# 14-1 EtherNet/IP Overview

What Is EtherNet/IP?

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

Cyclic and Message Communication

In EtherNet/IP, there is cyclic communication (Implicit message) that handles periodic sending and receiving of data, and there is also message communication (Explicit message) which handles sending and receiving of commands/responses arbitrarily.
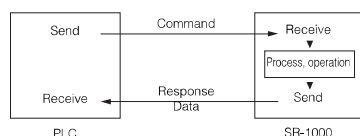
■ Cyclic communication

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

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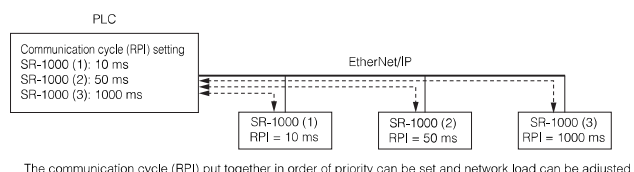
■ Message communication

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

List of Supported PLCs

■ PLC manufactured by KEYENCE

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

■ PLC manufactured by Rockwell Automation

• ControlLogix/Compact Logix category PLC

PLC model	EtherNet/IP Communication unit	Firmware version	Software used	Version of software used
1756 ControlLogix	1756-ENBT	Ver. 13 or later	RsLogix5000	Ver. 13 or later
1769 ConpactLogix	- (SR-2000 built-in port)			

• Micro Logix 1100/1400 category PLC

PLC model	EtherNet/IP Communication unit	Firmware version	Software used	Version of software used
1761/1766 MicroLogix	- (SR-2000 built-in port)/1761-NET-ENI	Series A, Revision A, FRN1	RsLogix500	Ver. 7.10 or later
1762/1763/1764 MicroLogix	1761-NET-ENI			

■ PLC manufactured by Omron

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

SR-1000 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-1000 Series can use with EtherNet/IP are shown below.

Function	Description
Reading instruction	Begins reading operation. Also executes reading end, bank setting reading, etc.
Preset instructions	Records successfully read data as preset data. Also registers or deletes preset data from the PLC.
Tuning instructions	Executes tuning. Can save tuning results in the set bank.
Error-handling	Checks the cause of the error that occurred in the main unit, and returns the error. (Example: Buffer overflow check/cancellation)
Main unit status acquisition	Checks the main unit status (BUSY status).
Operation results acquisition	Acquires read data. When set to silent mode, the read data is not updated.
Terminal status acquisition	Acquires input terminal and output terminal status.
Main unit reset instructions	Displays the SR-1000 Series software reset.

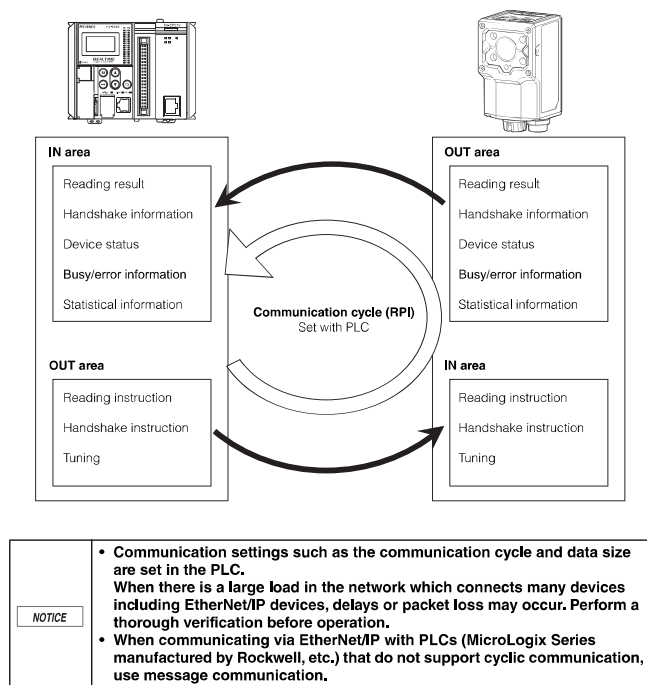> **NOTICE**
>
> **About the exclusion process**
> The SR-1000 Series can simultaneously give control instructions to multiple interfaces (I/O terminal, RS-232C, Ethernet Communication (TCP/IP), EtherNet/IP communication, test key operation). However, when a control instruction is being received from one interface, instructions from other interfaces cannot be received.

Cyclic Communication

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

IN area
- Reading result
- Handshake information
- Device status
- Busy/error information
- Statistical information

OUT area
- Reading instruction
- Handshake instruction
- Tuning

Communication cycle (RPI)
Set with PLC

OUT area
- Reading result
- Handshake information
- Device status
- Busy/error information
- Statistical information

IN area
- Reading instruction
- Handshake instruction
- Tuning

NOTICE
- Communication settings such as the communication cycle and data size are set in the PLC.
  When there is a large load in the network which connects many devices including EtherNet/IP devices, delays or packet loss may occur. Perform a thorough verification before operation.
- When communicating via EtherNet/IP with PLCs (MicroLogix Series manufactured by Rockwell, etc.) that do not support cyclic communication, use message communication.

SR-1000 Series Settings

1 Open the [Ethernet] tab.

2 Enter the [IP address] and [Subnet Mask] settings to assign to the SR-1000.

3 Start the [Setup Wizard].

4 STEP 1 Select the trigger input method.

5 STEP 2 Select [Field network/PLC].

6 STEP 3 Select [EtherNet/IP].

7 STEP 4 Configure the detailed EtherNet/IP settings.

Data handshake	Set whether to implement handshake processing.
Input assembly data size	Set this to a value that is the maximum amount of read data + 44 bytes or higher. *1
Output assembly data size	Specify a value of 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 the [Setup Wizard].

9 Click [Send Configuration].

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-1000 Series during EtherNet/IP cyclic communication. The types of usable connections vary depending on the device. The connections that can be used by the SR-1000 Series are shown below.

Connection type	Data type	Instance ID	Size (byte)	RPI (ms)
Exclusive Owner (Data transmission + control)	Result data (Input Assemblies)	0X64(100)	40 to 1400	10 to 10000
	Control data (Output Assemblies)	0X65(101)	8 to 1400	
Input Only (Data transmission only)	Result data (Input Assemblies)	0X64(100)	40 to 1400	10 to 10000
	Control data (Output Assemblies)	0XFE(254)	0	

Exclusive Owner	• SR-1000 → PLC: Data transmission • PLC → SR-1000: Control instruction Use this connection to send data from the SR-1000 Series and to enable the PLC to send control instructions, such as starting reading, to the SR-1000.
Input Only	• SR-1000 → PLC: Data transmission Use this connection to only send data from the SR-1000 Series. You can use multiple connections with a single SR-1000 Series. (To a maximum of 16 connections.)

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-1000 Series unit.
- The trigger timing of each connection is executed in a cyclic manner.
- When using the KV series, the connection names are assigned as shown below.
  - 1: Exclusive Owner → Result data/control data class 1
  - 2: Input Only → Result data class 1 (Input Only)

KV-5500 Series settings

We have prepared information regarding connecting the KV-5500 and the SR Series.
Download the information from the KEYENCE website.

CJ Series settings

We have prepared information regarding connecting the CJ Series and the SR Series.
Download the information from the KEYENCE website.

1 Set the PLC network communication.
Using the CX-Developer, make the communication settings of PLC's IP address, etc.

2 Set the EtherNet/IP network configuration for PLC and SR-1000.
Using Network Configurator, set the network configuration.
* The EDS file for SR-1000 is in the EDS folder on disc1 of SR-H6W.

3 Register the transmission area tag and the reception area tag for PLC.
Right-click the PLC icon on Network Configurator, select [Parameter] – [Edit], enter the [Edit device parameter] setting screen, and edit the tag.

4 Make the setting to relate the PLC tag with the SR-1000 tag.
Register the device on the [Edit device parameter] setting screen and make the connection assignment setting.
Transfer the configuration parameters to the PLC to complete the setting.

[Setting example]
Connection I/O type: Class1

| Originator device (PLC)		Target device (SR-1000)	
Input tag set	E0_00000 - [500byte]	Output tag set	Input_100 - [500byte]
Connection type	Multi-cast connection		
Output tag set	D00000 - [500byte]	Input tag set	Output_101 - [500byte]
Connection type	Point to Point connection		

* For operation details of CX-Developer and Network Configurator, see "SYSMAC CS/CJ Series EtherNet/IP Unit User's Manual" published by Omron.

Control Logix/Compact Logix Series settings

We have prepared information regarding connecting the Control Logix/Compact Logix Series and the SR Series.
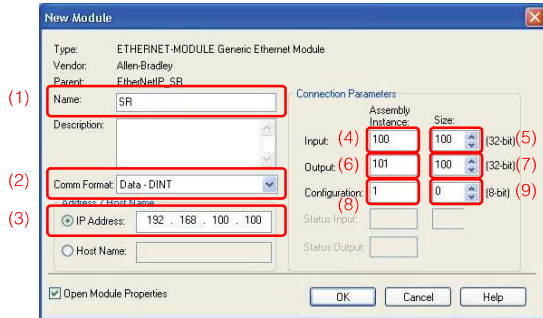Download the information from the KEYENCE website.

1 Right-click the EtherNet/IP enabled device on the RSLogix5000 and select New Module.
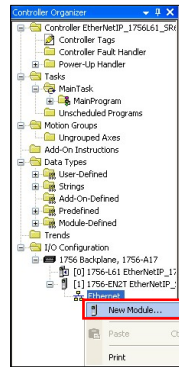
2 Click the Communications' [+] button, select ETHERNET-MODULE (Generic Ethernet Module), and click OK.
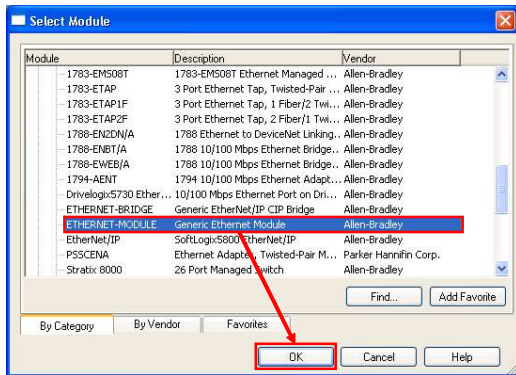
3 Set the ETHERNET-MODULE as follows:

(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-1000 Series
(4)	Input Assembly Instance	100
(5)	Input Size	Input assembly size of the SR-1000 Series[*1]
(6)	Output Assembly Instance	101[*2]
(7)	Output Size	Input assembly size of the SR-1000 Series[*1]
(8)	Configuration	1[*3]
(9)	Configuration Size	0[*3]

*1 In AutoID Network Navigator, the input assembly size and output assembly size are set with 8 bits, but these are set with 32 bits on the RSLogix5000.

8-bit notation	32-bit notation
100	25

*2 When operating with the "Input Only" connection type, set (6) to 254 and (7) to 0.

*3 The SR-1000 Series does not use the Configuration setting. However, enter the above value since failing to do so will result in an incomplete input error.

Memory Maps

Result data (Input Assemblies)

Input Assemblies write responses from the SR-1000 Series to the PLC. When using this device, each device function is assigned as follows. Device status, Result Data, etc. are written to the Input Assemblies.

■ Input Assemblies memory map (Instance ID: 0x64)

SR-1000 → PLC

Address	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0				ERR BUSY	MODE BUSY	LOCK BUSY	TRG BUSY	BUSY	General Error	Buffer Overflow Error				Read Data Update Complete	Read Data Update Available	Error
1	External Instruction Operation Failure				BLOAD Failure	Tuning Failure	Preset Data Registration Failure	Preset Reading Failure	Reading Error	External Instruction Operation Complete		BLOAD Complete	Tuning Complete	Preset Data Registration Complete	Preset Reading Complete	Reading Complete
2					SAE AS9132 Unstable	AIM DPM Unstable	ISO/IEC15415 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																
8	Reading Error Cause															
9	Preset Reading Failure Cause															
10	Preset Data Registration Failure Cause															
11	Tuning Failure Cause															
12	BLOAD Failure Cause															
13																
14																
15	External Instruction Operation Error Cause															
16	General Error Cause															
17	Slave ID															
18	Read Data Ready Count															
19	Read Data Update Count															
20	Trigger Input Count for Master															
21	Read Data Size															
22 and above	Read Data															

* Gray parts are reserved areas for the system.

Control data (Output Assemblies)

Output Assemblies write instructions from the PLC to the SR-1000 Series. When using this device, each device function is assigned as follows. Output Assemblies operate device control instructions, error clear, handshake process, etc.

■ Output Assemblies memory map (Instance ID: 0x65)

PLC → SR-1000

Address	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0					BLOAD Request	Tuning Start Request	Preset Data Registration Start Request	Preset Reading Start Request	Reading 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.

Details of Result Data (Input Assemblies)

Address 0   Bit 0 to Bit 7   Handshake and error status

Address	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0																

Address	Bit	Name	Description	Data contents
0	0	Error	This Bit turns ON when either "6 Buffer Overflow Error" or "7 General Error" Bit is ON.	0 : No error 1 : Error
0	1	Read Data Update Available	This Bit is used when using handshake.* This displays whether read data exists or not.	0 : No read data 1 : Read data available
0	2	Read Data Update Complete	This Bit is used when using handshake.* This turns ON when read data update is complete.	0→1: Result data update complete
0	6	Buffer Overflow Error	This turns ON when buffer overflow error occurs.	0 : No error 1 : Error
0	7	General Error	This turns ON when a communication or main unit error occurs. It does not turn ON when a buffer overflow error occurs. If this turns ON, the error code is output to "Address 16 General Error Cause".	0 : No error 1 : Error

* Handshake is a communication procedure to make the permission system for read data writing.
* Use handshaking when using the multi head mode of the master/slave function.

Address 0   Bit 8 to Bit 13   BUSY status

Address	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0																

Address	Bit	Name	Description	Data contents
0	8	BUSY	This Bit turns ON when any of the following BUSY Bits (9 to 13) is ON.	0 : - 1 : BUSY status
0	9	TRG BUSY	TRG BUSY	0 : - 1 : TRG BUSY status
0	10	LOCK BUSY	LOCK BUSY	0 : - 1 : LOCK BUSY status
0	11	MODE BUSY	MODE BUSY	0 : - 1 : MODE BUSY status
0	12	ERR BUSY	ERR BUSY	0 : - 1 : ERR BUSY status

Address 1   Bit 0 to Bit 7   Completion status

Address	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
1																

Address	Bit	Name	Description	Data contents
1	0	Reading Complete	This turns ON when reading is complete.*1	0 : - 1 : Complete*2
1	1	Preset Reading Complete	This turns ON when preset reading is complete.	0 : - 1 : Complete*2
1	2	Preset Data Registration Complete	This turns ON when preset data registration is complete.	0 : - 1 : Complete*2
1	3	Tuning Complete	This turns ON when tuning is complete.	0 : - 1 : Complete*2
1	4	BLOAD Complete	This turns ON when BLOAD is complete.	0 : - 1 : Complete*2
1	7	External Instruction Operation Complete	This turns ON when "Reading", "Preset reading" or "Tuning" is executed with the IN terminal or command and the operation is complete.	0 : - 1 : Complete*2

*1   This Bit also turns ON when the character string of "ERROR" is output when reading error occurs.
*2   This returns to 0 when the applicable clear bit is set to ON or when the Output Assemblies "Reading Start Request" bit is set to ON.

> **Point**   Check that "BUSY" is set to OFF before starting processing such as reading and tuning. When "BUSY" is set to ON, reading and tuning processing cannot start even if you provide instructions to do so. In the multi head mode of the master/slave function, the "Reading Complete" bit remains OFF.

Address 1   Bit 8 to Bit 15   Error status

Address	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
1																

Address	Bit	Name	Description	Data contents
1	8	Reading Error	This turns ON when reading error or comparison NG occurs.	0 : - 1 : Reading error, Comparison NG*
1	9	Preset Reading Failure	This turns ON when preset reading fails.	0 : - 1 : Preset reading failure*
1	10	Preset Data Registration Failure	This turns ON when preset data registration fails.	0 : - 1 : Preset data registration failure*
1	11	Tuning Failure	This turns ON when tuning fails.	0 : - 1 : Tuning failure*
1	12	BLOAD Failure	This turns ON when BLOAD fails.	0 : - 1 : BLOAD failure*
1	15	External Instruction Operation Failure	This turns ON when "Reading", "Preset reading" or "Tuning" is executed with the IN terminal or command and the operation fails.	0 : - 1 : External instruction operation failure*

* If any of the above errors occurs, the error code is output to "Failure cause status (Input Assemblies address 8 to 16)".

Address 2   Bit 0 to Bit 6   Terminal status

Address	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
2																

Address	Bit	Name	Description	Data contents
2	0	IN1 Status	This represents IN1 terminal status.	0 : OFF 1 : ON
2	1	IN2 Status	This represents IN2 terminal status.	0 : OFF 1 : ON
2	4	OUT1 Status	This represents OUT1 terminal status.	0 : OFF 1 : ON
2	5	OUT2 Status	This represents OUT2 terminal status.	0 : OFF 1 : ON
2	6	OUT3 Status	This represents OUT3 terminal status.	0 : OFF 1 : ON

* The above chart shows the contents when the input polarity setting of the SR-1000 is Norm. open (normally open). For Norm. closed (normally closed), the data is reversed as 0: ON 1: OFF.
* To check the writing of the read data, use not modes OUT 1 to 3, but the "Reading Complete" bit or the "External Instruction Operation Complete" bit. Depending on the communications load, the OUT terminal ON status and completion of reading may not synchronize.

Address 2   Bit 8 to Bit 12   Judgment result status for matching level and code quality verification function

Address	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
2																

Address	Bit	Name	Description	Data contents
2	8	Unstable	This Bit turns ON when any of the following Unstable Bits (9 to 12) is ON.	0 : Stable 1 : Unstable
2	9	Matching Level Unstable	Matching level judgment result	0 : Stable 1 : Unstable
2	10	ISO/IEC15415 Unstable	ISO/IEC15415 verification judgment result	0 : Stable 1 : Unstable
2	11	AIM DPM Unstable	ISO/IEC TR 29158 (AIM DPM-1-2006) verification judgment result	0 : Stable 1 : Unstable
2	12	SAE AS9132 Unstable	SAE AS9132 Unstable verification judgment result	0 : Stable 1 : Unstable

* Use this status when the code quality verification function of SR-1000 is enabled.
For the code quality verification function settings, refer to "9-7 Code Quality Verification".
* In the multi head mode of the master/slave function, the matching level and the status of the code quality verification function cannot be used.

Address 4 to 6   Total evaluation grade for matching level and code quality verification function

Address	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
4																
5																
6																

Address	Bit	Name	Description	Data contents	Data type
4		Matching Level	Matching Level * If multiple codes are read, the minimum value is output.	0 to 100[*1]	UINT
5		ISO/IEC15415 Grade	Total evaluation grade for ISO/IEC15415 verification	4 : A[*1] 3 : B 2 : C 1 : D 0 : F	UINT
6		AIM DPM Grade	Total evaluation grade for ISO/IEC TR 29158 (AIM DPM-1-2006)	4 : A[*1] 3 : B 2 : C 1 : D 0 : F	UINT

* Use this status when the code quality verification function of SR-1000 is enabled. For the code quality verification function settings, refer to "9-7 Code Quality Verification".
*1 This returns to 0 when the Output Assemblies "Reading Complete Clear" bit is set to ON.

Address 8 to 16   Failure cause status

Address	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
8																
9																
10																
11																
15																
16																

Address	Bit	Name	Description	Data contents	Data type
8		Reading Error Cause	When any of the error statuses (Input Assemblies Address 1, Bit 8 to Bit 15) turns on, the error code is output to the applicable location.	Error code[*]	UINT
9		Preset Reading Failure Cause			UINT
10		Preset Data Registration Failure Cause			UINT
11		Tuning Failure Cause			UINT
12		BLOAD Failure Cause			UINT
15		External Instruction Operation Error Cause			UINT
16		General Error Cause			UINT

* For error codes, refer to List of error codes (Page 76).

Address 18 to 19   Read data status

Address	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
18																
19																

Address	Bit	Name	Description	Data contents	Data type
18		Read Data Ready Count	Read Data Ready Count	0 to 65535[*]	UINT
19		Read Data Update Count	Read Data Update Count	0 to 65535[*]	UINT

* When the count number reaches 65535 and the next data arrives, the count number returns to 0.

Address 21 or above   Read data

Address	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
21																
22																
⋮																

Address	Bit	Name	Description	Data contents	Data type
21		Read Data Size	Read data length	0 and above[*]	UINT
22 and above		Read Data	Read Data	Read data[*]	BYTE[]

* When the header, terminator and append data are set to the read data of SR-1000, the header, terminator, append data and inter-delimiter are also output. [CR] has been set to the terminator as the default setting. Accordingly, [CR] is appended after the read data for output.
* If the silent mode is set for SR-1000, read data is not output.
* The read data is cleared each time that a code is read.

Address 17, 20   Master/slave

These are used in the multi head mode of the master/slave function.

Address	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
17																
20																

Address	Bit	Name	Description	Data contents	Data type
17		Slave ID	Displays the ID number of the reader which sent the most recent data.	0 to 31	UINT
20		Trigger input count for master	The trigger input count for the master unit (ID: 0) is displayed.	0 to 65535[*]	UINT

* If the count is 65535, it will be reset to 0 when the next read data arrives.

Details of Control Data (Output Assemblies)

Address 0   Bit 1 to Bit 7   Handshake/Clear bit

Address	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0																

Address	Bit	Name	Description	Data contents
0	1	Read Data Update Permitted	This Bit is used when using handshake. This displays whether read data exists or not.	0→1: Writing read data is permitted. 1→0: -
0	7	Error Clear Transmission Buffer Clear	The following Bits of Input Assemblies are cleared. • Buffer Overflow Error • General Error • Read Result Ready Count • Result Data Update Count • Read data stored in the transmission buffer of the SR-1000 Series	0→1: Clear 1→0: -

Address 0   Bit 8 to Bit 12   Reading start request/Each operation instruction

Address	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0																

Address	Bit	Name	Description	Data contents
0	8	Reading Start Request	The SR-1000 Series starts reading.[*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 (1 to 8) 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.**

Address 1   Bit 0 to Bit 7   Completion bit clear

Address	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
1																

Address	Bit	Name	Description	Data contents
1	0	Reading Complete Clear	"Reading Complete" Bit of Input Assemblies is cleared.[*]	0→1: Bit clear
1	1	Preset Reading Complete Clear	"Preset Reading Complete" Bit of Input Assemblies is cleared.[*]	0→1: Bit clear
1	2	Preset Data Registration Complete Clear	"Preset Data Registration Complete" Bit of Input Assemblies is cleared.[*]	0→1: Bit clear
1	3	Tuning Complete Clear	"Tuning Complete" Bit of Input Assemblies is cleared.[*]	0→1: Bit clear
1	4	BLOAD Complete Clear	"BLOAD Complete" Bit of Input Assemblies is cleared.[*]	0→1: Bit clear
1	7	External Instruction Operation Complete Clear	"External Instruction Operation Complete" Bit of Input Assemblies is cleared.[*]	0→1: Bit clear

* When Complete Bits are cleared, Error/Failure Bits of each operation are also cleared.

Address 2   **Bank number/BLOAD file number**

Address	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
2																

Address	Bit	Name	Description	Data contents	Data type
2		Bank number/ BLOAD file number	Input a bank number here and then start reading. Then, reading is completed with the parameter bank specified. Input a bank number here and then start tuning. Then, the tuning result is stored to the specified parameter bank. Input a file number here and then start BLOAD to switch the settings.	Parameter bank number: 1 to 16* BLOAD file number: 1 to 8*	UINT

* If inputting a parameter bank number other than 1 to 16 to start reading, then the alternate reading function operates.
* If inputting a parameter bank number other than 1 to 16 to start tuning, then an error occurs.

Address 5 and above   **Preset data**

Address	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
5																
6																
⋮																

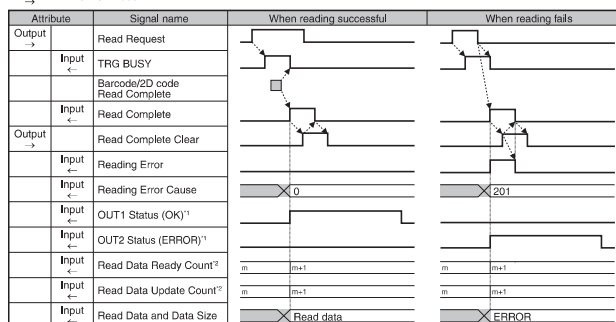| Address	Bit	Name	Description	Data contents	Data type
5		Preset Data Size	Preset data length	0 and above	UINT
6 and above		Preset Data	Preset data is specified. (Terminator is not necessary.)	Preset data	BYTE[]

List of error codes

Error code	Type of error	Error description
0	No error	-
100 to 199	Command error	Values with 100 added to the "Error codes" (page 54) are applicable.
201	Reading error	Reading failed.
202	Comparison error	The read data did not match the preset data.
210	Tuning failure	The code could not be found within the field of view while tuning.
213	Tuning failure	Tuning was aborted.
120	Operation instruction error	Another operation instruction was received during operation. In this case, the incoming instruction is not completed.
102	Bank number error	The parameter bank number specification is invalid. Example: A number other than 01 to 16 is specified in tuning operation.
220	Preset data error	The preset data specification is invalid. Example: The specified preset data size is invalid when preset data is registered.
230	EIP data update error	Read data larger than the specified size in the cyclic communication was received.

Operation Examples

Example 1) Trigger method: Level trigger. Handshaking: Disabled.

Input ← : PLC←SR-1000
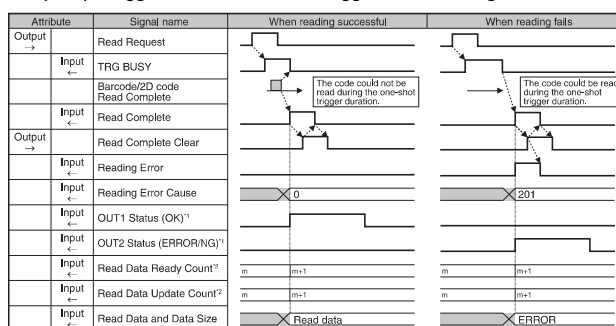Output → : PLC→SR-1000

● **When reading is successful**
1 "Read Request" is set to ON (1).
2 When "Read Request" is set to ON (1), the SR-1000 Series starts reading, and then "TRG BUSY" is set to ON (1).
3 When the code is read, its data is written into "Read data." "TRG BUSY" is set to OFF (0), and "Read Complete" is set to ON (1).
4 "Read Request" is set to OFF (0).
5 It is confirmed that "Read Complete" is ON (1), and then "Read Complete Clear" is set to ON (1).
6 When "Read Complete Clear" is set to ON (1), "Read Complete" is set to OFF (0).
7 It is confirmed that "Read Complete" is OFF (0), and then "Read Complete Clear" is set to OFF (0).

● **When reading fails**
1 "Read Request" is set to ON (1).
2 When "Read Request" is set to ON (1), the SR-1000 Series starts reading, and then "TRG BUSY" is set to ON (1).
3 "Read Request" is set to OFF (0).
4 The code could not be read, so "ERROR" is written to "Read data." "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).

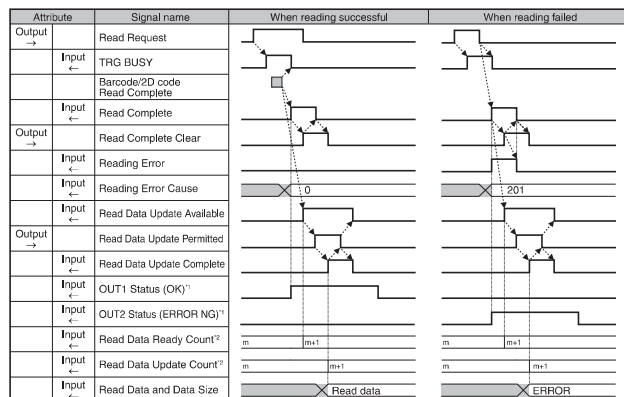**Example 2) Trigger method: One-shot trigger. Handshaking: Enabled.**

● **When reading is successful**
1 "Read Request" is set to ON (1).
2 When "Read Request" is set to ON (1), the SR-1000 Series starts reading, and then "TRG BUSY" is set to ON (1).
3 When the code is read, its data is written into "Read data." "TRG BUSY" is set to OFF (0), and "Read Complete" is set to ON (1).
4 "Read Request" is set to OFF (0).
5 It is confirmed that "Read Complete" is ON (1), and then "Read Complete Clear" is set to ON (1).
6 When "Read Complete Clear" is set to ON (1), "Read Complete" is set to OFF (0).
7 It is confirmed that "Read Complete" is OFF (0), and then "Read Complete Clear" is set to OFF (0).

● **When reading fails**
1 "Read Request" is set to ON (1).
2 When "Read Request" is set to ON (1), the SR-1000 Series starts reading, and then "TRG BUSY" is set to ON (1).
3 When the "One-shot trigger duration" elapses, reading stops.
4 The code could not be read, so "ERROR" is written to "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.

| Attribute		Signal name	When reading successful	When reading failed
Output →		Read Request		
	Input ←	TRG BUSY		
		Barcode/2D code Read Complete		
	Input ←	Read Complete		
Output →		Read Complete Clear		
	Input ←	Reading Error		
	Input ←	Reading Error Cause	0	201
	Input ←	Read Data Update Available		
Output →		Read Data Update Permitted		
	Input ←	Read Data Update Complete		
	Input ←	OUT1 Status (OK)[*1]		
	Input ←	OUT2 Status (ERROR NG)[*1]		
	Input ←	Read Data Ready Count[*2]	m | m+1	m | m+1
	Input ←	Read Data Update Count[*2]	m | m+1	m | m+1
	Input ←	Read Data and Data Size	Read data	ERROR

● **When reading is successful**

1 "Read Request" is set to ON (1).
2 When "Read Request" is set to ON (1), the SR-1000 Series starts reading, and then "TRG BUSY" is set to ON (1).
3 When the code is read, "TRG BUSY" is set to OFF (0), and "Read Complete" and "Read Data Update Available" are set to ON (1).
4 "Read Request" is set to OFF (0).
5 It is confirmed that "Read Complete" is ON (1), and then "Read Complete Clear" is set to ON (1).
6 When "Read Complete Clear" is set to ON (1), "Read Complete" is set to OFF (0).
7 It is confirmed that "Read Complete" is OFF (0), and then "Read Complete Clear" is set to OFF (0).
8 It is confirmed that "Read Data Update Available" is ON (1), and then "Read Data Update Permitted" is set to ON (1).
9 When "Read Data Update Permitted" is set to ON (1), the data is written into "Read data." "Read Data Update Complete" is set to ON (1).
10 It is confirmed that "Read Data Update Complete" is ON (1), and then "Read Data Update Permitted" is set to OFF (0).
11 When "Read Data Update Permitted" is set to OFF (0), "Read Data Update Available" and "Read Data Update Complete" are set to OFF (0).

● **When reading fails**

1 "Read Request" is set to ON (1).
2 When "Read Request" is set to ON (1), the SR-1000 Series starts reading, and then "TRG BUSY" is set to ON (1).
3 "Read Request" is set to OFF (0).
4 When the code cannot be read, "ERROR" is written to the send buffer, so "Read Complete" and "Read Data Update Available" are set to ON (1). "201" is written to "Reading Error Cause." "TRG BUSY" is set to OFF (0).
5 It is confirmed that "Read Complete" is ON (1), and then "Read Complete Clear" is set to ON (1).
6 When "Read Complete Clear" is set to ON (1), "Read Complete" is set to OFF (0).
7 It is confirmed that "Read Complete" is OFF (0), and then "Read Complete Clear" is set to OFF (0).
8 It is confirmed that "Read Data Update Available" is ON (1), and then "Read Data Update Permitted" is set to ON (1).
9 When "Read Data Update Permitted" is set to ON (1), "ERROR" is written into "Read data." "Read Data Update Complete" is set to ON (1).
10 It is confirmed that "Read Data Update Complete" is ON (1), and then "Read Data Update Permitted" is set to OFF (0).
11 When "Read Data Update Permitted" is set to OFF (0), "Read Data Update Available" and "Read Data Update Complete" are set to OFF (0).

⬦ **Point**

• **The signal directions are indicated as shown below.**

| Input ← | : **PLC ← SR-1000** |

| Output → | : **PLC → SR-1000** |
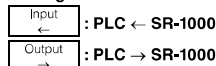
• **The OUT1 and OUT2 operations are described using the factory default configurations of the SR-1000 Series operation settings and multi I/O settings.**
• **The "Read Data Ready Count" and "Read Data Update Count" values may differ depending on the operation status and communication frequency.**
  For example, when a code is read and then the reading of the next code finishes before the updating of the PLC data finishes, the result data ready count will be larger than the expected value by one.

NOTICE

• **If "Read Request" is set to ON/OFF at high speed while the EtherNet/IP cyclic cycle (RPI) is slow, the SR-1000 Series may not be able to detect the change between the rising and falling edge of "Read Request."**
• **The SR-1000 Series is equipped with a 10 KB send buffer.**
• **Because a send buffer is present, even if the data processing on the PLC is unfinished during handshake processing, the next reading operation can be completed.**
• **When read data is still present in the SR-1000 Series during handshake processing, even if "Read Data Update Permitted" of the PLC is OFF (0), "Read Data Update Available" of the SR-1000 Series remains in the ON (1) state.**
  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-1000 Series is unnecessary during handshake processing, you can delete all the data from the send buffer by sending the send buffer clear command (BCLR) from the command port.**

14-3 Message Communication

Message Communication

Message communication is a function that uses objects and services (Service Code) prepared in the EtherNet/IP device and then issues and transmits commands arbitrarily. Message communication is used for applications such as reading and writing adaptor device settings.
There are established standard items, as well as device specific items in the objects and services in message communication.
The SR-1000 Series uses specific objects and services and can perform operations such as parameter reading/writing and resetting.

⬛ Reference The SR-1000 Series message communication function is compatible with UCMM (unconnected type) and CLASS 3 (connected type).

■ Objects and services

In message communication, data are sent and received using objects and services.
When services for SR-1000 Series objects are executed, data output, settings reading, and specified operations are executed.

■ Message communication basic format

During message communication, the PLC and the SR-1000 Series communicate by sending and receiving Explicit messages. When an Explicit message command is sent from the PLC, the SR-1000 Series sends a response to the PLC.
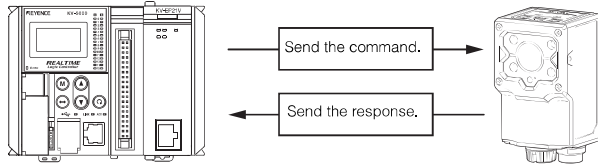
● **Commands**

Item	Description
Service code	Specifies the Service.
Class ID	Specifies the Class ID according to service.
Instance ID	Specifies the Instance ID according to service.
Attribute ID	Specifies the Attribute ID according to service.
Service data	Specifies the Service Data according to service.

● **Responses**

Item	Description
General status (1 byte)	Returns the General Status in response to the command. Returns 00H when operation is successful.
Additional status (2 bytes)	Returns Additional Status.
Service response	Returns the result data in response to the command.

■ Message communication operation

Send the command.

Send the response.

Commands are sent from the PLC to execute services on the SR-1000 Series. The SR-1000 Series sends back responses as service execution results. The service code, class ID, instance ID, and attribute ID are specified in the commands that are sent. The setting value (service data) is necessary when writing parameters.

Command
Service code
Class ID
Instance ID
Attribute ID
Service data

Response
General status
Additional status
Service response data

* The attribute ID and service data may not be necessary depending on the command used.
Service response data may not be generated depending on the command used.

SR-1000 Series Settings

1 Open the [Ethernet] tab.

2 Enter the [IP address] and [Subnet Mask] settings to assign to the SR-1000.

3 Start the [Setup Wizard].

4 STEP 1 Select the trigger input method.

5 STEP 2 Select [Field network/PLC].

6 STEP 3 Select [EtherNet/IP].

7 STEP 4 Configure the detailed EtherNet/IP settings.

Data handshake	Set whether to implement handshake processing.
Input assembly data size	Set this to a value that is the maximum amount of read data + 44 bytes or higher. *1
Output assembly data size	Specify a value of 6 bytes or higher. *1
Byte swapping	You can change the order in which data is stored in memory. Disable: Low order to high order Enable: High order to low order

*1   Increase the value according to the number of digits in the read data or preset data.

8 Exit the [Setup Wizard].

9 Click [Send Configuration].

Service Objects

■ Object configuration

Class ID	Object name	Description
105 (0x69)	SR AutoID Reader Object*	Object which delivers the SR-1000 Series status and parameter writing/reading.
1 (0x01)	Identity Object	Object which delivers general information, main unit reset, etc.

* The [SR AutoID Reader Object] is not an object within EtherNet/IP standards but rather it is an object that KEYENCE developed to make the SR-1000 Series easier to operate.

■ Reading the object table

● Attribute

(1) Instance ID	(2) Attribute ID	(3) Name	(4) 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) Instance ID	(2) Service code	(3) Service data		(4) Name	(5) Description
		Data type	Data		
1 (0x01)	0x4B	UINT	Bank Number	Read Start	Starts reading.

Item	Description
(1) Instance ID	The instance ID is shown in decimal (hexadecimal).
(2) Service code	The service code is shown in decimal (hexadecimal).
(3) Service data	Displays the type of the service data and service data description.
(4) Name	Displays the service name.
(5) Description	Displays the service function description.

● Data type
The data types are defined as follows.

Data type	Description	Range	
		Min.	Max.
BOOL	Boolean	0: FALSE	1: TRUE
SINT	Short integer	-128	127
INT	Integer	-32768	32767
DINT	Double precision integer	-2^{31}	$2^{31}-1$
LINT	Long integer	-2^{63}	$2^{63}-1$
USINT	Unsigned short integer	0	255
UINT	Unsigned integer	0	65535
UDINT	Unsigned double precision integer	0	$2^{32}-1$
ULINT	Unsigned long integer	0	$2^{64}-1$
String	String (1 byte/character)	-	-
SSTRING	String (1 byte/character)	-	-
BYTE	Bit sequence: 8-bit	-	-
WORD	Bit sequence: 16-bit	-	-
DWORD	Bit sequence: 32-bit	-	-
LWORD	Bit sequence: 64-bit	-	-

■ Object details

SR AutoID Reader Object   Class ID: 105 (0x69)

● Attributes

Instance ID	Attribute ID	Name	Response parameter	
			Data	Description
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 : FILE BUSY bit14 to 15 : Reserved
			UINT	bit0 : Read Complete bit1 : Read Failure
			UINT	bit0 : Unstable bit1 : Matching Level Unstable bit2 : ISO/IEC 15415 Unstable bit3 : AIM DPM Unstable bit4 : SAE AS9132 Unstable
			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 : FILE BUSY bit14 to 15 : 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 to 15 : 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 to 15 : 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 to 15 : Reserved
			UINT	bit0 : EXT. Request Complete bit1 : EXT. Request Failure bit2 to 15 : Reserved
			UINT	bit0 : Unstable bit1 : Matching Level Unstable bit2 : ISO/IEC 15415 Unstable bit3 : AIM DPM Unstable bit4 : SAE AS9132 Unstable
			UINT	EXT. Request Result Code
	108 (0x6C)	IN/OUT Status	UINT	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	Stable Reading Count
			UINT	Read Input Count
			UINT	Reserved
	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

Instance ID	Service code	Attribute ID	Name	Response parameter	
				Data	Description
1 (0x01)	Get_Attribute_Single 14 (0x0E)	144 (0x90)	Unstable Inspect Configuration	UINT	bit0 : Matching Level Inspect Valid bit1 : ISO/IEC15415 Inspect Valid bit2 : AIM DPM Inspect Valid bit3 : SAE AS9132 Inspect Valid bit4 to 7 : Reserve
	Set_Attribute_Single 16 (0x10)	145 (0x91)	Matching Level Threshold	UINT	99 to 00
		146 (0x92)	ISO/IEC15415 Threshold	UINT	0: Disabled 1(D) to A(4)
		147 (0x93)	AIM DPM Threshold	UINT	0: Disabled 1(D) to A(4)
	Get_Attribute_Single 14 (0x0E)	152 (0x98)	Matching Level	UINT	100 to 00
		153 (0x99)	ISO/IEC15415 Grade	UINT	4(A) to 0(F)
		154 (0x9A)	AIM DPM Grade	UINT	4(A) to 0(F)

● Service

Instance ID	Service code	Service data Data type: Data	Name	Description
1 (0x01)	14 (0x0E)	-	Get_Attribute_Single	Obtains the attribute's one item.
	16 (0x10)	-	Set_Attribute_Single	Obtains the attribute's one item.
	75 (0x4B)	UINT: Bank Number	Read Start	Starts reading.
	76 (0x4C)	-	Read Stop	Stops reading.
	77 (0x4D)	-	Preset Start	Starts preset data reading.
	78 (0x4E)	-	Preset Stop	Stops preset data reading.
	79 (0x4F)	UINT: Preset Data Size BYTE[]: Preset Data	Register Preset Data	Registers preset data. Preset data can be deleted when Size is (1) and Data is (0xFF).
	80 (0x50)	-	Tune Start	Starts tuning.
	81 (0x51)	-	Tune Stop	Stops tuning.
	83 (0x53)	-	Error Clear	Clears the error.
	84 (0x54)	-	EXT. Request Complete Clear	Clears the operation status from the external command.
	85 (0x55)	UINT: Result Data Size UINT: Offset	Get Result Data	Acquires read data. Response data UINT : Result Data Size UINT : Rest Result Data Size BYTE[] : Result Data
	86 (0x56)	-	Sequence Reset	Clears the following information: • Result Data Ready Count • Result Data Update Count • Main unit statistical information • Buffering data • Sequence bit
	87 (0x57)	-	Lock	Sets the operation lock command.
	88 (0x58)	-	Unlock	Sets the operation unlock command.
	90 (0x5A)	-	Read Complete Clear	Clears the Read Complete and Read Failure bits.
	91 (0x5B)	-	Preset Complete Clear	Clears the Preset Complete and Preset Failure bits.
	92 (0x5C)	-	Register Preset Data Complete Clear	Clears the Register Preset Data Complete and Register Preset Data Failure bits.
	93 (0x5D)	-	Tune Complete Clear	Clears the Tune Complete and Tune Failure bits.

Identity Object   Class ID: 1 (0x01)

● Service

Instance ID	Service code	Service data Data (Data type)	Name	Description
1	5 (0x05)	-	Reset	Executes hardware reset.

(1) Start reading (Read Start)

• Command

Class ID	105 (0x69)
Instance ID	1
Service code	75 (0x4B)
Attribute ID	-
Service data	UINT: Data size (2) UINT: Bank number

• Response

General response	-
Additional status	-
Service data	-

(2) Stop reading (Read Stop)

• Command

Class ID	105 (0x69)
Instance ID	1
Service code	76 (0x4C)
Attribute ID	-
Service data	UINT: Bank number

• Response

General response	-
Additional status	-
Service data	-

(3) Preset reading start (Preset Start)

• Command

Class ID	105 (0x69)
Instance ID	1
Service code	77 (0x4D)
Attribute ID	-
Service data	UINT: Bank number

• Response

General response	-
Additional status	-
Service data	-

Preset reading stop (Preset Stop)

• Command

Class ID	105 (0x69)
Instance ID	1
Service code	78 (0x4E)
Attribute ID	-
Service data	UINT: Bank number

• Response

General response	-
Additional status	-
Service data	-

(5) Preset data registration

• Command

Class ID	105 (0x69)
Instance ID	1
Service code	79 (0x4F)
Attribute ID	-
Service data	UINT: Data size BYTE[494]: Data

• Response

General response	-
Additional status	-
Service data	-

(6) Tuning instructions

• Command

Class ID	105 (0x69)
Instance ID	1
Service code	80 (0x50)
Attribute ID	-
Service data	UINT: Bank number

• Response

General response	-
Additional status	-
Service data	-

(7) Tuning stop

• Command

Class ID	105 (0x69)
Instance ID	1
Service code	81 (0x51)
Attribute ID	-
Service data	-

• Response

General response	-
Additional status	-
Service data	-

(8) Get result data

• Command

Class ID	105 (0x69)
Instance ID	1
Service code	85 (0x55)
Attribute ID	-
Service data	UINT: Data size UINT: Offset

• Response

General response	-
Additional status	-
Service data	UINT: Result Data Size UINT: Rest Result Data Size BYTE[]:Result Data

(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

14-4 Reference Programs

For the KV Series

■ Cyclic communication

● Without handshaking
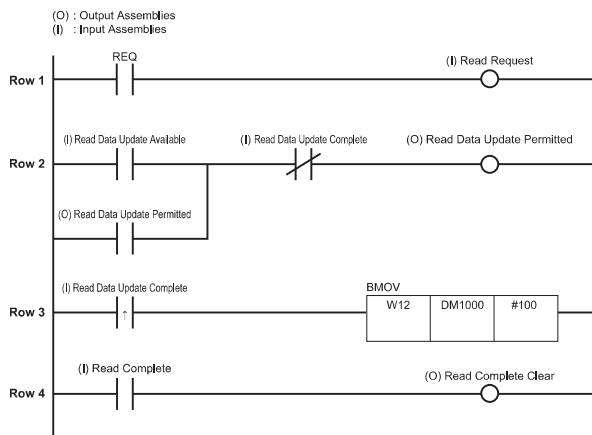
(O) : Output Assemblies
(I) : Input Assemblies
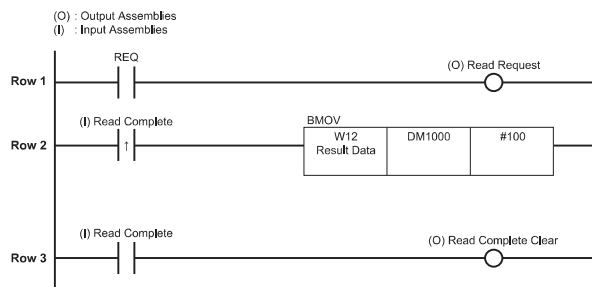
Row 1 : This starts Read Request and starts reading.
Row 2 : When Result Complete is ON, the data written to Result Data are copied to DM1000.
Row 3 : When Read Complete is ON, Read Complete Clear turns ON.

● With handshaking

(O) : Output Assemblies
(I) : Input Assemblies

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-1000.
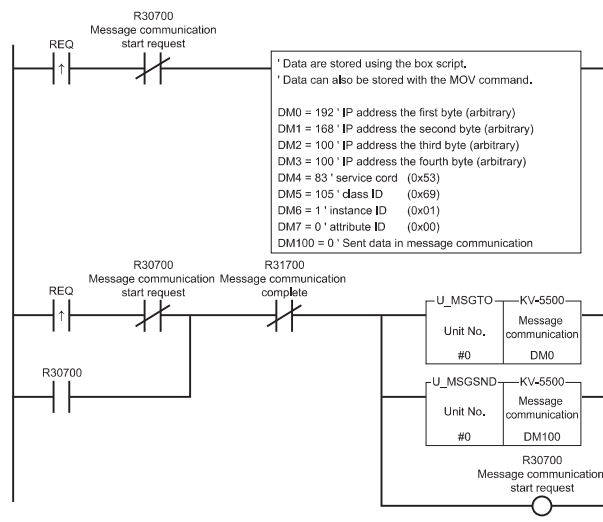**Row 3**: When Read Data Reception Complete turns ON, the data for the specified bytes are transferred from the read data to DM1000.
* Read Data Update Complete turns ON when the writing of read data from the SR-1000 to the PLC is complete.
Row 4 : When Read Complete turns ON, Read Complete Clear turns ON.
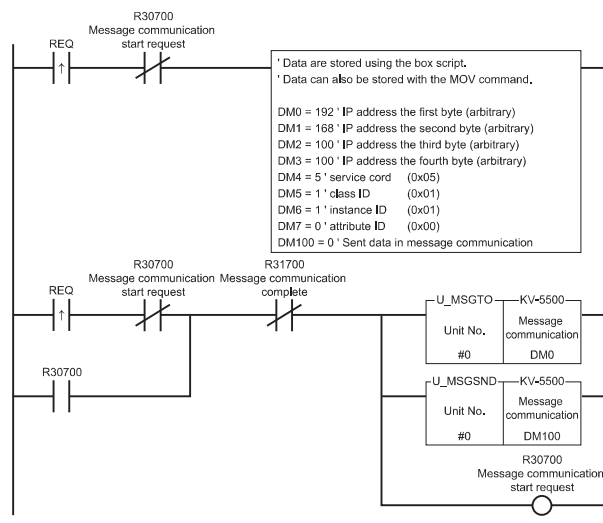
■ Message communication

• Error clear operation

' Data are stored using the box script.
' Data can also be stored with the MOV command.

DM0 = 192 ' IP address the first byte (arbitrary)
DM1 = 168 ' IP address the second byte (arbitrary)
DM2 = 100 ' IP address the third byte (arbitrary)
DM3 = 100 ' IP address the fourth byte (arbitrary)
DM4 = 83 ' service cord   (0x53)
DM5 = 105 ' class ID   (0x69)
DM6 = 1 ' instance ID   (0x01)
DM7 = 0 ' attribute ID   (0x00)
DM100 = 0 ' Sent data in message communication

The errors on the SR-1000 Series are cleared. The following items are cleared.
• Buffer overflow
• General errors
• Result Data Available
• Read data

• Software reset operation

' Data are stored using the box script.
' Data can also be stored with the MOV command.

DM0 = 192 ' IP address the first byte (arbitrary)
DM1 = 168 ' IP address the second byte (arbitrary)
DM2 = 100 ' IP address the third byte (arbitrary)
DM3 = 100 ' IP address the fourth byte (arbitrary)
DM4 = 5 ' service cord   (0x05)
DM5 = 1 ' class ID   (0x01)
DM6 = 1 ' instance ID   (0x01)
DM7 = 0 ' attribute ID   (0x00)
DM100 = 0 ' Sent data in message communication

The SR-1000 Series restarts.

Control Logix/Compact Logix (RSLogix 5000)

■ Cyclic communication

● Without handshaking

```
(O) : Output Assemblies
(I)  : Input Assemblies
```
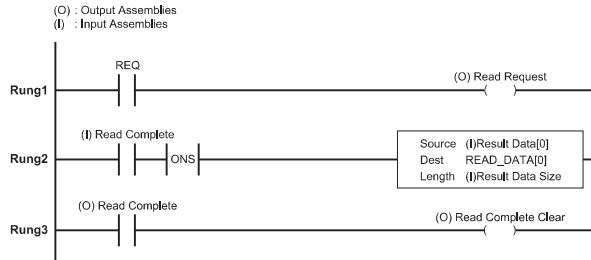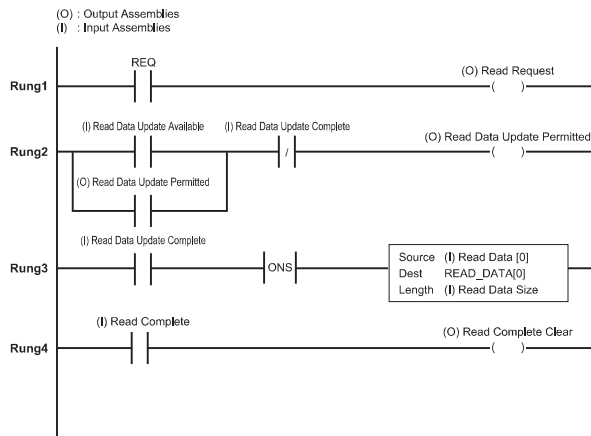

Rung1 : This starts Read Request and starts reading.
Rung2 : With the rising of Result Complete, the data written to Result Data are copied to READ_DATA.
Rung3 : When Read Complete is ON, Read Complete Clear turns ON.

● With handshaking

```
(O) : Output Assemblies
(I)  : Input Assemblies
```


Rung 1 : When the trigger (REQ) signal turns ON, Read Request turns ON.
Rung 2 : When Read Data Update Available turns ON and Read Data Update Complete turns OFF, Read Data Update Permitted turns ON.
Read Data Update Permitted is self-retained.
* Read Data Update Available turns ON when read data is buffered in the SR-1000.
Rung3 : When Read Data Update Complete turns ON, the read data is transferred to READ_DATA.
* Read Data Update Complete turns ON when the writing of read data from the SR-1000 to the PLC is complete.
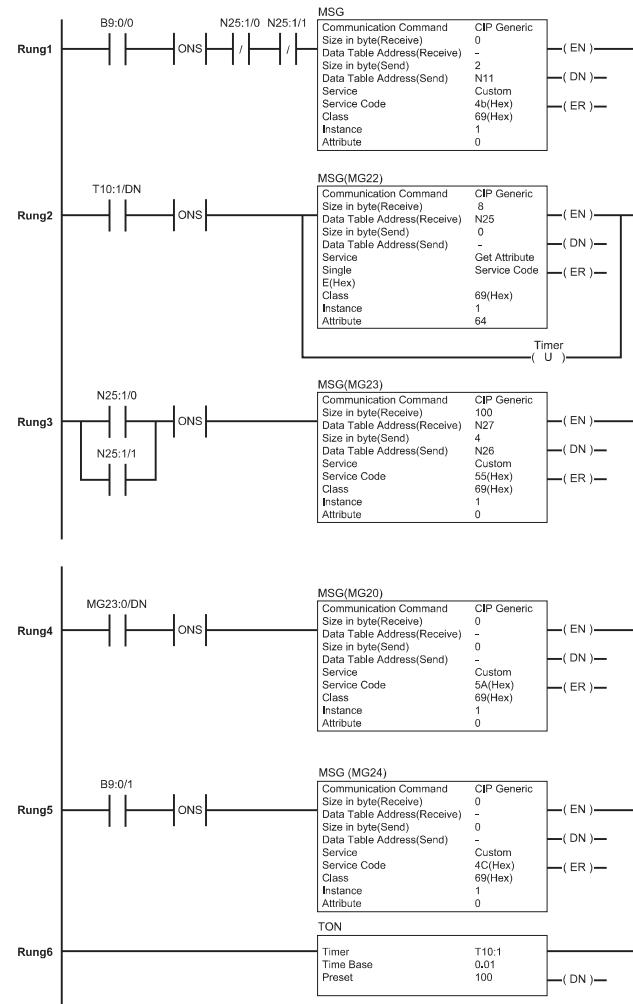**Rung 4** : When Read Complete turns ON, Read Complete Clear turns ON.

Description of tags used in the sample

Name	Data type	Description
REQ	BOOL	Bit to order to start/stop reading
READ_DATA	SINT[256]	Memory to store read data

For the Micro Logix (RSLogix 500)

■ Message communication

Description of the reference program

Rung1 : When Read Complete and Read Failure are OFF, the read start message is sent at the rising of B9:0:0.
Rung2 : For each timeout of the timer, Get Attribute Single is performed for Read Status.
The result is written to Read Status Res.
Rung3 : At the rising of either Result Status Res[1].0(Read Complete) or 1(Read Failure), Get Result Data is performed.
The result is written to Read Data Res.
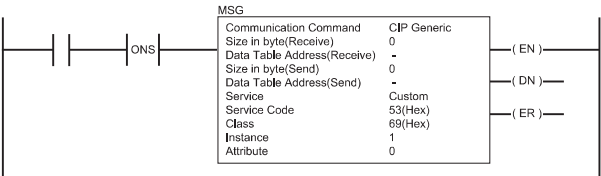**Rung4** : Read Complete Clear is performed.
Rung5 : This starts B9:0/1 and sends the read end message.
Rung6 : The timer is being performed to perform Rung2.

Description of tags used in the sample

Name	Data type	Description
B9:0/0	Binary	Bit to order to start/stop reading
T10	Timer	Timer
N11	Integer	Memory in which the bank number is stored
MG20		Message to perform Read Complete Clear
MG21		Message to perform Read Start
MG22	Message	Message to perform Get Attribute Single for Read Status
MG23		Message to perform Get Result Data
MG24		Message to perform Read Stop
N25	Integer	Memory that stores Get Attribute Single result of MG22
N26	Integer	Message command to receive the result data
N27	Integer	Memory that stores Get Result Data result of MG23
RIX30		Extended Routing Information for MG20
RIX31	Extended	Extended Routing Information for MG21
RIX32	Routing	Extended Routing Information for MG22
RIX33	Information	Extended Routing Information for MG23
RIX34		Extended Routing Information for MG24

• **Error clear operation**

```
                        MSG
 ┤ ├────┤ONS├─          Communication Command      CIP Generic
                        Size in byte(Receive)       0                      ─( EN )──
                        Data Table Address(Receive)  -
                        Size in byte(Send)          0                      ─( DN )──
                        Data Table Address(Send)     -
                        Service                     Custom
                        Service Code                53(Hex)                ─( ER )──
                        Class                       69(Hex)
                        Instance                    1
                        Attribute                   0
```
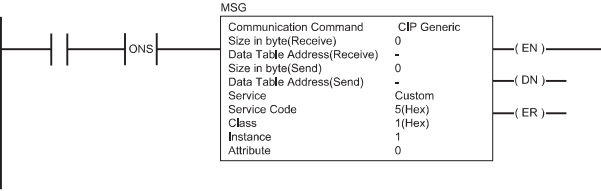
The errors on the SR-1000 Series are cleared. The following items are cleared.
• Buffer overflow
• General errors
• Result Data Available
• Read data

• **Software reset operation**

```
                        MSG
 ┤ ├────┤ONS├─          Communication Command      CIP Generic
                        Size in byte(Receive)       0                      ─( EN )──
                        Data Table Address(Receive)  -
                        Size in byte(Send)          0                      ─( DN )──
                        Data Table Address(Send)     -
                        Service                     Custom
                        Service Code                5(Hex)                 ─( ER )──
                        Class                       1(Hex)
                        Instance                    1
                        Attribute                   0
```

The SR-1000 Series restarts.