CKD

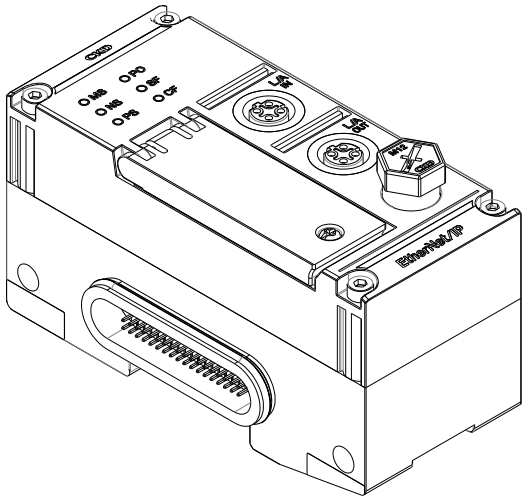
Remote I/O

RT Series

EtherNet/IP™ Compatible Device unit

INSTRUCTION MANUAL

SM-A71112-A/3



- Read this Instruction Manual before using the product.
- Read the safety notes carefully.
- Keep this Instruction Manual in a safe and convenient place for future reference.

CKD Corporation

PREFACE

Thank you for purchasing CKD's "**RT Series**". This Instruction Manual contains basic matters such as installation and usage instructions in order to ensure optimal performance of the product. Please read this Instruction Manual thoroughly and use the product properly.
Keep this Instruction Manual in a safe place and be careful not to lose it.

Product specifications and appearances presented in this Instruction Manual are subject to change without notice.

- This product is intended to be used by persons with sufficient knowledge and experience in the following areas.
  CKD shall not be responsible for accidents caused by persons who selected or used the product without knowledge or sufficient training with respect to them.
  - Electricity (qualified electrician or equivalent)
  - The industrial network communications used
  - FA systems in general
  - Each of the systems that use manifold solenoid valves, IO-Link, etc.
- Since there are a wide variety of customer applications, it is impossible for CKD to be aware of all of them.
  Depending on the application or usage, the product may not be able to exercise its full performance or an accident may occur. It is the responsibility of the customer to check the product specifications and decide how the product shall be used in accordance with the application and usage.

SAFETY INFORMATION

When designing and manufacturing any device incorporating the product, the manufacturer has an obligation to ensure that the device is safe. To that end, make sure that the safety of the machine mechanism of the device, the pneumatic or water control circuit, and the electric system that controls such mechanism is ensured.

To ensure the safety of device design and control, observe organization standards, relevant laws and regulations, which include the following:

ISO4414, JIS B8370, JFPS2008 (the latest edition of each standard),
the High Pressure Gas Safety Act, Industrial Safety and Health Act, other safety rules, organization standards, and relevant laws and regulations.

In order to use our products safely, it is important to select, use, handle, and maintain the products properly.
Observe the warnings and precautions described in this Instruction Manual to ensure device safety.

Although various safety measures have been adopted in the product, improper handling may lead to an accident. To avoid this:

Thoroughly read and understand this Instruction Manual before using the product.

To explicitly indicate the severity and likelihood of a potential harm or damage, precautions are classified into three categories: "DANGER", "WARNING", and "CAUTION".

⚠ **DANGER**	Indicates an imminent hazard. Improper handling will cause death or serious injury to people.
⚠ **WARNING**	Indicates a potential hazard. Improper handling may cause death or serious injury to people.
⚠ **CAUTION**	Indicates a potential hazard. Improper handling may cause injury to people or damage to property.

Precautions classified as "CAUTION" may still lead to serious results depending on the situation.
All precautions are equally important and must be observed.

Other general precautions and tips on using the product are indicated by the following icon.

	Indicates general precautions and tips on using the product.

Precautions on Product Use

⚠ DANGER

Do not use the product for the following applications.

- Medical devices involved in sustaining or managing people's lives or physical health.
- Mechanisms and mechanical devices used for the purpose of moving and transporting people.
- Important safety parts for mechanical devices.

⚠ WARNING

The product must be handled by a qualified person who has extensive knowledge and experience.

The product is designed and manufactured as a device or part for general industrial machinery.

Use the product within the specifications.

The product must not be used beyond its specifications.

This product is intended for use in general industrial machinery, equipment or parts. It is not intended for use outdoors (except for products with outdoor specifications) or for use under the following conditions or environments.

- Use for applications where safety is required
- In applications for nuclear power, railroads systems, aviation, ships, vehicles, medical equipment
- In applications for equipment that directly touches beverages or food
- For safety measures for amusement equipment, emergency shut-off circuits, press machines, or brake circuits
- Use for applications where life or assets could be significantly affected, and special safety measures are required

(An exception will be made if the customer consults with CKD prior to use and understands the specifications of the product. However, even in that case, safety measures must be taken to avoid danger in case of a possible failure.)

Never modify or additionally machine this product.

These may cause failure or malfunction. In addition, they are not covered by our warranty.

Do not handle the product or remove pipes and devices until safety is confirmed.

The product may operate in an unexpected way, causing injury to people or damage to equipment.

- Inspect and service the machine and devices only after confirming the safety of the entire system. Also, turn off the energy source (air supply or water supply) and power to the relevant facility. Release compressed air from the system and use extreme care to avoid water or electric leakage.
- Since there may be hot or live parts even after operation has stopped, use extreme care when handling the product or removing pipes and devices.
- When starting or restarting a machine or device that incorporates pneumatic components, make sure that a safety measure (such as a pop-out prevention mechanism) is in place and system safety is secured.

Observe the warnings and cautions on the following pages to prevent accidents.

⚠ CAUTION

Use the product in a specified manner.

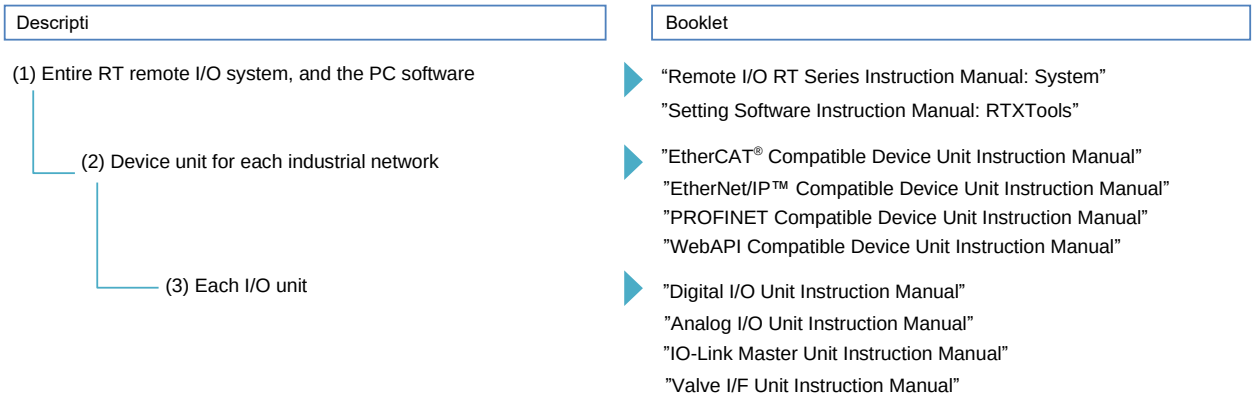
If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

CONTENTS

INSTRUCTION MANUAL FOR THIS PRODUCT

The manuals related to the Remote I/O RT Series are separated by purpose as follows.
(1) Entire RT remote I/O system, and the PC software
(2) Device unit for each industrial network
(3) Each I/O unit

"Remote I/O RT Series Instruction Manual: System Construction" is mandatory. Other manuals are not mandatory but must be referred to according to the units used.



List of Related Instruction Manuals

Instruction Manual No.	Instruction Manual name	Description
SM-A46342-A	Remote I/O RT Series Instruction Manual: System Construction	Instruction manual for the entire remote I/O RT Series system Includes explanations of the PC software RTXTools, the power supply unit RT-XP24A01N, and the End unit RT-XEE☐N00N.
SM-A90084-A	Setting software Instruction Manual: RTXTools	Instruction manual for RTXTools: setting software
SM-A46343-A	EtherCAT® Compatible Device unit Instruction Manual	Instruction manual for the EtherCAT compatible device unit RT-XTECN00N
SM-A71112-A	EtherNet/IP™ Compatible Device unit Instruction Manual (this manual)	Instruction manual for the EtherNet/IP compatible device unit RT- XTENN00N
SM-A87934-A	PROFINET Compatible Device unit Instruction Manual	Instruction manual for the PROFINET compatible device unit RT-XTEPN00N
SM-A95119-A	WebAPI Compatible Device Unit Instruction Manual	Instruction manual for the WebAPI compatible device unit RT-XTEAN00N
SM-A46344-A	IO-Link Master Unit Instruction Manual	Instruction manual for the IO-Link master unit RT-XLMSA08N
SM-A46345-A	Digital I/O Unit Instruction Manual	Instruction manual for the digital I/O unit RT-X☐DG☐☐☐☐
SM-A46347-A	Analog I/O Unit Instruction Manual	Instruction manual for the analog I/O unit RT-X☐AGA0 2N
SM-A46346-A	Valve I/F Unit Instruction Manual	Instruction manual for the valve I/F unit TVG☐P-TB-☐-KA1☐

Always read the instruction manual for each product connected to the remote I/O RT Series.
The product types that can be connected are:
- Upper master units in each industrial network (connected to a device unit)
- IO-Link devices (connected to the IO-Link master unit)
- Manifold solenoid valves (connected to the valve I/F unit)
- Other sensors/actuators (connected to a digital I/O unit, analog I/O unit, or IO-Link master unit)

	A video is available to show how to assemble the units, install the software, and how the LEDs blink. If necessary, refer to the video at the following URL RT product page: https://www.ckd.co.jp/kiki/en/product/detail/1064	

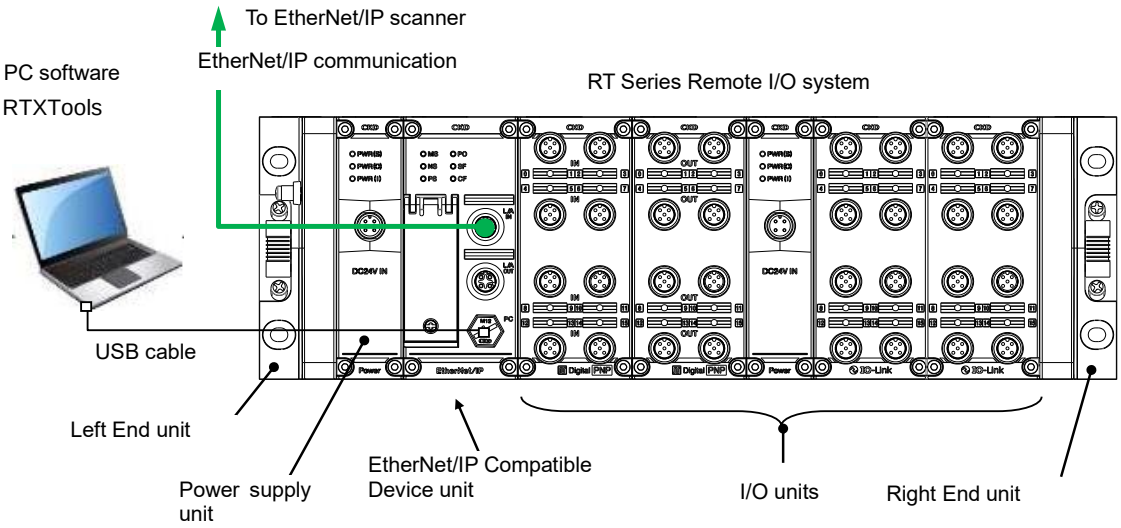
TERMS RELATED TO THE ETHERNET/IP COMPATIBLE DEVICE UNIT

Terms	Definition
EDS file	Abbreviation for Electronic Data Sheet. File that contains information and settings data of the product.
EtherNet/IP	EtherNet-based industrial network protocol managed by ODVA.
EtherNet/IP scanner	Node located on Ethernet/IP. It can control EtherNet/IP adapter.
EtherNet/IP adapter	Node located on Ethernet/IP. It is controlled from the Ethernet/IP scanner.
CIP communication	Common Industrial Protocol. CIP includes both connected and disconnected messages.
Object	A collection of data by role that can be controlled by CIP.
Class	Unique ID allocated to the object.
Instance	The entity of a class.
Attribute	The individual data that an instance has
WebAPI	A mechanism that provides an interface for manipulating applications over HTTP communication.
Implicit communication	EtherNet/IP communication that is transmitted and received at regular intervals.
Explicit communication	EtherNet/IP communication that is transmitted and received in an aperiodic way.
DLR	Device Level Ring. Network formed in a ring to maintain redundancy for EtherNet/IP communication.
QoS	Quality of Service. It can prioritize communication packets.
LAN	Local Area Network. A network constructed in a limited range such as an office.
DHCP	Dynamic Host Configuration Protocol. Function to dynamically allocate IP addresses to clients.
V	A value or a set value that disappears when the power is turned off.
NV	A value or a set value that is retained even the power is turned off.
json	Format of a text as defined in RFC8259.

1. PRODUCT OVERVIEW

RT Series EtherNet/IP compatible device unit is a device unit in the Remote I/O RT Series systems and compatible to open network EtherNet/IP.
The device unit acts as an interface between the Ethernet/IP scanner and each I/O units.

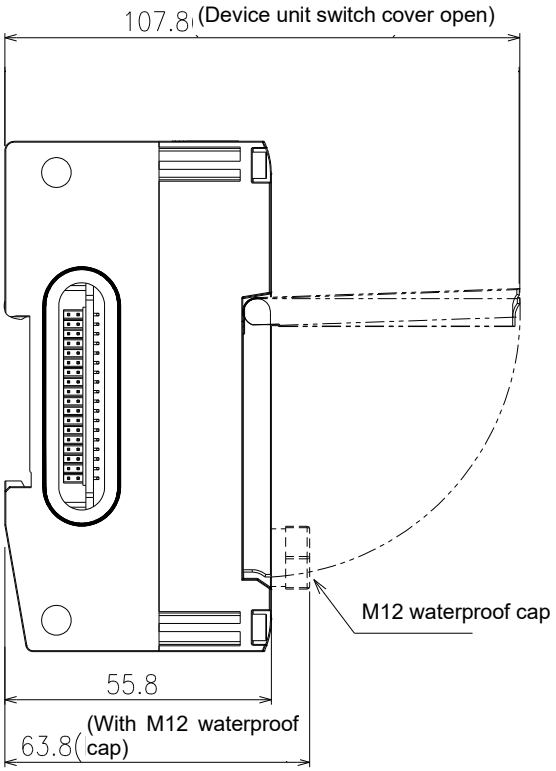
By connecting the PC software (free of charge) to the device unit via USB or LAN, it is possible to check the information and status of the entire Remote I/O RT Series system, as well as the settings/status of each unit.

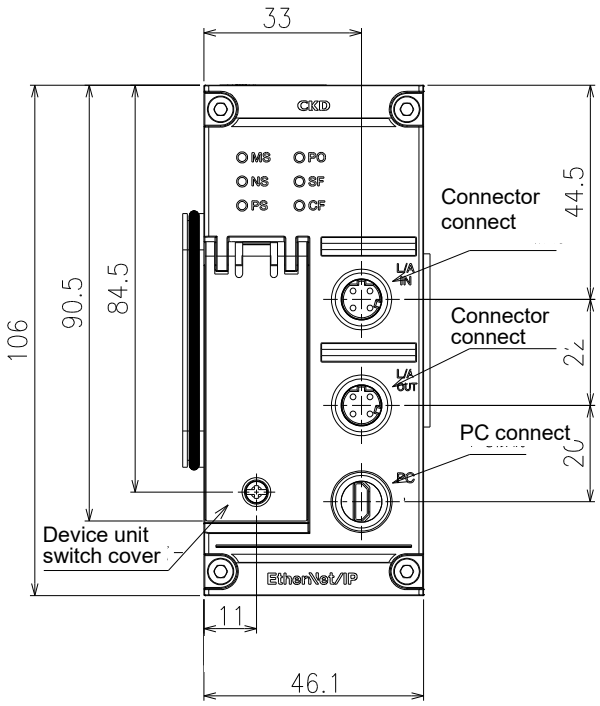


1.1 Features

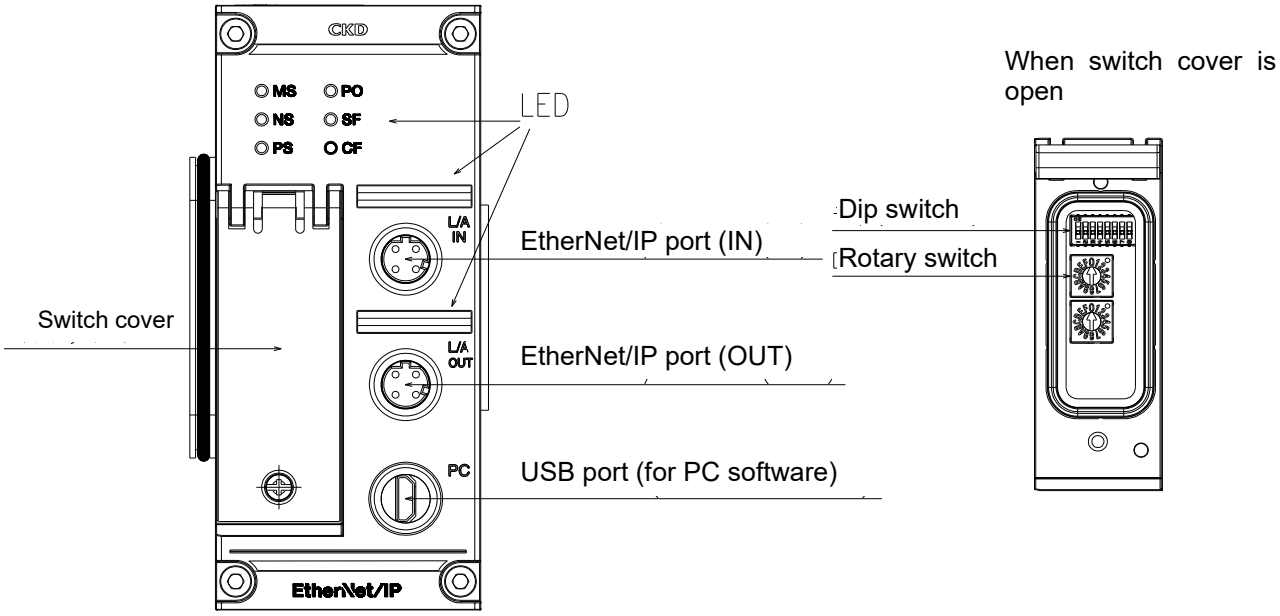
Features include:
- Supports both Implicit communication (cyclic communication) and Explicit communication (async communication) of EtherNet/IP.
- Transmits diagnostic information from the connected unit to the EtherNet/IP scanner via a cyclic communication.
- Supports the EtherNet/IP DLR (Device Level Ring) function.
- Monitors the status of the internal power supply from the power supply unit (from among the power supply units on the left side toward the device unit, the closest power supply unit to itself is monitored).
- The output operation in the event of a communication error can be specified for the entire Remote I/O system.
- The device unit can log its own or connected I/O units' errors to its own non-volatile memory. In addition, it is possible to use the PC software to save the time series data to a file.
- WebAPI compatible. Acquisition/change of the settings data of each unit and acquisition of the status is possible via LAN.

1.2 External Dimensions





1.3 Names and Functions of Each Part



■ LED

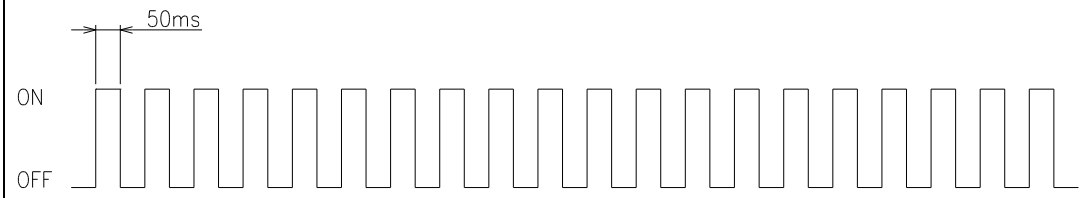
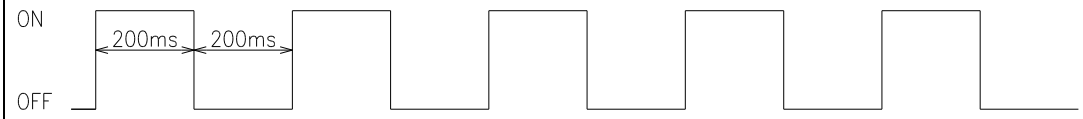
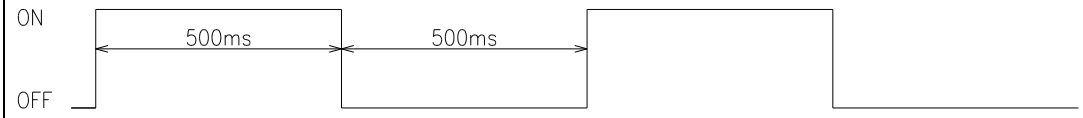
Specifications

LED name	Indication
MS	Indicates the status of the entire product.
NS	Indicates the EtherNet/IP connect status.
L/A IN	Indicates the link status on the IN side of the connector.
L/A OUT	Indicates the link status on the OUT side of the connector.
PS	Indicates the 24 V power status for the unit/input.
PO	Indicates the 24 V power status for the output.
SF	Indicates the status of the entire Remote I/O system.
CF	Indicates a setting change or forced input/output.

Status list

Name	Status	Meaning
MS	Off	No power
	Green blinking	IP address not set or in communication settings
	Green on	Normal
	Red on	Main unit error such as hardware failure
	Red blinking	Incorrect switch or settings status
NS	Off	No power or no IP address is set
	Green blinking	IP address is set but no EtherNet/IP connect is present
	Green on	EtherNet/IP in communication
	Red blinking	EtherNet/IP connect timed out
L/A IN	Green blinking (fast)	LINK、ACTIVITY
	Green on	LINK、NO ACTIVITY
	Off	NO LINK、NO ACTIVITY
L/A OUT	Green blinking (fast)	LINK、ACTIVITY
	Green on	LINK、NO ACTIVITY
	Off	NO LINK、NO ACTIVITY
PS	Red blinking (fast)	Unit/input voltage is outside the range of 24V ± 25%
	Yellow on	Unit/input voltage is recovered from voltage error Note) It latches once it occurs. It must be reset by a power cycle operation or by using PC software.
	Green on	Unit/input voltage is in normal status
	Off	Power OFF status
PO	Red blinking (fast)	Output voltage is outside the range of 24V ± 25%
	Yellow on	Output voltage is recovered from voltage error Note) It latches once it occurs. It must be reset by a power cycle operation or by using PC software.
	Green on	Output voltage is in normal status
	Off	Power OFF status
SF	Red blinking (fast)	Internal bus communication error Note) It latches once it occurs. It must be reset by a power cycle operation or by using PC software.
	Red blinking (slow)	Hardware error
	Red blinking (twice)	Factory setting error (serial number of device unit)
	Yellow on	Operation waiting
	Yellow blinking (fast)	Unit configuration error
	Green blinking (fast)	Initialized set memory (starts in system reset status) Note) It latches once it occurs. It must be reset by a power cycle operation or by using PC software.
	Green blinking (slow)	Process data overflow
	Green on	Normal status
	Off	Power OFF status
CF	Red blinking (slow)	WebAPI/PC concurrent access
	Yellow on	Being set to the forced I/O settings
	Green blinking (fast)	Being accessed to WebAPI
	Green blinking (slow)	Being accessed from PC
	Off	Power OFF or no access status

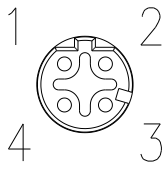
■ LED blinking statuses

Blinking status	Blinking timing
Blinking (fast)	
Blinking (slow)	
Blinking	

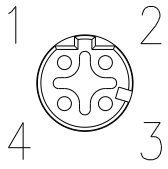
A video is available to show how the LEDs actually blink. If necessary, refer to the video at the following URL

RT product page:
https://www.ckd.co.jp/kiki/en/product/detail/1064

■ EtherNet/IP port (IN)

M12(A) 4 pin female	Pin number	Description
	1	TD+ (Transmit data plus)
	2	RD+ (Receive data plus)
	3	TD- (Transmit data minus)
	4	RD- (Receive data minus)

■ EtherNet/IP port (OUT)

M12(A) 4 pin female	Pin number	Description
	1	TD+ (Transmit data plus)
	2	RD+ (Receive data plus)
	3	TD- (Transmit data minus)
	4	RD- (Receive data minus)

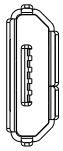
■ Waterproof cap

Always put a waterproof cap on any ports that are not in use.
The tightening torque is 0.1 ± 0.05 N･m.
In addition, proper use of waterproof caps (RT-CM12) is required to achieve protection structure IP65/IP67.
Purchase RT-CM12 separately.

■ USB port (for PC software)

⚠ CAUTION

Do not leave the USB port open.
If there are no waterproof caps on the USB port, the degree of protection of the USB port is IP20. Do not allow foreign objects to get inside, and ensure that the ports are free of water, solvents, and oil during use.

Micro USB (B)	Pin number	Description
	1	VBUS
	2	DM
	3	DP
	4	ID
	5	GND

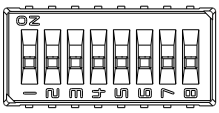
* For the unused USB port, always attach the waterproof cap that comes included as standard accessory (RT-CM12 when sold separately).

■ Dip switch

⚠ WARNING

When operating each switch on the device unit, switch OFF the supplied power and set the switches with a precision screwdriver or other tool.
Not doing so can cause a failure as a result of short circuits or damage to components.

When operating a switch, make sure that only the relevant areas are in contact.
Not doing so may result in a failure.

Dip switch 8 points	SW	Name	Description
	1	WebAPI	Specifies whether the WebAPI function is enabled or disabled. OFF: Disable (factory setting) ON: Enable
	2	Reserved	-
	3	Output settings in the event of a communication error/ priority to hardware	Selects whether the operation of all connected I/O units is specified at once by Dip switch SW4 or individually by unit. Read at start-up. OFF: Set individually by unit (factory setting) ON: Specified all units at once (specified by dip switch SW4)
	4	HOLD/CLEAR	If SW4 is ON, select whether the output operation (Note 2) in the event of error communication (Note 1) is to be HOLD at the last value or to be OFF (the output value of the process data remains unchanged, and the output power is turned OFF). Read at startup. OFF: CLEAR (the output value of the process data remains unchanged, and the output power is turned OFF) (factory setting) ON: HOLD at the last value Note 1: It indicates an industrial network communication error or an internal bus communication error. Note 2: It indicates valve I/F unit , digital output, analog output or output in DIO mode of IO-Link unit.
	5	Parameter initialization at startup	If ON at start-up, all units will be restored to the factory setting. OFF: Do not initialize (factory setting) ON: Initialize (restores factory setting for all installed units)
	6	Reserved	-
	7	IP address Third octet selection	Selects IP address third octet. OFF: 192.168.0.XXX (factory setting)

Dip switch 8 points	SW	Name	Description
(Continued)			ON:192.168.1.XXX * XXX is the value specified by the rotary switch below (when between 1 and 254).
	8	Remote I/O system diagnostic information ON/OFF	If ON at startup, diagnostic information for the entire Remote I/O system is added to the data to be sent to the EtherNet/IP scanner. OFF: Do not add Remote I/O system diagnostic information (factory setting) ON: Add Remote I/O system diagnostic information Note: The Remote I/O system diagnostic information is in an 8-bit form consisting of the following information: - System error - Hardware error - Operation waiting - Power failure - Unit output error - Unit input error

* The value which was set is read only once at startup and is confirmed.

■ Rotary switch

Two rotary switches	Value	Name	Description
 16 digits  1 digit	2 digits 0 to F.	IP address settings	Set the IP address of EtherNet/IP compatible device unit Set 0 to 255 with combination of x1 switches and x16 switches. 0: Use software settings value 1 to 254: 192.168.A.1 to 192.168.A. 254 *A is DIPSW number 7 above, select 0 or 1 255: Determined by DHCP Factory setting: 0 The value is read only once at startup and is confirmed.

1.4 Unit Specifications

<table>
<tr><th colspan="2">Item</th><th>Description</th></tr>
<tr><td colspan="2">Type</td><td>Device unit</td></tr>
<tr><td rowspan="7">Communication specifications</td><td>Protocol</td><td>EtherNet/IP</td></tr>
<tr><td>Compatibility standard</td><td>IEEE802.3u</td></tr>
<tr><td>Distance between nodes</td><td>Maximum 100 m</td></tr>
<tr><td>Cable</td><td>Standard EtherNet cable (CAT5 or higher, 100BASE-TX)</td></tr>
<tr><td>Speed</td><td>100 Mbps</td></tr>
<tr><td>Method</td><td>Full duplex/half duplex</td></tr>
<tr><td>Compatible function</td><td>・ Implicit Communication (cyclic communication)
・ Explicit communication (async communication)
・ DLR function
・ QoS function</td></tr>
<tr><td colspan="2">Number of I/O units that can be connected</td><td>1 to 17</td></tr>
<tr><td colspan="2">Number of hard connectable units</td><td>The width of the entire Remote I/O system must be no more than 922.5 mm
・ Input: Maximum 505 bytes (including 1 byte of device unit Remote I/O system diagnostic information)
・ Output: Maximum 504 bytes
・ Total I/O: Maximum 513 bytes (including 1 byte of device unit Remote I/O system diagnostic information)</td></tr>
<tr><td colspan="2">Process data size limitation</td><td>The following size limitations apply to the process data that a device unit can input and output from an upper master. If it is exceeded, a "process data overflow" occurs.
<table>
<tr><td>Item</td><td>Minimum size</td><td>Maximum size</td></tr>
<tr><td>Input</td><td>0 bytes</td><td>505 bytes (internal bus limit 504 bytes
+ Remote I/O system diagnostic information 1 byte)</td></tr>
<tr><td>Output</td><td>0 bytes</td><td>504 bytes</td></tr>
<tr><td>Total</td><td>1 byte</td><td>513 bytes (internal bus limit 512 bytes
+ Remote I/O system diagnostic information 1 byte)</td></tr>
</table></td></tr>
<tr><td colspan="2">Protection function</td><td>
<table>
<tr><td rowspan="2">Protection function</td><td colspan="3">Power line</td></tr>
<tr><td>Internal power supply</td><td>Unit/input</td><td>Output</td></tr>
<tr><td>Low voltage protection (reset function)</td><td>Yes</td><td>None</td><td>None</td></tr>
<tr><td>Overvoltage detection</td><td>None</td><td>Yes</td><td>Yes</td></tr>
<tr><td>Low voltage detection</td><td>None</td><td>Yes</td><td>Yes</td></tr>
</table></td></tr>
<tr><td colspan="2">Connector</td><td>M12 (D) 4-pin female x 2 (BUS IN / BUS OUT)
Micro USB (B) x 1 (for PC software)</td></tr>
<tr><td colspan="2">Switch for settings</td><td>Dip switch x 1: Output settings in the event of a communication error/ priority to hardware, HOLD/CLEAR, Parameter initialization at startup, Remote I/O system diagnostic information ON/OFF, WebAPI ON/OFF, IP address third octet selection
Rotary switch x 2 : for IP address settings</td></tr>
<tr><td colspan="2">LED</td><td>8 pcs (MS, NS, L/A IN、L/A OUT、PS、PO、SF、CF)</td></tr>
<tr><td colspan="2">Working temperature range</td><td>-10°C to 55°C</td></tr>
<tr><td colspan="2">Relative humidity</td><td>30% to 85% RH</td></tr>
<tr><td colspan="2">Ambient atmosphere</td><td>No corrosive gases or heavy dust</td></tr>
<tr><td colspan="2">Installation location</td><td>Indoor use</td></tr>
<tr><td colspan="2">Altitude</td><td>Up to 2000 m</td></tr>
<tr><td colspan="2">Pollution degree</td><td>3</td></tr>
<tr><td colspan="2">Degree of protection</td><td>IP65/IP67 (when connected to manifold)</td></tr>
<tr><td colspan="2">Current consumption</td><td>Power supply unit/input: 100 mA or less (24 V conversion)</td></tr>
</table>

Item	Description
	Power supply output 20 mA or less (24 V conversion)
Size (W x H x D)	46.1 x 106 x 55.8 (mm)
Net weight	Approx. 230 g (including 2 tie rods for the device unit)
Standard accessories	Two tie rods for the device unit (RT-TR-1), waterproof cap for USB port x 1 (RT-CM12) Note: Waterproof cap for EtherNet/IP port (RT-CM12) is sold separately.

Note 1: IP65/IP67 is not part of the UL certification.

2. INSTRUCTIONS FOR USE

⚠CAUTION

Thoroughly read and understand the instruction manual for the industrial network communication system used before using the device unit.
The product may operate in an unexpected way, causing injury to people or damage to equipment.

Measures against unauthorized access to the product should be taken on the connected network side.
If measures are not taken, communications with the product may be intercepted or tampered with due to the unauthorized access.

Instructions		Reference
Check in advance	Check Remote I/O system configuration.	"Remote I/O RT Series Instruction Manual: System Construction"
	Check the power supply units' current consumption (related to: the number of power supply units used).	
	Determine whether Remote I/O system diagnostic information is used (It is related to dip switch SW8 on device unit).	"1.3 Names and functions of each part"
	Check whether a variable I/O unit (e.g. IO-Link master unit) is present in I/O unit.	"Remote I/O RT Series Instruction Manual: System Construction"
	If variable I/O units (e.g. IO-Link master unit) are present, check the size of the parts where they are variable in size. (E.g. For IO-Link master units, check the size of each output size and the size of the inputs on the connected IO-Link device of the ports to be used as IO-Link mode.)	
	・Check the I/O size and assignment information for the Remote I/O system. ・Design allocation variables (arrangements, structures, etc.) on the EtherNet/IP scanner side.	
	Determine output operation upon communication error occurrence. (It relates to the settings of the dip switches SW3 and SW 4 on the device unit and each I/O unit.)	"1.3 Names and functions of each part"
↓	↓	-
Hardware mounting, wiring, and setup	Install EtherNet/IP scanner.	Manual for EtherNet/IP scanner
	↓	-
	・ Assemble Remote I/O system. ・ Install Remote I/O system (DIN rail mounting or direct screw mounting).	"Remote I/O RT Series Instruction Manual: System Construction"
	↓	-
	Wire LAN cable to the device unit.	"3.2 EtherNet/IP Communication Wiring"
	↓	-
	Wire 24V power supply to the power supply unit.	"Remote I/O RT Series Instruction Manual: System Construction"
	↓	-
	Wire each external I/O to the I/O units. Note: For an IO-Link master unit, IO-Link devices must also be connected.	"Remote I/O RT Series Instruction Manual: System Construction"
	↓	
	Set the following switches on the device unit. ・ DIP switches: Whether there will be diagnostic information; operation in the event of a communication error; etc.E1005 ・ Rotary switch: IP address (If 0 is selected, use the PC software to set the IP address of EtherNet/IP compatible device unit. If 255 is selected, check the DHCP server settings on the same network.)	"Remote I/O RT Series Instruction Manual: System Construction" "1.3 Names and functions of each part"
↓	↓	-

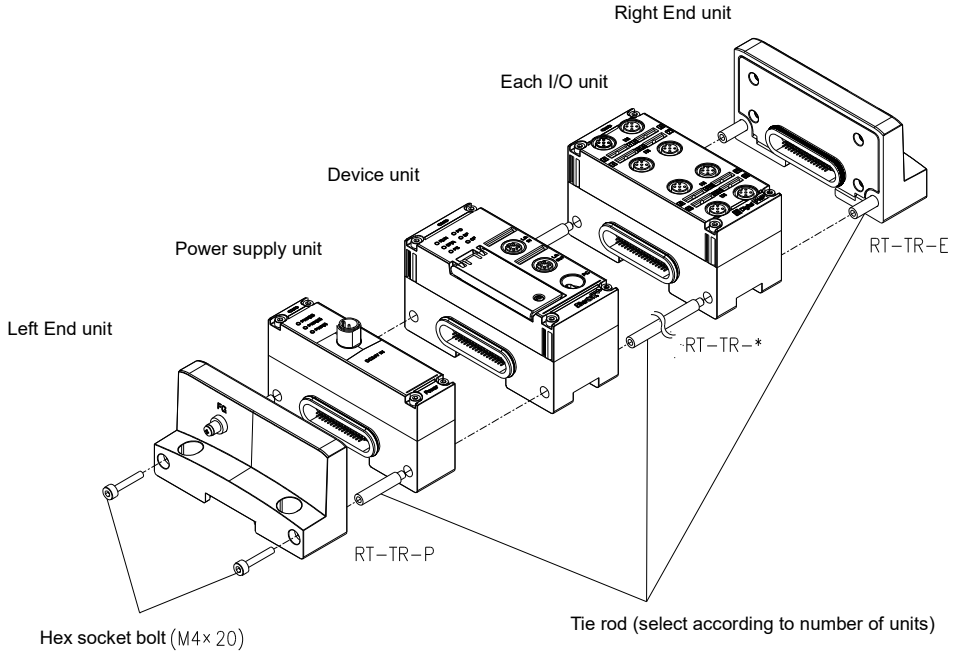
Instructions		Reference
Settings on the EtherNet/IP scanner side	Install the EDS files for the product in the upper EtherNet/IP scanner side configuration tool.	"6.1 Downloading and Installing the EDS File for The Product"
	↓	-
	Set the following on the EtherNet/IP scanner configuration tool. ・ Adding the product to the system ・ Set the process data size ・ Communication settings such as RPI	"Remote I/O RT Series Instruction Manual: System Construction" "5. F" "6. SETTINGS TO COMMUNICATE WITH THE ETHERNET/IP SCANNER"
	↓	-
	・ Implicit communication On the upper EtherNet/IP scanner side configuration tool, set the variable in accordance with the process data size and allocate it to the process data. ・ Explicit communication Create a CIP communication program.	"6.3.4 Assignment of process data to variables or addresses for upper program"
↓	↓	-
Checking Remote I/O system settings/status	Supply 24V power to the power supply unit. Note: If there is more than one power supply unit, power them all on within 3 seconds.	"Remote I/O RT Series Instruction Manual: System Construction"
	↓	-
	Settings of device unit	"4. S"
	●If setting up from the PC software	"Remote I/O RT Series Instruction Manual: System Construction"
	Connect the PC software to the device unit with a USB cable.	
	↓	
	Check the actual Remote I/O system configuration with the PC software.	
	↓	
	Set the actual Remote I/O system configuration with the PC software. Note: If the I/O unit is a variable I/O unit, set the I/O size manually or from actual device.	
	● When settings from the upper EtherNet/IP scanner side via CIP communication	Manual for EtherNet/IP scanner "9. O"
	Create a program to write the objects for each setting specified in the communication instructions of the high-level EtherNet/IP scanner.	
	↓	-
	(When needed) Check the output wiring by settings the forced output from the PC software.	"Remote I/O RT Series Instruction Manual: System Construction"
	↓	-
	Note: Some settings require a power cycle.	-
↓	↓	-
Check EtherNet/IP communication and start control from the upper EtherNet/IP scanner	Check EtherNet/IP communication. (e.g. Check LED on the upper EtherNet/IP scanner and the device unit)	Manual for EtherNet/IP scanner "1.3 Names and functions of each part" "8. T"
	↓	-
	Check the reading/writing of data from the EtherNet/IP scanner to the Remote I/O system via Implicit communication.	Manual for EtherNet/IP scanner
	↓	-
	(When needed) Check the reading/writing of data to the Remote I/O system via Implicit communication.	Manual for EtherNet/IP scanner "9. O"

3. INSTALLATION AND WIRING

3.1 Device unit Installation

Connect device unit horizontally with power supply and I/O unit.

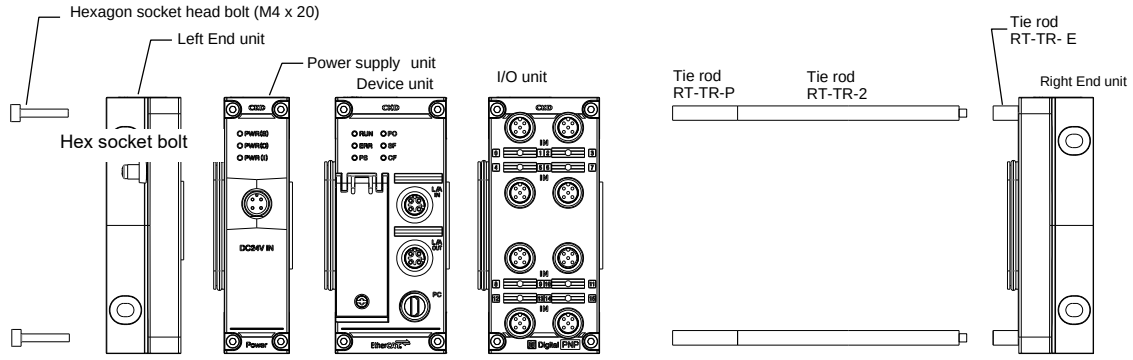
E.g.)



1 Connect the following tie rods in advance.
Select as few tie rods as possible.

Tie rod model No.	Applicable unit	Specifications
RT -TR-P	For one power supply unit	M4 x 27 mm, 2 pcs
RT -TR-1	For one device unit and one I/O unit	M4 x 46 mm, 2 pcs
RT -TR-2	For one device unit and two I/O units	M4 x 92 mm, 2 pcs
RT -TR-4	For one device unit and four I/O units	M4 x 184 mm, 2 pcs
RT -TR-8	For one device unit and eight I/O units	M4 x 368 mm, 2 pcs
RT-TR-V	For one valve I/F unit	M4 x 32 mm, 2 pcs
RT -TR-E	For right end unit	M4 x 35 mm, 2 pcs

E.g.)



2 Connect the units together.

3 Pass the tie rods through each unit, and then push adjacent units together.

4 Tighten the Left End unit with hex socket bolt (M4 x 20) (tightening torque 1.2 N･m ± 0.05 N･m).

5 Check that all units are connected without any gaps.

3.2 EtherNet/IP Communication Wiring

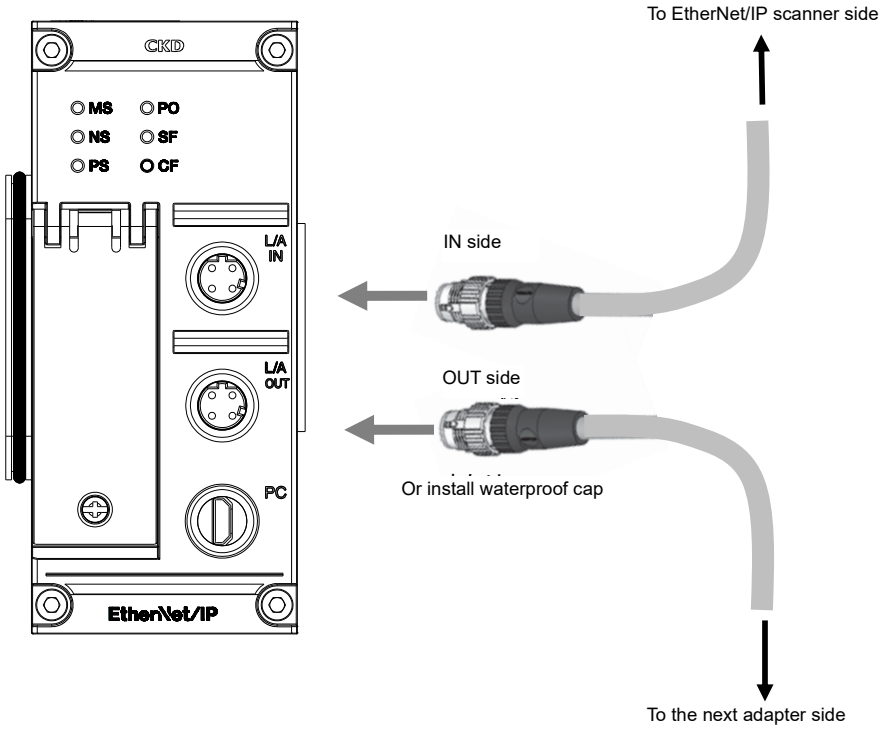
⚠WARNING

Use the specified cable for the communication cable.
Using cables other than those specified can cause communication malfunctions, and result in personal injury or damage to equipment.

When connecting EtherNet/IP communication cable, follow the instructions below.

1 After confirming safety, stop EtherNet/IP communication and turn off all peripheral equipment.

2 Refer to the following figure to wire the cables that comply with the EtherNet/IP specifications to the IN and OUT sides.
If the remote device is not connected to the OUT side, install a waterproof cap (RT-CM12) sold separately.



For EtherNet/IP communication wiring, purchase a cable or connector that meets the following specifications.
Specifications: M12 plug (male), D-coding., 4 cores

■ Recommended communication cable

･When connecting an EtherNet/IP compatible device unit to a scanner or adapter with an RJ45 connector type

Product name	Specifications	Number of cores	Cable extraction method	Length	Manufacturer	OMRON Corporation model No.
XS5W industrial Ethernet plug cable with connectors on both sides (M12 straight to RJ45)	M12 plug (D-coding, male) - RJ45	4 cores	Straight - RJ45	0.5m	OMRON Corporation	XS5W-T421-BMC-SS
				1m		XS5W-T421-CMC-SS
				2m		XS5W-T421-DMC-SS
				3m		XS5W-T421-EMC-SS
				5m		XS5W-T421-GMC-SS
				10m		XS5W-T421-JMC-SS

･ For a wire with one open-end side

Product name	Specifications	Number of cores	Cable extraction method	Length	Manufacturer	OMRON Corporation model No.
XS5H industrial Ethernet plug cable with a connector on one side (M12 straight to open-end-cable)	M12 plug (D-coding, male) – open-end-cable	4 cores	Straight to open-end-cable	0.5m	OMRON Corporation	XS5H-T421-BM0-K
				1m		XS5H-T421-CM0-K
				2m		XS5H-T421-DM0-K
				3m		XS5H-T421-EM0-K
				5m		XS5H-T421-GM0-K
				10m		XS5H-T421-JM0-K
				15m		XS5H-T421-KM0-K

4. SETTINGS

⚠WARNING

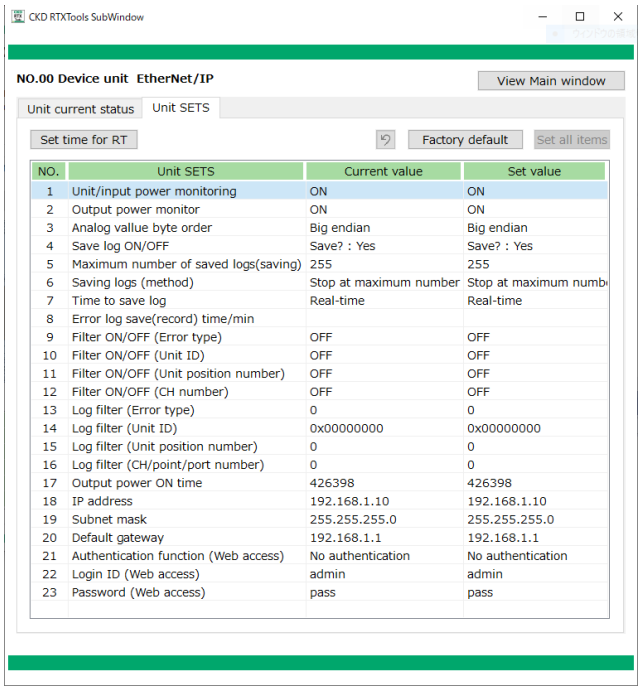
Check the settings of each unit before operating.
Setting the units incorrectly can cause malfunction, or result in personal injury or damage to equipment.

4.1 Setting Method

There are three settings method of EtherNet/IP compatible device unit, using PC software, using industrial network communication, or using WebAPI.

4.1.1 Using PC software

Select EtherNet/IP compatible device unit on [Unit SETS] main tab and click [Set all items] button.



NO.	Unit SETS	Current value	Set value
1	Unit/input power monitoring	ON	ON
2	Output power monitor	ON	ON
3	Analog vallue byte order	Big endian	Big endian
4	Save log ON/OFF	Save? : Yes	Save? : Yes
5	Maximum number of saved logs(saving)	255	255
6	Saving logs (method)	Stop at maximum number	Stop at maximum numb
7	Time to save log	Real-time	Real-time
8	Error log save(record) time/min		
9	Filter ON/OFF (Error type)	OFF	OFF
10	Filter ON/OFF (Unit ID)	OFF	OFF
11	Filter ON/OFF (Unit position number)	OFF	OFF
12	Filter ON/OFF (CH number)	OFF	OFF
13	Log filter (Error type)	0	0
14	Log filter (Unit ID)	0x00000000	0x00000000
15	Log filter (Unit position number)	0	0
16	Log filter (CH/point/port number)	0	0
17	Output power ON time	426398	426398
18	IP address	192.168.1.10	192.168.1.10
19	Subnet mask	255.255.255.0	255.255.255.0
20	Default gateway	192.168.1.1	192.168.1.1
21	Authentication function (Web access)	No authentication	No authentication
22	Login ID (Web access)	admin	admin
23	Password (Web access)	pass	pass

4.1.2 Using industrial network communication

Set the objects of EtherNet/IP compatible device unit by the message communication instructions from EtherNet/IP scanner, etc. Refer to "9. Object list" for details.

4.1.3 Method to use WebAPI

When connecting PC software, specify IP address instead of COM port to connect. The PC and EtherNet/IP compatible device unit must be connected on the same network.
Users can also access the WebAPI through their own applications. Refer to "10. WebAPI FUNCTION" for details.

4.2 List of Settings

The following items can be set.

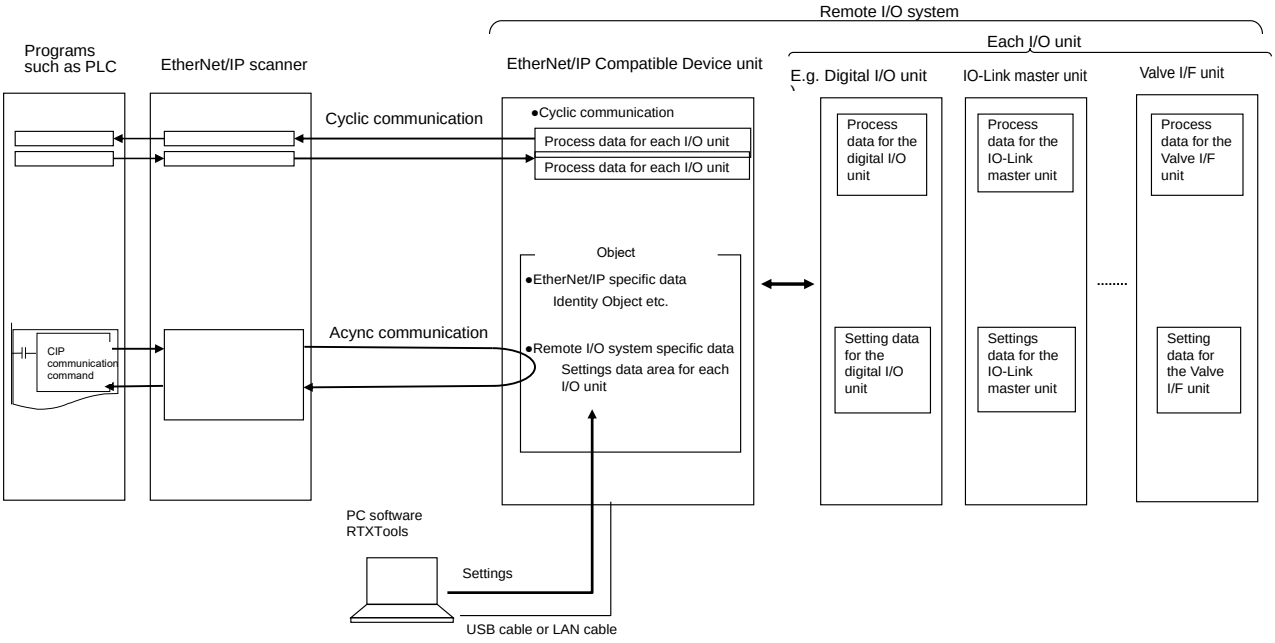
Settings	Description	Value	Factory setting	Settings required
Unit/input power monitoring	Set whether the device unit monitors the unit/input power from the power supply unit closest to itself on the left when facing it. In the event of an error, a "Unit/input power voltage error" will occur.	0: OFF (not monitored) 1: ON (monitored)	1: ON (monitored)	-
Output power supply monitor	Set whether the device unit monitors the power supply for the output from the power supply closest to itself on the left when facing it. In the event of an error, an "Output power voltage error" will occur.	0: OFF (not monitored) 1: ON (monitored)	1: ON (monitored)	-
Analog value byte order	Set the byte order used when the device unit transmits to or receives from the upper master analog input or output values for the connected analog I/O units.	0: Big endian 1: Little endian	0: Big endian	-
Save log ON/OFF, number of logs saved	Set whether to save logs. Set the maximum number of entries to log.	0: Do not save 1 to 255: Maximum number to save	0: Do not save	-
Saving logs (method)	Select how to save logs from the following. - Repeat (overwrite) - Stop at maximum number	0: Repeat (overwrite) 1: Stop at maximum number	1: Stop at maximum number	-
Log saving time	Select when to save logs from the following. - Save immediately when an error occurs - Save at each set value (minutes)	0: Real-time 1 to 60: Save every 1 to 60 minutes	30: Save every 30 minutes	-
	Set the save interval when the time to save logs is "save at every set value (minutes)."			-
Type of log filter	Set whether error logging filtering (logging only errors with specified conditions) is enabled. Set the type of log filter. Save logs that have passed the filtering target filter with the following bit equal to "1". Bit 7: Enable/disable log filter error type Bit 6: Enable/disable log filter unit ID Bit 5: Enable/disable log filter unit position number Bit 4: Enable/disable log filter CH/point/port number If this setting is 0x00, all logs are saved.	0x00 to 0xFF The meaning of each bit is as follows: OFF: Disable ON: Enable	0X00: All disabled	-
Filter ON/OFF (error type)	Only log errors for the specified error type. Set the error type to filter for.	0x00 to 0xFF	0x00	-
Filter ON/OFF (unit ID)	Only log errors for the specified unit ID. Set the unit ID to filter for. However, the variable I/O unit determines a match in the top 2 bytes.	0x00000000 to 0xFFFFFFFF	0x00000000	-
Filter ON/OFF (unit position number)	Only log errors for the unit with the specified unit position number.	0–17 (device unit = 0)	0	-
Filter ON/OFF (CH/point/port number)	Only log errors for the specified CH/point/port number. Set the CH/point/port number to be filtered.	0 to 31	0	-
IP address	Set the IP address of EtherNet/IP compatible device unit. It is used when 0 is specified by the rotary switch.	000.000.000.000 to 255.255.255.255	192.168.1.10	

Settings	Description	Value	Factory setting	Settings required
Subnet mask	Set the subnet mask of EtherNet/IP compatible device unit. It is used when 0 is specified by the rotary switch.	000.000.000.000 to 255.255.255.255	255.255.255.0	
Default gateway	Set the default gateway of EtherNet/IP compatible device unit. It is used when 0 is specified by the rotary switch.	000.000.000.000 to 255.255.255.255	192.168.1.1	
WebAPI access authentication	Sets the authentication method for accessing the WebAPI.	0: Basic authentication 1: Digest authentication 2: No authentication	2: No authentication	
WebAPI login ID	Sets the login ID for accessing the WebAPI.	Alphanumeric characters and symbols 1 to 16 characters	admin	
WebAPI password	Sets the password for accessing the WebAPI.	Alphanumeric characters and symbols 1 to 16 characters	pass	

5. FUNCTIONS

5.1 Functions to Communicate with EtherNet/IP Scanner

The RT series remote I/O systems can communicate with the EtherNet/IP scanners in Implicit (cyclic) communication and Explicit (async) communication.



5.1.1 Implicit (cyclic) communication

The unit's process data is exchanged with the EtherNet/IP scanner at set intervals.

5.1.2 Explicit (async) communication

EtherNet/IP scanner reads and writes the specified data of the unit at any time when necessary.
The read and write target is all the data that is placed on the object of EtherNet/IP compatible device unit. It is mainly used to set the settings data area for each I/O unit.

Note 1: Refer to "9. O".

For RT series remote I/O systems, this can be set from PC software connected to a USB or LAN instead of settings using Explicit communication from the upper EtherNet/IP scanner.

Data allocated in Implicit communication (cyclic communication target)

Unit type	Example
Digital I/O unit	Digital input, digital output
Analog I/O unit	Analog input, analog output
IO-Link master unit	IO-Link COMM error flag, IO-Link input data enable flag, digital input/output, Input Data/Output Data, etc.
Valve I/F unit	Valve output

■ Readable data in Explicit communication (specify object)

Unit type	Example (Note 1)
Digital I/O unit	Off_On cycle counts, signal line error detection setting, etc.
Analog I/O unit	CH enable/disable setting, max/min range, etc.
IO-Link master unit	IN size, OUT size, device verification, etc. Note: It is also possible to send and receive ISDU communication to connected IO-Link devices.
Valve I/F unit	Off_On cycle value, signal line error detection setting, etc.

Note 1: For the individual functions of each I/O unit, refer to the Instruction Manual of the respective I/O unit.

5.2 DLR (Device Level Ring) Function

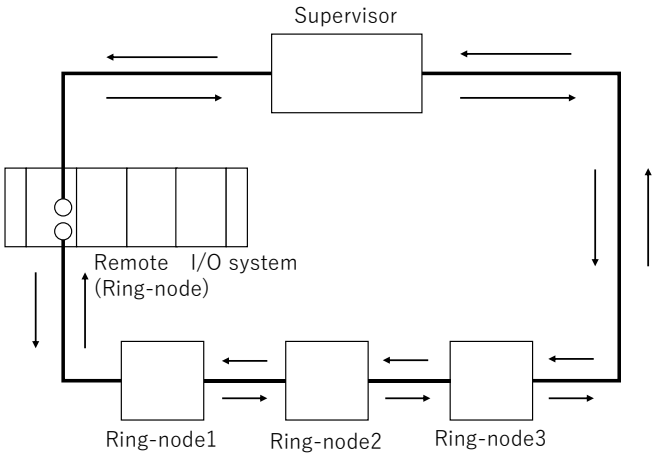
⚠CAUTION

Configure and wire the network appropriately in accordance with DLR specifications. Locate Supervisor on the same network.

Check the DLR specifications and set them to be the correct network configuration. Similarly, wire them appropriately. The device is a Ring-node compatible with Announce. A Ring-Supervisor is required on the same network to operate DLR.

The product is compatible with DLR (Device Level Ring) function for EtherNet/IP.
DLR is the function that can wire each device in a ring-like manner, so that it can continue to communicate in the event of an open circuit in any part of the ring.

In order to use DLR function, EtherNet/IP device with Ring-Supervisor function is necessary on the same network. It is also necessary to register EtherNet/IP Adapter, etc. that will configure the ring as a Ring-Supervisor settings. When properly wired and set, the device operates as a Ring-node compatible with Announce.



5.3 Remote I/O System Diagnostic Information Function

The EtherNet/IP compatible device unit sends diagnostic information for the entire Remote I/O system to the upper EtherNet/IP scanner via Implicit communication.

If the dip switch SW8 (Remote I/O system diagnostic information ON/OFF) on EtherNet/IP compatible device unit is ON, it is sent to the upper EtherNet/IP scanner. If OFF, it is not sent to the upper EtherNet/IP scanner.

The process data for the Remote I/O system diagnostic information function is as follows.

Data size	Bit	Data
1 byte	0	Unit input error
	1	Unit output error
	2	Reserved
	3	Power failure
	4	Reserved
	5	Operation waiting
	6	Hardware error
	7	System error

For more information about the function for Remote I/O system diagnostic information, refer to "8.1 Function for Remote I/O System Diagnostic Information" in the "Remote I/O RT Series Instruction Manual: System Construction".

6. SETTINGS TO COMMUNICATE WITH THE ETHERNET/IP SCANNER

This section describes the operations required on the EtherNet/IP scanner side for the product to conduct EtherNet/IP communication.

For more information, refer to the manual for EtherNet/IP scanner or the manual for configuration tool of the EtherNet/IP scanner side used.

6.1 Downloading and Installing the EDS File for The Product

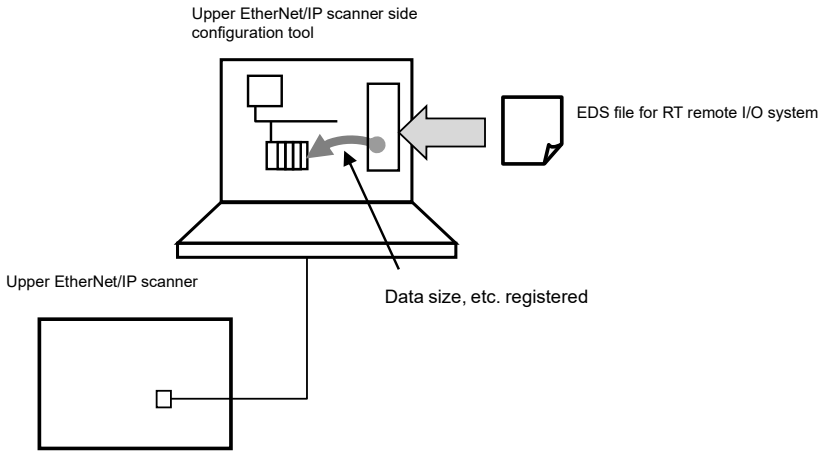
1 Obtain the EDS files for the product in advance.
EDS file name for the product (RT Series Remote I/O System): CKD_RT_XTENN00Nv1EDS.eds
The latest EDS file can be downloaded from CKD website
RT product page：:
https://www.ckd.co.jp/kiki/en/product/detail/1064
If it is not available, contact CKD support at the following link:.
https://www.ckd.co.jp/kiki/en/support/index.html

2 Install the EDS file for the product in the configuration tool on the EtherNet/IP scanner side.
For the installation method, refer to the manual for the EtherNet/IP scanner side configuration tool.

6.2 Registering The Product in the EtherNet/IP System

The product supports the EtherNet/IP DLR (Device Level Ring) function.

On the configuration tool on the upper EtherNet/IP scanner side, carry out the following two settings.
- Register the product using EDS file
- Register the product as Ring-node that configures DLR * when using DLR function



6.3 EtherNet/IP Communication Settings

Set the parameters for EtherNet/IP communication on the EtherNet/IP scanner side configuration tool.

6.3.1 Setting IP address

Specify the IP address of the product to connect. Refer to "Dip switch" and "Rotary switch" of "1.3 Names and functions of each part" for the settings method of IP address.

If the IP address is not known, connect the PC software and the product with USB and check it in the sub window of EtherNet/IP compatible device unit.

6.3.2 Specifying instance

⚠CAUTION

When using variable I/O units, adjust the settings so that the process data size per variable I/O unit is an even number.

If the input and/or output process data size per variable I/O unit (e.g. IO-Link master unit) is an odd bytes, adjust the settings of the variable I/O unit so that the input and output process data size is an even bytes. If the process data size is an odd number, it may become an unintended I/O status.

In accordance with the specifications of the EtherNet/IP scanner to be used and the ladder program, specify appropriate instance in input and output.

Instance	Input/output	Description
100 (0x64)	Output	Process output data
101(0x65)	Output	Process output data. If the original process data length is an odd byte, adjust it to an even byte by appending 1 byte (0xFF) to the end.
110(0x6E)	Input	Process input data
111(0x6F)	Input	If the original process data length is an odd byte, adjust it to an even byte by appending 1 byte (0xFF) to the end.

6.3.3 Setting process data size

Specify the process data size of the product to be connected.
Refer to the table below, the Instruction Manual for each unit, or check the table on the I/O memory tab of PC software and specify the correct size.

6.3.4 Assignment of process data to variables or addresses for upper program

⚠CAUTION

When using variable I/O units, adjust the settings so that the process data size per variable I/O unit is an even number.

If the input and/or output process data size per variable I/O unit (e.g. IO-Link master unit) is an odd bytes, adjust the settings of the variable I/O unit so that the input and output process data size is an even bytes. If the process data size is an odd number, it may become an unintended I/O status.

The process data of this product is assigned to the input/output of the upper program..
Specifically, it is assigned to a variable or address. For variables, arrays or structures are typically used.
When the Explicit communication function is used, create a communication program.

Examples of process data is shown when the unit configurations and settings are as in the table below.
For details of the process data, refer to the Instruction Manual of the respective unit.

Number	Unit name	Model No.	Settings	Input size	Output size
1	End unit	RT-XEELN00N	-	-	-
2	Power supply unit	RT-XP24A01N	-	-	-
3	Device unit	RT-XTENN00N	Diagnostic information ON	1	0
4	Digital input unit	RT-XADGA16A/B	-	2	0
5	Digital output unit	RT-XBDGA16A/B	-	0	2
6	Analog input unit	RT-XAAGA02A	-	4	0
7	Analog output unit	RT-XBAGA02A	-	0	4
8	IO-Link master unit	RT-XLMSA08N	Initial value	38	34
9	Valve I/F unit	TVG☐P-TB-☐-KA1☐	-	0	4
			Total	40byte	44byte

Process data placement example (Input)

	+0	+1	+2	+3	+4	+5	+6	+7	+8	+9
+0	Diagnosis Information	Digital input (16bit)		Analog input (2byte x 2CH)				IO-Link master		
+10	IO-Link Master (Continued)									
+20	IO-Link Master (Continued)									
+30	IO-Link Master (Continued)									0xFF *1

*1 Will be added when the instance 111 is specified.

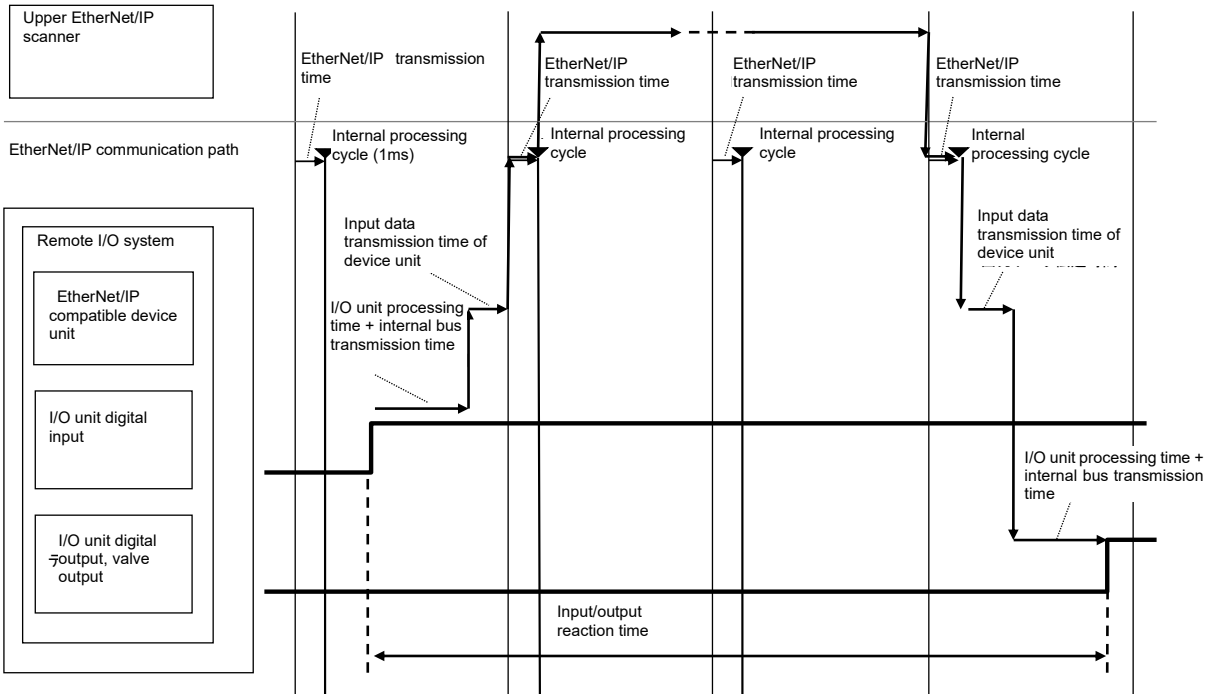
Process data placement example (Output)

	+0	+1	+2	+3	+4	+5	+6	+7	+8	+9
+0	Digital output (16 bit)		Analog output (2byte x 2CH)				IO-Link master			
+10	IO-Link Master (Continued)									
+20	IO-Link Master (Continued)									
+30	IO-Link Master (Continued)									
+40	IO-Link master (Continued)									

7. COMMUNICATION PERFORMANCE

This section describes the input/output response times of the I/O units in the remote I/O system for EtherNet/IP device unit connections under the following conditions.

The figure below shows the direction to the right as the chronological order. The digital input and output lines indicate ON/OFF.



7.1 Calculation Method

The maximum value for the input/output reaction time is as follows.

Maximum Input/output reaction time =	RPI×2
	+ EtherNet/IP scanner transmission delay time
	+ Transmission jitter
	+ Maximum time for input data transmission of device unit
	+ Maximum time for output data transmission of device unit
	+ Maximum time for processing input data specific to each I/O unit
	+ Maximum time for processing output data specific to each I/O unit
	+ Input delay time specific to each I/O unit
	+ Output delay time specific to each I/O unit

Note: The minimum value is RPI×1 and the processing time when the unit has the lowest processing and delay times.

The following are the main maximum reference values for each time element.

● RPI (Requested Packet Interval)

The RPI that can be set for this product is from 1 to 3200 (ms).

● EtherNet/IP scanner transmission delay time

Depends on the operating environment.

● Transmission jitter

Depends on the operating environment.

● Maximum time for input data transmission of device unit

The total of the update period for the following internal bus and the time for data transmission from the internal bus to EtherNet/IP.
- The update period of the internal bus varies according to the number of connections or the connected I/O unit as follows.
  - When the total number of device unit and I/O unit is 15 or less: 501 µs.
  - When the total number of device unit and I/O unit is 16 or more: 1037 µs.
  - When IO-Link master unit is included in the configuration (regardless of its number): 2365 µs.
- The data transmission time from the internal bus to EtherNet/IP can be maximum 2000 µs (depending on the number of connected I/O units).

● Maximum time for output data transmission of device unit

The total of the update period for the following internal buses and the time for data transmission from EtherNet/IP to the internal bus.
- The update period of the internal bus varies according to the number of connections or the connected I/O unit as follows.
  - When the total number of device unit and I/O unit is 15 or less: 501 µs.
  - When the total number of device unit and I/O unit is 16 or more: 1037 µs.
  - When IO-Link master unit is included in the configuration (regardless of its number): 2365 µs.
- The data transmission time from the EtherNet/IP to internal bus can be maximum 2000 µs (depending on the number of connected I/O units).

● Maximum time for processing input data specific to each I/O unit

The write cycle/time during which input data is written to the internal bus.
Varies depending on the I/O unit, as follows.
- Write cycle:
  - Digital input: Maximum 1000 µs (when changing settings, etc.). Otherwise, it is typ. 300 µs)
  - Analog input: Maximum 3000 µs (almost no variation)
  - IO-Link master: maximum 4000 µs (Note 1)

  Note 1: The maximum condition for an IO-Link master unit is 64 bytes input and 64 bytes output. For 38 input bytes and 34 output bytes, it is 3000 µs.
- Write time:
  - Digital input: Maximum 200 µs (almost no change)
  - Analog input: Typ. 200 µs (almost no variation)
  - IO-Link master: maximum 1400 µs (Note 2)

  Note 2: The maximum condition for an IO-Link master unit is 64 bytes input and 64 bytes output. For 38 input bytes and 34 output bytes, it is 900 µs.

● **Maximum time for processing output data specific to each I/O unit**

The read cycle/time during which output data is read from the internal bus.
Varies depending on the I/O unit, as follows.

- Read cycle:
  - Digital output: Maximum 1000 μs (when changing settings, etc. Otherwise, it is typ. 300 μs)
  - Analog output: Maximum 3000 μs (almost no change)
  - IO-Link master: maximum of 4000 μ s (Note 3)
  - Valve I/F: maximum of 1200 μ s (Note 4)

  Note 3: The maximum condition for an IO-Link master unit is 64 bytes input and 64 bytes output.
  For 38 bytes input and 34 bytes output, it is 3000 μ s.

  Note 4: The condition for the maximum value of the Valve I/F unit is when it is 32 points and when the settings are changed, etc.

- Read time:
  - Digital output: Maximum 200 μs (almost no change)
  - Analog output: Typ. 200 μs (almost no change)
  - IO-Link master: maximum of 1400 μ s (Note 5)
  - Valve I/F: typ.240 μ s (Note 6)

  Note 5: The maximum condition for an IO-Link master unit is 64 bytes input and 64 bytes output.
  For 38 bytes input and 34 bytes output, it is 900 μ s.

  Note 6: The condition for the Valve I/F unit typ.value is when it is 32 points.

● **Input delay times specific to each I/O unit**

Varies depending on the I/O unit, as follows. Each item varies depending on the settings.

- Digital input: Sampling cycle 100 μs + filter time 100 μs or above (+ input hold time)
- Analog input: Sampling cycle 1000 μs or above × average number of filters 2 times or more.
- IO-Link master: It depends on typ. 1200 μs (Note 7) or by IO-Link communication cycle time manual settings.

Note 7: When in IO-Link mode, and the communication period is 1 ms, 4 bytes input and 4 bytes output.

● **Output delay time specific to each I/O unit**

Varies depending on the I/O unit, as follows.

- Digital output: 500 μs or less when ON, 1000 μs or less when OFF
- Analog output: 150 ms or less
- IO-Link master: typ.1200 μ s (Note 8)
- Valve I/F: 500 μs or less when ON, 1000 μs or less when OFF (Note 9)

Note 8: In IO-Link mode, the communication cycle is 1 ms, 4 bytes input, 4 bytes output.

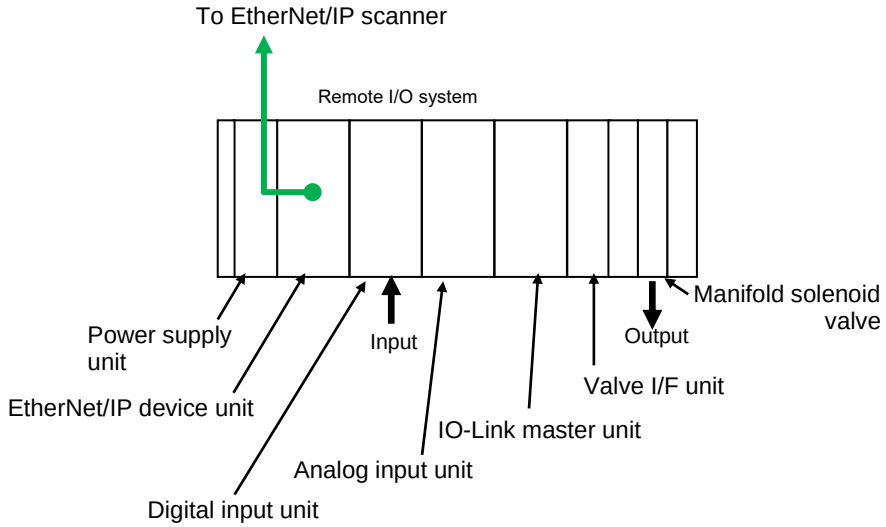
Note 9: The delay of the manifold solenoid valve itself is excluded.

7.2 Example Calculation

The following is an example calculation.

- RPI, EtherNet/IP scanner transmission delay time and transmission jitter depends on the use environment and settings.
- All the following I/O unit specific delay settings are defaults.
  Input filter time settings for digital input unit: Default 0.1ms
  Sampling cycle settings for analog input: Default 2ms
  Averaging sampling count for analog input settings: Default 2 times (2ms)

The following is an example of RT series remote I/O system structure.



The maximum input/output time from the input of the digital input unit to the output of the valve I/F unit is as follows, assuming the above conditions.

Total)
Maximum 211590μs(211.6ms)

Breakdown:
- RPI: When it is 100ms
- EtherNet/IP scanner transmission delay time: When it is 10 μs
- Transmission jitter: When it is 10 μs
- Maximum time for input data transmission of device unit: 4365 μs
- Maximum time for output data transmission of device unit: 3365 μs
- Write cycle for input data processing: 1000 μs for digital input unit only
- Write time for input data processing: 200 μs for digital input unit only
- Read cycle for output data processing: 1200 μs for valve I/F unit only
- Read time for output data processing: 240 μs valve I/F unit only
- Input delay time specific to each I/O unit: Digital input only, 200 μs
- Output delay time specific to each I/O unit: 1000 μs

8. TROUBLESHOOTING

8.1 Unit Fault (device unit diagnostic information)

The information can be read from the PC software or from an upper EtherNet/IP scanner or WebAPI.

■ Error codes displayed in PC software

The CH diagnostic information can be checked in the following screen of the PC software as a hexadecimal "error code" with the compatible bit set to 1 (ON).
- [Code] on the [Errors] main tab
- [Error code] (in error log)

■ Reading diagnostic information area from the upper EtherNet/IP scanner by Explicit communication

The diagnostic information for the device unit is also stored in the diagnostic information area (9.7.2 Diagnostic information by unit) of the object on EtherNet/IP compatible device unit below. It can be read from the upper EtherNet/IP scanner with Explicit communication.
For EtherNet/IP compatible device unit, the following errors can be checked.

Bit	Error name	Description	"Error type" in the device unit "Remote I/O system diagnostic information"
15	Memory read/write error	Unable to read/write various memory or checksum is incorrect.	Hardware error
14	Factory setting error	The serial number or MAC address of the device unit is the initial value.	System error
13	Unit configuration error	The device unit cannot automatically recognize the connected I/O units correctly at power on or has detected a change in the connected I/O unit number during operation.	System error
12	Process data overflow	The total process data size exceeds the maximum size below. ・ Input: Maximum 505 bytes (Note) ・ Output: Maximum 504 bytes ・ Total I/O: maximum 513 bytes (Note) Note: One byte for device unit remote I/O system diagnostic information is included.	System error
10	Unit/input power voltage error	When the "unit/input power monitoring" settings is " monitored", the device unit has detected a voltage of 24 VDC ± 25% or more from the Power supply unit closest to itself on the left when facing it.	Power failure
9	Reserved	0 Fixed	-
8	Output power voltage error	When the "output power supply monitor" setting is "monitored", the device unit has detected a voltage of 24 VDC ± 25% or more from the power supply unit closest to itself on the left when facing it.	Power failure
7	Internal bus communication error	There is an error in the communication via the Remote I/O system's internal bus.	System error
6	Initialized set memory	Set memory was initialized and started up with the dip switch SW5 (Parameter initialization at startup) OFF.	System error
5	Reserved	0 Fixed	-
4	WebAPI/PC concurrent access	Device unit is being accessed concurrently from PC software and Web interface.	System error
3	Hardware error	An error has occurred that is suspected to be a hardware error in the device unit.	Hardware error
2	Reserved	0 Fixed	-
1	Reserved	0 Fixed	-
0	Reserved	0 Fixed	-

8.2 Troubleshooting from LED Display

8.2.1 LED is normal but conduct unintended operation

LED	Problem	Cause	Action
・ MS, NS on device unit: Green on SF: Off ・ Even number (left) LED of O-Link master unit: Green on	When the I/O unit configuration includes an IO-Link master unit, upper EtherNet/IP scanner cannot read the process data of the IO-Link device correctly when in IO-Link mode. The value of the process data is different from the value checked on the I/O monitor tab of the PC software connected directly to the Remote I/O system, or the value of the PC software is incorrect. E.g.) When the process data (PD) of the IO-Link device on port 1 is 4 bytes, the data of port 2 are stored from halfway in the upper EtherNet/IP scanner side, or extra data are stored between them and the data on port 2.	The size or mode settings for each port on the IO-Link master unit is incorrect. Or the IO-Link device is operating at a different from the data size expected. * However, actual process data size matches the process data size of the device registered in the EtherNet/IP scanner.	Check the size of the process data (PD) of the IO-Link devices connected in IO-Link mode. Set the process data size settings or mode correctly for each port on the IO-Link master. If necessary, update the process data size settings on the device registered in the EtherNet/IP scanner.

8.2.2 Troubleshooting from power supply unit LED display

■ Power supply unit LED

Power supply unit			Problem	Action
PWR(S)	PWR(O)	PWR(I)		
24 V unit/input status	24 V output status	5 V internal status		
Green on	Green on	Green on	Normal condition	-
Off	Off	Off	24 V unit/input and 24 V output are not supplied correctly.	Supply 24 V unit/input and 24 V outputs correctly.
Off	Green on	Off	24 V unit/input is not correctly supplied or the power supply unit internal fuse is blown.	Check the unit/input 24 V power supply. If the problem persists, replace the power supply unit.
Green on	Off	Green on	24 V output is not correctly supplied. Or, The internal fuse of the power supply unit is blown.	Check the output 24 V power supply. If the problem persists, replace the power supply unit.
Green on	Green on	Off	The internal IC of the power supply unit has failed.	Replace the power supply unit (Note 1).

Note 1: If replacing the power supply unit does not fix it, it may be due to a faulty I/O unit. If such is the case, contact CKD.

8.2.3 Troubleshooting from the LED display on an EtherNet/IP compatible device unit

■ Power monitoring LED on the device unit

Device unit PS	Problem	Cause	Action
Red blinking (fast)	Unit/input power voltage error	When the "unit/input power monitoring" setting is "monitored", the device unit has detected that the 24 VDC unit/input voltage is outside the range of 24 VDC ± 25%.	Verify that the 24 V unit/input voltage to the power supply unit is within the range of ± 10%.
Yellow on	Unit/input voltage is recovered from voltage error	It is latched after recovering from a voltage error in the unit/input 24 V.	Reset it using power cycle operation or PC software operation.
Off	Power OFF status	24 V for unit/input to the power supply unit is OFF or not correctly supplied.	Verify that there is 24 V for the unit/input to the power supply unit.

Device unit PO	Problem	Cause	Action
Red blinking (fast)	Output power voltage error	When the "output power supply monitoring" setting is "monitored", the device unit has detected that the 24 VDC output voltage is outside the range of 24 VDC ± 25%.	Verify that the 24 V output voltage to the power supply unit is within the range of -5 to +10%.
Yellow on	Output voltage is recovered from voltage error	It is latched after recovering from a voltage error in the output 24 V.	Reset it using power cycle operation or PC software operation.
Off	Power OFF status	The 24 V output to the power supply is OFF or not supplied correctly.	Verify that there is 24 V output to the power supply unit.

■ Basic LED on the device unit

Normal status

Device unit								Problem
MS	NS	SF	CF	PS	PO	L/A IN	L/A OUT	
Status of EtherNet/IP device	Status of EtherNet/IP communication	Status of the entire Remote I/O system	Setting change or forced input/output	Status of the 24 V power supply for the unit/input	Status of the 24 V power supply for the output	Link status on the IN side of the connector	Link status on the OUT side of the connector	
Green on	Green on	Green on	Off	Green on	Green on	Green blinking (fast)	Green blinking (fast)	Normal status

Error condition

Device unit				Problem	Diagnostic information of the device unit	Cause	Action
MS	NS	SF	CF				
Status of EtherNet/IP device	Status of EtherNet/IP communication	Status of the entire Remote I/O system	Setting change or forced input/output				
Green blinking	Off	Undefined	Undefined	It cannot be connected to EtherNet/IP scanner.	-	No IP address is set. Or IP address has not allocated from DHCO server.	Set the IP address appropriately or check the status of DHCP server.
Green blinking	Off	Undefined	Undefined		-	Power is on, but not moved to the initialization sequence.	Turn the unit power off and then on again. If the problem persists, contact CKD.
Red on	Off	Yellow blinking (fast)	Undefined	"Unit Configuration Error" is occurring.	Unit configuration error	The device unit does not automatically recognize the connected I/O units correctly when it is powered on, or it has detected a change in the number of I/O units connected during operation.	・ If the actual I/O unit configuration is correct, leave the configuration as is and power it off and on again. ・If the actual I/O unit configuration is not correct, turn OFF the power, change the I/O unit configuration, and then turn on the power. ・ Check the connection between the units.
						When using multiple power supplies, the power on timing between the power supply units has shifted by more than 3 seconds.	Conduct power cycle with turn on timing to multiple power supplies at the same time (within 3 seconds).
Off	Off	Off	Off	It does not work at al	-	The power is not supplied properly.	・ Check that the 24V is supplied to the Power supply unit. ・ Check that all LEDs on the Power supply unit are lit.
Green on	Green blinking	Undefined	Undefined	It cannot be connected to EtherNet/IP scanner.	-	The communication path or EtherNet/IP scanner has error.	Check that there is no disconnection or misconnection in the communication path. Check whether the EtherNet/IP scanner is set incorrectly and it is operating correctly.

Device unit				Problem	Diagnostic information of the device unit	Cause	Action
MS	NS	SF	CF				
Status of EtherNet/IP device	Status of EtherNet/IP communication	Status of the entire Remote I/O system	Setting change or forced input/output				
Undefined	Undefined	Red blinking (fast)	Undefined	An internal bus communication error has occurred.	Internal bus communication error	There is a physical connection problem between the units, or there is a strong noise around the area.	Disconnect, reconnect, and power on the Remote I/O system units. If it still occurs, check the connection, improve the noise condition, or implement a workaround. If the condition persists even after making improvements, contact CKD.
Undefined	Undefined	Red blinking (slow)	Undefined	A hardware error has occurred in the device unit.	Hardware error	It may be a hardware error.	Turn the unit power off and then on again. If it still occurs, replace the device unit.
Undefined	Undefined	Red blinking (slow)	Undefined	・ Unable to read/write various memories. ・ Settings are initialized. ・ Cannot communicate with the EtherNet/IP scanner. ・ Automatic recognition fails. ・ Cannot read log data from the PC software.	Memory read/write error	It may be a hardware failure.	Power it off and on again after writing new data, or do so while the dip switch SW5 is ON. If the problem persists, contact CKD.
Undefined	Undefined	Red blinking (twice)	Undefined	Factory setting error has occurred.	Factory setting error	The serial number of the device unit is the initial value (the serial number is always written at manufacturing). It may be a failure.	Contact CKD.

Device unit				Problem	Diagnostic information of the device unit	Cause	Action
MS	NS	SF	CF				
Status of EtherNet/IP device	Status of EtherNet/IP communication	Status of the entire Remote I/O system	Setting change or forced input/output				
Undefined	Undefined	Yellow on	Undefined	Process data is fixed.	-	・Disconnection detected in digital input unit or analog input unit. ・The digital output unit or analog output unit is in Manual output status. ・Valve I/F unit is in a manual output state. ・Changed the settings that changes the process data size on the variable I/O unit.	Turn the unit power off and then on again.
Undefined	Undefined	Green blinking (fast)	Undefined	The I/O unit setting is initialized and started. Cannot connect to the upper master.	Initialized set memory	・The setting memory was initialized and started up while the device unit's dip switch SW5 (Parameter initialization at startup) was OFF. ・Changed connected I/O unit (when the device unit started up, the unit ID and connection position number of the connected I/O unit did not match ones at the last start-up). ・The checksum of the setting memory in the analog I/O unit and IO-Link master unit did not match the one stored in the device unit.	Check if the configuration of the I/O unit has changed. And power it off and on again. If the problem persists, contact CKD. Note: To clear the error, power it off and on again, or a latch reset operation from the PC software.
Undefined	Undefined	Green blinking (slow)	Undefined	The process data size of some I/O units is different than expected. Some I/O units have an internal bus communication error. Cannot connect to the EtherNet/IP scanner.	Process data overflow	The process data size with the upper master as a device unit exceeds the maximum size below. ・ Input: Up to 504 bytes (not including one byte for the device unit remote I/O system diagnostic information). ・ Output: Up to 504 bytes. ・ Total input/output: Up to 512 bytes (not including one byte for the device unit remote I/O system diagnostic information).	Make the process data size the maximum size or lower, for example by reducing the number of I/O units or changing the I/O unit type. Following this, power it off and on again.
Undefined	Undefined	Undefined	Yellow on	Cannot control process data	-	There is a unit with a forced I/O setting.	Remove the forced I/O setting from the

Device unit				Problem	Diagnostic information of the device unit	Cause	Action
MS	NS	SF	CF				
Status of EtherNet/IP device	Status of EtherNet/IP communication	Status of the entire Remote I/O system	Setting change or forced input/output				
				from the EtherNet/IP scanner.			PC software, or power it off and on again.
Undefined	Undefined	Undefined	Either of Red blinking (slow), Yellow on	Cannot control process data from the EtherNet/IP scanner.	WebAPI/PC concurrent access	At the same time, settings are changed from the LAN-connected PC software or from the WebAPI.	Check whether the settings are changed also from the LAN-connected PC software or from WebAPI.
Undefined	Undefined	Undefined	Either of Red blinking (slow), Green blinking (fast), Green blinking (slow).	Cannot change settings by Explicit communication.	WebAPI/PC concurrent access	At the same time, settings are changed from the LAN-connected PC software, WebAPI, or USB-connected PC software.	Check whether the settings are also changed from the LAN-connected PC software, WebAPI, or USB-connected PC software.
Undefined	Undefined	Undefined	Green blinking (slow)	Cannot change settings by Explicit communication.	-	At the same time, settings are also changed from the PC software.	Check whether the settings are changed from the PC software as well.
Undefined	Undefined	Undefined	Off	Cannot be controlled from the PC software.		There is no access from the PC software (connected to a USB) for 60 seconds or more.	Check that the COM port specified is correct.
Undefined	Undefined	Undefined	Off	Cannot be controlled from the PC software or WebAPI.	-	There is no access from the PC software (connected to LAN) or WebAPI for 60 seconds or more.	Check that the dip switch SW1 of the device unit is ON (Note 1). And check if the IP address and URL specified are correct.

Note 1: Turn the power off and on again when the switch settings have been changed.

■ LED in data transmission/reception status of the device unit

Device unit	Problem	Cause	Action
L/A IN L/A OUT			
Off	No EtherNet communication.	The Ethernet cable is not connected properly.	Check the Ethernet cable connection.

8.3 Status Code

A list of General Status Codes used in the product and the nature of the error are shown below. General Status Code is usually included in CIP communication and is sent from the product to EtherNet/IP scanner when an error occurs.

Code	Description	
0x00	Name	Success
	Description/condition	Succeeded
	Workaround	None
0x01	Name	Communications Related Problem
	Description/condition	A connection error, such as a connection timeout, has occurred
	Workaround	Check the connect status or operating status of upper equipment.
0x02	Name	Resource unavailable
	Description/condition	There are not enough resources in the product.
	Workaround	Contact CKD.
0x03	Name	Invalid parameter value
	Description/condition	Incorrect settings value
	Workaround	The set value specified is incorrect. Check the enable range of values, etc.
0x04	Name	Path segment error
	Description/condition	The path settings when connected is incorrect
	Workaround	Review the path settings.
0x05	Name	Path destination unknown
	Description/condition	The object specified by the path does not exist
	Workaround	Review the path.
0x06	Name	Partial transfer
	Description/condition	Incomplete data are received.
	Workaround	Review the network configuration.
0x08	Name	Service not supported
	Description/condition	The specified service is not implemented or is not defined in the target class/object.
	Workaround	Change the specifications of the service or check the definition of the target class/object.
0x09	Name	Invalid attribute value
	Description/condition	Attempted to set a value that cannot be set for target attribute.
	Workaround	Check that the value trying to set is appropriate.
0x0C	Name	Object state conflict
	Description/condition	When the instructions are carried out, inconsistency will occur with the current operating status.
	Workaround	Check the current operating status and change it to a consistent instruction.
0x0E	Name	Attribute not settable
	Description/condition	The target attribute is not writable
	Workaround	Check that the attribute trying to write is specified correctly.
0x0F	Name	Privilege violation
	Description/condition	There is an unauthorized access
	Workaround	Review the network configuration and upper control program.
0x10	Name	Device state conflict
	Description/condition	These are requests that are prohibited depending on the status of the equipment
	Workaround	Check the status of the product. Review the upper control program.
0x11	Name	Reply data too large
	Description/condition	The size of the response data is large
	Workaround	Review the upper control program. Or contact CKD.
0x13	Name	Not enough data
	Description/condition	The request does not contain enough data.
	Workaround	Check the specifications to which the request is made or the settings/communication of the EtherNet/IP scanner.
0x14	Name	Attribute not supported
	Description/condition	The target attribute is not implemented.
	Workaround	Check that the attribute trying to instruct is specified correctly.

0x15	Name	Too much data
	Description/condition	The data size of the request is large.
	Workaround	Check the specifications to which the request is made or the settings/communication of the EtherNet/IP scanner.
0x17	Name	Service fragmentation out of sequence
	Description/condition	There was a flag error during sequence in progress.
	Workaround	Review the network configuration. Review the upper control program.
0x1A	Name	Routing failure, request packet too large
	Description/condition	The data size of the request is large.
	Workaround	Check the specifications to which the request is made or the settings/communication of the EtherNet/IP scanner.
0x1B	Name	Routing failure, response packet too large
	Description/condition	The size of the response data is large.
	Workaround	Check the specifications to which the request is made or the settings/communication of the EtherNet/IP scanner.
0x1E	Name	Embedded service error
	Description/condition	There was an error while processing the request
	Workaround	Review the network configuration. Review the upper control program.
0x20	Name	Invalid parameter
	Description/condition	The value requested does not meet the specifications.
	Workaround	Check the specifications to which the request is made or its contents
0x24	Name	Message Format Error
	Description/condition	The format of the request is incorrect
	Workaround	Check the settings/communication of the EtherNet/IP scanner.
0x28	Name	Invalid Member ID
	Description/condition	Accessed with an incorrect member ID
	Workaround	Check the settings/communication of the EtherNet/IP scanner.
0x29	Name	Member not settable
	Description/condition	The target member cannot be changed
	Workaround	Check the specifications to which the request is made or the settings/communication of the EtherNet/IP scanner.
0x2E	Name	Service Not Supported for Specified Path 1
	Description/condition	The requested service is supported, but not compatible with the applicable path (attribute).
	Workaround	Check the specifications to which the request is made or the settings/communication of the EtherNet/IP scanner.

9. OBJECT LIST

9.1 Supported Object

The following objects are supported by the product.

Class Code		Class Name	The product-specific object	Description	Item
Decimal	Hexadecimal				
1	0x01	Identity Object			9.6.1
2	0x02	Message Router Object			9.2.1
4	0x04	Assembly Object			9.2.2
6	0x06	Connection Manager Object			9.2.3
71	0x47	Device Level Ring (DLR) Object			9.2.4
72	0x48	QoS Object			9.2.5
100	0x64	Diagnosis History	Yes		9.7.4
101	0x65	Manifold Diagnosis	Yes		9.7.3
102	0x66	Unit Diagnosis	Yes		9.7.2
103	0x67	Points Channel Port Diagnosis	Yes		9.7.1
104	0x68	Specific Diagnosis	Yes		9.7.5
112	0x70	Own Parameters	Yes		9.5.1
113	0x71	Digital Input Parameters	Yes		9.5.3 9.5.4
114	0x72	Digital Output Parameters	Yes		9.5.6 9.5.7
115	0x73	Analog Input Parameters	Yes		9.5.2
116	0x74	Analog Output Parameters	Yes		9.5.6
117	0x75	Valve Interface Parameters	Yes		9.5.9
118	0x76	IO-Link master parameters	Yes		9.5.10
119	0x77	Digital Input 32 points Parameters	Yes		9.5.5
120	0x78	Digital Output 32 points Parameters	Yes		9.5.8
128	0x80	IO-Link Master ISDU Tx/Rx	Yes		9.8.1
144	0x90	Digital Input Data Object	Yes		9.3.2 9.3.3 9.3.4
145	0x91	Digital Output Data Object	Yes		9.4.2 9.4.3 9.4.4
148	0x94	Analog Input Data Object	Yes		9.3.1
149	0x95	Analog Output Data Object	Yes		9.4.1
152	0x98	IO-Link Master Input Object	Yes		9.3.5
153	0x99	IO-Link Master Output Object	Yes		9.4.6
160	0xA0	Detected Module ID List Object	Yes		9.6.2
244	0xF4	Port Object Class			9.2.6
245	0xF5	TCP/IP Interface Object			9.2.7
246	0xF6	EtherNet Link Object			9.2.8

■ Instances

Instances of some classes are related to the physical position of the unit. The device unit is always allocated 1. Allocate the left end unit except the device unit as 2, and the unit first to the right as 3, and the unit next right to its right as 4, and so on. The maximum is 18.

9.2 Communication Settings Area

Indicates the objects defined mainly in the EtherNet/IP specifications.

9.2.1 Message Router Object (Class:0x02)

Attributes for the class (0x02)

Number	Name	Access method	Data type	Initial value	Description
1	Revision	Get	UINT	0x02	The revision of this object
2	Max Instance	Get	UINT	0x01	Maximum number of instances

There are no attributes for instance (1)

Compatible services

Service code	Compatible		Service name	Remarks
	Class	Instance		
0x01(1)	Compatible	-	Get_Attributes_All	
0x0E(14)	Compatible	-	Get_Attribute_Single	

9.2.2 Assembly Object (Class:0x04)

Attributes for the class (0x04)

Number	Name	Access method	Data type	Initial value	Description
1	Revision	Get	UINT	0x02	The revision of this object

Attributes of instance
For instances, refer to "6.3.2 Specifying instance".

Attr ID	Access method	NV	Name	Data type	Initial value	Description
3	Get	V	Data	ARRAY of octet	-	--
4	Get	V	Size	UINT	-	The size of the Data (byte)

Compatible services

Service code	Compatible		Service name	Remarks
	Class	Instance		
0x0E(14)	Compatible	Compatible	Get_Attribute_Single	
0x10(16)	Incompatible	Compatible	Set_Attribute_Single	
0x18(24)	Incompatible	Compatible	Get_Member	
0x19(25)	Incompatible	Compatible	Set_Member	

9.2.3 Connection Manager Object (Class:0x06)

Attributes for the class (0x06)

Number	Name	Access method	Data type	Initial value	Description
1	Revision	Get	UINT	0x01	The revision of this object
2	Max Instance	Get	UINT	0x01	Maximum number of instances

There are no attributes for the instance.

Compatible services

Service code	Compatible		Service name	Remarks
	Class	Instance		
0x0E(14)	Compatible	Incompatible	Get_Attribute_Single	
0x4E(78)	Incompatible	Compatible	Forward_Close	
0x54(84)	Incompatible	Compatible	Forward_Open	

9.2.4 Device Level Ring (DLR) Object (Class:0x47)

Attributes of the class

Number	Name	Access method	Data type	Initial value	Description
1	Revision	Get	UINT	0x02	The revision of this object

Attributes of instance

Attr ID	Access method	NV	Name	Data type	Initial value	Description
1	Get	V	Network Topology	USINT	0	0 : "Linear" 1: "Ring"
2	Get	V	Network Status	USINT	0	0 : "Normal" 1: "Ring Fault" 2 ::"Unexpected Loop Detected" 3: "Partial Network Fault" 4 : "Rapid Fault/Restore Cycle"
10	Get	V	Active Supervisor Address	STRUCT of:	0	-
			Supervisor IP Address	UDINT	0	-
			Supervisor MAC Address	ARRAY of 6 USINTs	0	-
12	Get	NV	Capability Flags	DWORD	0x82	Flush Table frame Capable Beacon-based Ring Node

Compatible services

Services Code	Compatible		Service name	Remarks
	Class	Instance		
0x01(1)	Compatible	-	Get_Attributes_All	
0x0E(14)	Compatible	-	Get_Attribute_Single	

9.2.5 QoS Object (Class:0x48)

Attributes of the class

Number	Name	Access method	Data type	Initial value	Description
1	Revision	Get	UINT	0x02	The revision of this object

Attributes of instance

Attr ID	Access method	NV	Name	Data type	Initial value	Description
1	Set	NV	802.1Q Tag Enable	USINT	0	0:disabled 1:enabled
4	Set	NV	DSCP Urgent	USINT	55	0-63
5	Set	NV	DSCP Scheduled	USINT	47	0-63
6	Set	NV	DSCP High	USINT	43	0-63
7	Set	NV	DSCP Low	USINT	31	0-63
8	Set	NV	DSCP Explicit	USINT	27	0-63

Compatible services

Service code	Compatible		Service name	Remarks
	Class	Instance		
0x0E(14)	Compatible	Compatible	Get_Attribute_Single	
0x10(16)	Incompatible	Compatible	Set_Attribute_Single	

9.2.6 Port Object Class (Class:0xF4)

Attributes of the class

Number	Name	Access method	Data type	Initial value	Description
1	Revision	Get	UINT	0x02	The revision of this object
2	Max Instance	Get	UINT	0x02	Maximum number of instances
3	Num instances	Get	UINT	0x02	Number of instances
8	Entry Port	Get	UINT	0x02	Port number
9	Port Instance Info	Get	ARRAY of STRUCT of	-	
	Port Type		UINT	0x0000	Port type (reserve)
	Port Number		UINT	0x0000	Port number
	Port Type		UINT	0x0000	Port Type (No Routing)
	Port Number		UINT	0x0001	Port number
	Port Type		UINT	0x0004	Port type (TCP/IP)
	Port Number		UINT	0x0002	Port number

The attributes of the instance (2). Instance 1 does not return a valid value.

Attr ID	Access method	NV	Name	Data type	Initial value	Description
1	Get	NV	Port Type	UINT	-	Port type
2	Get	NV	Port Number	UINT	-	Port number
3	Get	NV	Logical Link Object	STRUCT of	-	None
			Path Length	UINT	-	-
			Link Path	Padded EPATH	-	-
4	Get	NV	Port Name	SHORT_STRING	-	Port name
7	Get	NV	Port Number and Node Address	Padded EPATH	-	IP address
10	Get	NV	Port Routing Capabilities	DWORD	0x03	In-UCMM support Out-UCMM support
11	Get	NV	Associated Communication Objects	STRUCT of	-	-
			Number of entries in array	USINT	2	2 ports
				Array of STRUCT of	-	-
			Number of 16 bit words in the following path	USINT	-	-
			Logical path segments that identify an associated communication object instance	Padded EPATH	-	-

Compatible services

Services Code	Compatible		Service name	Remarks
	Class	Instance		
0x01(1)	Compatible	Compatible	Get_Attributes_All	
0x0E(14)	Compatible	Compatible	Get_Attribute_Single	

9.2.7 TCP/IP Interface Object (Class:0xF5)

Attributes of the class

Number	Name	Access method	Data type	Initial value	Description
1	Revision	Get	UINT	0x04	The revision of this object
2	Max Instance	Get	UINT	1	
3	Number of Instances	Get	UINT	1	
4	Optional attribute list	Get	STRUCT of	-	
	number of attributes	Get	UINT	-	
	Optional attributes	Get	ARRAY of UINT	-	
6	Maximum ID Number Class Attributes	Get	UINT	7	
7	Maximum ID Number Instance Attributes	Get	UINT	0x11	

Attributes for instance (1)

Attr ID	Access method	NV	Name	Data type	Initial value	Description
1	Get	V	Status	DWORD	-	
2	Get	NV	Configuration Capability	DWORD	-	It is different depending on IP address settings method
3	Get/Set	NV	Configuration Control	DWORD	-	It is different depending on IP address settings method
4	Get	NV	Physical Link Object	STRUCT of:		
			Path size	UINT	0	
			Path	Padded EPATH	-	
5	Get/Set	V/NV	Interface Configuration	STRUCT of:		
			IP Address	UDINT	192.168.1.10	
			Network Mask	UDINT	255.255.255.0	
			Gateway Address	UDINT	192.168.1.1	
			Name Server	UDINT	0.0.0.0	
			Name Server 2	UDINT	0.0.0.0	
			Domain Name	STRING	Blank	
6	Get/Set	NV	Host Name	UDINT	RT-XTENN00N	
8	Get/Set	NV	TTL Value	USINT	1	
9	Get/Set	NV	Mcast Config	STRUCT of:		
			Alloc Control	Alloc Control	0	
			Reserved	USINT	0	
			Num Mcast	UINT	0	
			Mcast Start Addr	UDINT	239.192.2.32	
13	Get/Set	NV	Encapsulation Inactivity Timeout	UINT	0x78	

* If set with DIPSW or DHCP for IP address, only AttrID's 8 and 9 cannot be changed and the status code 0x0E is returned

Compatible services

Service code	Compatible		Service name	Remarks
	Class	Instance		
0x01(1)	Compatible	Incompatible	Get_Attributes_All	
0x0E(14)	Compatible	Compatible	Get_Attribute_Single	
0x10(16)	Incompatible	Compatible	Set_Attribute_Single	

9.2.8 EtherNet Link Object (Class:0xF6)

Attributes of the class

Number	Name	Access method	Data type	Initial value	Description
1	Revision	Get	UINT	0x04	The revision of this object
2	Max Instance	Get	UINT	2	
3	Number of Instances	Get	UINT	2	

Attributes for instance (1/2)

Attr ID	Access method	NV	Name	Data type	Initial value	Description
1	Get	V	Interface Speed	UDINT	100	
2	Get	V	Interface Flags	DWORD	-	
3	Get	NV	Physical Address		3C831E0CXXXX	
4	Get	V	Interface Counters	STRUCT of:	-	
			In Octets	UDINT	-	
			In Ucast Packets	UDINT	-	
			In NUcast Packets	UDINT	-	
			In Discards	UDINT	-	
			In Errors	UDINT	-	
			In Unknown Protos	UDINT	-	
			Out Octets	UDINT	-	
			Out Ucast Packets	UDINT	-	
			Out NUcast Packets	UDINT	-	
			Out Discards	UDINT	-	
			Out Errors	UDINT	-	
5	Get	V	Media Counters	STRUCT of:	-	
			Alignment Errors	UDINT	-	
			FCS Errors	UDINT	-	
			Single Collisions	UDINT	-	
			Multiple Collisions	UDINT	-	
			SQE Test Errors	UDINT	-	
			Deferred Transmissions	UDINT	-	
			Late Collisions	UDINT	-	
			Excessive Collisions	UDINT	-	
			MAC Transmit Errors	UDINT	-	
			Carrier Sense Errors	UDINT	-	
			Frame Too Long	UDINT	-	
			MAC Receive Errors	UDINT	-	
6	Set	NV	Interface Control	STRUCT of:	-	
			Control Bits	WORD	0x0100	
			Forced Interface Speed	UINT	0x0000	
7	Get	NV	Interface Type	USINT	0x02	
10	Get	NV	Interface Label	SHORT_STRING	Port_1/Port_2	
11	Get	NV	Interface Capability	STRUCT of:	-	
			Capability Bits	DWORD	0x0E000000	
			Speed/Duplex Options	STRUCT of:	-	
			Speed/Duplex Array Count	USINT	01	
			Speed/Duplex Array	ARRAY of STRUCT of:	-	
			Interface Speed	UINT	0x6400	
			Interface Duplex Mode	USINT	0x01	
14	Get	V	Ethernet Errors	UDINT		

Compatible services

Service code	Compatible		Service name	Remarks
	Class	Instance		
0x01(1)	Compatible	Compatible	Get_Attributes_All	
0x0E(14)	Compatible	Compatible	Get_Attribute_Single	
0x10(16)	Incompatible	Compatible	Set_Attribute_Single	
0x4c(76)	Incompatible	Compatible	Set_Port_Admin_State	

9.3 Input Process Data Area

9.3.1 Analog input 2CH unit (Class:0x94)

There are no attributes for the class. For a description of the instances, refer to "Instances".

Attributes of instance

Instance	Attr ID	Access method	NV	Name	Data type	Initial value	Description
2 to 18	1	Get	V	Channel 0	WORD	0x0000	Analog input CH0
	2	Get	V	Channel 1	WORD	0x0000	Analog input CH1

Compatible services

Service code	Compatible		Service name	Remarks
	Class	Instance		
0x01(1)	-	Compatible	Get_Attributes_All	
0x0E(14)	-	Compatible	Get_Attribute_Single	

9.3.2 Digital input unit M 8 x 8 type (Class:0x90)

There are no attributes for the class. For a description of the instances, refer to "Instances".

Attributes of instance

Instance	Attr ID	Access method	NV	Name	Data type	Initial value	Description
2 to 18	1	Get	V	Digital Input	ARRAY of BOOL		Digital input
				Point 0	BOOL	FALSE	Digital input Point 0
				…	…	…	…
				Point 7	BOOL	FALSE	Digital input Point 7

Compatible services

Service code	Compatible		Service name	Remarks
	Class	Instance		
0x01(1)	-	Compatible	Get_Attributes_All	

9.3.3 Digital input unit M 12 x 8 type (Class:0x90)

There are no attributes for the class. For a description of the instances, refer to "Instances".

Attributes of instance

Instance	Attr ID	Access method	NV	Name	Data type	Initial value	Description
2 to 18	1	Get	V	Digital Input	ARRAY of BOOL		Digital input
				Point 0	BOOL	FALSE	Digital input Point 0
				…	…	…	…
				Point 15	BOOL	FALSE	Digital input Point 15

Compatible services

Service code	Compatible		Service name	Remarks
	Class	Instance		
0x01(1)	-	Compatible	Get_Attributes_All	

9.3.4 Digital input unit Push-in terminal block type (Class:0x90)

There are no attributes for the class. For a description of the instances, refer to "Instances".

Attributes of instance

Instance	Attr ID	Access method	NV	Name	Data type	Initial value	Description
2 to 18	1	Get	V	Digital Input	ARRAY of BOOL		Digital input
				Point 0	BOOL	FALSE	Digital input Point 0
				…	…	…	…
				Point 31	BOOL	FALSE	Digital input Point 31

Compatible services

Service code	Compatible		Service name	Remarks
	Class	Instance		
0x01(1)	-	Compatible	Get_Attributes_All	

9.3.5 IO-Link master unit (Class:0x98)

There are no attributes for the class. For a description of the instances, refer to "Instances".

Attributes of instance

Instance	Attr ID	Access method	NV	Name	Data type	Initial value	Description
2 to 18	1	Get	V	IO-Link Digital input 1	ARRAY of BOOL		Digital input 1
				Port 0 Digital IN 1	BOOL	FALSE	Port 0
				…	…	…	…
				Port 7 Digital IN 1	BOOL	FALSE	Port 7
	9	Get	V	IO-Link Digital input 2	ARRAY of BOOL		Digital input 2
				Port 0 Digital IN 2	BOOL	FALSE	Port 0
				…	…	…	…
				Port 7 Digital IN 2	BOOL	FALSE	Port 7
	17	Get	V	IO-Link port error flag	ARRAY of BOOL		Port error flag
				Port 0 Error flag	BOOL	FALSE	Port 0
				…	…	…	…
				Port 7 Error flag	BOOL	FALSE	Port 7
	25	Get	V	IO-Link COMM error flag	ARRAY of BOOL		IO-Link error flag
				Port 0 COMM error flag	BOOL	FALSE	Port 0
				…	…	…	…
				Port 7 COMM error flag	BOOL	FALSE	Port 7
	33	Get	V	IO-Link Error log update flag	ARRAY of BOOL		Error log update
				Port 0 Error log update flag	BOOL	FALSE	Port 0
				…	…	…	…
				Port 7 Error log update flag	BOOL	FALSE	Port 7
	41	Get	V	IO-Link Input data enable flag	ARRAY of BOOL		IO-Link input data enable flag
				Port 0 Input data enable flag	BOOL	FALSE	Port 0
				…	…	…	…
				Port 7 Input data enable flag	BOOL	FALSE	Port 7
	50	Get	V	Port 0 Input data	ARRAY of USINT	0x00	Port 0 Input byte
	52	Get	V	Port 1 Input data	ARRAY of USINT	0x00	Port 1 Input byte
	54	Get	V	Port 2 Input data	ARRAY of USINT	0x00	Port 2 Input byte
	56	Get	V	Port 3 Input data	ARRAY of USINT	0x00	Port 3 Input byte
	58	Get	V	Port 4 Input data	ARRAY of USINT	0x00	Port 4 Input byte
	60	Get	V	Port 5 Input data	ARRAY of USINT	0x00	Port 5 Input byte
	62	Get	V	Port 6 Input data	ARRAY of USINT	0x00	Port 6 Input byte
	64	Get	V	Port 7 Input data	ARRAY of USINT	0x00	Port 7 Input byte

Compatible services

Service code	Compatible		Service name	Remarks
	Class	Instance		
0x01(1)	-	Compatible	Get_Attributes_All	
0x0E(14)	-	Compatible	Get_Attribute_Single	

9.4 Output Process Data Area

9.4.1 Analog output 2CH unit (Class:0x95)

There are no attributes for the class. For a description of the instances, refer to "Instances".

Attributes of instance

Instance	Attr ID	Access method	NV	Name	Data type	Initial value	Description
2 to 18	1	Get	V	Channel 0	WORD	0x0000	Analog output CH0
	2	Get	V	Channel 1	WORD	0x0000	Analog output CH1

Compatible services

Service code	Compatible		Service name	Remarks
	Class	Instance		
0x01(1)	-	Compatible	Get_Attributes_All	
0x0E(14)	-	Compatible	Get_Attribute_Single	

9.4.2 Digital output unit M 8 x 8 type (Class:0x91)

There are no attributes for the class. For a description of the instances, refer to "Instances".

Attributes of instance

Instance	Attr ID	Access method	NV	Name	Data type	Initial value	Description
2 to 18	1	Get	V	Digital Output	ARRAY of BOOL		Digital output
				Point 0	BOOL	FALSE	Digital output Point 0
				…	…	…	…
				Point 7	BOOL	FALSE	Digital output Point 7

Compatible services

Service code	Compatible		Service name	Remarks
	Class	Instance		
0x01(1)	-	Compatible	Get_Attributes_All	

9.4.3 Digital output unit M 12 x 8 type (Class:0x91)

There are no attributes for the class. For a description of the instances, refer to "Instances".

Attributes of instance

Instance	Attr ID	Access method	NV	Name	Data type	Initial value	Description
2 to 18	1	Get	V	Digital Output	ARRAY of BOOL		Digital output
				Point 0	BOOL	FALSE	Digital output Point 0
				…	…	…	…
				Point 15	BOOL	FALSE	Digital output Point 15

* The instance is the position of the unit counted from the left edge. If the left unit is not a device unit, the left edge unit is 2.

Compatible services

Service code	Compatible		Service name	Remarks
	Class	Instance		
0x01(1)	-	Compatible	Get_Attributes_All	

9.4.4 Digital output unit Push-in terminal block type (Class:0x91)

There are no attributes for the class. For a description of the instances, refer to "Instances".

Attributes of instance

Instance	Attr ID	Access method	NV	Name	Data type	Initial value	Description
2 to 18	1	Get	V	Digital Output	ARRAY of BOOL		Digital output
				Point 0	BOOL	FALSE	Digital output Point 0
				…	…	…	…
				Point 31	BOOL	FALSE	Digital output Point 31

* The instance is the position of the unit counted from the left edge. If the left unit is not a device unit, the left edge unit is 2.

Compatible services

Service code	Compatible		Service name	Remarks
	Class	Instance		
0x01(1)	-	Compatible	Get_Attributes_All	

9.4.5 Valve I/F 32-point unit (Class:0x91)

There are no attributes for the class. For a description of the instances, refer to "Instances".

Attributes of instance

Instance	Attr ID	Access method	NV	Name	Data type	Initial value	Description
2 to 18	1	Get	V	Valve output	ARRAY of BOOL		Valve output
				Point 0	BOOL	FALSE	Valve output Point 0
				…	…	…	…
				Point 31	BOOL	FALSE	Valve output Point 31

* The instance is the position of the unit counted from the left edge. If the left unit is not a device unit, the left edge unit is 2.

Compatible services

Service code	Compatible		Service name	Remarks
	Class	Instance		
0x01(1)	-	Compatible	Get_Attributes_All	

9.4.6 IO-Link master unit (Class:0x99)

There are no attributes for the class. For a description of the instances, refer to "Instances".

Attributes of instance

Instance	Attr ID	Access method	NV	Name	Data type	Initial value	Description
2 to 18	1	Get	V	IO-Link Digital output 1	ARRAY of BOOL		Digital output 1
				Port 0 Digital OUT 1	BOOL	FALSE	Port 0
				…	…	…	…
				Port 7 Digital OUT 1	BOOL	FALSE	Port 7
	9	Get	V	IO-Link Event clear flag	ARRAY of BOOL		Error log cleared
				Port 0 Event clear flag	BOOL	FALSE	Port 0
				…	…	…	…
				Port 7 Event clear flag	BOOL	FALSE	Port 7
	50	Get	V	Port 0 Output data	ARRAY of USINT	0x00	Port 0 Output byte
	52	Get	V	Port 1 Output data	ARRAY of USINT	0x00	Port 1 Output byte
	54	Get	V	Port 2 Output data	ARRAY of USINT	0x00	Port 2 Output byte
	56	Get	V	Port 3 Output data	ARRAY of USINT	0x00	Port 3 Output byte
	58	Get	V	Port 4 Output data	ARRAY of USINT	0x00	Port 4 Output byte
	60	Get	V	Port 5 Output data	ARRAY of USINT	0x00	Port 5 Output byte
	62	Get	V	Port 6 Output data	ARRAY of USINT	0x00	Port 6 Output byte
	64	Get	V	Port 7 Output data	ARRAY of USINT	0x00	Port 7 Output byte

* The instance is the position of the unit counted from the left edge. If the left unit is not a device unit, the left edge unit is 2.

Compatible services

Service code	Compatible		Service name	Remarks
	Class	Instance		
0x01(1)	-	Compatible	Get_Attributes_All	
0x0E(14)	-	Compatible	Get_Attribute_Single	

9.5 Setting Data Area

■ “Setting change failed” notification

All I/O units and device unit will set the [Setting change failed] to 0 when the setting change using Explicit communication is successful. [Setting change failed] is set to 1 when the setting change using Explicit communication is failed.
Therefore, use this [Setting change failed] as a result of successful/failed setting changes using Explicit communication.
The Attr ID for the [Setting change failed] differs depending on the I/O unit as follows.
This value is updated within 2 seconds after requesting a setting change.

9.5.1 Settings for the device unit (Class: 0x70)

There are no attributes for the class. For a description of the instances, refer to "Instances".

Attributes of instance. For a description of the instances, refer to "Instances".

Instance	Attr ID	Access method	NV	Name	Data type	Initial value	Description
1	1	Get/Set	NV	Control power monitoring	USINT	1	0: OFF (do not monitor) 1: ON (monitored)
	2	Get/Set	NV	Output power supply monitor	USINT	1	0: OFF (do not monitor) 1: ON (monitored)
	3	Get/Set	NV	Analog byte order	USINT	0	0: Big endian 1: Little endian
	5	Get/Set	NV	Maximum number of saved logs	USINT	0x00	0X00: Save? : None 0x01 to 0xFF: Maximum number of Save? : Yes
	6	Get/Set	NV	Saving logs (method)	USINT	1	0: Repeat (overwrite) 1: Stop at maximum number
	8	Get/Set	NV	Time to save log	USINT	0x1E	0X00: Real-time 0x 1 to 3C: Save every 1 to 60 minutes
	9	Get/Set	NV	Log filter	USINT	0x00	Refer to 4.2 List.
	10	Get/Set	NV	Log filter details (error code specifications)	USINT	0x00	0x00 to 0xFF
	11	Get/Set	NV	Log filter details (Unit specifications)	UDINT	0x00000000	0x00000000 to 0xFFFFFFFF
	12	Get/Set	NV	Log filter details (unit position designation)	USINT	0	0x00 to 0x11
	13	Get/Set	NV	Log filter details (CH specifications)	USINT	0x00	0x00 to 0xFF
	14	Get	NV	Output power supply ON time	UDINT	-	0x00000000 to 0xFFFFFFFF
	15	Get	V	Setting change failed	BOOL	0	0: Setting change succeeded 1: Setting change failed

Compatible services

Service code	Compatible		Service name	Remarks
	Class	Instance		
0x01(1)	None	Compatible	Get_Attributes_All	
0x0E(14)	None	Compatible	Get_Attribute_Single	
0x10(16)	None	Compatible	Set_Attribute_Single	

Note 1: Refer to [Remote I/O RT Series Instruction Manual: System Construction] "8.3.6 Settings of error log".

9.5.2 Settings for the analog input 2CH unit (Class:0x73)

There are no attributes for the class. For a description of the instances, refer to "Instances".

Attributes of instance.

Instance	Attr ID	Access method	NV	Name	Data type	Initial value	Description
2 to 18	1	Get/Set	NV	Power line error detection CH 0	BOOL	1	0: Disabled 1: Enabled
	2	Get/Set	NV	Power line error detection CH 1	BOOL	1	0: Disabled 1: Enabled
	17	Get/Set	NV	Averaging sampling count	USINT	0x00	0X00: Twice 0X01: 4 times 0X02: 8 times 0X03: 16 times
	18	Get/Set	NV	Sampling period	UINT	0x0001	0X0001(1ms) to 0xFFFF (65535ms)
	19	Get/Set	NV	Data format CH 0	BOOL	0x01	Note 1
	20	Get/Set	NV	Data format CH 1	USINT	Same as above	Same as above
	23	Get/Set	NV	Input range CH 0	USINT	0x00	Note 2
	24	Get/Set	NV	Input range CH 1	USINT	Same as above	Same as above
	27	Get/Set	NV	Max range error CH 0	USINT	1	0: Disabled 1: Enabled
	28	Get/Set	NV	Max range error CH 1	USINT	Same as above	Same as above
	35	Get/Set	NV	Min range error CH 0	USINT	1	0: Disabled 1: Enabled
	36	Get/Set	NV	Min range error CH 1	USINT	Same as above	Same as above
	43	Get/Set	NV	User set value upper limit error CH 0	USINT	0	0: Disabled 1: Enabled
	44	Get/Set	NV	User set value upper limit error CH 1	USINT	Same as above	Same as above
	51	Get/Set	NV	User set value lower limit error CH 0	USINT	0	0: Disabled 1: Enabled
	52	Get/Set	NV	User set value lower limit error CH 1	USINT	Same as above	Same as above
	59	Get/Set	NV	User set value upper limit error threshold CH 0	UINT	0x0000	Note 3
	60	Get/Set	NV	User set value upper limit error threshold CH 1	UINT	0x0000	Note 3
	63	Get/Set	NV	User set value lower limit error threshold CH 0	UINT	0x0000	Note 3
	64	Get/Set	NV	User set value lower limit error threshold CH 1	UINT	0x0000	Note 3
	67	Get/Set	NV	Sensor power CH 0	USINT	1	0: OFF (do not supply) 1: ON (supply)
	68	Get/Set	NV	Sensor power CH 1	USINT	Same as above	Same as above
	75	Get/Set	NV	Measured hysteresis CH 0	USINT	0	0: OFF 1: ON
	76	Get/Set	NV	Measured hysteresis CH 1	USINT	Same as above	Same as above
	63	Get/Set	NV	Enable/Disable CH 0	USINT	1	0: Disabled 1: Enabled
	84	Get/Set	NV	Enable/Disable CH 1	USINT	Same as above	Same as above
	88	Get	V	Setting change failed	BOOL	0	0: Setting change succeeded 1: Setting change failed

Note 1: The values for the data format setting are as follows:

0x00: Offset 12(12bit)
0x01: Offset 16(16bit)
0x02: Signed magnitude A (12 bit)
0x03: Signed magnitude B (16 bit)
0x04: Signed magnitude C (16 bit)
0x05: Signed magnitude D (16 bit)
0x06: Signed magnitude E (16 bit)
0x07: Signed 2's complement (16 bit)

Note 2: The values for input range setting are as follows:

0x00: DC -10 to 10V
0x01: DC -5 to 5V
0x02: DC 0 to 10V
0x03: DC 0 to 5V
0x04: DC 1 to 5V
0x0A: DC -20 to 20mA
0x0B: DC 4 to 20mA
0x0C: DC 0 to 20mA

Note 3: Refer to “7.1.1 Analog Input” of “Analog I/O Unit Instruction Manual “ for the valid setting value for the combination of data format and input range.

Compatible services

Service code	Compatible		Service name	Remarks
	Class	Instance		
0x01	None	Compatible	Get_Attributes_All	
0x0E	None	Compatible	Get_Attribute_Single	
0x10	None	Compatible	Set_Attribute_Single	

Note 1: Refer to [Remote I/O RT Series Instruction Manual: System Construction] "8.3.6 Settings of error log".

9.5.3 Setting for the digital input unit M 8 x 8 type (Class:0x71)

There are no attributes for the class. For a description of the instances, refer to "Instances".

Attributes of instance

Instance	Attr ID	Access method	NV	Name	Data type	Initial value	Description
2 to 18	1	Get/Set	NV	Power line error detection connector 0	BOOL	TRUE	FALSE: Disable TRUE: Enable
	…	…	…	…	…	…	…
	8	Get/Set	NV	Power line error detection connector 7	BOOL	Same as above	
	9	Get/Set	NV	ON count threshold (Input) point 0	UDINT	0	0x000000 to 0xFFFFFF Do not count when 0x000000
	…	…	…	…	…	…	…
	16	Get/Set	NV	ON count threshold (Input) point 7	UDINT	Same as above	Same as above
	25	Get	NV	On Operating Cycle point 0	UDINT	0	0x000000 to 0xFFFFFF
	…	…	…	…	…	…	…
	32	Get	NV	On Operating Cycle point 7	UDINT	Same as above	Same as above 1
	41	Get/Set	NV	Input filter time point 0	USINT	0	Same as above
	…	…	…	…	…	…	…
	48	Get/Set	NV	Input filter time point 7	USINT	Same as above	Same as above
	57	Get/Set	NV	Input hold time point 0	USINT	0	0: 1 ms 1: 15 ms 2: 100 ms 3: 200 ms
	…	…	…	…	…	…	…
	64	Get/Set	NV	Input hold time point 7	USINT	Same as above	Same as above
	73	Get	V	Setting change failed	BOOL	0	0: Setting change succeeded 1: Setting change failed

Compatible services

Service code	Compatible		Service name	Remarks
	Class	Instance		
0x01	None	Compatible	Get_Attributes_All	
0x0E	None	Compatible	Get_Attribute_Single	
0x10	None	Compatible	Set_Attribute_Single	

9.5.4 Settings for the digital input unit M 12 x 8 type (Class:0x71)

There are no attributes for the class. For a description of the instances, refer to "Instances".

Attributes of instance

Instance	Attr ID	Access method	NV	Name	Data type	Initial value	Description
2 to 18	1	Get/Set	NV	Power line error detection connector 0	BOOL	TRUE	FALSE: Disable TRUE: Enable
…	…	…	…	…	…	…	…
	8	Get/Set	NV	Power line error detection connector 7	BOOL	Same as above	
	9	Get/Set	NV	ON count threshold (Input) point 0	UDINT	0	0x000000 to 0xFFFFFF Do not count when 0x000000
	…	…	…	…	…	…	…
	24	Get/Set	NV	ON count threshold (Input) point 15	UDINT	Same as above	Same as above
	25	Get	NV	On Operating Cycle point 0	UDINT	0	0x000000 to 0xFFFFFF
	…	…	…	…	…	…	…
	40	Get	NV	On Operating Cycle point 15	UDINT	Same as above	Same as above 1
	41	Get/Set	NV	Input filter time point 0	USINT	0	Same as above
	…	…	…	…	…	…	…
	56	Get/Set	NV	Input filter time point 15	USINT	Same as above	Same as above
	57	Get/Set	NV	Input hold time point 0	USINT	0	0: 1 ms 1: 15 ms 2: 100 ms 3: 200 ms
	…	…	…	…	…	…	…
	72	Get/Set	NV	Input hold time point 15	USINT	Same as above	Same as above
	73	Get	V	Setting change failed	BOOL	0	0: Setting change succeeded 1: Setting change failed

Compatible services

Service code	Compatible		Service name	Remarks
	Class	Instance		
0x01	None	Compatible	Get_Attributes_All	
0x0E	None	Compatible	Get_Attribute_Single	
0x10	None	Compatible	Set_Attribute_Single	

9.5.5 Settings for the digital input unit Push-in terminal block type (Class:0x77)

There are no attributes for the class. For a description of the instances, refer to "Instances".

Attributes of instance

Instance	Attr ID	Access method	NV	Name	Data type	Initial value	Description
2 to 18	1	Get/Set	NV	Power line error detection block 0	USINT	2	0: OFF 1: Detect at restart only (disconnection) 2: Any time detect
…	…	…	…	…	…	…	…
	8	Get/Set	NV	block 7	USINT	Same as above	
	9	Get/Set	NV	ON count threshold (Input) point 0	UDINT	0	0x000000 to 0xFFFFFF Do not count when 0x000000
	…	…	…	…	…	…	…
	40	Get/Set	NV	ON count threshold (Input) point 31	UDINT	Same as above	Same as above
	41	Get	NV	On Operating Cycle point 0	UDINT	0	0x000000 to 0xFFFFFF
	…	…	…	…	…	…	…
	72	Get	NV	On Operating Cycle point 31	UDINT	Same as above	Same as above
	73	Get/Set	NV	Input filter time point 0	USINT	0	0: 0.1 ms 1: 1 ms 2: 5 ms 3: 10 ms 4: 20 ms
	…	…	…	…	…	…	…
	104	Get/Set	NV	Input filter time point 31	USINT	Same as above	Same as above
	105	Get/Set	NV	Input hold time point 0	USINT	0	0: 1 ms 1: 15 ms 2: 100 ms 3: 200 ms
	…	…	…	…	…	…	…
	121	Get/Set	NV	Input hold time point 16	USINT	2	2: 100 ms 3: 200 ms
	…	…	…	…	…	…	…
	136	Get/Set	NV	Input hold time point 31	USINT	Same as above	Same as above
	137	Get	V	Setting change failed	BOOL	0	0: Setting change succeeded 1: Setting change failed

Compatible services

Service code	Compatible		Service name	Remarks
	Class	Instance		
0x01	None	Compatible	Get_Attributes_All	
0x0E	None	Compatible	Get_Attribute_Single	
0x10	None	Compatible	Set_Attribute_Single	

9.5.6 Settings for the analog output 2CH unit (Class:0x74)

There are no attributes for the class. For a description of the instances, refer to "Instances".

Attributes of instance

Instance	Attr ID	Access method	NV	Name	Data type	Initial value	Description
2 to 18	1	Get/Set	NV	Power line error detection CH 0	USINT	1	0: Disabled 1: Enabled
	2	Get/Set	NV	Power line error detection CH 1	USINT	Same as above	Same as above
	9	Get/Set	NV	Signal line error recovery operation CH 0	USINT	0	0: Auto 1: Manual
	10	Get/Set	NV	Signal line error recovery operation CH 1	USINT	Same as above	Same as above
	17	Get/Set	NV	Data format CH 0	USINT	0x01	Note 1
	18	Get/Set	NV	Data format CH 1	USINT	Same as above	Same as above
	21	Get/Set	NV	Output range CH 0	USINT	0x02	Note 2
	22	Get/Set	NV	Output range CH 1	USINT	Same as above	Same as above
	25	Get/Set	NV	Max range error CH 0	USINT	1	0: Disabled 1: Enabled
	26	Get/Set	NV	Max range error CH 1	USINT	Same as above	Same as above
	33	Get/Set	NV	Min range error CH 0	USINT	1	0: Disabled 1: Enabled
	34	Get/Set	NV	Min range error CH 1	USINT	Same as above	Same as above
	41	Get/Set	NV	User set value upper limit error CH 0	USINT	0	0: Disabled 1: Enabled
	42	Get/Set	NV	User set value upper limit error CH 1	USINT	Same as above	Same as above
	49	Get/Set	NV	User set value lower limit error CH 0	USINT	0	0: Disabled 1: Enabled
	50	Get/Set	NV	User set value lower limit error CH 1	USINT	Same as above	Same as above
	57	Get/Set	NV	User set value upper limit error threshold CH 0	UINT		Note 3
	58	Get/Set	NV	User set value upper limit error threshold CH 1	UINT		Note 3
	61	Get/Set	NV	User set value lower limit error threshold CH 0	UINT		Note 3
	62	Get/Set	NV	User set value lower limit error threshold CH 1	UINT		Note 3
	65	Get/Set	NV	Load power CH 0	USINT	1	0: OFF 1: ON
	66	Get/Set	NV	Load power CH 1	USINT	Same as above	Same as above
	73	Get/Set	NV	Customized output value at communication error CH 0	UINT	0x0000	0x0000 to 0xFFFF
	74	Get/Set	NV	Customized output value at communication error CH 1	UINT	Same as above	Same as above
	77	Get/Set	NV	Operation in the event of a communication error CH 0	USINT	0x02	0X00: OFF 0X01: User 0X02: HOLD
	78	Get/Set	NV	Operation in the event of a communication error CH 1	USINT	Same as above	Same as above
	81	Get/Set	NV	Enable/Disable CH 0	USINT	1	0: Disabled 1: Enabled
	82	Get/Set	NV	Enable/Disable CH 1	USINT	Same as above	Same as above
	86	Get	V	Setting change failed	USINT	0	0: Setting change succeeded 1: Setting change failed

Note 1: The values for the data format settings are as follows:

0x00: Offset 12(12bit)
0x01: Offset 16(16bit)
0x02: Signed magnitude A (12 bit)
0x03: Signed magnitude B (16 bit)
0x04: Signed magnitude C (16 bit)
0x06: Signed magnitude E (16 bit)
0x07: Signed two's complement (16bit)

Note 2: Each value of Output range settings are as follows:

0X02: DC 0 to 10V
0x03: DC 0 to 5V
0x04: DC 1 to 5V
0x0B: DC 4 to 20mA
0x0C: DC 0 to 20mA

Note 3: Refer to “7.1.2 Analog Output” of “Analog I/O Unit Instruction Manual “ for the valid setting value for the combination of data format and output range.

Compatible services

Service code	Compatible		Service name	Remarks
	Class	Instance		
0x01	None	Compatible	Get_Attributes_All	
0x0E	None	Compatible	Get_Attribute_Single	
0x10	None	Compatible	Set_Attribute_Single	

9.5.7 Settings for the digital Output unit M 12 x 8 type (Class:0x72)

There are no attributes for the class. For a description of the instances, refer to "Instances".

Attributes of instance

Instance	Attr ID	Access method	NV	Name	Data type	Initial value	Description
2 to 18	1	Get/Set	NV	Signal line error detection point 0	BOOL	TRUE	FALSE: Disable TRUE: Enable
	…	…	…	…	…	…	…
	16	Get/Set	NV	Signal line error detection point 15	Same as above	Same as above	Same as above
	17	Get/Set	NV	Signal line error recovery operation point 0	BOOL	0	0: Auto 1: Manual
	…	…	…	…	…	…	…
	32	Get/Set	NV	Signal line error recovery operation point 15	Same as above	Same as above	Same as above
	33	Get/Set	NV	ON count threshold (Output) point 0	UDINT	0x00000	0x000000 to 0xFFFFFF Do not count when 0
	…	…	…	…	…	…	…
	48	Get/Set	NV	ON count threshold (Output) point 15	Same as above	Same as above	Same as above
	49	Get/Set	NV	On Operating Cycle point 0	UDINT	0x00000	0x000000 to 0xFFFFFF
	…	…	…	…	…	…	…
	64	Get/Set	NV	On Operating Cycle point 15	Same as above	Same as above	Same as above
	65	Get/Set	NV	Communication error operation point 0	USINT	0x02	0X00: OFF 0x01：ON 0x02：HOLD
	…	…	…	…	…	…	…
	80	Get/Set	NV	Communication error operation point 15	Same as above	Same as above	Same as above
	81	Get	V	Setting change failed	USINT	0	0: Setting change succeeded 1: Setting change failed

Compatible services

Service code	Compatible		Service name	Remarks
	Class	Instance		
0x01	None	Compatible	Get_Attributes_All	
0x0E	None	Compatible	Get_Attribute_Single	
0x10	None	Compatible	Set_Attribute_Single	

9.5.8 Settings for the digital Output unit Push-in terminal block type (Class:0x78)

There are no attributes for the class. For a description of the instances, refer to "Instances".

Attributes of instance

Instance	Attr ID	Access method	NV	Name	Data type	Initial value	Description
2 to 18	1	Get/Set	NV	Signal line error detection point 0	BOOL	TRUE	FALSE: Disable TRUE: Enable
	…	…	…	…	…	…	…
	32	Get/Set	NV	Signal line error detection point 31	Same as above	Same as above	Same as above
	33	Get/Set	NV	Signal line error recovery operation point 0	BOOL	0	0: Auto 1: Manual
	…	…	…	…	…	…	…
	64	Get/Set	NV	Signal line error recovery operation point 31	Same as above	Same as above	Same as above
	65	Get/Set	NV	ON count threshold (Output) point 0	UDINT	0x00000	0x000000 to 0xFFFFFF Do not count when 0
	…	…	…	…	…	…	…
	96	Get/Set	NV	ON count threshold (Output) point 31	Same as above	Same as above	Same as above
	97	Get/Set	NV	On Operating Cycle point 0	UDINT	0x00000	0x000000 to 0xFFFFFF
	…	…	…	…	…	…	…
	128	Get/Set	NV	On Operating Cycle point 31	Same as above	Same as above	Same as above
	129	Get/Set	NV	Communication error operation point 0	USINT	0x02	0X00: OFF 0x01：ON 0x02：HOLD
	…	…	…	…	…	…	…
	160	Get/Set	NV	Communication error operation point 31	Same as above	Same as above	Same as above
	161	Get	V	Setting change failed	USINT	0	0: Setting change succeeded 1: Setting change failed

Compatible services

Service code	Compatible		Service name	Remarks
	Class	Instance		
0x01	None	Compatible	Get_Attributes_All	
0x0E	None	Compatible	Get_Attribute_Single	
0x10	None	Compatible	Set_Attribute_Single	

9.5.9 Settings for the valve I/F 32-point unit (Class:0x75)

There are no attributes for the class. For a description of the instances, refer to "Instances".

Attributes of instance

Instance	Attr ID	Access method	NV	Name	Data type	Initial value	Description
2 to 18	1	Get/Set	NV	Signal line error detection point 0	BOOL	TRUE	FALSE: Disable TRUE: Enable
				…	…	…	…
	32	Get/Set	NV	Signal line error detection point 31	Same as above	Same as above	Same as above
	33	Get/Set	NV	Signal line error recovery operation point 0	BOOL	0	0: Auto 1: Manual
				…	…	…	…
	64	Get/Set	NV	Signal line error recovery operation point 31	Same as above	Same as above	Same as above
	65	Get/Set	NV	ON count threshold (Output) point 0	UDINT	0x00000	0x000000 to 0xFFFFFF Do not count when 0
	…	…	…	…	…	…	…
	96	Get/Set	NV	ON count threshold (Output) point 31	Same as above	Same as above	Same as above
	97	Get/Set	NV	On Operating Cycle point 0	UDINT	0x00000	0x000000 to 0xFFFFFF
	…	…	…	▪	…	…	…
	128	Get/Set	NV	On Operating Cycle point 31	Same as above	Same as above	Same as above
	129	Get/Set	NV	Communication error operation point 0	USINT	0x02	0X00: OFF 0x01：ON 0x02：HOLD
	…	…	…	…	…	…	…
	160	Get/Set	NV	Communication error operation point 31	Same as above	Same as above	Same as above
	161	Get	V	Setting change failed	USINT	0	0: Setting change succeeded 1: Setting change failed

Compatible services

Service code	Compatible		Service name	Remarks
	Class	Instance		
0x01	None	Compatible	Get_Attributes_All	
0x0E	None	Compatible	Get_Attribute_Single	
0x10	None	Compatible	Set_Attribute_Single	

9.5.10 Settings for the IO-Link master unit (Class:0x76)

There are no attributes for the class. For a description of the instances, refer to "Instances".

Attributes of instance

Instance	Attr ID	Access method	NV	Name	Data type	Initial value	Description
2 to 18	1	Get/Set	NV	Device ID port 0	UDINT	0x000000	0x000000 to 0xFFFFFF
	2	Get/Set		Vendor ID port 0	UINT	0x0000	0x000000 to 0xFFFFFF
	3	Get/Set		Revision port 0	USINT	0x00	0x00 to 0xFF
	5	Get/Set		Input size port 0	UINT	0x04	0x00 to 0x20
	6	Get/Set	NV	Output size port 0	UINT	0x04	0x00 to 0x20
	7	Get/Set	…	Serial number port 0	STRING	0x00 (null)	ASCII code of up to 16 characters
	8	Get/Set	NV	Connector 0 operation settings	UINT	0x0E01	0x0000 to 0xFFFF(Note 1)
	9	Get/Set	NV	Cycle time port 0	USINT	0x00	0X00: Auto 0x0A to 0xFF: Manual settings
	10	Get/Set	…	Input filter time port 0	USINT	0x00	0X00: 0.1 ms 0X01: 1ms 0X02: 5ms 0X03: 10ms 0X04: 20 ms
	11	Get/Set	NV	Input hold time port 0	USINT	0x00	0X00: 1 ms 0X01: 15ms 0X02: 100ms 0X03: 200ms
	13 to 24	-	-	Similar to port 0 settings	-	-	For Port1
	25 to 35	-	-	Similar to port 0 settings	-	-	For Port2
	37 to 47	-	-	Similar to port 0 settings	-	-	For Port3
	49 to 59	-	-	Similar to port 0 settings	-	-	For Port4
	61 to 71	-	-	Similar to port 0 settings	-	-	For Port5
	73 to 83	-	-	Similar to port 0 settings	-	-	For Port6
	85 to 96	-	-	Similar to port 0 settings	-	-	For Port7
	97	Get	V	Setting change failed	USINT	0	0: Setting change succeeded 1: Setting change failed

Note 1: The bit allocation for the operation settings by port are as follows:

Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
Reserved	Reserved	Reserved	Signal line error recovery operation	Signal line error detection	Power line error detection	Operation in the event of a communication error	

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Sync between ports	Settings backup	Restore settings	Device verification		Select operation mode		

Each value for operation settings by port are as follows:

Operation settings by port name	Value	Factory setting
Select operation mode	0 (000): Disable mode, 1 (001): IO-Link mode, 2 (010): Digital input mode (PNP), 3 (011): Digital input mode (NPN), 4 (100): Digital input mode (PNP), 5 (101): Digital output mode (NPN)	1 (001): IO-Link mode
Device verification	0: Do not verify, 1: 3 types verification, 2: 4 types verification	0: Do not verify
Restore settings	0: Do not restore, 1: Restore	0: Do not restore
Settings backup	0: Do not back up, 1: Back up	0: Do not back up
Sync between ports	0: Do not sync, 1: Sync	0: Do not sync
Operation in the event of a communication error	0(00): OFF, 1(01): ON, 2(10): HOLD	2: HOLD
Power line error detection	0: Disabled, 1: Enabled	1: Enabled
Signal line error detection	0: Disabled, 1: Enabled	1: Enabled

Compatible services

Service code	Compatible		Service name	Remarks
	Class	Instance		
0x01	None	Compatible	Get_Attributes_All	
0x0E	None	Compatible	Get_Attribute_Single	
0x10	None	Compatible	Set_Attribute_Single	

9.6 Remote Device Information Area

9.6.1 Identity Object (Class:0x01)

Attributes of the class

Number	Name	Access method	Data type	Initial value	Description
1	Revision	Get	UINT	0x02	The revision of this object

Attributes for instance (1)

Attr ID	Access method	NV	Name	Data type	Initial value	Description
1	Get	NV	Vendor ID	UINT	00C9	CKD
2	Get	NV	Device Type	UINT	0x0C	Communications Adapter
3	Get	NV	Product code	UNIT	0805	
4	Get	NV	Revision	STRUCT of		
			Major Revision	USINT	0x01	
			Minor Revision	USINT	0x01	
5	Get	V	Status	WORD	0x0000	
6	Get	NV	Serial Number	UDINT	Depends on the product	Depends on the product
7	Get	NV	Product Name	SHORT_STRING	RT-XTENN00N	
8	Get	V	State	USINT	0x0000	
9	Get	NV	Configuration Consistency Value	UINT	0000	

Compatible services

Service code	Compatible		Service name	Remarks
	Class	Instance		
0x01	Compatible	Compatible	Get_Attributes_All	
0x05	Compatible	Compatible	Reset	
0x0E	Compatible	Compatible	Get_Attribute_Single	
0x10	Incompatible	Compatible	Set_Attribute_Single	

9.6.2 Unit ID configuration detected by automatic recognition (Class:0xA0)

It is the I/O unit configuration actually detected by the device unit at power-up.
There are no attributes for the class.

Attributes for instance (1)

Attr ID	Access method	NV	Name	Data type	Initial value	Description
1	Get	V	Module Ident of the module detected on position 1	UDINT	Undefined	Unit ID Refer to table below
…	…	…	…	…	…	…
18	Get	V	Module Ident of the module detected on position 18	UDINT	Undefined	Unit ID Refer to table below

Compatible services

Service code	Compatible		Service name	Remarks
	Class	Instance		
0x01	None	Compatible	Get_Attributes_All	
0x0E	None	Compatible	Get_Attribute_Single	

Unit ID List

Unit ID	Model No.	Type	Main function	Connector	Points/CH/ports	Polarity
07010000	RT-XTENN00N	Device unit	EtherNet/IP compatible	-	-	-
2B280100	RT-XADGB08A	Input	Digital	M8	8 points	PNP
2B2C0100	RT-XADGB08B	Input	Digital	M8	8 points	NPN
2C080200	RT-XADGA16A	Input	Digital	M12	16 points	PNP
2C0C0200	RT-XADGA16B	Input	Digital	M12	16 points	NPN
2D680400	RT-XADGC32A	Input	Digital	Terminal block	32 points	PNP
2D6C0400	RT-XADGC32B	Input	Digital	Terminal block	32 points	NPN
2C100002	RT-XBDGA16A	Output	Digital	M12	16 points	PNP
2C140002	RT-XBDGA16B	Output	Digital	M12	16 points	NPN
2D700004	RT-XBDGC32A	Output	Digital	Terminal block	32 points	PNP
2D740004	RT-XBDGC32B	Output	Digital	Terminal block	32 points	NPN
51080400	RT-XAAGA02N	Input	Analog	M12	2CH	-
51100004	RT-XBAGA02N	Output	Analog	M12	2CH	-
D300xxyy(Note 1)	RT-XLMSA08N	IO-Link	Master	M12	8 ports	-
6D020004	RT-XVVCN32A(Note 2)	Valve I/F	TVG		32 points	PNP
6D820004	RT-XVVCN32B(Note 2)	Valve I/F	TVG		32 points	NPN

Note 1: The module name for Valve I/F unit are indicated as the model No. on the software only. The actual model No. for valve manifold is TVG□P-TB-□-KA1□.

Note 2: xxyy varies depending on the unit settings. (Initial setting value: 2622)

9.7 Diagnostic Information Area

9.7.1 Diagnostic information by point (Class: 0x67)

Diagnostic information by point, CH, and port
There are no attributes for the class. For a description of the instances, refer to "Instances".

Attributes of instances *3

Attr ID	Access method	NV	Name	Data type	Initial value	Description
1–64*1	Get	V	diagnosis	UINT	0x0000	Diagnostic information by point, CH, and port *2

*1 The maximum value of attr ID is the number of points, CH and ports that the target unit has.
*2 For definitions of diagnostic information, refer to the Instruction Manual for each unit.
*3 The device unit is not supported. When accessing the device unit instance (1), a status code of 0x05 returns

Compatible services

Service code	Compatible		Service name	Remarks
	Class	Instance		
0x01	None	Compatible	Get_Attributes_All	Responds with diagnostic information of point, CH, and port number
0x0E	None	Compatible	Get_Attribute_Single	

9.7.2 Diagnostic information by unit (Class:0x66)

Diagnostic information for each unit
There are no attributes for the class.

Attributes for instance (1)

Attr ID	Access method	NV	Name	Data type	Initial value	Description
1–18*1	Get	V	diagnosis	UINT	0x0000	Diagnostic information of the unit*2

*1 the attributes in the diagnostic information area by unit are related to the physical location of the unit. The device unit is always allocated 1. Allocate the left end unit except the device unit as 2, and the unit first to the right as 3, and the unit next right to its right as 4, and so on. The maximum is 18.
*2 The diagnostic information of the unit is the result of OR logic conducted to all the diagnostic information by point of the target unit.

Compatible services

Service code	Compatible		Service name	Remarks
	Class	Instance		
0x01	None	Compatible	Get_Attributes_All	Respond with diagnostic information to the right end unit
0x0E	None	Compatible	Get_Attribute_Single	

9.7.3 Remote IO system diagnostic information (Class:0x65)

Diagnostic information of the entire system. It is a collection of diagnostic information by unit.
There are no attributes for the class.

Attributes for instance (1)

Attr ID	Access method	NV	Name	Data type	Initial value	Description
1	Get	V	diagnosis	ARRAY of		Diagnostic information of the unit
			Unit input error	BOOL	FALSE	(Bit0) Input error
			Unit output error	BOOL	FALSE	(Bit1) Output error
			Reserve	BOOL	FALSE	(Bit2) Reserved
			Power failure	BOOL	FALSE	(Bit3) Power related error
			Reserve	BOOL	FALSE	(Bit4) Reserved
			Operation waiting	BOOL	FALSE	(Bit5) Operation waiting
			Hardware abnormal	BOOL	FALSE	(Bit6) Hardware error
			System error	BOOL	FALSE	(Bit7) System error

Compatible services

Service code	Compatible		Service name	Remarks
	Class	Instance		
0x0E	None	Compatible	Get_Attribute_Single	

9.7.4 Remote I/O system log (Class:0x64)

Error logs for the product is saved.
There are no attributes for the class

Attributes of the class

Number	Name	Access method	Data type	Initial value	Description
1	Revision	Get	UINT	1	The revision of this object
2	Max Instance	Get	UINT	0	Maximum number of instances

Attributes of the instance (0x01-0xFF)

Attr ID	Access method	NV	Name	Data type	Initial value	Description
1	Get	V	Time Stamp	ULINT	0x00000000	Number of seconds since startup
2	Get	V	Unit ID	ULINT	0x00000000	Unit ID of the target unit
3	Get	V	Unit Position	USINT	0x00	Position of the target unit
4	Get	V	CH	USINT	0x00	Target CH/ Point/ Port
5	Get	V	Error Code	UINT	0x00	Error code

Compatible services

Service code	Compatible		Service name	Remarks
	Class	Instance		
0x01	Compatible	Compatible	Get_Attributes_All	
0x0E	Compatible	Compatible	Get_Attribute_Single	

9.7.5 Unit-specific diagnostic information (Specific Diagnosis) (Class:0x68)

Diagnosis information for a specific I/O unit is stored in this area.

■ Error log of the IO-Link master unit

A maximum of 6 error histories within the IO-Link master unit (history of event codes for IO-Link devices or error responses for ISDU communication) are stored. This data can be read out with Explicit communication from the EtherNet/IP scanner or in [Error log] window of the PC software. The error log data is automatically deleted from IO-Link master unit as soon as it is read out.
There are no attributes for the class. For a description of the instances, refer to "Instances".

Attr ID	Access method	NV	Name	Data type	Initial value	Description
1	Get/Set	V	Read Target Port	USINT	000	Read target port
2	Get	V	Read Complete	BOOL	0	Read Complete (Note 1)
3	Get	V	IO-Link Device Error1	UDINT	0x00000000	IO-Link error log 1 (Note 2)
4	Get	V	IO-Link Device Error2	UDINT	0x00000000	IO-Link error log 2 (Note 2)
5	Get	V	IO-Link Device Error3	UDINT	0x00000000	IO-Link error log 3 (Note 2)
6	Get	V	IO-Link Device Error4	UDINT	0x00000000	IO-Link error log 4 (Note 2)
7	Get	V	IO-Link Device Error5	UDINT	0x00000000	IO-Link error log 5 (Note 2)
8	Get	V	IO-Link Device Error6	UDINT	0x00000000	IO-Link error log 6 (Note 2)

Note 1: The values for the completed read out are as follows: Device unit writes the end status when the writing process is completed.
0: Reading
1: Read complete. Or, it generates when the wait time for a response has timed out.

Note 2: The bit allocation for IO-Link error log is as follows. The upper row is for IO-Link device events and the lower row is for error responses for ISDU communication. Refer to IO-Link Communication specifications for details. Event Code may contain a unique value for the product.

Bit 31		Bit 24	Bit 23		Bit 16	Bit 15		Bit 8	Bit 7		Bit 1	Bit 0
Event Code						Event Qualifier			0		IOLDEP(Note 3)	
Additional Code			Error Code			I-Service			0		IOLDEP(Note 3)	

Note 3: Details of IOLDEP (IO-Link Device Error Pattern) are as follows.
00: No error during IO-Link communication
01: Diagnosis
10: ISDU

Examples of Event Codes that can be generated on IO-Link master units are as follows.

Event Code	Description	Remarks
0xFFF3	Device ID to verify is not registered.	-
0xFFFB	IO-Link device is not connected.	-
0xFFFC	Verification error with serial number occurred.	During this error, IO-Link communication is stopped on PREOPERATE.
0xFFFE	IO-Link devices have different device IDs.	During this error, IO-Link communication is stopped on PREOPERATE.
0xFFFF	Device ID of restore destination is different.	When the storage data ID and the device ID are different at the restore.

* For events that generate on IO-Link devices, refer to the specifications for each IO-Link device in use.

The instruction for read is as follows:

1 Set the number of desired port to [Read Target Port] .

2 Wait until [Read Complete] is "1."
This value is typically updated within two seconds of setting the target port to [Read Target Port].

3 When [Read Complete] is "1", check the value and the "IO-Link error log".
* The existence of error log from IO-Link devices can be checked in [Error log update] in the

process data.

9.8 Other Areas

9.8.1 ISDU communication area (Class:0x80)

It is the area for sending and receiving ISDU communication (acyclic communication of IO-Link communication) for IO-Link devices by specifying the index/sub-index of the service data of IO-Link device via IO-Link master unit.
The device unit uses this data to send ISDU communication to the target IO-Link master unit.

There are two ways to read/write the ISDU communication area to this IO-Link device:
- Request from the upper EtherNet/IP scanner
- Operation from [ISDU] tab in the PC software

There are no attributes for the class. For a description of the instances, refer to "Instances".

Attributes of instance

Instance	Attr ID	Access method	NV	Name	Data type	Initial value	Description
2 to 18	1	Get/Set	V	Write Target Port	USINT	0	Write target port
	3	Get/Set	V	Write Index	UINT	0	Write index number
	4	Get/Set	V	Write Subindex	USINT	0	Write sub index number
	5	Get/Set	V	Write Size	USINT	0	Write Size (bytes)
	6	Get/Set	V	Write Data	ARRAY of USINT	0	Write data
	7	Get/Set	V	Write State	USINT	0	Write status
	9	Get	V	Write Return Code	UDINT	0	Write response code
	10	Get/Set	V	Read Target Port	USINT	0	Read target port
	12	Get/Set	V	Read Index	UINT	0	Read index number
	13	Get/Set	V	Read Subindex	USINT	0	Read subindex number
	14	Get	V	Read Size	USINT	0	Read Size (bytes)
	15	Get/Set	V	Read Data	ARRAY of USINT	0	Read data
	16	Get/Set	V	Read State	USINT	0	Read status
	18	Get	V	Read Return Code	UDINT	0	Read response code

■ Write data

Binary data from 0 to 232 bytes. An array of USINT (byte size unsigned integer) type with element numbers from 0 to a maximum of 231.

■ Read data

Binary data of 232 bytes. An array of USINT (byte size unsigned integer) type with element numbers 0 to 231. Zero padding will be made for excess data toward the read target.

■ Write State / Read State

The user and the device unit write the values according to their status.

Value	Value meaning/ condition/ timing
0	Initial value
1	ISDU send instruction. Users write. Sends ISDU data to the designated IO-Link master unit when 1 is written to the device unit. When a user writes a value other than 1, it moves to an error termination status (3 below).
2	Sending ISDU. Device unit writes.
3 (Note 1)	Error termination. Status is indicated in the write (read) response code. Device unit writes.
4 (Note 1)	Normal termination. Status is indicated in the write (read) response code. Device unit writes.

Note 1: When 3 or 4, user can write 1.

■ Write response code/ Read response code

The device unit writes the termination status when the sequence is finished.

23	22	21	20	19	18	17	16	15		14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
General Error				ISDU Status						ISDU additional Code							ISDU Error Code							

Name	Role
General Error	It indicates an error other than a response to ISDU communication Value: Details of the error 0: No error 1: Parameter error. Occurs when the value is outside the specifications 2: ISDU communication response timeout 3: Error 4 to 15: Undefined
ISDU Status	0: The target port is not in IO-Link mode. Or IO-Link COMM error is generated 2: Successful (I-Service during ISDU response is "0101" or "1101") 3: Failed (I-Service during ISDU response is "0100" or "1100")
ISDU Additional Code	Same as Additional Code for ISDU communication
ISDU Error Code	Same as Error Code for ISDU communication

■ Write procedures for ISDU communication area

Use the following instructions.

1 Set the desired write destination for [Write Target Port], [Write Index], [Write Subindex].

2 Set the size to be written to [Write Size].

3 Set the data to be written to [Write Data].

4 Set [Write State] to "1".

5 Wait until [Write State] is "3" or "4".
This value is typically updated within 2 seconds of setting [Write State] to "1".

6 When [Write State] changes to "3" or "4", check its value and [Write Return Code]e.

■ Read procedures for ISDU communication area

Use the following instructions.

1 Set the desired read destination for [Read Target Port], [Read Index], [Read SubIndex].

2 Set [Read State] to "1".

3 Wait until [Read State] is "3" or "4".
This value is typically updated within 2 seconds of setting [Read State] to 1.

4 When [Read State] changes to "3" or "4", check its value and [Read Return Code].

5 If [Read State] is "4" and [Read Return Code] indicates no errors, read the data from [Read Data] for the [Read Size].

10. WebAPI FUNCTION

This product has the WebAPI function. Turn ON dip switch number 1 and power it on to enable the WebAPI function.

WebAPI function is used mainly for the application below.
- LAN connect for RTXTools
- Periodic data collection from system monitoring applications, etc.
- Data collection or setting changes from applications specific to users

10.1 Settings Method

Although the WebAPI function is initially freely accessible by anyone, access to the WebAPI can be restricted by authentication. It is recommended to set up user ID and password following the instructions below.

1. Connect the product to the PC using a USB cable.
2. Start RTXTools and click the Product Appearance.
3. Set "Authentication function" to "Digest Authentication".
4. Change the "Login ID (Web access)".
5. Change the "Password (Web access)".
6. Click the Settings Reflect button to reflect the settings to the product.

* This setting will reflect in real-time.

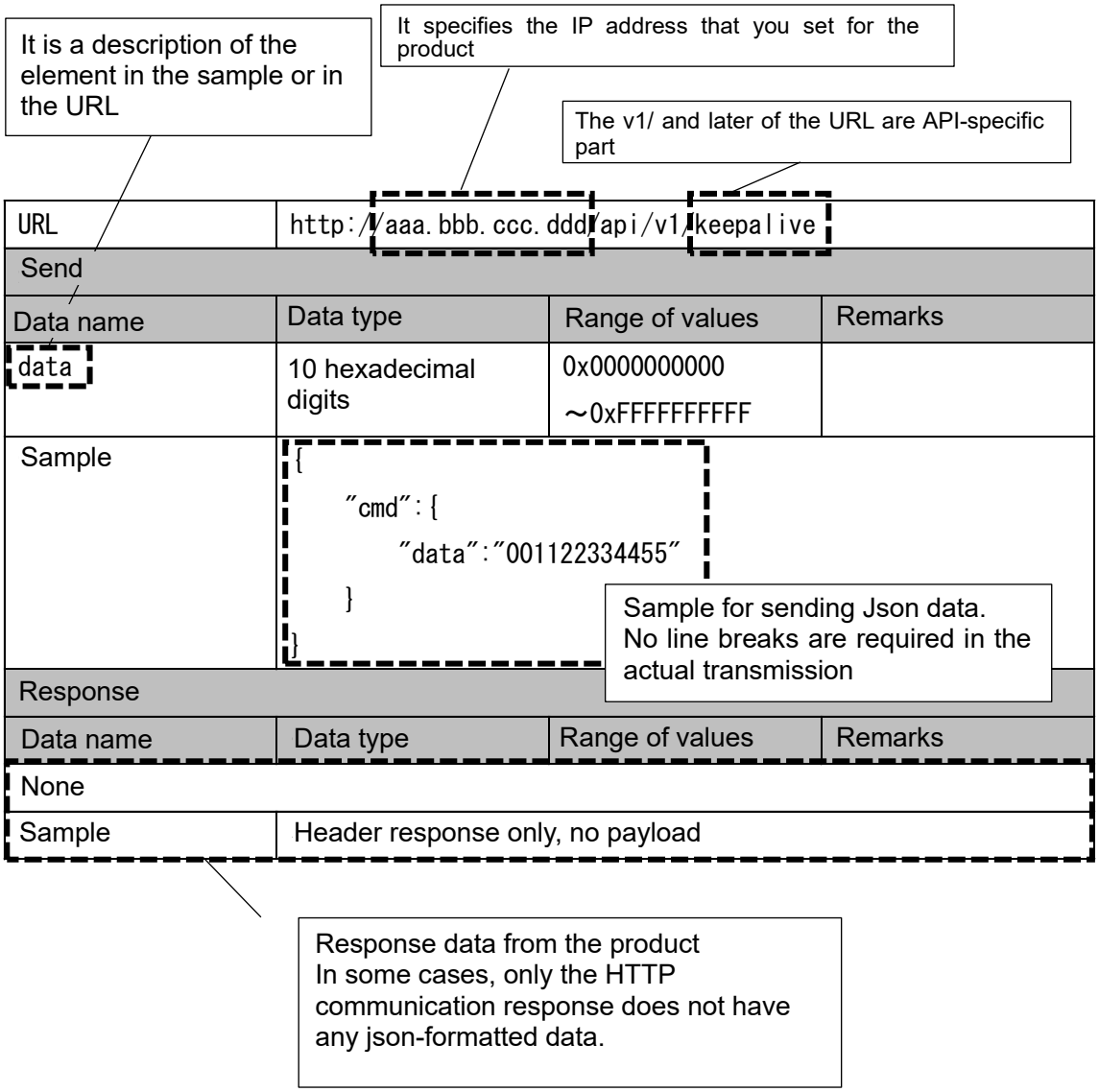
10.2 Access Method

Some WebAPIs can acquire data using general web browsers. Follow the instructions below to acquire the data.

1. Enable the WebAPI function by turning ON the dip switch 1.
2. Change the login ID and password as appropriate.
3. Start a web browser.
4. Check the IP address of the product (the IP address set in “2. INSTRUCTIONS FOR USE”).
5. Access using a web browser with the URL http://192.168.1.10/api/v1/dipsw. (* Replace "192.168.1.10" with the IP address checked in instruction 4.)
6. Check that the dip switch and rotary switch statuses are responded in the JSON format. (* In case of no response, check that the WebAPI is enabled and that the entered URL is correct.)

10.3 Description of Each API

Each API is described in the following format:



10.3.1 Keepalive

It is used to maintain a connect status with the product. Send once every 30 seconds.

<table>
<tr><td>URL</td><td colspan="3">http://aaa.bbb.ccc.ddd/api/v1/keepalive</td></tr>
<tr><td colspan="4">Send</td></tr>
<tr><td>Data name</td><td>Data type</td><td>Value</td><td>Remarks</td></tr>
<tr><td>data</td><td>10 Hexadecimal digits</td><td>Send the current time of the PC in the format below.
(1 byte = 2 digits)
<table><tr><td>Byte</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td></tr><tr><td>Description</td><td colspan="2">Date</td><td>Hours</td><td>Minutes</td><td>Seconds</td></tr></table>Date: 0x0000 to 0xFFFF
(January 1, 2000-June 6, 2179)
Hours: 0x00 to 0x17 (0 to 23)
Minutes: 0x00 to 0x3B (0 to 59)
Seconds: 0x00 to 0x3B (0 to 59)</td><td></td></tr>
<tr><td>Sample</td><td colspan="3">{
"cmd":{
"data":"FFFF000000"
}
}</td></tr>
<tr><td colspan="4">Response</td></tr>
<tr><td>Data name</td><td>Data type</td><td>Value</td><td>Remarks</td></tr>
<tr><td colspan="4">None</td></tr>
<tr><td>Sample</td><td colspan="3">Header response only, no payload</td></tr>
</table>

10.3.2 Get device unit switch status

It acquires the status of the settings switches (dip switches, rotary switches) on the device unit.

<table>
<tr><td>URL</td><td colspan="3">http://aaa.bbb.ccc.ddd/api/v1/dipsw</td></tr>
<tr><td colspan="4">Send</td></tr>
<tr><td>Data name</td><td>Data type</td><td>Value</td><td>Remarks</td></tr>
<tr><td colspan="4">None</td></tr>
<tr><td>Sample</td><td colspan="3">Header only, no payload</td></tr>
<tr><td colspan="4">Response</td></tr>
<tr><td>Data name</td><td>Data type</td><td>Value</td><td>Remarks</td></tr>
<tr><td>data</td><td>8 hexadecimal digits
(4 x 1 byte 2 digits)</td><td>1st byte: Dip switch status.
SW number is 1 in the highest bit and 8 is the lowest bit
2nd byte: Value of rotary switch (x16)
3rd byte: Value of rotary switch (x1)
4th byte: 0x00 fixed</td><td></td></tr>
<tr><td>Sample</td><td colspan="3">{
"cmd":{
"data":"00000000"
}
}</td></tr>
</table>

10.3.3 Get Version

It acquires the software and hardware versions of the unit.

URL	http://aaa.bbb.ccc.ddd/api/v1/cmd/version/[unit]		
Send			
Data name	**Data type**	**Value**	**Remarks**
[unit]	2 hexadecimal digits	0x00 to 0x11	Specifies the unit position. 0x00 is the position of the product and 0x01-0x11 is the position of the other units excluding the product, counted from the left to the right. Indicated by URL.
Sample			
Response			
Data name	**Data type**	**Value**	**Remarks**
unit	2 hexadecimal digits	0x00 to 0x11	Same as above unit position
data	12 hexadecimal digits (4 digits x 3 types)	Refer to sample column and remarks column	When the product is the target AAAA: Hardware version BBBB: Software version CCCC: Option number When the product is not the target AAAA: Microcomputer version 1 BBBB: Microcomputer version 2 CCCC: Microcomputer version 3
Sample	{ "cmd":{ "unit":"00", "data":"AAAABBBBCCCC" } }		

10.3.4 Date and time settings

It adjusts the internal time of the product to the specified time. It is only held while the power is ON.

<table>
<tr><td>URL</td><td colspan="3">http://aaa.bbb.ccc.ddd/api/v1/datetime</td></tr>
<tr><td colspan="4">Send</td></tr>
<tr><td>Data name</td><td>Data type</td><td>Value</td><td>Remarks</td></tr>
<tr><td>data</td><td>12 Hexadecimal digits</td><td>Sends the date and time in the format below. (1 byte = 2 digits)
<table><tr><td>byte</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td></tr><tr><td>Description</td><td colspan="2">Date</td><td>Hours</td><td>Minutes</td><td>Seconds</td><td>Milliseconds</td></tr></table>Date: 0x0000 to 0xFFFF
(January 1, 2000-June 6, 2179)
Hours: 0x00 to 0x17 (0 to 23)
Minutes: 0x00 to 0x3B (0 to 59)
Seconds: 0x00 to 0x3B (0 to 59)
Milliseconds: 0x00 to 0x63 (0 to 99) *1=10msec</td><td></td></tr>
<tr><td>Sample</td><td colspan="3">{
"cmd":{
"data":FFFF00000000
}
}</td></tr>
<tr><td colspan="4">Response</td></tr>
<tr><td>Data name</td><td>Data type</td><td>Value</td><td>Remarks</td></tr>
<tr><td>data</td><td>12 hexadecimal digits</td><td>Returns the date and time that can be set.
The format is the same as described above.</td><td></td></tr>
<tr><td>Sample</td><td colspan="3">{
"cmd":{
"data":" FFFF00000000"
}
}</td></tr>
</table>

10.3.5 Latch reset

It releases the latch of the LED lighting status at the time specified by the user.

URL	http://aaa.bbb.ccc.ddd/api/v1/latchreset		
Send			
Data name	**Data type**	**Value**	**Remarks**
None			
Sample	Header only, no payload		
Response			
Data name	**Data type**	**Value**	**Remarks**
None			
Sample	None. When status code is 200, release is complete		

10.3.6 Get remote IO system diagnostic data

It obtains diagnostic data for the Remote IO system. This diagnostic data is identical to the diagnostic data contained in the process data. Refer to "9.7.3 Remote IO system diagnostic information".

URL	http://aaa.bbb.ccc.ddd/api/v1/diag		
Send			
Data name	**Data type**	**Value**	**Remarks**
None			
Sample	Header only, no payload		
Response			
Data name	**Data type**	**Value**	**Remarks**
data	2 hexadecimal digits	Diagnostic information	

Sample	{
	"cmd":{
	"data":"00"
	}
	}		

10.3.7 Get unit diagnostic data

It acquires diagnostic information for the specified unit.

URL	http://aaa.bbb.ccc.ddd/api/v1/diag/[unit]		
Send			
Data name	**Data type**	**Value**	**Remarks**
[unit]	2 hexadecimal digits	0x00 to 0x11	Specifies the unit position. 0x00 is the position of the product and 0x01-0x11 is the position of the other units excluding the product, counted from the left to the right. Indicated by URL.
Sample	Header only, no payload		
Response			
Data name	**Data type**	**Value**	**Remarks**
unit	2 hexadecimal digits	0x00 to 0x11	Same as described above
data	4 hexadecimal digits	0x0000-0xFFFF	Diagnostic information for the target unit. Refer to the Instruction Manual for each unit.

Sample	{
	"cmd":{
	"unit":"00",
	"data":"0000"
	}
	}		

10.3.8 Get point/CH diagnostic data

It acquires diagnostic information by point/CH/port for the specified unit.

URL	http://aaa.bbb.ccc.ddd/api/v1/diag/[unit]/ch		
Send			
Data name	**Data type**	**Value**	**Remarks**
[unit]	2 hexadecimal digits	0x00 to 0x11	Specifies the unit position. 0x00 is the position of the product and 0x01-0x11 is the position of the other units excluding the product, counted from the left to the right. Indicated by URL.
Sample	Header only, no payload		
Response			
Data name	**Data type**	**Value**	**Remarks**
unit	2 hexadecimal digits	0x00 to 0x11	Same as described above
data	4 hexadecimal digits X point/CH/ ports	-	Diagnostic information for each point/CH/port. The child elements of data are listed, separated by commas, in descending order.
Sample	{ "cmd":{ "unit":00, "data":["0000", "0000", "0000", "0000", "0000", "0000", "0000", "0000"] } }		

10.3.1 Get unit settings data

It acquires the settings data for each unit.

URL	http://aaa.bbb.ccc.ddd/api/v1/config/[unit]		
Send			
Data name	**Data type**	**Value**	**Remarks**
[unit]	2 hexadecimal digits	0x00 to 0x11	Specifies the unit position. 0x00 is the position of the product and 0x01-0x11 is the position of the other units excluding the product, counted from the left to the right. Indicated by URL.
Sample	Header only, no payload		
Response			
Data name	**Data type**	**Value**	**Remarks**
unit	2 hexadecimal digits	0x00 to 0x11	Same as described above
len	4 hexadecimal digits	Refer to Remarks column	Expresses the length of the received data in bytes, half of the string length of data below.
pos	4 hexadecimal digits	-	Represents the management position within the product. It is described in the table below.
data	N hexadecimal digits	-	A string representing the settings data. It expresses 1 byte as a 2-character hexadecimal number.
Sample	{ "cmd":{ "unit":"00", "len":"00FF", "pos":"0000", "data":"00000000000000…(omitted)" } }		

The list of the settings data for each unit is shown below. Refer to the Instruction Manual of the unit for details.

This product (device unit)

Position	Length (bytes)	Name	Overview
pos+0x0C	**1**	Unit/input power monitoring	**Refer to 4.2** List.
pos+0x0D	**1**	Output power supply monitor	
pos+0x0E	**1**	Analog value byte order	
pos+0x10	**1**	Save log ON/OFF and number of saved logs	
pos+0x11	**1**	Saving logs (method)	
pos+0x12	**1**	Log saving time	
pos+0x13	**1**	Type of log filter	
pos+0x14	**1**	Filter ON/OFF (error type)	
pos+0x15	**4**	Filter ON/OFF (unit ID)	
pos+0x19	**1**	Filter ON/OFF (unit position number)	
pos+0x1A	**1**	Filter ON/OFF (CH/point/port)	
pos+0x30	**4**	IP address	
pos+0x34	**4**	Subnet mask	
pos+0x38	**4**	Default gateway	
pos+0x40	**16**	WebAPI login ID	
pos+0x50	**16**	WebAPI password	
pos+0x60	**1**	WebAPI access authentication	

Analog input unit

Position	Length (bytes)	Name	Overview
pos+0x01	**1**	Power line error detection	Sets enables/disables of power line error detection.
pos+0x09	**1**	Averaging sampling count	Sets the average number of filters for the analog input.
pos+0x0B	**2**	Sampling period	Sets the sampling period for the analog input.
pos+0x11	**4**	Data format	Sets the conversion method to the process data of analog input.
pos+0x19	**4**	Input range	Selects the analog input signal of the analog input unit from the following. 0：-10 VDC to +10 VDC 1：-5 VDC to +5 VDC 2：0 VDC to 10 VDC 3：0 VDC to 5 VDC 4：1 VDC to 5 VDC 10：-20 mA DC to +20 mA 11：4 mA DC to 20 mA 12：0 mA DC to 20 mA DC
pos+0x31	**4**	Max range error	Sets whether or not to use max range error of analog input.
pos+0x39	**4**	Min range error	Sets whether or not to use min range error of analog input.
pos+0x61	**4**	User set value upper limit error	Sets whether or not to use user set value upper limit error of analog input.
pos+0x69	**4**	User set value lower limit error	Sets whether or not to use user set value lower limit error of analog input.
pos+0x71	**8**	User set value upper limit error threshold	Sets the threshold value of user set value upper limit error of analog input.
pos+0x81	**8**	User set value lower limit error threshold	Sets the threshold value of user set value lower limit error of analog input.
pos+0x91	**4**	Input power ON/OFF	Sets whether or not the external device is supplied with input power when the analog input is used.
pos+0x99	**4**	Measured hysteresis	Sets whether or not measurement values are hysteresis treated.
pos+0xa1	**4**	CH Enable/Disable	It is possible to set without using the target CH.

Digital input unit M8 connector x 8 / M12 connector x 8 types

Position	Length (bytes)	Name	Overview
pos+0x01	**1**	Power line error detection	Sets enables/disables of power line error detection. Error detection is set per connector.
Pos 0x08 x3n (n = point number of the target)	**3 (Per point)**	Input Off_On cycle threshold	Threshold for monitoring the number of cycles of the change from OFF to ON. The actual threshold is used by multiplying the set value by 10.
pos+0xDE	**6**	Input filter time	Sets the input filter time.
pos+0xEC	**4**	Input hold time	Sets the input hold time.

Digital input unit Push-in terminal block type

Position	Length (bytes)	Name	Overview
pos+0x01	**2**	Power line error detection	Sets enables/disables of power line error detection. Error detection is set per connector.
Pos 0x08 x3n (n = point number of the target)	**3 (Per point)**	Input Off_On cycle threshold	Threshold for monitoring the number of cycles of the change from OFF to ON. The actual threshold is used by multiplying the set value by 10.
pos+0xDE	**12**	Input filter time	Sets the input filter time.
pos+0xEC	**8**	Input hold time	Sets the input hold time.

Analog output unit

Position	Length (bytes)	Name	Overview
pos+0x01	**1**	Power line error detection	Sets enables/disables of power line error detection.
pos+0x02	**1**	Power line error recovery operation	Sets whether to maintain the same behavior as during the power line error when it has been recovered from, or return to normal from the most recent data update after recovery.
pos+0x11	**4**	Data format	Sets the conversion method to the process data of analog output..
pos+0x19	**4**	Output range	Select the analog input signal of the analog input unit from the list below.
pos+0x31	**4**	Max range error	Sets whether or not to use max range error of analog output.
pos+0x39	**4**	Min range error	Sets whether or not the range lower error of analog output is used.
pos+0x61	**4**	User set value upper limit error	Sets whether or not to use user set value upper limit error of analog output.
pos+0x69	**4**	User set value lower limit error	Sets whether or not to use user set value lower limit error of analog output.
pos+0x71	**8**	User set value upper limit error threshold	Sets the threshold value of user set value upper limit error of analog output.
pos+0x81	**8**	User set value lower limit error threshold	Sets the threshold value of user set value lower limit error of analog output.
pos+0x91	**4**	Output power ON/OFF	Sets whether or not the external device is supplied with output power when the analog output is used.
pos+0xa1	**4**	CH Enable/Disable	It is possible to set without using the target CH as a unit.
pos+0xc1	**8**	Customized output value at communication error	Sets the value to be output when “Communication error operation” is “User settings”.
pos+0xd1	**4**	Communication error operation	If the device unit's dip switch settings SW3 (output settings in the event of a communication error / priority to hardware) is OFF, the output operation in the event of a communication (upper communication or internal bus communication) error is set on the Analog output unit side.

Digital output unit M12 connector x 8 type

Position	Length (bytes)	Name	Overview
pos+0x01	**2**	Signal line error detection	Sets enables/disables of signal line error detection. Error detection is set per connector.
pos+0x03	**2**	Signal line error recovery operation	Sets whether the behavior at the time of occurrence is maintained or the condition is returned to normal after the last data update, when a signal line error is recovered. Error recovery operation is set for each connector. When the behavior at the time of occurrence.is to be maintained, wait for the user to operate power cycle.
pos+0x08+x3n (n = point number of the target)	**3 (Per point)**	Output Off_On cycle threshold	Threshold for monitoring the number of cycles of the change from OFF to ON. The actual threshold is used by multiplying the set value by 10.
pos+0xD4	**4**	Communication error operation	When the dip switch settings SW3 on the device unit is OFF (set individually), the digital output operation at the communication (upper or internal bus communication) error is set on the digital output unit side.

Digital output unit Push-in terminal block type / Valve I/F 32-point unit

Position	Length (bytes)	Name	Overview
pos+0x01	**4**	Signal line error detection	Sets enables/disables of signal line error detection. Error detection is set per connector.
pos+0x08+x3n (n = point number of the target)	**3 (Per point)**	Output Off_On cycle threshold	Threshold for monitoring the number of cycles of the change from OFF to ON. The actual threshold is used by multiplying the set value by 10.
pos+0xC9	**4**	Signal line error recovery operation	Threshold for monitoring the number of cycles of the change from OFF to ON. The actual threshold is used by multiplying the set value by 10.
pos+0xCD	**8**	Communication error operation	When the dip switch settings SW3 on the device unit is OFF (set individually), the digital output operation at the communication (upper or internal bus communication) error is set on the digital output unit side.

IO-Link master unit

Position	Length (bytes)	Name	Overview
pos+0x01	**31**	**Port 0 settings**	The settings for each port. Refer to the table below for details
pos+0x20	**31**	**Port 1 settings**	
pos+0x3F	**31**	**Port 2 settings**	
pos+0x5E	**31**	**Port 3 settings**	
pos+0x7D	**31**	**Port 4 settings**	
pos+0x9C	**31**	**Port 5 settings**	
pos+0xBB	**31**	**Port 6 settings**	
pos+0xDA	**31**	**Port 7 settings**	

Details of the settings of each port of the IO-Link master unit (specify the relative position in relation to the "position" in the table above)

Relative position	Length (bytes)	Name	Overview
+0x00	**3**	Device ID	Device type of the connected IO-Link device.
+0x03	**2**	Vendor ID	Vendor ID of the connected IO-Link device.
+0x05	**1**	Revision	Revision of the connected IO-Link device.
+0x06	**2**	Input size settings	Sets the size (bytes) of the input process data of the connected IO-Link device.
+0x08	**2**	Output size settings	Sets the size (bytes) of the output process data of the connected IO-Link device.
+0x0A	**16**	Serial number	Serial number of the connected IO-Link device.
+0x1A	**2**	Select operation mode	Selects which operation mode is to be used for each port on the IO-Link master unit.
+0x1C	**1**	Communication cycle time settings	Sets the IO-Link communication cycle.
+0x1D	**1**	Input filter time settings	Sets the input filter time.
+0x1E	**1**	Input hold time settings	Sets the input hold time.

10.3.2 Get unit order/number/type

It acquires the order and number/type of units connect to the product.

URL	http://aaa.bbb.ccc.ddd/api/v1/order		
Send			
Data name	**Data type**	**Value**	**Remarks**
None			
Sample	Header only, no payload		
Response			
Data name	**Data type**	**Value**	**Remarks**
data	10 hexadecimal digits X number of units	Refer to Remarks column	Numbers and unit IDs containing the product are listed in comma-separated in the order from the left to the right. The first two characters represent the order in 1 byte, and the remaining eight characters represent the unit ID. For unit IDs, refer to “9.6.2Unit ID configuration detected by automatic recognition”.

Sample	{
	"cmd":{
	"data":[
	"0007010000",
	"012C080200",
	"022C080200",
	"03D3000000"
	]
	}
	}		

10.3.3 Unit setting data settings

It changes the settings data for each unit..

URL	http://aaa.bbb.ccc.ddd/api/v1/config/[unit]		
Send			
Data name	**Data type**	**Value**	**Remarks**
[unit]	2 hexadecimal digits	0x00 to 0x11	Specifies the unit position. 0x00 is the position of the product and 0x01-0x11 is the position of the other units excluding the product, counted from the left to the right. Indicated by URL.
len	4 hexadecimal digits	Refer to Remarks column	Expresses the length of the data to be sent in bytes, half of the string length of data below. Only those parts that need to be changed can be sent.
pos	4 hexadecimal digits	-	Represents the management position within the product. It is described in "10.3.1 Get unit settings data". Only those parts that need to be changed can be sent.
data	N hexadecimal digits	-	A string representing the settings data. It expresses 1 byte as a 2-character hexadecimal number. Only those parts that need to be changed can be sent.

Sample	{
	"cmd":{
	"len":"0000",
	"pos":"0000",
	"data":"00000000000000"
	}
	}		

Response			
Data name	**Data type**	**Value**	**Remarks**
None			
Sample	Header only, no payload		

10.3.4 Get log data

It reads the log data stored inside the product.

URL	http://aaa.bbb.ccc.ddd/api/v1/log/[pos]/[req]		
Send			
Data name	**Data type**	**Value**	**Remarks**
[pos]	4 hexadecimal digits	0~	The location of the log desire to start acquiring. 0 is the most recent. Specified in the URL. When POS is 1 and REQ is 5, it will result in "5 records are acquired from one log older than the most recent".
[req]	2 hexadecimal digits	0 to 255	The number of logs desire to acquire. 0 to 255. Get all at 0.
Sample	None		
Response			
Data name	**Data type**	**Value**	**Remarks**
pos	4 hexadecimal digits	0 +	Same as described above
req	2 hexadecimal digits	0 to 255	Same as described above
num	2 hexadecimal digits	0 to 255	The number of logs that could be acquired.
data	32 hexadecimal digits x num	Refer to Remarks column	16 bytes of data per element Refer to the table below for details

Sample	{
	"cmd":{
	"pos":"0000",
	"req":"0000",
	"num":"0000",
	"data":[
	"00000…00000000000",
	"00000…00000000000"
	]
	}
	}		

Name	Size (bytes)	Description
Date	2	Number of days since January 1, 2000, as 0 (up to June 6, 2179)
Hours	1	Hours when the device unit received the error information. The milliseconds are in 10 ms units.
Minutes	1	
Seconds	1	
Milliseconds	1	
Error code	2	16-bit data determined per unit. Refer to the Instruction Manual for each unit.
Unit ID	4	Refer to "9.6.2 Unit ID configuration detected by automatic recognition".
Unit position	1	0x00 is the product. 0x01-0x11 is the position of the other units excluding the product counted from the left to the right.
Point/CH number	1	The number of CH where the error occurred. If the CH is not identified because of a unit level error etc., 255 is used.
Reserve	2	Always 0

10.3.5 Clear log data

It deletes the log data stored inside the product.

URL	http://aaa.bbb.ccc.ddd/api/v1/log/clear		
Send			
Data name	**Data type**	**Value**	**Remarks**
None			
Sample	None		
Response			
Data name	**Data type**	**Value**	**Remarks**
None			
Sample	Header only, no payload		

10.3.6 Get unit during forced input

It acquires the unit using the forced input function.

URL	http://aaa.bbb.ccc.ddd/api/v1/force/enabled/in/		
Send			
Data name	**Data type**	**Value**	**Remarks**
None			
Sample	None		
Response			
Data name	**Data type**	**Value**	**Remarks**
data	Decimal array	The unit number of the unit in forced input is entered.	

Sample	{
	"cmd":{
	"data":[1,2,3]
	}
	}		

10.3.7 Get unit in forced output

It acquires the unit using the forced output function.

URL	http://aaa.bbb.ccc.ddd/api/v1/force/enabled/out/		
Send			
Data name	**Data type**	**Value**	**Remarks**
None			
Sample	None		
Response			
Data name	**Data type**	**Value**	**Remarks**
data	Decimal array	The unit number of the unit in forced output is entered.	

Sample	{
	"cmd":{
	"data":[1,2,3]
	}
	}		

10.3.8 Get forced input

It acquires information on the forced input instructions for the target unit.

URL	http://aaa.bbb.ccc.ddd/api/v1/force/monitor/in/[unit]		
Send			
Data name	**Data type**	**Value**	**Remarks**
[unit]	2 hexadecimal digits	0x00 to 0x11	Specifies the unit position. 0x00 is the position of the product and 0x01-0x11 is the position of the other units excluding the product, counted from the left to the right. Indicated by URL.
Sample	None		
Response			
Data name	**Data type**	**Value**	**Remarks**
data	N hexadecimal digits	Refer to Remarks column	The data that has been overwritten is entered to the process data for the specified unit. The data is represented as two hexadecimal characters per 1 byte. The length of the data is the same as the process data of the specified unit.
data2	N hexadecimal digits	Refer to Remarks column	Indicates the position that is being overwritten for the process data of the specified unit. The bit that is overwritten is 1, and the bit that is not overwritten is 0. The length of the data is the same as the process data of the specified unit.

Sample	{
	"cmd":{
	"unit":"01",
	"data":"0000",
	"data2":"0000"
	}
	}		

10.3.9 Get forced output

It acquires information on the forced output instructions for the target unit.

URL	http://aaa.bbb.ccc.ddd/api/v1/force/monitor/out/[unit]		
Send			
Data name	**Data type**	**Value**	**Remarks**
[unit]	2 hexadecimal digits	0x00 to 0x11	Specifies the unit position. 0x00 is the position of the product and 0x01-0x11 is the position of the other units excluding the product, counted from the left to the right. Indicated by URL.
Sample	None		
Response			
Data name	**Data type**	**Value**	**Remarks**
data	N hexadecimal digits	Refer to Remarks column	The data that has been overwritten is entered to the process data for the specified unit. The data is represented as two hexadecimal characters per 1 byte. The length of the data is the same as the process data of the specified unit.
data2	N hexadecimal digits	Refer to Remarks column	Indicates the position that is being overwritten for the process data of the specified unit. The bit that is overwritten is 1, and the bit that is not overwritten is 0. The length of the data is the same as the process data of the specified unit.
Sample	{ "cmd":{ "unit":"01", "data":"0000", "data2":"0000" } }		

10.3.10 Forced input settings

It indicates whether the forced input function is enabled or disabled for the target unit.

URL	http://aaa.bbb.ccc.ddd/api/v1/force/control/in/[unit]		
Send			
Data name	**Data type**	**Value**	**Remarks**
[unit]	2 hexadecimal digits	0x00 to 0x11	Specifies the unit position. 0x00 is the position of the product and 0x01-0x11 is the position of the other units excluding the product, counted from the left to the right. Indicated by URL.
res	String	"ON" or "OFF"	If specify "ON", it disables the forced entry instructions for the target unit.
data	N hexadecimal digits	Refer to Remarks column	Instructs the data to be overwritten on the process data of the specified unit. The data is specified as two hexadecimal characters per 1 byte. The length of the data is matched to the process data of the specified unit.
data2	N hexadecimal digits	Refer to Remarks column	Instructs the bit of the data to be overwritten on the process data of the specified unit. Specify 1 for the bit to overwrite and 0 for the bit not to overwrite. The length of the data is matched to the process data of the specified unit.

Sample	{
	"cmd":{
	"res":"ON",
	"data":"0000",
	"data2":"0000"
	}
	}		

Response			
Data name	**Data type**	**Value**	**Remarks**
None			
Sample	Header only, no payload		

10.3.11 Forced output settings

It indicates whether the forced output function is enabled or disabled for the target unit.

URL	http://aaa.bbb.ccc.ddd/api/v1/force/control/out/[unit]		
Send			
Data name	**Data type**	**Value**	**Remarks**
[unit]	2 hexadecimal digits	0x00 to 0x11	Specifies the unit position. 0x00 is the position of the product and 0x01-0x11 is the position of the other units excluding the product, counted from the left to the right. Indicated by URL.
res	String	"ON" Or "OFF"	If specify "ON", it disables the forced entry instructions for the target unit.
data	N hexadecimal digits	Refer to Remarks column	Instructs the data to be overwritten on the process data of the specified unit. The data is specified as a hexadecimal number of two hexadecimal characters per 1 byte. The length of the data is matched to the process data of the specified unit.
data2	N hexadecimal digits	Refer to Remarks column	Instructs the bit of the data to be overwritten on the process data of the specified unit. Specify 1 for the bit to overwrite and 0 for the bit not to overwrite. The length of the data is matched to the process data of the specified unit.

Sample	{
	"cmd":{
	"res":"ON",
	"data":"0000",
	"data2":"0000"
	}
	}		

Response			
Data name	**Data type**	**Value**	**Remarks**
None			
Sample	Header only, no payload		

10.3.12 Get process data

It acquires the process data covered by the product.

URL	http://aaa.bbb.ccc.ddd/api/v1/procdata/		
Send			
Data name	**Data type**	**Value**	**Remarks**
No data to send			
Sample	None		
Response			
Data name	**Data type**	**Value**	**Remarks**
data	N hexadecimal digits	Refer to Remarks column	It is the data being transmitted from the PLC to the device unit. The data is represented as two hexadecimal characters per 1 byte. The length of the data is the same as the length of the process data.
data2	N hexadecimal digits	Refer to Remarks column	It is the data being transmitted from the device unit to the PLC. It is represented as two hexadecimal characters per 1 byte. The length of the data is the same as the length of the process data.
Sample	{ "cmd":{ "data":"00000000", "data2":"0000" } }		

10.3.13 Get unit current value

It acquires the data that each unit is handling via its internal bus.

URL	http://aaa.bbb.ccc.ddd/api/v1/procdata/[unit]		
Transmission specifications			
Data name	**Data type**	**Value**	**Remarks**
[unit]	2 hexadecimal digits	0x00 to 0x11	Specifies the unit position. 0x00 is the position of the product and 0x01-0x11 is the position of the other units excluding the product, counted from the left to the right. Indicated by URL.
Sample	None		
Response specifications			
Data name	**Data type**	**Value**	**Remarks**
data	Hexadecimal	Refer to Remarks column	It is the data that each unit is handling via its internal bus. When a device unit (unit=0x00) is specified, it represents the output data to instruct each unit. When any other unit is specified, it represents the input data sent from each unit to the device unit. It is represented as two hexadecimal characters per 1 byte. The length of the data is the same as the length of the process data.
Sample	{ "cmd":{ "data":"00000000" } }		

10.4 HTTP Response Status Code

The product supports the following status codes.

Number	Meaning	Conditions
200	OK	When the request is successful
400	Bad Request	When the syntax of the request is disabled
401	Unauthorized	When the request requires authentication
404	Not found	When the requested resource (URL) does not exist
405	Method Not Allowed	When a request is made with an unauthorized method
408	Request Timeout	When response cannot be made within a predefined time
413	Payload too large	When the payload of the request is long
414	URI too large	When the URI is long
500	Internal server Error	When any operation that is not defined by the product has occurred
501	Not implemented	When accessed by anything other than GET, HEAD, or POST
505	HTTP Version Not Supported	When a request is made with an unsupported HTTP version

When the response is made with the above status code, it responds including json data as follows.

Response Sample	{
	"status": {
	"code":401,
	"title": "401 Not Authorized"
	}
	}

11. APPENDIX: DIAGNOSTIC INFORMATION LIST FOR THE PRODUCT

This section lists the operation of EtherNet/IP compatible device unit when the error occurs and when the error recovers.

11.1 Device Unit Diagnostic Information

The diagnostic information list is as follows.

Error	When	LED	LED status	State and countermeasures
Memory read/write error	On occurrence	SF (device unit)	Red Blinking (slow)	No EtherNet/IP communication. No automatic recognition.
Memory read/write error	On recovery	SF (device unit)	Green on	May recover by turning the power off and on again. If the problem persists, contact CKD.
Factory setting error	On occurrence	SF (device unit)	Red blinking (twice)	(No specific behavior.)
Factory setting error	On recovery	SF (device unit)	Green on	Factory setting is written and restored after powering it off and on again. Contact CKD.
Unit configuration error	On occurrence	All unit LEDs	Red on	Automatic recognition failed. If the LEDs do not light up red, the assignment size of the variable I/O unit is recognized as 0.The SFLED on the device unit blinks yellow (fast).
		SF (device unit)	Yellow blinking (fast)	Does not start EtherNet/IP communication if it occurs at power-up. Stops EtherNet/IP communication if it occurs during EtherNet/IP communication.
Unit configuration error	On recovery	SF (device unit)	Green on	May recover by reviewing the unit configuration and connections between units.
Process data overflow	On occurrence	SF (device unit)	Green blinking (slow)	EtherNet/IP communication does not start.
Process data overflow	On recovery	SF (device unit)	Green on	Will recover by reviewing the unit configuration and making the process data size 512 bytes or less in the total IN/OUT.
Unit/input power voltage error	On occurrence	PS (device unit)	Red blinking (fast)	The behavior of each unit becomes unstable or the power turns OFF. It will recover when the supply voltage is within normal range.
Unit/input power voltage error	On recovery	PS (device unit)	Yellow on	After "latch reset" using the PC software, the PS LED on the device unit will be Green on (normal status).
Output power voltage error	On occurrence	PO (device unit)	Red blinking (fast)	It will recover when the supply voltage is within normal range.
Output power voltage error	On occurrence	Output unit, except IO-Link master unit	Yellow on	It will recover when the supply voltage is within normal range.
Output power voltage error	On recovery	PO (device unit)	Yellow on	After "latch reset" using the PC software, the PO LED on the device unit will be Green on (normal status).
Internal bus communication error	On occurrence	SF (device unit)	Red blinking (fast)	(No specific behavior.) Communication is unstable due to electromagnetic waves or other influences.
Internal bus communication error	On recovery	SF (device unit)	Green on	May recover by reviewing the connections between the units or eliminating external influences.

Error	When	LED	LED status	State and countermeasures
Initialized set memory	On occurrence	Green blinking (fast)	Green blinking (fast)	EtherNet/IP communication does not start. Each I/O unit may operate unintentionally.
Initialized set memory	On recovery	SF (device unit)	Green on	Will recover by turning the power off and on again. It starts with the settings initialized status.
Hardware error	On occurrence	SF (device unit)	Red f Blinking (slow)	(No specific behavior.) Contact CKD.
Hardware error	On recovery	SF (device unit)	Red blinking (slow)	If there are no other errors, the SF LED on the device unit lights green.

12. WARRANTY PROVISIONS

12.1 Warranty Conditions

■ Warranty coverage

If the product specified herein fails for reasons attributable to CKD within the warranty period specified below, CKD will promptly provide a replacement for the faulty product or a part thereof or repair the faulty product at one of CKD's facilities free of charge.
However, when the following items apply, they are excluded from the scope of this warranty.

- Failure caused by handling or use of the product under conditions and in environments not conforming to those stated in the catalog, the Specifications, or the Instruction Manual.
- Failure caused by use of the product exceeding its durability (cycles, distance, time, etc.) or caused by consumable parts. (Note1)
- Failure caused by incorrect use such as careless handling or improper management.
- Failure not caused by the product.
- Failure caused by use not intended for the product
- Failure caused by modifications/alterations or repairs not carried out by CKD
- Failure that could have been avoided if the customer's machinery or device, into which the product is incorporated, had functions and structures generally provided in the industry
- Failure caused by reasons unforeseen at the level of technology available at the time of delivery
- Failure caused by acts of nature and disasters beyond control of CKD.

Note 1: For details on the durability and consumable parts, contact your nearest CKD sales office.

The warranty stated herein covers only the delivered product itself. Any loss or damage induced by failure of the delivered product is excluded from this warranty.

■ Confirmation of product compatibility

It is the responsibility of the customer to confirm compatibility of the product with any system, machinery, or device used by the customer.

■ Others

The terms and conditions of this warranty stipulate basic matters.
When the terms and conditions of the warranty described in individual specification drawings or the Specifications are different from those of this warranty, the specification drawings or the Specifications shall have a higher priority.

12.2 Warranty Period

The product specified herein is warranted for one (1) year from the date of delivery to the location specified by the customer.