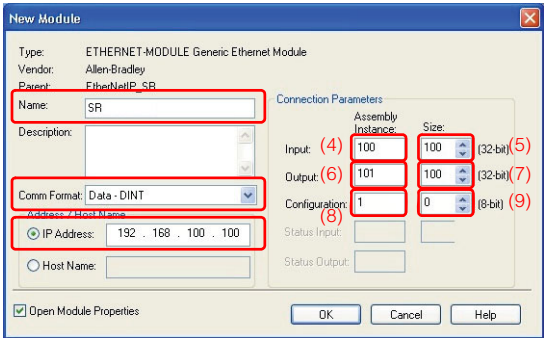
- 1 Right-click the EtherNet/IP enabled device on the RSLogix5000 and select New Module.



- 2 Click the Communications' [+] button, select ETHERNET-MODULE (Generic Ethernet Module), and click OK.



- 3 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-X Series
(4) Input Assembly Instance	100
(5) Input Size	Input assembly size of the SR-X Series ^{*1}
(6) Output Assembly Instance	101 ^{*2}
(7) Output Size	Output assembly size of the SR-X 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-X 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-X 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-X → 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		READY		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 Reading Failure	Preset Reading Failure	Reading Error	External Instruction Operation Complete			BLOAD Complete	Tuning Complete	Preset Data Registration Complete	Preset Reading Complete	Reading Complete
2			ISO/IEC 15416 Unstable	SAE AS9132 Unstable	AIMDPM Unstable	ISO/IEC 15415 Unstable	Matching Level 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	ISO/IEC 15416															
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-X 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-X

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 Registration Start Request	Preset Reading Start Request	Reading Start Request	Error Clear Transmission Buffer Clear					Read Data Update Permitted		
1								External Instruction Operation Complete Clear				BLOAD Complete Clear	Tuning Complete Clear	Preset Data Registration Complete Clear	Preset Reading Complete Clear	Reading Complete Clear
2	Bank Number/BLOAD File Number															
3																
4																
5	Preset Data Size															
6 and above	Preset Data															

* Gray parts are reserved areas for the system.

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 description
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.

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 description
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.

Address 0 Bit 8 to Bit 14 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 description
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
0	14	READY	READY This continues to be ON in non-"BUSY" status.	0: - 1: Ready state

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 description
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 7 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 description
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-X is Norm. open (normally open). For Norm. closed (normally closed), the data is reversed as 0: ON 1: OFF.
- * When checking the writing of read data, do not use OUT1 to 4 statuses, but use the "Reading Complete" bit or "External Instruction Operation Complete" bit. Depending on the communication load, the ON statuses of the OUT terminals and reading completion may not be synchronized.

Address 2 Bit 8 to Bit 13 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) are ON.	0 : Stable 1 : Unstable
2	9	Matching Level Unstable	Matching level judgment result	0 : Stable 1 : Unstable
2	10	ISO/IEC15415 Unstable	ISO/IEC 15415 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
2	13	ISO/IEC 15416 Unstable	ISO/IEC 15416 verification judgment result	0 : Stable 1 : Unstable


* Use this status when the code quality verification function of SR-X is enabled. For the code quality verification function settings, refer to  "10-6 Code Quality Verification" (Page 67).

* 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 7 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																
7																

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/IEC 15415 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
7		ISO/IEC 15416 Grade	Total evaluation grade for ISO/IEC 15416	4 : A ^{*1} 3 : B 2 : C 1 : D 0 : F	UINT

* Use this status when the code quality verification function of SR-X is enabled. For the code quality verification function settings, refer to  "10-6 Code Quality Verification" (Page 67).

*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																
12																
15																
16																

Address	Bit	Name	Description	Data description	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			UNIT
15		External Instruction Operation Error Cause			UINT
16		General Error Cause			UINT

* For error codes, refer to  "List of Error Codes" (Page 128).

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 description	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 description	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-X, 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-X, read data is not output.

* The read data is cleared each time that a code is read.

Address 17, 20 Master/slave

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 description	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

* When the count number reaches 65535 and the next data arrives, the count number returns to 0.

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 description
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-X 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 description
0	8	Read Start Request	The SR-X Series starts reading. *1	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 "m" in "Address 2 Bank number."

Point Exclusive control of reading start/each operation instruction
For reading start/each operation instruction, priority is given to the operation executed first. An error will occur if another operation is executed during operation.

Reference m=1-8 (SR-X100/X100W), 1-256 (SR-X300/X300W)

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 description
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 description	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.	1 to 16: bank number 1 to 256 (SR-X300/X300W): BLOAD file number 1 to 8 (SR-X100/X100W): BLOAD file number	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 description	Data type
5		Preset Data Size	Preset data length	0 to	UINT
6 and above		Preset Data	Preset data is specified. (Terminator is not necessary.)	Preset data	BYTE[]

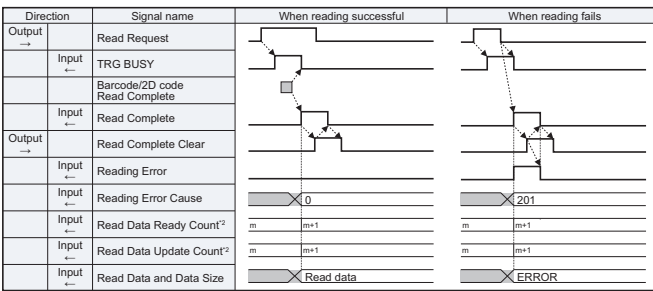
List of Error Codes

Error code	Type of error	Error description
0	No error	-
100 to 199	Command error	Values with 100 added to "14 Command Communication" (Page 97) 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.
112	File number error	The specified file number does not exist.
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-X
Output
: PLC → SR-X



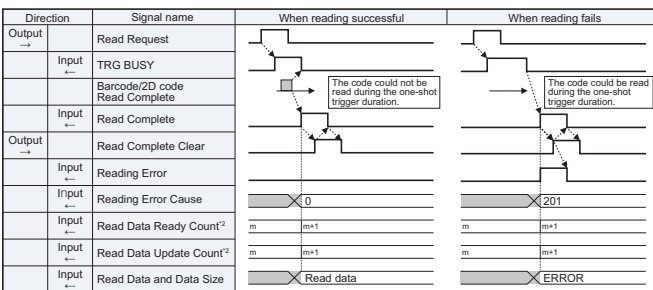
● When reading is successful

- 1 "Read Request" is set to ON (1).
- 2 When "Read Request" is set to ON (1), the SR-X 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-X 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." "201" is written to "Reading Error Cause." "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: Disabled.



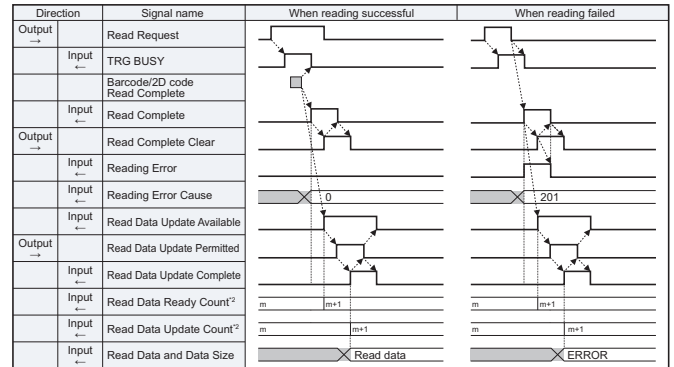
● When reading is successful

- 1 "Read Request" is set to ON (1).
- 2 When "Read Request" is set to ON (1), the SR-X 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-X 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." "201" is written to "Reading Error Cause." "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.



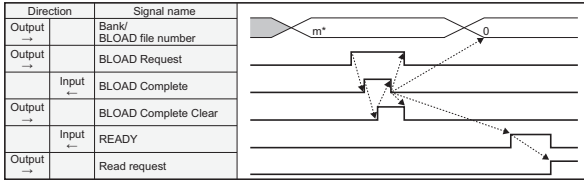
● When reading is successful

- 1 "Read Request" is set to ON (1).
- 2 When "Read Request" is set to ON (1), the SR-X 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-X 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).

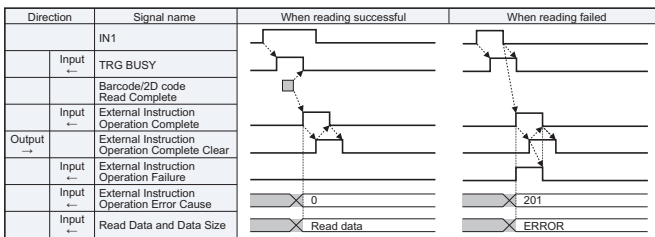
Example 4) Using the changeover function



* m=1-8 (SR-X100/X100W), 1-256 (SR-X300/X300W)

- 1 The file number is added to "Bank/BLOAD File Number."
- 2 "BLOAD Request" is turned on (1), which changes the file number setting and turns on "BLOAD Complete."
- 3 It is confirmed that "BLOAD Complete" is on (1), and then "BLOAD Complete Clear" is turned on (1).
- 4 "BLOAD Complete Clear" is turned on (1), which turns off (0) "BLOAD Complete."
- 5 It is confirmed that "BLOAD Complete" is off (0), and then "BLOAD Request" is turned off (0).
- 6 "Bank/BLOAD File Number" is set to 0.
- 7 It is confirmed that "READY" is on (1), and then "Read Request" is turned on (1).

Example 5) Reading with the IN terminal. IN1: Trigger input, Trigger method: Level trigger, Handshaking: Disabled.



● When reading is successful

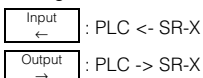
- 1 The signal of the IN terminal is set to ON.
- 2 When the signal of the IN terminal is set to ON, the SR-X Series starts reading, and then "TRG BUSY" is set to ON (1).
- 3 When the code is read, its data is written into "Read data." Then "TRG BUSY" is set to OFF (0), and "External Instruction Operation Complete" is set to ON (1).
- 4 The signal of the IN terminal is set to OFF.
- 5 It is confirmed that "External Instruction Operation Complete" is ON (1), and then "External Instruction Operation Complete Clear" is set to ON (1).
- 6 When "External Instruction Operation Complete Clear" is set to ON (1), "External Instruction Operation Complete" is set to OFF (0).
- 7 It is confirmed that "External Instruction Operation Complete" is OFF (0), and then "External Instruction Operation Complete Clear" is set to OFF (0).

● When reading fails

- 1 The signal of the IN terminal is set to ON.
- 2 When the signal of the IN terminal is set to ON, the SR-X Series starts reading, and then "TRG BUSY" is set to ON (1).
- 3 The signal of the IN terminal is set to OFF (0).
- 4 The code could not be read, so "ERROR" is written to "Read data." "201" is written to "External Instruction Operation Error Cause." Then "TRG BUSY" is set to OFF (0), and "External Instruction Operation Complete" is set to ON (1).
- 5 It is confirmed that "External Instruction Operation Complete" is ON (1), and then "External Instruction Operation Complete Clear" is set to ON (1).
- 6 When "External Instruction Operation Complete Clear" is set to ON (1), "External Instruction Operation Complete" and "External Instruction Operation Failure" are set to OFF (0).
- 7 It is confirmed that "External Instruction Operation Complete" is OFF (0), and then "External Instruction Operation Complete Clear" is set to OFF (0).

Point

- The signal directions are indicated as shown below.



- 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.

- If "Read Request" is set to ON/OFF at high speed while the EtherNet/IP cyclic cycle (RPI) is slow, the SR-X Series may not be able to detect the change between the rising and falling edge of "Read Request."
- The SR-X Series is equipped with a 20KB 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-X Series during handshake processing, even if "Read Data Update Permitted" of the PLC is OFF (0), "Read Data Update Available" of the SR-X Series remains in the ON (1) state.
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).
- If the data stored on the SR-X 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.

NOTICE

16-3 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 adapter device settings.

There are established standard items, as well as device specific items in the objects and services in message communication.

The SR-X Series uses specific objects and services and can perform operations such as parameter reading/writing and resetting.

Reference The SR-X Series message communication function is compatible with UCM (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-X 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-X Series communicate by sending and receiving Explicit messages. When an Explicit message command is sent from the PLC, the SR-X Series sends a response to the PLC.

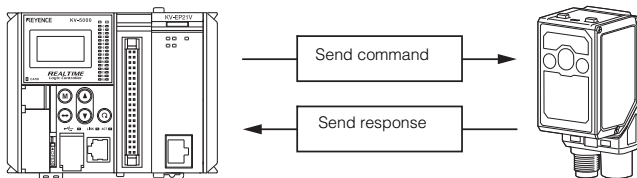
Commands

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-X Series. The SR-X 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	Response
Service code	General status
Class ID	Additional status
Instance ID	Service response data
Attribute ID	
Service 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-X Series Settings

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

- 3 Start [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 (send)	Set this to a value that is the maximum amount of read data + 44 bytes or higher. *1
Output assembly data size (receive)	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 [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-X 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-X Series easier to operate.

Reading the object table

● Attribute

(1)	(2)	(3)	(4)	
Instance ID	Attribute ID	Name	Response parameter	
			Data type	Description
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

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

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 ObjectClass ID: 105 (0x69)

● Attributes

Instance ID	Attribute ID	Name	Response parameter	
			Data	Description
1 (0x01)	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: Reserved bit14: READY bit15: Reserved
			UINT	bit0: Read Complete bit1: Read Failure
			UINT	Reserved
			UINT	Read Result Code
	101 (0x65)	Preset 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: Reserved bit14: READY bit15: Reserved
			UINT	bit0: Preset Complete bit1: Preset Failure bit2 to 15: Reserved
			UINT	Reserved
			UINT	Preset Result Code
	102 (0x66)	Register Preset Data 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: Reserved bit14: READY bit15: Reserved
			UINT	bit0: Register Preset Data Complete bit1: Register Preset Data Failure bit2 to 15: Reserved
			UINT	Reserved
			UINT	Register Preset Data Result Code
	103 (0x67)	Tune 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: Reserved bit14: READY bit15: Reserved
			UINT	bit0: Tune Complete bit1: Tune Failure bit2 to 15: Reserved
			UINT	Reserved
			UINT	Tune Result Code

Instance ID	Attribute ID	Name	Response parameter	
			Data	Description
1 (0x01)	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: Reserved bit14: READY bit15: Reserved
				bit0: EXT. Request Complete bit1: EXT. Request Failure bit2 to 15: Reserved
			UINT	Reserved
			UINT	EXT. Request Result Code
	108 (0x6C)	IN/OUT Status	UINT	bit0: 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	Reserved
			UINT	Read Input Count
	110 (0x6E)	Result Data Count	UINT	Result Data Ready Count
			UINT	Result Data Update Count
	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
	128 (0x80)	Result Data Ready Count	UINT	Result Data Ready Count
	129 (0x81)	Result Data Update Count	UINT	Result Data Update Count

● 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	Sets 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)	UINT: Bank Number	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)	-	Preset 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)	0	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: 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	-

• 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	-

• 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	-

• 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

(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

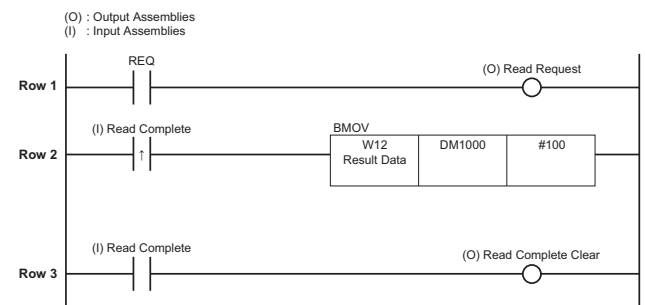
General response	-
Additional status	-
Service data	Attribute parameters

16-4 Reference Programs

For the KV Series

Cyclic communication

• Without handshaking

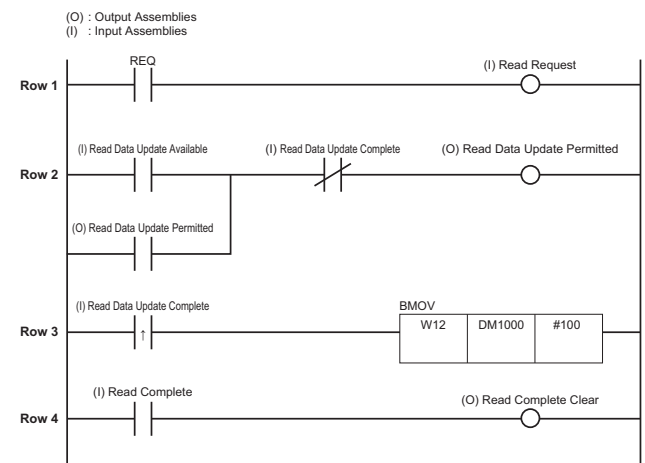


Row 1: This starts Read Request and starts reading.

Row 2: When Result Complete is ON, the data written to Result Data are copied to DM1000.

Row 3: When Read Complete is ON, Read Complete Clear turns ON.

• With handshaking



Row 1: When the trigger (REQ) signal turns ON, Read Request turns ON.

Row 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-X.

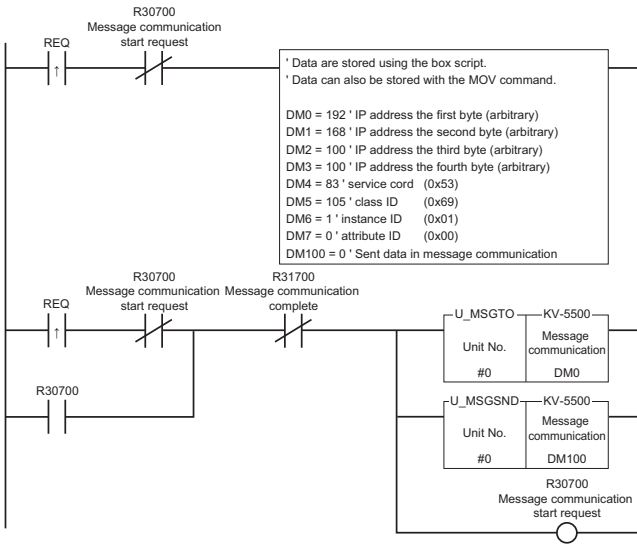
Row 3: When Read Data Reception Complete turns ON, the data for the specified bytes are transferred from the read data to DM1000.

* Read Data Update Complete turns ON when the writing of read data from the SR-X to the PLC is complete.

Row 4: When Read Complete is ON, Read Complete Clear turns ON.

Message communication

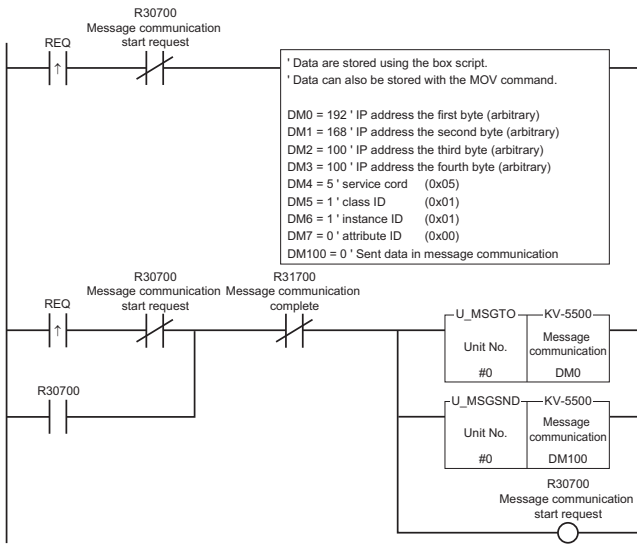
• Error clear operation



The errors on the SR-X Series are cleared. The following items are cleared.

- Buffer overflow
- General errors
- Result Data Available
- Read data

• Software reset operation

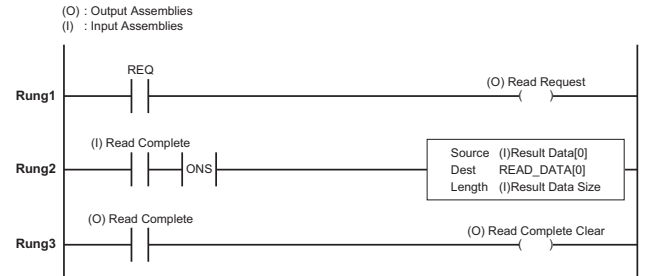


The SR-X Series restarts.

Control Logix/Compact Logix (RSLogix 5000)

Cyclic communication

• Without handshaking

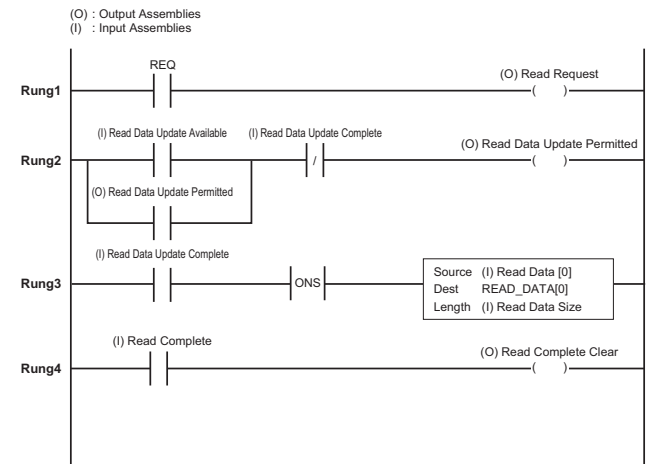


Rung1: This starts Read Request and starts reading.

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-X.

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-X 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

17

PROFINET

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17-1 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-X Series is compliant with Conformance Class B.

List of Supported PLCs

Siemens PLCs

PLC series	Software	Version
S7-1500/1200/400/300	TIA Portal	Ver. 16.0 and later

SR-X Series PROFINET Communication Specifications

Communication type	PROFINET IO
Communication cycle	8 ms or more
GSDML file version	2.4

Usable Functions

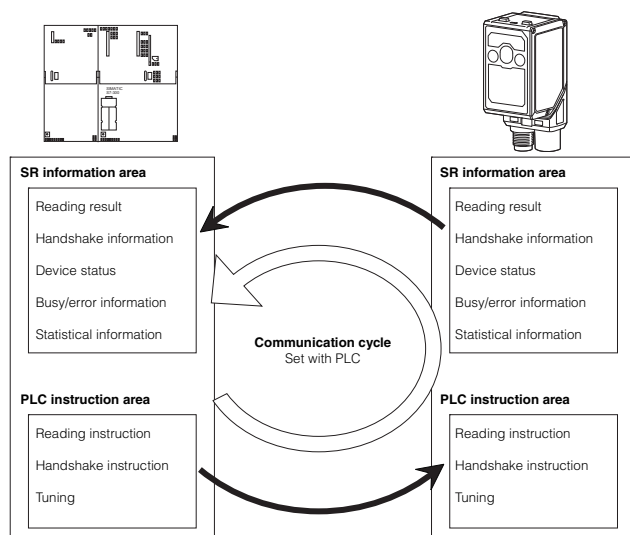
Function	Description
Timing input control	Controls timing input ON/OFF. Timing input with the parameter bank specified is possible.
Preset data control	Read OK data can be set as preset data. Also, preset data can be registered or deleted from PLC.
Tuning	Tuning can be executed by specifying the parameter 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-X Series can be restored from the error state.
Statistical information acquisition	Read count and read data update count can be checked.
Operation status acquisition	I/O status can be checked as well as read data.

17-2 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 hundreds of milliseconds. Also, you can control the SR-X 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-X Series, SR-X Series functions are assigned to the PLC devices.

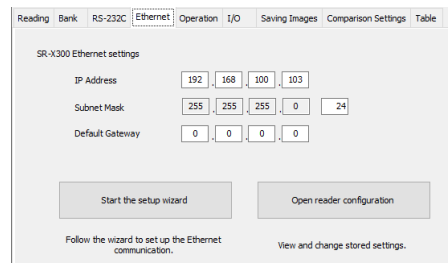


Important

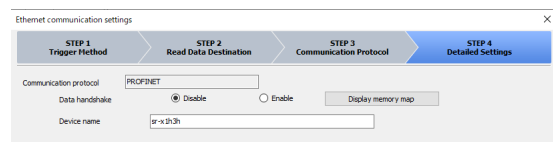
- Communication settings such as the communication cycle and data size are set in the PLC. When there is a large load in the network which connects many devices including PROFINET devices, delays or packet loss may occur. Perform thorough verification before operation.
- The maximum read length is 1008 digits.

SR-X Series Settings

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



- 3 Start [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 [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-abcde." (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 configuration

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-X

● Bit area

In the following areas, information is divided by bit.
Information is represented with 0 or 1.

Slot: 1

Module name: Handshake and General Error Status Bits

Size (Byte)	Bit address	Name	Description	Data description
1	0	Error	This bit turns ON when either "Buffer Overflow Error" or "General Error" bit turns ON.	0: No error 1: Error
	1	Result Data Available	This displays whether read data exists or not.*1	0: No read data 1: Read data available
	2	Result Data Strobe	This turns ON when read data update is complete.*1	0 -> 1: Read data update complete 1 -> 0: -
	6	Buffer Overflow Error	This turns ON when buffer overflow error occurs.	0: No error 1: Error
	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. When this turns ON, an error code is output to "Slot: 8 General Error Code."	

*1 Used only when handshake is enabled.

- Handshake is a communication procedure to make the permission system for read data writing.

Slot: 2

Module name: BUSY Status Bits

Size (Byte)	Bit address	Name	Description	Data description
1	0	BUSY	This bit turns ON when any of the following BUSY bits (1 to 4) are ON.	0: - 1: BUSY state
	1	TRG BUSY	TRG BUSY	0: - 1: TRG BUSY state
	2	LOCK BUSY	LOCK BUSY	0: - 1: LOCK BUSY state
	3	MODE BUSY	MODE BUSY	0: - 1: MODE BUSY state
	4	ERR BUSY	ERR BUSY	0: - 1: ERR BUSY state
	6	READY	READY This continues to be ON in non-"BUSY" state.	0: - 1: READY state

Slot: 3

Module name: Completion Status Bits

Size (Byte)	Bit address	Name	Description	Data description
1	0	Read Complete	This turns ON when reading is complete.*1	0: - 1: Complete*2
	1	Preset Complete	This turns ON when preset reading is complete.	0: - 1: Complete*2
	2	Register Preset Data Complete	This turns ON when preset data registration is complete.	0: - 1: Complete*2
	3	Tune Complete	This turns ON when tuning is complete.	0: - 1: Complete*2
	4	BLOAD Complete	This turns ON when BLOAD is complete.	0: - 1: Complete*2
	7	EXT. Request 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.

Slot: 4

Module name: Error Status Bits

Size (Byte)	Bit address	Name	Description	Data description
1	0	Read Failure	This turns ON when reading error or comparison NG occurs.	0: - 1: Reading error, Comparison NG*1
	1	Preset Failure	This turns ON when preset reading fails.	0: - 1: Preset reading failure*1
	2	Register Preset Data Failure	This turns ON when preset data registration fails.	0: - 1: Preset data registration failure*1
	3	Tune Failure	This turns ON when tuning fails.	0: - 1: Tuning failure*1
	4	BLOAD Failure	This turns ON when BLOAD fails.	0: - 1: BLOAD failure*1
	7	EXT. Request 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*1

*1 If any of the above errors occurs, the error code is output to "Slot: 8 Operation Result Status."

Slot: 5

Module name: Terminal Status Bits

Size (Byte)	Bit address	Name	Description	Data description
1	0	IN1 Status	This represents IN1 terminal status.	0: OFF 1: ON
	1	IN2 Status	This represents IN2 terminal status.	0: OFF 1: ON
	4	OUT1 Status	This represents OUT1 terminal status.	0: OFF 1: ON
	5	OUT2 Status	This represents OUT2 terminal status.	0: OFF 1: ON
	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-X is Norm. open (normally open). For Norm. closed (normally closed), the data is reversed as 0: ON 1: OFF.
- When checking the writing of read data, do not use OUT1 to 3 statuses, but use the "Read Complete" bit or "EXT. Request Complete" bit. Depending on the communication load, the ON statuses of the OUT terminals and reading completion may not be synchronized.

Slot: 6

Module name: Unstable Read Status Bits

Size (Byte)	Bit address	Name	Description	Data description
1	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
	5	ISO/IEC 15416 Unstable	ISO/IEC 15416 verification result unstable	0: Stable 1: Unstable

● Word area/byte area

In the following areas, information is represented with the following units.

Slot: 7**Module name: Matching Level and Total Evaluation Grade Status**

Size (Byte)	Word address	Name	Description	Data description	
8	0	Matching Level	Matching level	100 to 0*1	If multiple codes are read, the smallest value is displayed.
	1	ISO/IEC 15415 Grade	ISO/IEC 15415 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	
	3	ISO/IEC 15416 Grade	15416 total evaluation grade	4: A*1 3: B 2: C 1: D 0: F	

*1 When multiple codes are read, the minimum value is shown.
When the "Read Complete Clear" bit in Output Assemblies is turned ON, the value returns to 0.

Slot: 8**Module name: Operation Result Status**

Size (Byte)	Word address	Name	Description	Data description
20	0	Read Result Code	When "Slot: 4 Error Status Bits" turns ON, the error code is output to the applicable location.	Error code*
	1	Preset Result Code		
	2	Register Preset Data Result Code		
	3	Tune Result Code		
	4	BLOAD Result Code		
	7	EXT. Request Result Code		
	8	General Error Code		
	9	Slave ID	The ID of the reader to which the most recent data was written is displayed.	0 to 31

* For error codes, refer to □ "Error List" (Page 140).

Slot: 9**Module name: Read Data *** Byte*1**

Size (Byte)	Word address	Name	Description	Data description
8 + Data size	0	Result Data Ready Count	Read Data Ready Count	0 to 65535*2
	1	Result Data Update Count	Read Data Update Count	0 to 65535*2
	2	Trigger Input Count for Master	The trigger input count for the master unit (ID: 0) is displayed.	0 to 65535*2
	3	Result Data Size	Read data length	0 and above*3
	Byte area 32Byte 64Byte 128Byte 246Byte	Result Data	Read data	Read data*3

*1 Select one from Read Data 32 Byte, Read Data 64 Byte, Read Data 128 Byte and Read Data 246 Byte.

*2 If the count is 65535, it will be reset to 0 when the next read data arrives.

*3 When the header, terminator and append data are set to the read data of SR-X, 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-X, read data is not output.
- The read data is cleared each time that a code is read.

When handling the read data exceeding 246 bytes, use Slot: 9 "Read Data 246 Byte" and also use Slots 10 to 12. Using all of the Slots 9 to 12 enables handling of data up to 1008 bytes.

Slot: 10**Module name: Read Data Ex 254 Byte**

Size (Byte)	Bit address	Name	Description	Data description
254	254Byte	Result Data	Read data (247 to 500 bytes)	Read data

Slot: 11**Module name: Read Data Ex 254 Byte**

Size (Byte)	Bit address	Name	Description	Data description
254	254Byte	Result Data	Read data (501 to 754 bytes)	Read data

Slot: 12**Module name: Read Data Ex 254 Byte*4**

Size (Byte)	Bit address	Name	Description	Data description
254	254Byte	Result Data	Read data (755 to 1008 bytes)	Read data

*4 This module cannot be used when the S7-1200 Series is used.
It can be used with the S7-1500/300/400.

Q address Output address PLC -> SR-X**● Bit area**

In the following areas, information is divided by bit.
Information is represented with 0 or 1.

Slot: 10**Module name: Latch and Error Clear Control Bits**

Size (Byte)	Bit address	Name	Description	Data description
1	1	Result Data Latch	Result data update permitted*1	0 -> 1: Writing to result data device permitted 1 -> 0: -
	7	Error Clear	Error Clear*2	0 -> 1: Error clear 1 -> 0: -

*1 This functions only when handshake is enabled.

*2 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

Slot: 11**Module name: Operation Instruction Control Bits**

Size (Byte)	Bit address	Name	Description	Data description
1	0	Read Request	Reading start request*1	0 -> 1: Start reading 1 -> 0: Stop reading
	1	Preset Request	Preset reading start request*2	0 -> 1: Preset read start 1 -> 0: Preset read stop
	2	Register Preset Data Request	Preset data registration request*3	0 -> 1: Preset data registration 1 -> 0: -
	3	Tune Request	Tuning start request*4	0 -> 1: Start tuning 1 -> 0: Stop tuning
	4	BLOAD Request	BLOAD request*4	0 -> 1: Start BLOAD 1 -> 0: -

*1 When specifying a bank, specify a value in the Parameter Bank Number module.

*2 Reading with the specified bank is not available.

*3 Turn this bit ON after specifying a value in the User Data Size and User Data modules.

*4 Turn this bit ON after specifying a value in the Parameter Bank Number module.

Slot: 12

Module name: Completion Clear Control Bits

Size (Byte)	Bit address	Name	Description	Data description
1	0	Read Complete Clear	Reading complete clear ^{*1}	0 -> 1: Complete clear 1 -> 0: -
	1	Preset Complete Clear	Preset reading complete clear ^{*1}	0 -> 1: Complete clear 1 -> 0: -
	2	Register Preset Data Complete Clear	Preset data registration complete clear ^{*1}	0 -> 1: Complete clear 1 -> 0: -
	3	Tune Complete Clear	Tuning complete clear ^{*1}	0 -> 1: Complete clear 1 -> 0: -
	4	BLOAD Complete Clear	BLOAD complete clear ^{*1}	0 -> 1: Complete clear 1 -> 0: -
	7	EXT. Request Complete Clear	External instruction operation complete clear ^{*1}	0 -> 1: Complete clear 1 -> 0: -

^{*1} When Complete bits are cleared, Error/Failure bits of each operation are also cleared.

Word area/byte area

In the following areas, information is represented with the following units.

Slot: 13

Module name: Parameter Bank Number^{*1}

Size (Byte)	Word address	Name	Description	Data description
2	0	Bank Number/BLOAD File Number	Bank number/BLOAD file number	1 to 16: Bank number 1 to 256 (SR-X300/X300W): BLOAD file number 1 to 8 (SR-X100/X100W): BLOAD file number

- Input a bank number here and then start reading. Then, reading is completed with the bank number specified.
If reading is started with a value other than 1 to 16 input, the alternate reading will be performed.
- Input a bank number here and then start tuning. Then, the tuning result is stored to the specified bank number. If tuning is started with a value other than 1 to 16 input, an error occurs.
- Input a file number here and then start BLOAD to switch the settings.
If BLOAD is started with a value other than "m" input, an error occurs.

Reference: m=1-8 (SR-X100/X100W), 1-256 (SR-X300/X300W)

Slot: 14

Module name: User Data *** byte^{*1}

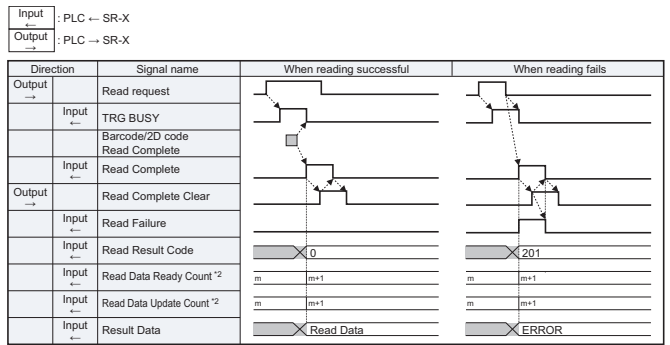
Size (Byte)	Word address	Name	Description	Data description
2+User Data Size	0	User Data Size	Preset data size ^{*2}	
	Byte area	User Data	1: Preset data ^{*2}	
	32Byte			
	64Byte			

^{*1} Select one from User Data 32 Byte, User Data 64 Byte, User Data 128 Byte and User Data 252 Byte.

^{*2} Terminator is not necessary.

Operation Examples

Example 1) Trigger method: Level trigger, Handshaking: Disabled.



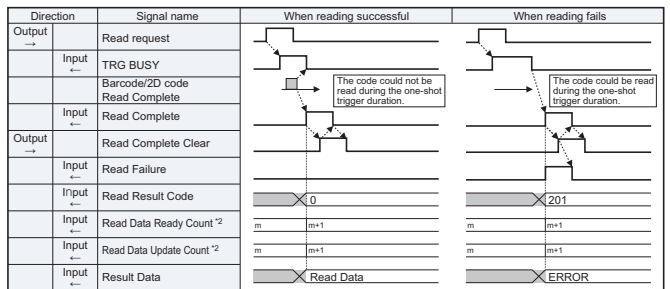
When reading is successful

- "Read request" is set to ON (1).
- When "Read request" is set to ON (1), the SR-X Series starts reading, and then "TRG BUSY" is set to ON (1).
- When the code is read, its data is written into "Result 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-X 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." "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: Enabled.



When reading is successful

- "Read request" is set to ON (1).
- When "Read request" is set to ON (1), the SR-X Series starts reading, and then "TRG BUSY" is set to ON (1).
- When the code is read, its data is written into "Result 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).

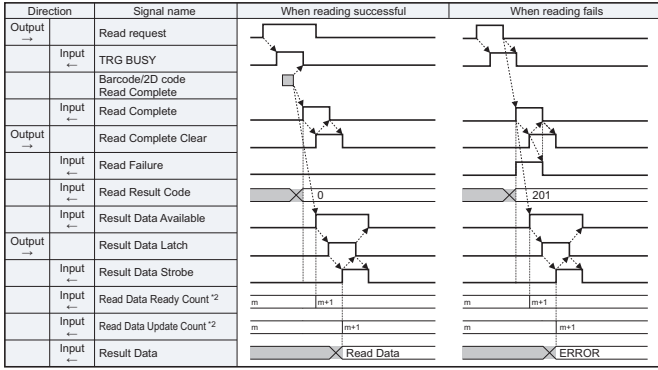
When reading fails

- "Read request" is set to ON (1).
- When "Read request" is set to ON (1), the SR-X Series starts reading, and then "TRG BUSY" is set to ON (1).
- When the "One-shot trigger duration" elapses, reading stops.
- The code could not be read, so "ERROR" is written to "Result Data." "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).

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).
112	File number error	The specified file number does not exist.
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.)

Example 3) Trigger method: Level trigger, Handshaking: Enabled.



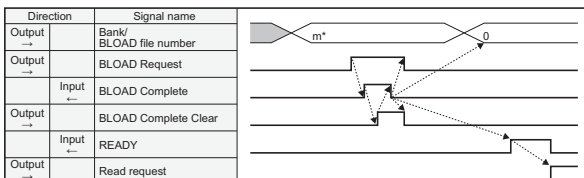
• When reading is successful

- "Read request" is set to ON (1).
- When "Read request" is set to ON (1), the SR-X Series starts reading, and then "TRG BUSY" is set to ON (1).
- When the code is read, "TRG BUSY" is set to OFF (0), and "Read Complete" and "Result Data Available" are 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).
- It is confirmed that "Result Data Available" is ON (1), and then "Result Data Latch" is set to ON (1).
- When "Result Data Latch" is set to ON (1), the data is written into "Result Data." "Result Data Strobe" is set to ON (1).
- It is confirmed that "Result Data Strobe" is ON (1), and then "Result Data Latch" is set to OFF (0).
- When "Result Data Latch" is set to OFF (0), "Result Data Available" and "Result Data Strobe" are set to OFF (0).

• When reading fails

- "Read request" is set to ON (1).
- When "Read request" is set to ON (1), the SR-X Series starts reading, and then "TRG BUSY" is set to ON (1).
- "Read request" is set to OFF (0).
- 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).
- 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).
- It is confirmed that "Result Data Available" is ON (1), and then "Result Data Latch" is set to ON (1).
- When "Result Data Latch" is set to ON (1), "ERROR" is written into "Result Data." "Result Data Strobe" is set to ON (1).
- It is confirmed that "Result Data Strobe" is ON (1), and then "Result Data Latch" is set to OFF (0).
- When "Result Data Latch" is set to OFF (0), "Read Complete Clear" and "Result Data Strobe" are set to OFF (0).

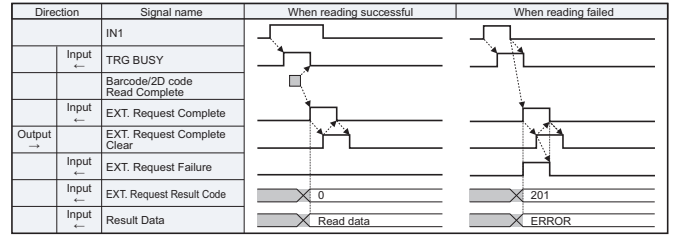
Example 4) Using the changeover function



* m=1-8 (SR-X100/X100W), 1-256 (SR-X300/X300W)

- The file number is added to "Bank/BLOAD File Number."
- "BLOAD Request" is turned on (1), which changes the file number setting and turns on "BLOAD Complete."
- It is confirmed that "BLOAD Complete" is on (1), and then "BLOAD Complete Clear" is turned on (1).
- "BLOAD Complete Clear" is turned on (1), which turns off (0) "BLOAD Complete."
- It is confirmed that "BLOAD Complete" is off (0), and then "BLOAD Request" is turned off (0).
- "Bank/BLOAD File Number" is set to 0.
- It is confirmed that "READY" is on (1), and then "Read Request" is turned on (1).

Example 5) Reading with the IN terminal. IN1: Trigger input, Trigger method: Level trigger, Handshaking: Disabled.



• When reading is successful

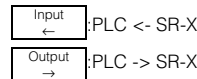
- The signal of the IN terminal is set to ON.
- When the signal of the IN terminal is set to ON, the SR-X Series starts reading, and then "TRG BUSY" is set to ON (1).
- When the code is read, its data is written into "Result Data." Then "TRG BUSY" is set to OFF (0), and "EXT. Request Complete" is set to ON (1).
- The signal of the IN terminal is set to OFF.
- It is confirmed that "EXT. Request Complete" is ON (1), and then "EXT. Request Complete Clear" is set to ON (1).
- When "EXT. Request Complete Clear" is set to ON (1), "EXT. Request Complete" is set to OFF (0).
- It is confirmed that "EXT. Request Complete" is OFF (0), and then "EXT. Request Complete Clear" is set to OFF (0).

• When reading fails

- The signal of the IN terminal is set to ON.
- When the signal of the IN terminal is set to ON, the SR-X Series starts reading, and then "TRG BUSY" is set to ON (1).
- The signal of the IN terminal is set to OFF (0).
- The code could not be read, so "ERROR" is written to "Result Data." "201" is written to "EXT. Request Result Code." Then "TRG BUSY" is set to OFF (0), and "EXT. Request Complete Clear" is set to ON (1).
- It is confirmed that "EXT. Request Complete" is ON (1), and then "EXT. Request Complete Clear" is set to ON (1).
- When "EXT. Request Complete Clear" is set to ON (1), "EXT. Request Complete" and "EXT. Request Failure" are set to OFF (0).
- It is confirmed that "EXT. Request Complete" is OFF (0), and then "EXT. Request Complete Clear" is set to OFF (0).

Point

- The signal directions are indicated as shown below.



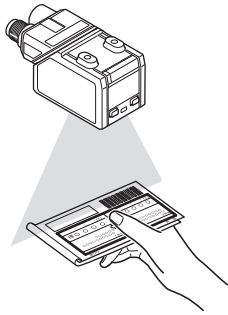
- The "Read Data Ready Count" and "Read Data Update Count" values may differ depending on the operation status and communication frequency.
For example, when a code is read and then the reading of the next code finishes before the updating of the PLC data finishes, the result data ready count will be larger than the expected value by one.

18

Application Examples

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18-1 Reading in Presentation Mode

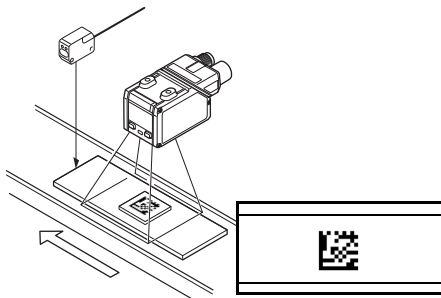


With this operation, read codes by presenting them by hand in front of the SR-X Series.

The configuration procedure and operations vary depending on whether a trigger sensor will be used.

Refer to Presentation mode in ["5-2 Application Selection"](#) (Page 19)

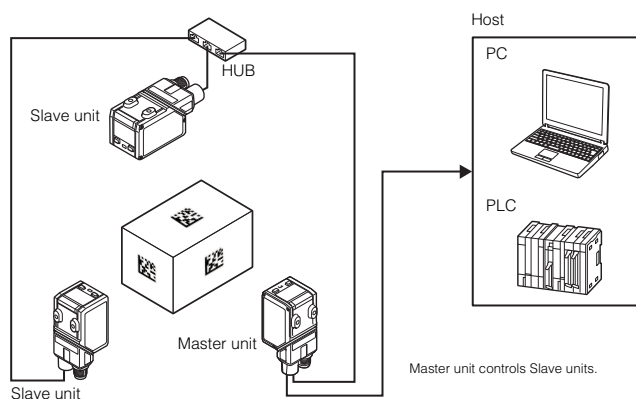
18-2 Reading Moving Codes



With this operation, the SR-X reads codes that are in motion.

Refer to Moving Codes in ["5-2 Application Selection"](#) (Page 19)

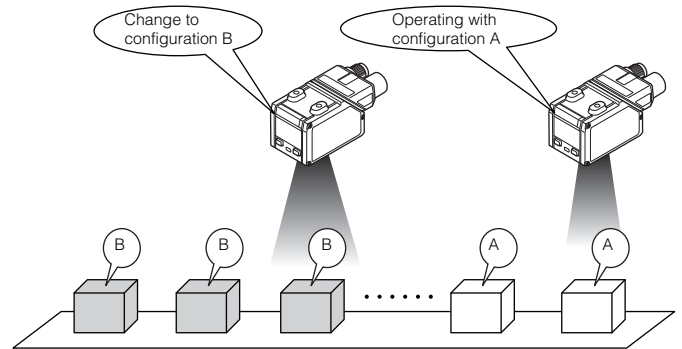
18-3 Reading Codes with Unknown Positions



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.

Refer to the advanced multi-head mode in ["10-8 Master/Slave Function"](#) (Page 79).

18-4 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.

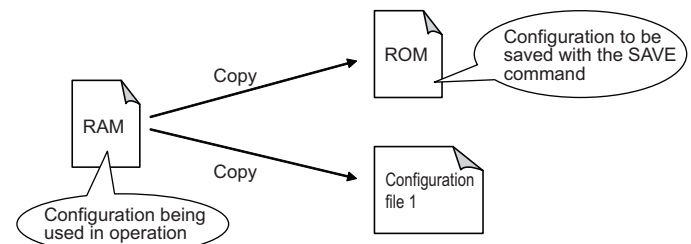
Configuration File Switch Commands

You can switch the settings that are used to operate the SR-X Series (for a changeover) by sending commands to the SR-X. This makes it possible to operate the SR-X 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.

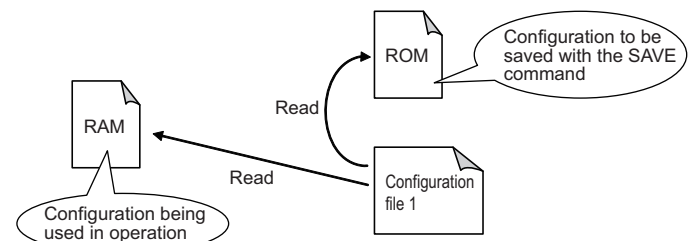


Command	BSAVE, <u>m</u>
Parameter	<u>m</u> =1-256 (SR-X300/X300W) 1-8 (SR-X100/X100W) ROM configuration file number at copy destination (config1.ptc, config2.ptc ...) ROM script file number at copy destination (FmtSet1.Lua, FmtSet2.Lua ...)
Response	OK,BSAVE

Loading changeover configuration files

This command reads the contents of the retained configuration file into RAM and ROM.

Use this command to switch the configuration used by the reader.



Command	BLOAD, <u>m</u>
Parameter	<u>m</u> =1-256 (SR-X300/X300W) 1-8 (SR-X100/X100W) 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-X.**
- 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-X.**
- 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-X Series can save up to "m" configuration file and script file pairs.
- A separate focus position is saved for each configuration file.
- The BLOAD function can be used in conjunction with PLC Link, Ethernet/IP, and PROFINET.
- By disabling [Table]-[System]-[Device operation]-[Write BLOAD to ROM], writing to ROM can be disabled. It does not affect the number of times the system ROM is rewritten. However, since it is not saved in ROM by the SAVE command, if the power is cycled to the SR-X series, it will operate with the configuration from before the changeover.
- m=1-8 (SR-X100/X100W), 1-256 (SR-X300/X300W)

19

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19-1 Specifications

Code readers

Model			SR-X300	SR-X300W	SR-X300 + SR-XHR	SR-X100	SR-X100W
Type			Standard type (2.3 megapixels)	Wide range type (2.3 megapixels)	High resolution type	Standard type (1.4 megapixels)	Wide range type (1.4 megapixels)
Receiver	Sensor		CMOS Image Sensor				
	Number of pixels		1920 x 1200			1360 x 1024	
	Focus adjustment		Automatic ^{*1}				
Light emitter	Light source		High-intensity red LED/White LED ^{*2}			High-intensity red LED ^{*2}	
	Pointer light source		High-intensity green LED ^{*2}				
Reading specifications	Supported symbol	2D code	QR, MicroQR, DataMatrix(ECC200), DMRE, GS1 DataMatrix, PDF417, MicroPDF417, GS1 Composite(CC-A/CC-B/CC-C), DotCode, MaxiCode, Aztec Code				
		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, Postal(Japan Postal, IMB)				
	Minimum resolution	2D code	0.024 mm	0.060 mm	0.010 mm	0.024 mm	0.060 mm
		Barcode	0.082 mm	0.082 mm	0.082 mm	0.082 mm	0.082 mm
	Reading distance		70-1000 mm	50-1000 mm	32-47 mm	70-1000 mm	50-1000 mm
	Reading view range		104 mm x 65 mm (Distance: 300 mm)	267 mm x 166 mm (Distance: 300 mm)	12.3 mm x 7.7 mm (Distance: 47 mm)	74 mm x 55 mm (Distance: 300 mm)	189 mm x 142 mm (Distance: 300 mm)
I/O specifications	Control input	Points	2				
		Input type	Bidirectional voltage input				
		Maximum rating	30 VDC				
		Minimum ON voltage	15 VDC				
		Maximum OFF current	0.2 mA				
	Control output	Points	3				
		Output type	Photo MOS relay output				
		Maximum rating	30 VDC				
		Maximum load current	1 output: 50 mA or less, 3-output total: 100 mA or less				
		Leakage current when OFF	0.1 mA or less				
		Residual voltage when ON	1 V or less				
	Ethernet	Communication standard	IEEE 802.3 compliant, 100BASE-TX				
		Supported protocol	TCP/IP, SNMP, FTP, SFTP, HTTP, BOOTP, EtherNet/IP™, PROFINET, KV STUDIO, MC Protocol, OMRON PLC Link				
	Serial communication	Communication standard	RS-232C compliant				
		Communication speed	600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 bps				
Supported protocol		None, KV STUDIO, MC Protocol, SYSWAY					
USB	Communication standard	USB 2.0 High Speed compliant					
Environmental resistance	Enclosure rating		IP65 / IP67 (IEC60529) ^{*3}				
	Operating ambient temperature		0 to +45°C				
	Storage ambient temperature		-10 to +50°C				
	Operating ambient humidity		35 to 85%RH (No condensation)				
	Storage ambient humidity		35 to 85%RH (No condensation)				
Rating	Power supply voltage		24 VDC+25%/-20%				
	Current consumption		Approx. 750 mA			Approx. 650 mA	
Weight			Approx. 200 g		Approx. 225 g	Approx. 180 g	

ROM rewrites: 100,000

*1 The focus position can be automatically adjusted during installation or tuning.

*2 The degree of risk of this product is shown below.

Light source	Risk Group*
Aimer LED (Green)	Risk Group 1
Lighting LED (Red)	Risk Group 1
Lighting LED (White) * only for SR-X300/X300W	Risk Group 1

* LED/Lamp product is classified as shown below according to IEC 62471.

- Exempt Group
Does not pose any photobiological hazard
- Risk Group 1 (Low-Risk)
Does not pose a hazard due to normal behavioral limitations on exposure.
- Risk Group 2 (Moderate-Risk)
Does not pose a hazard due to the aversion response to very bright light sources or due to thermal discomfort.
- Risk Group 3 (High-Risk)
May pose a hazard even for momentary or brief exposure.

*3 Attach a USB port cover to meet the protective structural specification.

Setup software (AutoID Network Navigator)

Model	SR-H8W
Supported operating system	Windows 11 Professional or higher Windows 10 Professional or higher 32-bit/64-bit Windows 8 Professional or higher 32-bit/64-bit (excluding Windows RT)
Running environment	Processor 2.0 GHz or higher, Memory 8 GB or more, Required free space on hard disk 1 GB or more (space is also required for saving data) DVD-ROM drive (required for installation), Screen resolution 1440 x 1080 or higher

- .NET Framework 4.6.1 or higher is installed.
- Microsoft Visual C++ redistributable packages (x86) for Visual Studio 2015, 2017, and 2019 are installed.
- Windows, Visual Studio, Microsoft Edge, Internet Explorer, and Excel are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries.

Control Cable

Model	OP-88678 OP-88681 OP-88684 OP-88687	OP-88679 OP-88682 OP-88685 OP-88688	OP-88680 OP-88683 OP-88686 OP-88689	OP-88764	OP-88846
Cable length	2 m	5 m	10 m	Approx. 0.45 m	0.45 m
Weight	Approx. 250 g	Approx. 450 g	Approx. 800 g	Approx. 100 g	Approx. 80 g

Ethernet Cable

Model	OP-87230 OP-88301	OP-87231 OP-88302	OP-87232 OP-88303
Cable length	2 m	5 m	10 m
Weight	Approx. 200 g	Approx. 350 g	Approx. 500 g

* Category 5

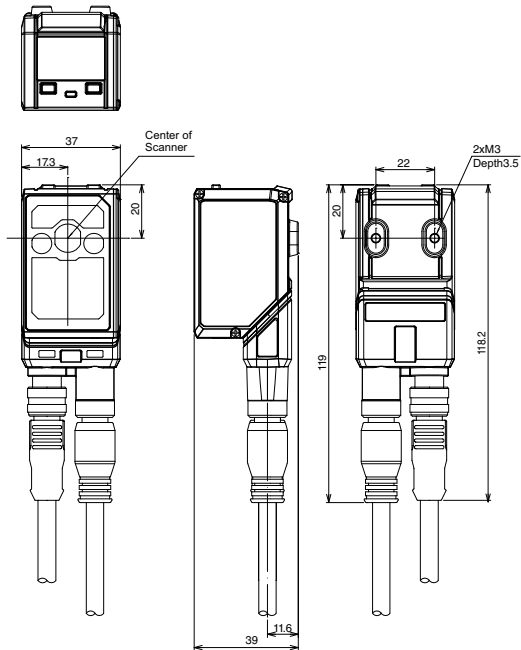
Option

Model	SR-XESD	SR-XLP	SR-XHR
Weight	Approx. 10 g	Approx. 15 g	Approx. 30 g

Model	OP-88696	OP-88697	OP-88698	OP-88699
Weight	Approx. 30 g	Approx. 90 g	Approx. 30 g	Approx. 30 g

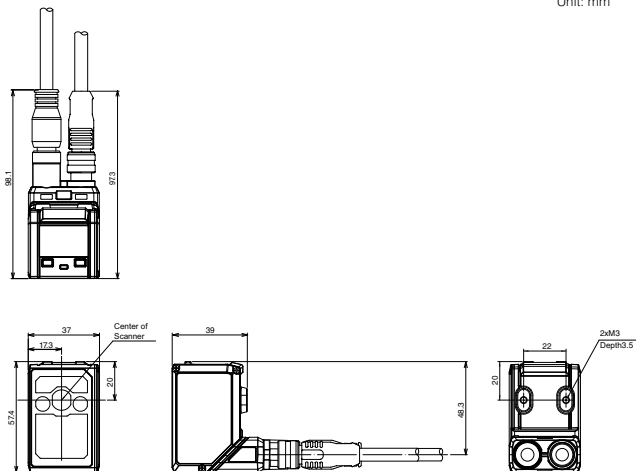
19-2 Dimensions

SR-X300/X300W



Unit: mm

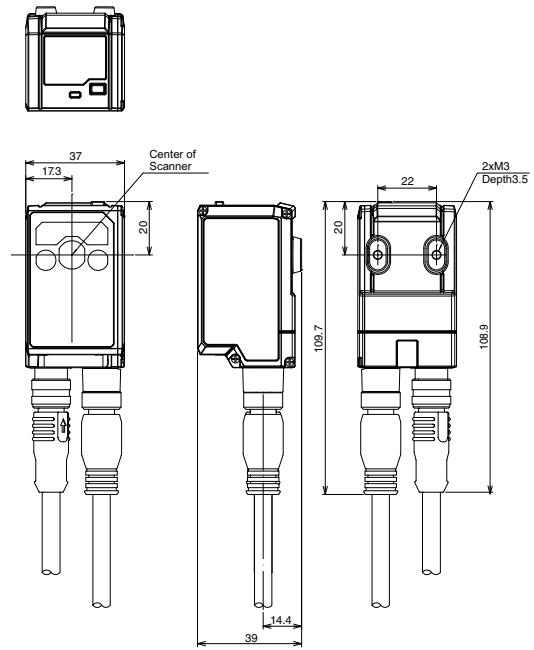
SR-X300/X300W (rotating connector)



Unit: mm

SR-X100/X100W

Unit: mm



• Cable bending radius

Ensure that the cable bending radius when mounted is greater than or equal to the values show below.

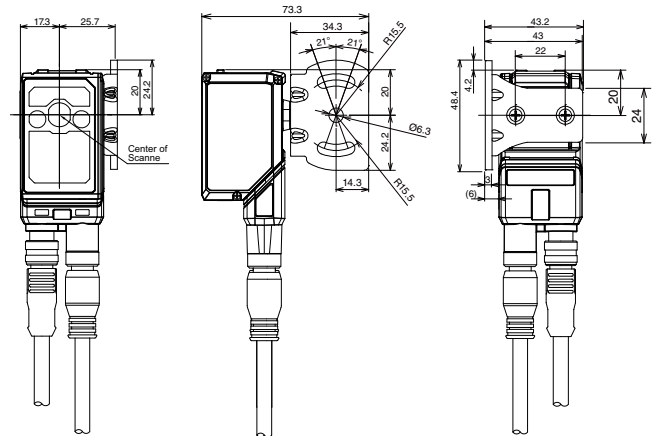
Unit: mm

	Moving	Not moving
Control cable	20	15
Ethernet cable	50	15

When the mounting bracket is used

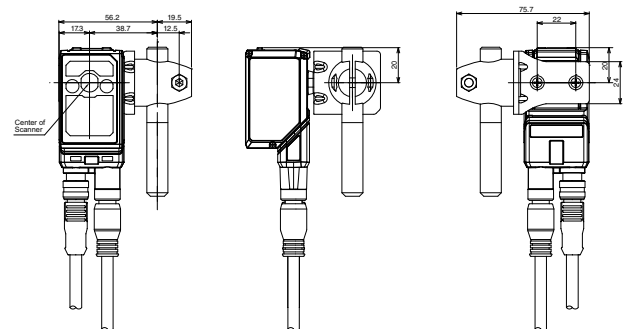
• SR-X300+OP-88696

Unit: mm

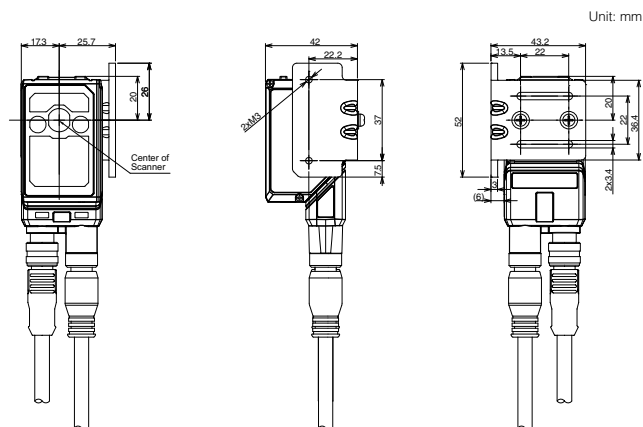


• SR-X300+OP-88697

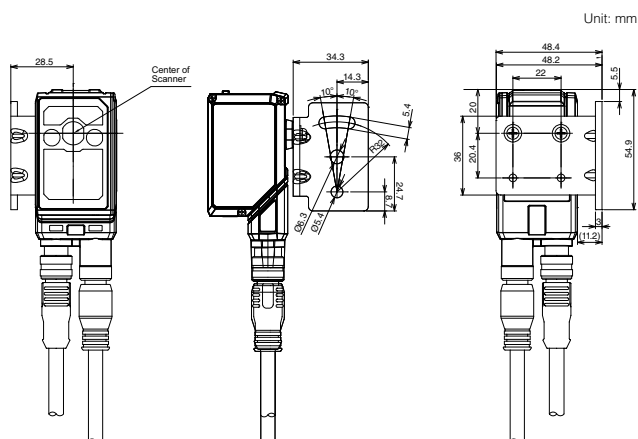
Unit: mm



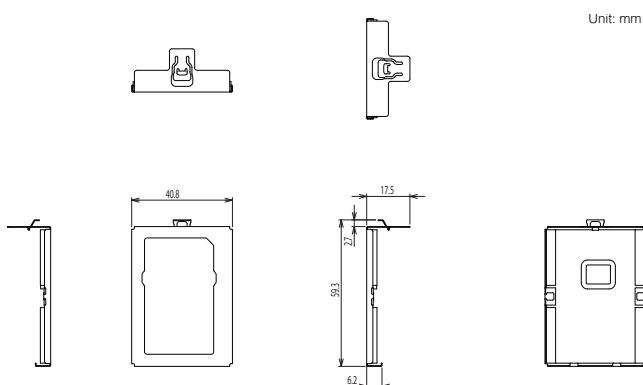
- **SR-X300+OP-88698**



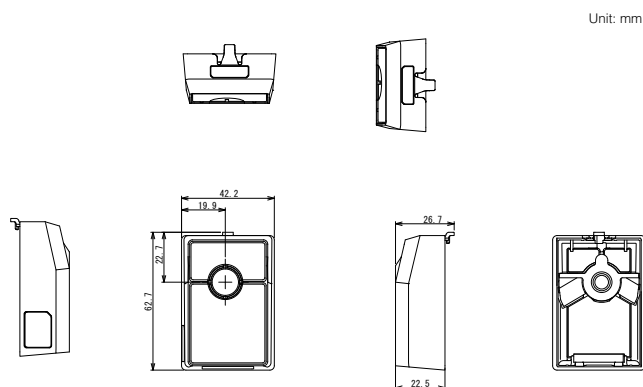
- **SR-X300+OP-88699**



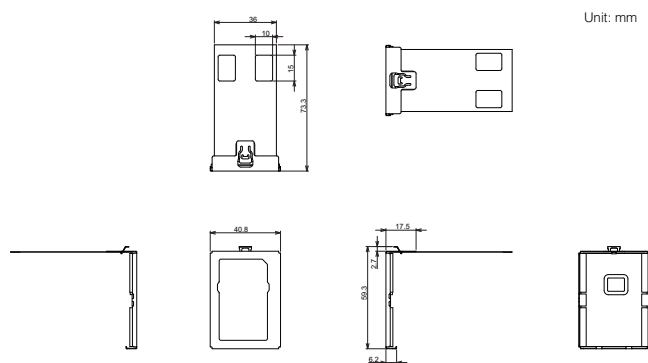
SR-XLP



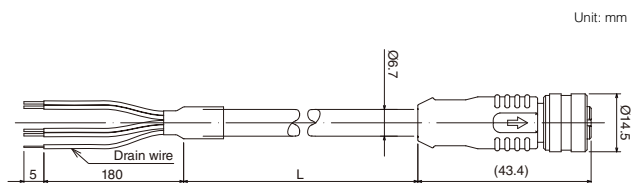
SR-XHR



SR-XESD

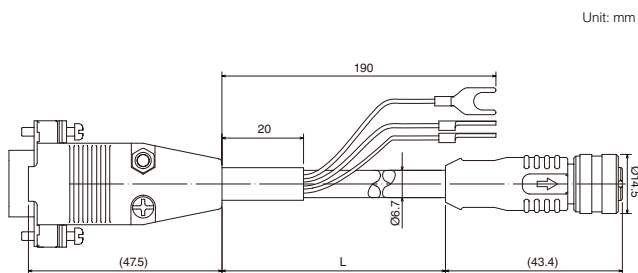


OP-88678/88679/88680



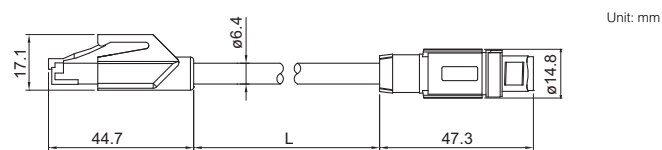
Model	L
OP-88678	2 m
OP-88679	5 m
OP-88680	10 m

OP-88681/88682/88683



Model	L
OP-88681	2 m
OP-88682	5 m
OP-88683	10 m

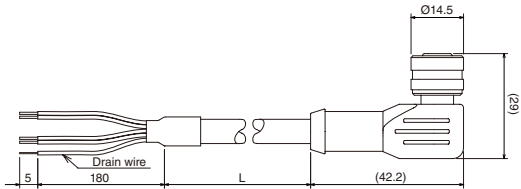
OP-87230/87231/87232



Model	L (mm)
OP-87230	2000
OP-87231	5000
OP-87232	10000

OP-88684/88685/88686

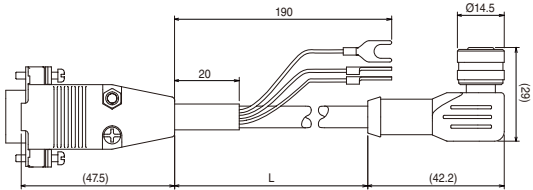
Unit: mm



Model	L (mm)
OP-88684	2000
OP-88685	5000
OP-88686	10000

OP-88687/88688/88689

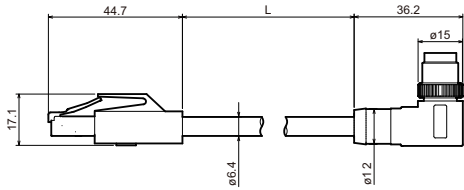
Unit: mm



Model	L (mm)
OP-88687	2000
OP-88688	5000
OP-88689	10000

OP-88301/88302/88303

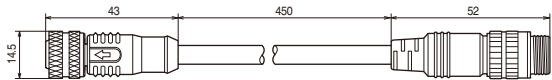
Unit: mm



Model	L (mm)
OP-88301	2000
OP-88302	5000
OP-88303	10000

OP-88764

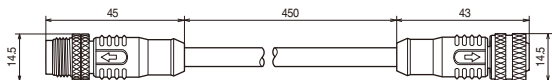
Unit: mm



Model	L (mm)
OP-88764	450

OP-88846

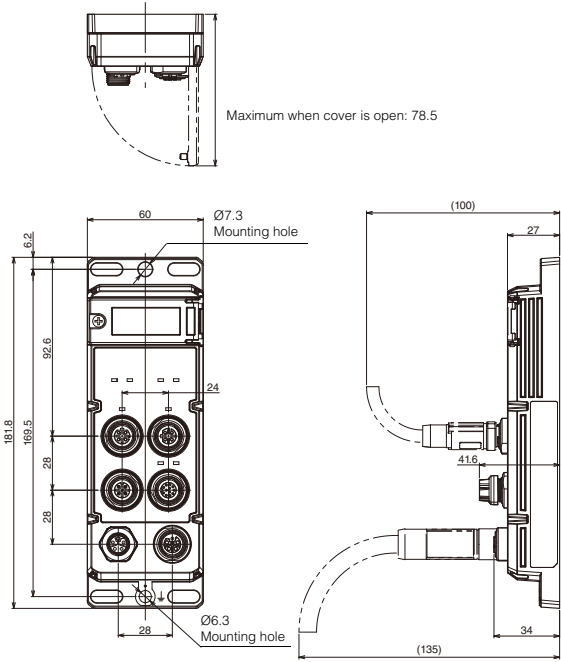
Unit: mm



Model	L (mm)
OP-88846	450

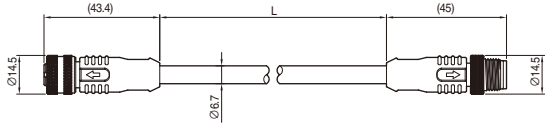
SR-EC1/ SR-PN1

Unit: mm



OP-88776/88777/88778

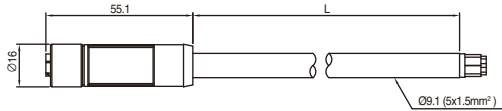
Unit: mm



Model	L (mm)
OP-88776	2000
OP-88777	5000
OP-88778	10000

OP-88782/88783/88784

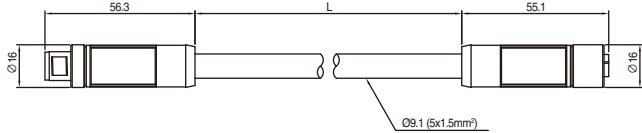
Unit: mm



Model	L (mm)
OP-88782	2000
OP-88783	5000
OP-88784	10000

OP-88785/88786/88787

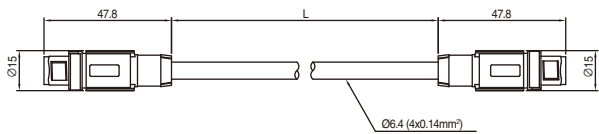
Unit: mm



Model	L (mm)
OP-88785	300
OP-88786	2000
OP-88787	10000

OP-88788/88789/88790/88791

Unit: mm



Model	L (mm)
OP-88788	300
OP-88789	2000
OP-88790	5000
OP-88791	10000

19-3 Troubleshooting

Error Shown on the SR-X 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	A mismatch of the internal memory information occurred. • Hold down the [SELECT] button for at least 4 seconds to clear the error. • If the error cannot be cleared, contact your nearest KEYENCE office.
E2 CONFIG VER	A configuration file of a different version has been set in the SR main unit. • Hold down the [SELECT] button for at least 4 seconds to clear the error. • Send a correct configuration file again from the AutoID Network Navigator. • Update the SR firmware.
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-X 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-X 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-X Series firmware update. Cycle power to the SR-X Series, and then execute update again.
E7 PLC LINK	A PLC link error occurred. Check the communication between the SR-X Series and the PLC.
E8 SCRIPT	An error occurred during script execution. Check the SR-X 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-X 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.
E15 REPLACE FILE	An error occurred with the command replacement. Refer to sections on SR-X Series configuration and command replacement files.
E99 MISC	Contact your nearest KEYENCE office.

Unable to Install AutoID Network Navigator or the SR-X Series Driver

Check the following points, and then install the software again.

- **Administrator rights**
To install the software, log on as a user with Administrator rights.
- **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 18)
- **Ethernet connection**
☞ "5-1 Connecting" (Page 18)

SR-X Series Does Not Turn ON

- **When connecting 24 VDC directly to the power cable**
Check the power cable and confirm that 24 VDC power is supplied to the SR-X Series.

Unable to Read Codes with the SR-X Series

- **Tuning options**
You have to tune the SR-X Series to read codes.
Tuning execution:
Using the reader ☞ "4-1 Tuning" (Page 15)
Using the setup software ☞ "5-3 Reading Settings" (Page 20)
Configuration confirmation: ☞ "9-1 Checking SR-X Series Settings" (Page 52)
- **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.

Data Is Not Output Through the RS-232C Interface

- **Communication settings confirmation**
Check that the communication settings of the SR-X Series match those of the host device.
☞ "5-4 Communication Settings" (Page 21)
- **Wiring**
To communicate via RS-232C, the pin arrangement of the SR-X 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 8)
☞ "2-3 Wiring to a PLC or Peripheral" (Page 9)

Data Is Not Output Through the Ethernet Interface

- **Communication settings confirmation**
Check that the settings for communication between the SR-X Series and the host device are correct.
☞ "5-4 Communication Settings" (Page 21)
- **Wiring**
If you are using a hub or other intermediary device between the SR-X 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-X 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 27)
 - **Tuning options**
You have to tune the SR-X Series to read codes.
Tuning execution:
Using the reader ☞ "4-1 Tuning" (Page 15)
Using the setup software ☞ "5-3 Reading Settings" (Page 20)
Configuration confirmation: ☞ "9-1 Checking SR-X Series Settings" (Page 52)
 - **Line speed**
If the reader cannot read the codes moving on the line, the reading settings may not be correct.

"ER,**" in the Output Data

- This is displayed when the PC or PLC sends a command to the SR-X Series and the processing of the command fails.
- **Error details**
☞ "14-1 Command Communication" (Page 98)

19-4 ASCII Codes

			High-order 4 bits							
		Hexadecimal	0	1	2	3	4	5	6	7
		Binary	0000	0001	0010	0011	0100	0101	0110	0111
Low-order 4	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	FF	FS	,	<	L	\	l	|
	D	1101	CR	GS	-	=	M	]	m	}
	E	1110	SO	RS	.	>	N	^	n	~
	F	1111	SI	US	/	?	O	_	o	del

19-5 Precautions on Proper Use

CE and UKCA Markings

Keyence Corporation has confirmed that this product complies with the essential requirements of the applicable EU Directive(s) and UK regulations, based on the following specifications. Be sure to consider the following specifications when using this product in the Member States of European Union and in the United Kingdom.

● EMC Directive (CE) and Electromagnetic Compatibility Regulations (UKCA)

- Applicable standards (BS) EN61326-1, Class A
(BS) EN61326-1
- The length of cable connected to the power supply connector must be less than or equal to 30 m.
- Wrap the USB cable around a ferrite core close to the device to connect to. Ferrite core: TDK ZCAT1730-0730A-BK equivalent
- This product is intended to be used in an industrial electromagnetic environment.

Remarks: These specifications do not give any guarantee that the end-product with this product incorporated complies with the essential requirements of EMC Directive and Electromagnetic Compatibility Regulations. The manufacturer of the end-product is solely responsible for the compliance on the end-product itself according to EMC Directive and Electromagnetic Compatibility Regulations.

UL Certificate

This product is a UL/c-UL certified product.

- UL File No.: E222809
- Category: QUYYX,QUYYX7

Be sure to consider the following specifications when using this product as an UL/c-UL Listed product.

- Overvoltage category
- Use this product under pollution degree 3.
- Use this product at the altitude of 2500 m or less.
- Indoor use only.
- Ensure the external circuits to be connected to the SR-X Series are SELV circuits.
- CSA or UL certified power supply that provides Class 2 output as defined in the CEC (Canadian Electrical Code) and NEC (National Electrical Code).
- Only USB memory or designated devices* can be connected to the USB port.

* OP-88569

KC mark (Republic of Korea)

사용자안내문

이 기기는 업무용 환경에서 사용할 목적으로 적합성평가를 받은 기기로서 가정용 환경에서 사용하는 경우 전파간섭의 우려가 있습니다.

North American Regulations

This product complies with the following North American regulations.

- Applicable regulation FCC Part15 Subpart B, Class A Digital Device
ICES-003, Class A Digital Apparatus
- Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.
- FCC CAUTION

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

19-6 Software License Agreement

NOTICE TO USER: PLEASE READ THIS SOFTWARE LICENSE AGREEMENT (THIS "AGREEMENT") CAREFULLY. BY USING ALL OR ANY PORTION OF THE [SR-H8W] (THIS "SOFTWARE"), YOU ARE AGREEING TO BE BOUND BY ALL THE TERMS AND CONDITIONS OF THIS AGREEMENT. IF YOU DO NOT AGREE TO ANY TERMS OF THIS AGREEMENT, DO NOT USE THIS SOFTWARE.

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- 6.3 You will compensate KEYENCE for costs or any lost profits caused by your violation or breach of any term of this Agreement.

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- 7.1 This Agreement will be governed by and construed in accordance with the substantive laws of Japan without regards to the principles of conflicts of law.
- 7.2 If any part of this Agreement is found void and unenforceable, it will not affect the validity of the balance of this Agreement, which shall remain valid and enforceable according to its terms and conditions.

19-7 Libraries and programs

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