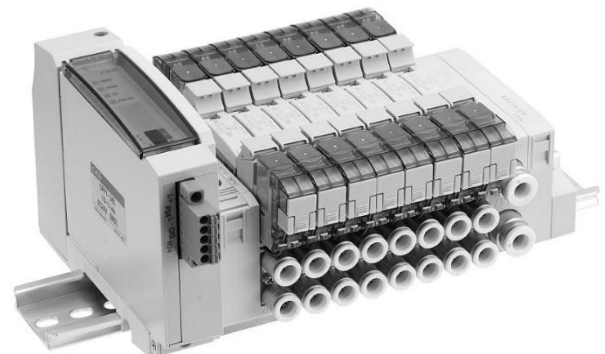# CKD

Serial Transmission Device Unit
4GR series T8KC
(4GR-OPP7-□KC)

IO-Link Compatible

INSTRUCTION MANUAL

SM-A35570-A/2

- 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.

PREFACE

Thank you for purchasing CKD's serial transmission device unit. 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.

> - The product, which uses control valves such as solenoid valves, motor valves, and air operated valves, is intended for users who have basic knowledge about materials, fluids, piping, and electricity. CKD shall not be responsible for accidents caused by persons who selected or used the product without knowledge or sufficient training with respect to control valves.
> - 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 due to fluid, piping, or other conditions. 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 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, customer's 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

> ## ⚠ 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. In addition, never modify or additionally machine this product.
>   The product is intended for use in devices or parts for general industrial machinery. It is not intended for use outdoors or in the conditions or environment listed below.
>   (Exception is 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.)
>   • In applications for nuclear power, railroad system, aviation, ship, vehicle, medical equipment, and equipment that directly touches beverage or food.
>   • For special applications that require safety including amusement equipment, emergency shut-off circuit, press machine, brake circuit, and safety measures.
>   • For applications where life or properties may be adversely affected and special safety measures are required.
>
> **Do not handle the product or remove pipes and devices until confirming safety.**
>   • Inspect and service the machine and devices 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.

CONTENTS

1. PRODUCT OVERVIEW

1.1　System Overview

1.1.1　System features

> Make sure to read the instruction manual for each product.
> This Instruction Manual describes the device unit T8KC(4GR□-OPP7-□KC) for 4GR.
> For the master unit and other device units that are connected in the same system, refer to the instruction manuals issued by each manufacturer.
> For manifold solenoid valves, make sure to read both this instruction manual and the solenoid valve's instruction manual to fully understand the functions and performance in order to use them correctly.

■ T8KC (4GR-OPP7-□KC)

This is a device unit for 4GR that can communicate with the master unit of IO-Link: the technology maintained and managed by the IO-Link Community.
The device unit has following features.
- The device unit is connected to the IO-Link master with a cable only, allowing a significant reduction of wiring man-hours.
- The unit power and the valve power are separated, ensuring easy maintenance.
- The device unit output status in the event of communication error can be set by switches. (All points ON/ All points OFF/ Other)
- The device unit is available in +COM or -COM specification and 16-point or 32-point output, allowing wide variety of applications.
- The device unit is a slot-in structure and is fixed with just one screw, allowing reduction in maintenance man-hours.

■ IO-Link

IO-Link is a communication technology for sensors and actuators that complies with IEC61131-9. IO-Link uses the conventional 3-wire cable as it is for one-to-one communication with sensors and actuators.
Each port on the IO-Link master is capable of functioning for both traditional contact I/O and IO-Link communication analog signal (e.g. 8-bit, 12-bit, 16-bit, etc.). Easy connection, automatic parameter setting, and extended diagnostics are also feature of IO-Link.

If you have any questions concerning the IO-Link system, refer to the following website run by IO-Link Community Japan or IO-Link Community.

IO-Link Community Japan or IO-Link Community:
http://www.io-link.jp/ or https://www.io-link.com/

1.1.2 System structure

This system mainly consists of a PLC, master unit, T8KC(4GR-OPP7-□KC) mounted manifold solenoid valve, and peripheral equipment.

■ Examples of PLC and master unit combination

PLC manufacturer	Compatible PLC	Master unit model
Omron Corporation	NX Series	NX-ILM400
Other IO-Link compatible master unit		

■ Example of basic structure of the system

IO-Link system

PC

Master unit

PLC

* Referred software:
  Omron Corporation
  SYSMAC STUDIO

IO-Link network

Device unit

IO-Link device units

Manifold   solenoid
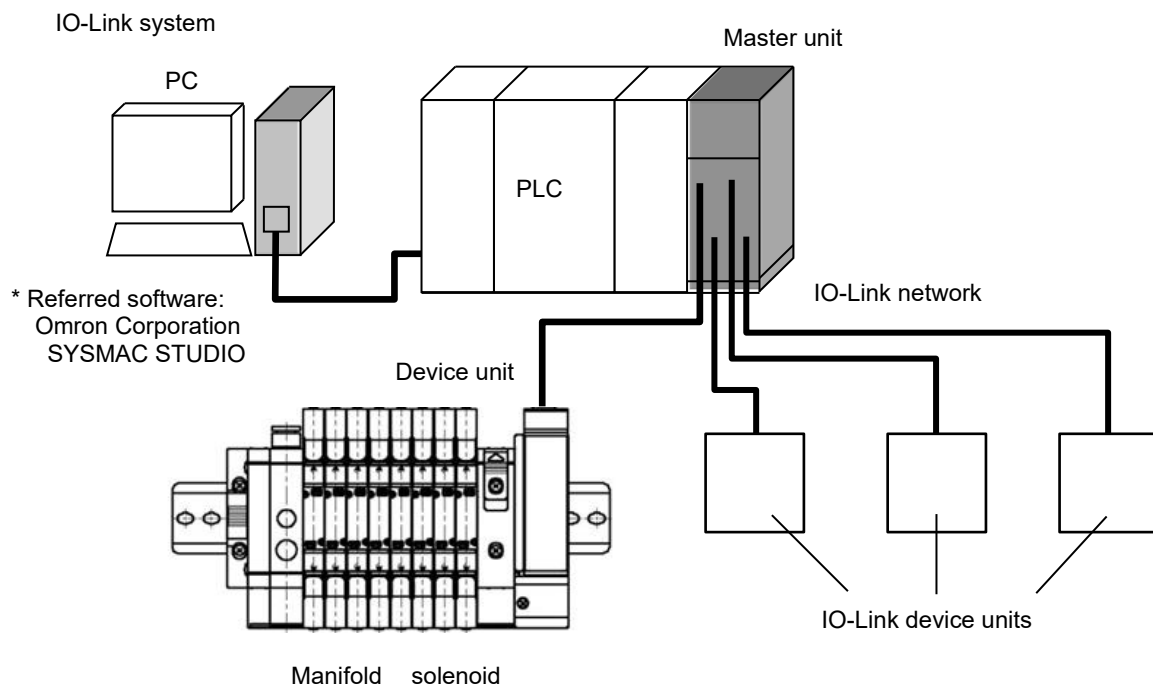
1.2　Part Name

1.2.1　Parts of the Device Unit
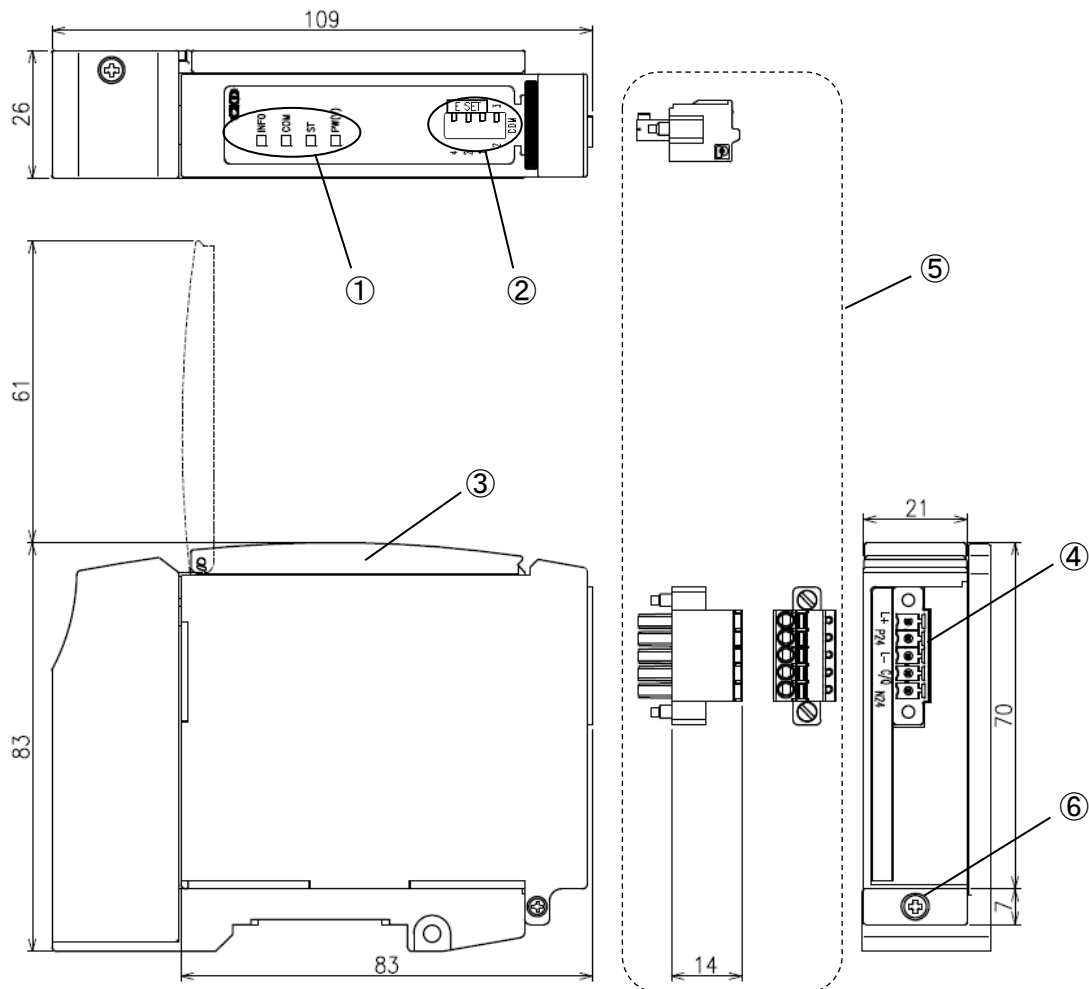
No.	Part name	Description
①	LED	Indicates the status of the device unit and network with INFO, COM, ST and PW(V).
②	Switches	Set the valve operation at communication error and transmission (baud) rate by slide switches.
③	Cover	Protects the LED indicators and setting switches.
④	IO-Link socket	Connects the IO-Link plug.
⑤	IO-Link plug (supplied item)	Connect the IO-Link network cable and unit/ valve power cable to this plug.
⑥	Device unit fixing screw (M2.5 tapping screw)	Secures the device unit to the device unit connecting block.

1.2.2 Switches and LED indicators

> ⚠ **CAUTION**
>
> **Discharge static electricity from your body before touching the product.**
>   Static electricity may cause damage to the product.
> **Set switches while unit power is turned off.**
>   Make sure the unit power is turned off upon setting as it is read into the unit at power-up.
> **Always close the cover except when setting the switches.**
>   The cover may become damaged or foreign matters may enter inside and cause unexpected failure.
>   Be extremely careful not to allow any foreign matter to enter the device unit when setting the switches.
> **Do not handle switches roughly.**
>   Switches are precision devices and can be easily damaged. Never touch the internal circuit board when setting the switches.

■ Switches

These switches set the device unit output in the event of a communication error and station number.
Set the switches with the power off.

① Output setting in the event of communication error

E SET			Output mode	Valve operation at communication error
4	2	1		
OFF	OFF	OFF	Hardware mode	All points OFF
	OFF	ON		Final output data
	ON	OFF		All points ON
	ON	ON		The value of Process Data Out last received.
ON	Reserved	Reserved	Software mode	The value set in [Value Setting Communication Error] (See "3.2.3 Parameter")

* Since IO-Link has one-to-one communication with the master unit, there is no switch for address setting.

② Transmission (baud) rate setting

COM	Output mode
OFF	COM3
ON	COM2
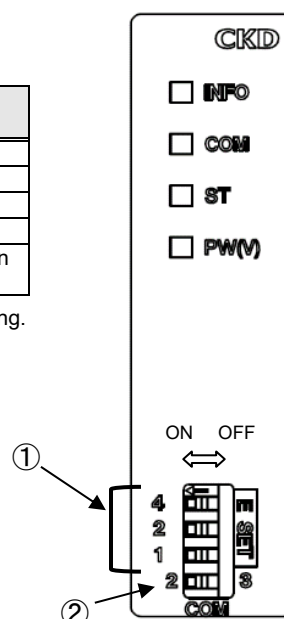
■ LED indicators

These LEDs indicate device unit status and network status.

Part name	Display function	Status	
INFO	Not used	-	-
COM	Communication status	Off	Unit power OFF
		Green on	Unit power ON (IO-Link communication has not started)
		Green blinking	Unit power ON (In IO-Link communication)
ST	Device unit status	Off	Operating normally
		Red blinking	Needs maintenance
		Red on	Hardware error (disconnection, memory error, etc.)
PW(V)	Valve power status	Off	Valve power OFF
		Green on	Valve power ON

1.3 Specifications

1.3.1 Communication specifications

Item	Specifications
Communication protocol	IO-Link
Protocol version	1.1
Class	B
Transmission rate Baud rate)	By switch setting (COM2/ COM3)
Supporting SIO mode	None
Data storage	330 bytes
Distance between nodes	Up to 20m

1.3.2 Device unit specifications

The product must be used within the following specifications.

Item	Specifications			
Model No.	T8KC1 (4GR-OPP7-1KC)	T8KC2 (4GR-OPP7-2KC)	T8KCP1 (4GR-OPP7-1KC-P)	T8KCP2 (4GR-OPP7-2KC-P)
Unit power voltage	18 VDC to 30 VDC			
Unit power current consumption	50 mA or less (at 24.0 VDC with all points ON)			
Valve power voltage	22.8 VDC to 26.4 VDC（24VDC +10%, -5%）			
Valve power current consumption	10 mA or less (all points OFF) 15 mA or less (under no load with all points ON)			
Output type	NPN output (+COM)		PNP output (-COM）	
Number of output points	16 points	32 points	16 points	32 points
Insulation resistance	Between external terminals and the case: 30 MΩ or more with 500 VDC			
Withstand voltage	Between external terminals and the case: 500 VAC for one minute			
Shock resistance	294.0 m/s^2 for 3 times in 3 directions			
Storage ambient temperature	-20°C to 70°C			
Storage humidity	30 to 85%RH（no dew condensation）			
Ambient temperature	−5°C to 55°C			
Ambient humidity	30 to 85%RH（no dew condensation）			
Atmosphere	No corrosive gas			
Output insulation	Photo coupler insulation			
Max. load current	40 mA/1 point			
Leakage current	0.1 mA or less			
Residual voltage	0.5 V or less			
Fuse	Valve power: 24V, 3A / Unit power 24V, 2A (Both fuses are not replaceable）			
Degree of protection	IP40			
Vibration resistance	Durability	10 Hz to 150 Hz to 10 Hz, 1 octave/min., 15 sweeps each in X, Y, Z directions with 0.75 mm half-amplitude or 98.0 m/s^2, whichever smaller.		
	Malfunction	10 Hz to 150 Hz to 10 Hz, 1 octave/min., 4 sweeps each in X, Y, Z directions with 0.5 mm half-amplitude or 73.5 m/s^2, whichever smaller.		

* For the delay time, refer to the instruction manual for the master unit. Transmission delay as a system varies depending on the PLC scan time and other devices connected to the same network.
* For the response time of the solenoid valve, check the solenoid valve specifications.
* Solenoid valve Off time is delayed by approximately 20 msec due to the surge absorbing circuit integrated in the device unit.

2. INSTALLATION

2.1   Mounting

⚠ CAUTION

Before handling the device, touch a grounded metal part to discharge static electricity from your body.
　　Static electricity may cause damage to the product.

Do not apply tension or shocks to the power cable or network cable.
　　If the wiring is long, the cable weight or shocks may cause an unexpected force and result in damage to the connector or device.
　　Take appropriate measures such as secure the wiring to the machine or device midway.

To prevent noise problems, keep the following in mind when wiring:
- If noise could have an effect, prepare power for each manifold solenoid valve and wire separately.
- Wire the power cable as short as possible.
- Wire the power cables for the product separately from the power cables for noise-generating devices such as inverter motors.
- Wire the power cable and network cable away from other power lines as much as possible.

Wire the power cable and network cable properly within its specifications.
　　Incorrect wiring may cause the device unit to malfunction or break.

Make sure that cables and connectors are securely connected before turning on the power.

1　Connect the network cable and power cable.
　　Check all this Instruction Manual, the instruction manuals for PLC and each unit, and connect the cable properly.
　　Incorrect connection may cause not only a system failure but also serious fault to the other devices.

2　Keep 200 mm or more away from high-voltage lines and power lines or wire the high-voltage lines and power lines in metal tubing and ground it before mounting this device unit.

2.2   Wiring

2.2.1   Wiring to the IO-Link plug and connecting to the IO-Link socket

⚠ WARNING

Carry out wiring with the power turned off.
   An electric shock may occur by touching the electrical wiring connection (bare live part).
Do not touch live parts with bare hands.
   An electric shock may occur.
Thoroughly read and understand this instruction manual before working on electrical wiring.

⚠ CAUTION

Check the working voltage and polarity before wiring and energizing.
Take measures against lightning surges on the device side.
   The product has no resistance to lightning surges.
Use a network cable that complies with IO-Link specifications.
Provide sufficient bending radius for the network cable and do not bend it forcibly.
Separate the network cable from power lines and high-voltage lines.
Always check the polarity and rated voltage thoroughly before connecting cables.
Calculate the current consumption to select the power cable.
Consider the voltage drop due to cables when selecting and wiring the cables if power is supplied to more than one device unit (remote I/O unit) from one power supply.
Take measures to secure the specified power supply voltage if voltage drop cannot be avoided.
   For example, wire the power cables in multiple systems or install other power supplies to secure the specified power supply voltage.

An IO-Link plug is supplied to this product. It can be connected to the IO-Link socket on the device unit by wiring the unit power supply cable, valve power supply cable and network cable.

Unit power supply
This is the power supply to operate the device unit. 24 VDC power is supplied from the master.

Valve power supply
This is the power supply to operate the solenoid valve. Use 22.8 VDC to 26.4 VDC power supply with the least noise.

IO-Link plug (supplied item)

Part name	Model No.	Manufacturer
5-pin connector	FK-MCP1.5/5-STF-3.5	PHOENIX CONTACT

Recommended ferrules and crimp tools

Part name	Model No.	Manufacturer
Ferrule (without sleeve)	A0.5-10 to 1.5-10	PHOENIX CONTACT
Ferrule (with sleeve)	AI0.25-10 to 0.75-10	PHOENIX CONTACT
Crimping tool (in common)	CRIMPFOX6(1212034)	PHOENIX CONTACT

■ Connecting the cables

Follow the steps below to connect the network and power cables to the IO-Link plug.

1   After confirming safety, stop network communication and turn off all peripheral equipment.

2   As necessary, attach a terminal such as a ferrule to the cable to be connected.

3   Refer to the figure below and wire the 24V valve power supply cable to the P24 terminal of IO-Link plug and the 0 V power cable to the N24 terminal by matching the polarity symbols.

4   Wire the 24V unit power supply cable of the IO-Link master to the L+ terminal of IO-LINK plug, the 0V power cable to the L- terminal, and the network cable to the C/Q terminal.

5   Connect the IO-Link plug to the IO-Link socket on the device unit and secure the plug flange with the appropriate tightening torque (0.25 N·m).

IO-Link socket [on device unit]
5 pin socket (female)
MC1.5/5-GF-3.5 P26 THRR44

IO-Link plug (supplied item)
5 pin plug (male)
FK-MCP1.5/5-STF-3.5

L+
P24
L-
C/Q
N24

L+: Unit power (+24V)
P24: Valve power (+24V)
L-: Unit power (0V)
C/Q: IO-Link signal
N24: Valve power (0V)

Device unit
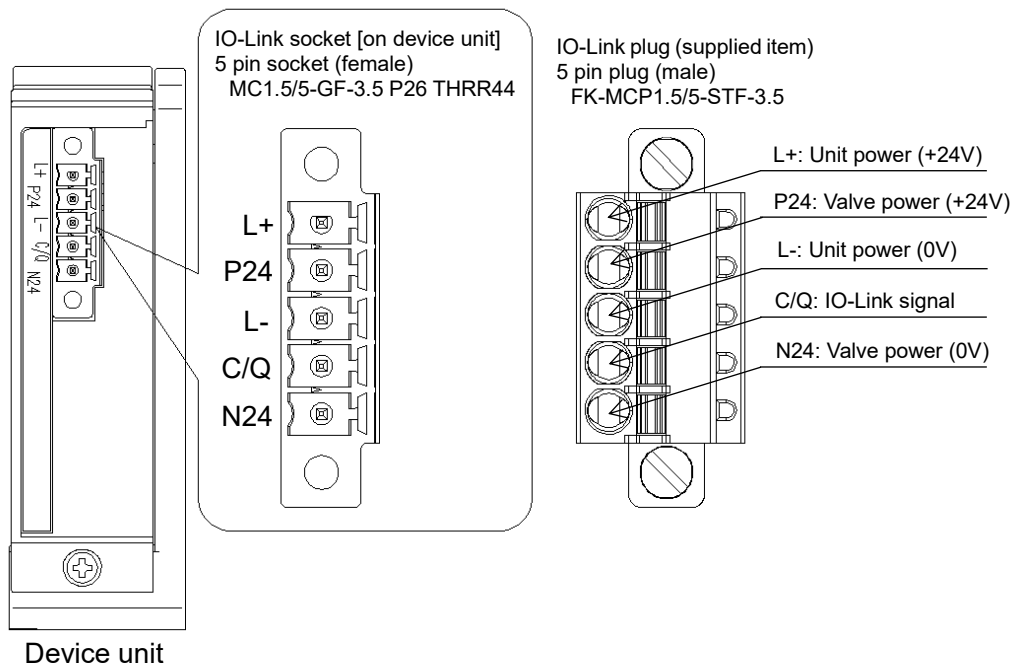
Make sure to understand these specifications before wiring IO-Link.
For details, refer to the instruction manual of the master unit manufacturer or IO-Link Community.

3. USAGE

⚠ WARNING

Consult CKD about the specifications before using the product under conditions not specified for the product or for special applications.

⚠ CAUTION

Thoroughly read and understand the instruction manual for the network system to be used before using the serial transmission device unit.

Carefully check the hard switch settings of serial transmission device unit before use.
   Setting improper value may cause valves or cylinders to malfunction.

Be careful of the surroundings and ensure safety before turning on or off the power.
   The system or solenoid valve (cylinder) may operate suddenly.

3.1   IODD (IO Device Description) file

The IODD file describes the communication specifications of the device. Registering the IODD file may be necessary for connecting the device unit to the master unit. Refer to the instruction manual issued by the master unit manufacturer for registering the IODD file. Use the latest IODD file for proper network configuration.

Download the IODD file from the CKD website. (https://www.ckd.co.jp/kiki/jp/).

3.1.1   List of IODD files

Check the specifications (model name) of the device unit and transmission (baud) rate before registering, as both the unit and IODD file need to be matched. Refer to the following table for the specifications and IODD file.

Item	Specifications			
Manifold Model No.	T8KC1		T8KCP1	
Single unit model No.	OPP7-1KC		OPP7-1KC-P	
Output type	NPN（+COM）		PNP（-COM）	
Number of output points	16-point output			
Transmission rate (Baud rate)	COM2	COM3	COM2	COM3
Device ID	0x200002	0x200003	0x200004	0x200005
IODD file name	CKD-OPP7_1KC_COM2_ ********	CKD-OPP7_1KC_COM3_ ********	CKD-OPP7_1KC_P_COM2_ ********	CKD-OPP7_1KC_P_COM3_ ********

Item	Specifications			
Manifold Model No.	T8KC2		T8KCP2	
Single unit model no.	OPP7-2KC		OPP7-2KC-P	
Output type	NPN（+COM）		PNP（-COM）	
Number of output points	32-point output			
Transmission rate (Baud rate)	COM2	COM3	COM2	COM3
Device ID	0x200006	0x200007	0x200008	0x200009
IODD file name	CKD-OPP7_2KC_COM2_ ********	CKD-OPP7_2KC_COM3_ ********	CKD-OPP7_2KC_P_COM2_ ********	CKD-OPP7_2KC_P_COM3_ ********

3.2   IO-Link communication specifications

3.2.1   General

Item	Specifications
IO-Link Version ID	V 1.1
Process Data Input Length	0 byte
Process Data Output Length	Refer to Table 1
Min Cycle Time	COM3: 1.0ms, COM2: 2.3ms
Device ID	Refer to Table 1

Table 1: Process Data Output Length and Device ID

Model No.	OPP7-1KC		OPP7-1KC-P		OPP7-2KC		OPP7-2KC-P	
Transmission rate (COM)	COM2	COM3	COM2	COM3	COM2	COM3	COM2	COM3
Process Data Output Length	2 bytes				4 bytes			
Device ID	0x200002	0x200003	0x200004	0x200005	0x200006	0x200007	0x200008	0x200009

3.2.2   On demand data

■   Identification

Vendor ID: 855 (decimal) / 0x357 (hexadecimal)

Index(dec)	Sub Index	Item	Value	Access			Length	Format
				U	M	S		
0x0010(16)	0	Vendor Name	CKD Corporation	R	R	R	-	String
0x0011(17)	0	Vendor Text	https://www.ckd.co.jp/kiki/jp/	R	R	R	-	String
0x0012(18)	0	Product Name	Refer to Table 2.	R	R	R	-	String
0x0013(19)	0	Product ID	Refer to Table 2.	R	R	R	-	String
0x0014(20)	0	Product Text	Refer to Table 2.	R	R	R	-	String
0x0015(21)	0	Serial Number	Unique for each unit	R	R	R	8 bytes	String
0x0016(22)	0	Hardware Revision	1.0	R	R	R	-	String
0x0017(23)	0	Firmware Revision	1.1	R	R	R	-	String
0x0018(24)	0	Application Specific Tag	****************	R	R/W	R/W	32 bytes	String

Table 2: Product Name, Product ID and Product Text

Model No.	OPP7-1KC		OPP7-1KC-P		OPP7-2KC		OPP7-2KC-P	
Transmission rate (COM)	COM2	COM3	COM2	COM3	COM2	COM3	COM2	COM3
Product Name	OPP7-1KC		OPP7-1KC-P		OPP7-2KC		OPP7-2KC-P	
Product ID								
Product Text	4GR outputs16 NPN		4GR outputs16 PNP		4GR outputs32 NPN		4GR outputs32 PNP	

■ **Parameter and commands**

Common specifications

Index(dec)	Sub Index	Item	Value	Access U	Access M	Access S	Length	Format
0x0002(2)	0	System Command	Refer to Table 3	-	-	W	1 byte	UInteger8
0x000C(12)	0	Device Access Locks	0x0000: Parameter lock 0x0001: Data storage lock	R	R/W	R/W	2 bytes	Record
0x0020(32)	0	Error Count	0	R	R	R	2 bytes	UInteger16
0x0024(36)	0	Device Status	0	R	R	R	1 byte	UInteger8
0x0025(37)	0	Detailed Device Status	All octets 0x00: No error/ warning Octet 1: EventQualifier Octet 2,3; EventCode	R	R	R	60 bytes	Array of 3 Octetstring

Table 3: System Command

Command(dec)	Command name	OPP7-1KC, OPP7-1KC-P	OPP7-2KC, OPP7-2KC-P
0x80(128)	Device reset	Enable	Enable
0x81(129)	Application reset	Enable	Enable
0x82(130)	Restore factory settings	Enable	Enable
0xA0(160)	Output Off_On Cycles Reset 0	Enable	Enable
0xA1(161)	Output Off_On Cycles Reset 1	Enable	Enable
0xA2(162)	Output Off_On Cycles Reset 2	Enable	Enable
0xA3(163)	Output Off_On Cycles Reset 3	Enable	Enable
0xA4(164)	Output Off_On Cycles Reset 4	Enable	Enable
0xA5(165)	Output Off_On Cycles Reset 5	Enable	Enable
0xA6(166)	Output Off_On Cycles Reset 6	Enable	Enable
0xA7(167)	Output Off_On Cycles Reset 7	Enable	Enable
0xA8(168)	Output Off_On Cycles Reset 8	Enable	Enable
0xA9(169)	Output Off_On Cycles Reset 9	Enable	Enable
0xAA(170)	Output Off_On Cycles Reset 10	Enable	Enable
0xAB(171)	Output Off_On Cycles Reset 11	Enable	Enable
0xAC(172)	Output Off_On Cycles Reset 12	Enable	Enable
0xAD(173)	Output Off_On Cycles Reset 13	Enable	Enable
0xAE(174)	Output Off_On Cycles Reset 14	Enable	Enable
0xAF(175)	Output Off_On Cycles Reset 15	Enable	Enable
0xB0(176)	Output Off_On Cycles Reset 16	Disable	Enable
0xB1(177)	Output Off_On Cycles Reset 17	Disable	Enable
0xB2(178)	Output Off_On Cycles Reset 18	Disable	Enable
0xB3(179)	Output Off_On Cycles Reset 19	Disable	Enable
0xB4(180)	Output Off_On Cycles Reset 20	Disable	Enable
0xB5(181)	Output Off_On Cycles Reset 21	Disable	Enable
0xB6(182)	Output Off_On Cycles Reset 22	Disable	Enable
0xB7(183)	Output Off_On Cycles Reset 23	Disable	Enable
0xB8(184)	Output Off_On Cycles Reset 24	Disable	Enable
0xB9(185)	Output Off_On Cycles Reset 25	Disable	Enable
0xBA(186)	Output Off_On Cycles Reset 26	Disable	Enable
0xBB(187)	Output Off_On Cycles Reset 27	Disable	Enable
0xBC(188)	Output Off_On Cycles Reset 28	Disable	Enable
0xBD(189)	Output Off_On Cycles Reset 29	Disable	Enable
0xBE(190)	Output Off_On Cycles Reset 30	Disable	Enable
0xBF(191)	Output Off_On Cycles Reset 31	Disable	Enable

Individual specifications

Index (dec)	sub Index	Item	Access	Data Storage	Bit number	OPP7-1KC OPP7-1KC-P	OPP7-2KC OPP7-2KC-P
0x0040 (64)	1	Value Setting at Communication Error (OUT0-15)	R/W	Enable	16	Enable	Enable
	2	Value Setting at Communication Error (OUT0-15)		Enable	16		
0x0041 (65)	1	Value Setting at Communication Error (OUT16-31)	R/W	Enable	16	Disable	Enable
	2	Value Setting at Communication Error (OUT16-31)		Enable	16		
0x0044 (68)	1	Output Off_On Cycles 0	R	Disable	32	Enable	Enable
	2	Output Off_On Cycles 1		Disable	32	Enable	Enable
	3	Output Off_On Cycles 2		Disable	32	Enable	Enable
	4	Output Off_On Cycles 3		Disable	32	Enable	Enable
	5	Output Off_On Cycles 4		Disable	32	Enable	Enable
	6	Output Off_On Cycles 5		Disable	32	Enable	Enable
	7	Output Off_On Cycles 6		Disable	32	Enable	Enable
	8	Output Off_On Cycles 7		Disable	32	Enable	Enable
	9	Output Off_On Cycles 8		Disable	32	Enable	Enable
	10	Output Off_On Cycles 9		Disable	32	Enable	Enable
	11	Output Off_On Cycles 10		Disable	32	Enable	Enable
	12	Output Off_On Cycles 11		Disable	32	Enable	Enable
	13	Output Off_On Cycles 12		Disable	32	Enable	Enable
	14	Output Off_On Cycles 13		Disable	32	Enable	Enable
	15	Output Off_On Cycles 14		Disable	32	Enable	Enable
	16	Output Off_On Cycles 15		Disable	32	Enable	Enable
	17	Output Off_On Cycles 16		Disable	32	Disable	Enable
	18	Output Off_On Cycles 17		Disable	32	Disable	Enable
	19	Output Off_On Cycles 18		Disable	32	Disable	Enable
	20	Output Off_On Cycles 19		Disable	32	Disable	Enable
	21	Output Off_On Cycles 20		Disable	32	Disable	Enable
	22	Output Off_On Cycles 21		Disable	32	Disable	Enable
	23	Output Off_On Cycles 22		Disable	32	Disable	Enable
	24	Output Off_On Cycles 23		Disable	32	Disable	Enable
	25	Output Off_On Cycles 24		Disable	32	Disable	Enable
	26	Output Off_On Cycles 25		Disable	32	Disable	Enable
	27	Output Off_On Cycles 26		Disable	32	Disable	Enable
	28	Output Off_On Cycles 27		Disable	32	Disable	Enable
	29	Output Off_On Cycles 28		Disable	32	Disable	Enable
	30	Output Off_On Cycles 29		Disable	32	Disable	Enable
	31	Output Off_On Cycles 30		Disable	32	Disable	Enable
	32	Output Off_On Cycles 31		Disable	32	Disable	Enable
0x004B (75)	-	Output Off_On Cycles Maintenance Threshold	R/W	Enable	32	Enable	Enable

Index (dec)	sub Index	Item	Access	Data Storage	Bit number	OPP7-1KC OPP7-1KC-P	OPP7-2KC OPP7-2KC-P
0x00A0 (160)	-	Output Data Monitor 0-15	R	Disable	16	Enable	Enable
0x00A1 (161)	-	Output Data Monitor 16-31	R	Disable	16	Disable	Enable
0x00A2 (162)	-	Input Data Monitor 0-15	R	Disable	16	Disable	Disable
0x00A3 (163)	-	Maintenance Setting	R/W	Enable	16	Enable	Enable
0x00A4 (164)	-	Maintenance Monitor	R	Disable	16	Enable	Enable
0x00A5 (165)	-	Energizing Time Monitor	R	Disable	32	Enable	Enable
0x00A6 (166)	-	Energizing Time Maintenance Threshold	R/W	Enable	32	Enable	Enable
0x00A7 (167)	-	Communications Error Value Setting	R	Disable	3	Enable	Enable
0x00C0 (192)	-	Cycle Output Data 0-15	R	Disable	16	Enable	Enable
0x00C1 (193)	-	Cycle Output Data 16-31	R	Disable	16	Disable	Enable
0x00C2 (194)	-	Forced Output Setting 0-15	R/W	Disable	16	Enable	Enable
0x00C3 (195)	-	Forced Output Setting 16-31	R/W	Disable	16	Disable	Enable
0x00C4 (196)	-	Forced Output Data 0-15	R/W	Disable	16	Enable	Enable
0x00C5 (197)	-	Forced Output Data 16-31	R/W	Disable	16	Disable	Enable
0x00C6 (198)	-	Output Off_On Cycles Maintenance Setting 0-15	R/W	Enable	16	Enable	Enable
0x00C7 (199)	-	Output Off_On Cycles Maintenance Setting 16-31	R/W	Enable	16	Disable	Enable
0x00C8 (200)	-	Output Off_On Cycles Maintenance Monitor 0-15	R	Disable	16	Enable	Enable
0x00C9 (201)	-	Output Off_On Cycles Maintenance Monitor 16-31	R	Disable	16	Disable	Enable

Index (dec)	sub Index	Item	Access	Data Storage	Bit Length	OPP7-1KC OPP7-1KC-P	OPP7-2KC OPP7-2KC-P
0x00CA (202)	1	Valve name 0	R/W	Enable	64	Enable	Enable
	2	Valve name 1		Enable	64	Enable	Enable
	3	Valve name 2		Enable	64	Enable	Enable
	4	Valve name 3		Enable	64	Enable	Enable
	5	Valve name 4		Enable	64	Enable	Enable
	6	Valve name 5		Enable	64	Enable	Enable
	7	Valve name 6		Enable	64	Enable	Enable
	8	Valve name 7		Enable	64	Enable	Enable
	9	Valve name 8		Enable	64	Enable	Enable
	10	Valve name 9		Enable	64	Enable	Enable
	11	Valve name 10		Enable	64	Enable	Enable
	12	Valve name 11		Enable	64	Enable	Enable
	13	Valve name 12		Enable	64	Enable	Enable
	14	Valve name 13		Enable	64	Enable	Enable
	15	Valve name 14		Enable	64	Enable	Enable
	16	Valve name 15		Enable	64	Enable	Enable
0x00CB (203)	1	Valve name 16	R/W	Enable	64	Disable	Enable
	2	Valve name 17		Enable	64	Disable	Enable
	3	Valve name 18		Enable	64	Disable	Enable
	4	Valve name 19		Enable	64	Disable	Enable
	5	Valve name 20		Enable	64	Disable	Enable
	6	Valve name 21		Enable	64	Disable	Enable
	7	Valve name 22		Enable	64	Disable	Enable
	8	Valve name 23		Enable	64	Disable	Enable
	9	Valve name 24		Enable	64	Disable	Enable
	10	Valve name 25		Enable	64	Disable	Enable
	11	Valve name 26		Enable	64	Disable	Enable
	12	Valve name 27		Enable	64	Disable	Enable
	13	Valve name 28		Enable	64	Disable	Enable
	14	Valve name 29		Enable	64	Disable	Enable
	15	Valve name 30		Enable	64	Disable	Enable
	16	Valve name 31		Enable	64	Disable	Enable
0x00CE (206)	-	Valve Power Supply Monitor	R	Disable	8	Enable	Enable

■ Process data OUT

OPP7-1KC, OPP7-1KC-P

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	MSB															LSB
Data name	Valve output 0-15															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Format	Boolean															

OPP7-2KC, OPP7-2KC-P

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	MSB																															LSB
Data name	Valve output 0-31																															
	31	30	29	28	27	26	25	24	23	22	21	20	19	16	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Format	Boolean																															

Index 0x0000 (Direct Parameter Page 1)

Index	Parameter name	Access	Data			
			T8KC1	T8KCP1	T8KC2	T8KCP2
			OPP7-1KC	OPP7-1KC-P	OPP7-2KC	OPP7-2KC-P
0x02	Min Cycle Time	R	Refer to Table 4			
0x03	M-sequence Capability	R	Refer to Table 4			
0x04	Revision ID	R	0x11			
0x05	Process Data In	R	0x00			
0x06	Process Data Out	R	0x10 (2 bytes)		0x83 (4 bytes)	
0x07	Vendor ID 1	R	0x03			
0x08	Vendor ID 2	R	0x57			
0x09	Device ID 1	R/W	Refer to Table 4			
0x0A(10)	Device ID 2	R/W	Refer to Table 4			
0x0B(11)	Device ID 3	R/W	Refer to Table 4			

Table 4: Min CycleTime, M-sequence Capability and Device ID

Model No.	OPP7-1KC		OPP7-1KC-P		OPP7-2KC		OPP7-2KC-P	
Transmission rate (COM)	COM2	COM3	COM2	COM3	COM2	COM3	COM2	COM3
Min Cycle Time	0x17	0x0A	0x17	0x0A	0x17	0x0A	0x17	0x0A
M-sequence Capability	0x2B	0x2B	0x2B	0x2B	0x2B	0x2B	0x2B	0x2B
Device ID	0x200002	0x200003	0x200004	0x200005	0x200006	0x200007	0x200008	0x200009
Device ID 1	0x20	0x20	0x20	0x20	0x20	0x20	0x20	0x20
Device ID 2	0x00	0x00	0x00	0x00	0x00	0x00	0x00	0x00
Device ID 3	0x02	0x03	0x04	0x05	0x06	0x07	0x08	0x09

3.2.3 Parameter

Parameters can be written for the following contents.

No.	Item	Description
1	Device Access Lock [Note 1]	Parameter(write) Access Lock: Parameters of the device is write-protected. Date Storage Lock：Data storage is write-protected.
2	Value Setting Communications Error	Sets output value of the valve in the event of communication error.
3	Output Off_On Cycles Maintenance Threshold	Sets the valve cycle count for notifying maintenance information to [Maintenance Monitor]. Sets this threshold to use the maintenance function. (Initial value 0 disables maintenance function)
4	Maintenance Setting	Sets the maintenance items which to inform. (Initial value: 0x0000 (no maintenance information notice))
5	Energizing Time Maintenance Threshold	Sets the energizing time to the device unit for notifying maintenance information to [Energizing Time Monitor]. Unit: seconds (Initial value 0 disables maintenance function)
6	Output Off_On Cycles Maintenance Setting	0: Stop maintenance monitor 1: Execute maintenance monitor Sets maintenance monitor for each valve
7	Forced Output Setting [Note 1]	0: Cyclic output data enable 1: Forced output data enable Sets the point to output arbitrarily.
8	Forced Output Data [Note 1]	0: OFF 1: ON Sets the valve output status forcibly
9	Valve Name	Sets the valve name.

Note 1: Reconfigure the setting as it is cleared when the unit is powered OFF.

✎ Output Off_On Cycles and Energizing Time are written into the device every 3 minutes.

■ Valve output settings at communication error.

In software mode, valve output with arbitrary setting is enable in the event of communication error.

Value Setting Communication Error		Description
1	2	
0	0	All point output OFF
0	1	Final output data
1	0	All point output ON
1	1	Cyclic data last received

Example) Following tables show the case when the solenoid output S0 is set to OFF, the output S15 is to ON, and the rest S01 to S14 are set to hold the last value in the event of communication error. (for 16 output point) (For 16-point output)

Setting of Value Setting Communication Error1

MSB   LSB

S15	S14	S13	S12	S11	S10	S9	S8	S7	S6	S5	S4	S3	S2	S1	S0
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0

Setting of Value Setting Communication Error2

MSB   LSB

S15	S14	S13	S12	S11	S10	S9	S8	S7	S6	S5	S4	S3	S2	S1	S0
0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0

Valve output in the event of communication error:

MSB   LSB

S15	S14	S13	S12	S11	S10	S9	S8	S7	S6	S5	S4	S3	S2	S1	S0
1	"C"	"C"	"C"	"C"	"C"	"C"	"C"	"C"	"C"	"C"	"C"	"C"	"C"	"C"	0

0: OFF, 1: ON, "C": Cyclic output data (Final data)

■ Maintenance settings

Maintenance monitor is 2 bytes data.
Use the function by changing the bit of the maintenance item from "0": Disable to "1": Enable.
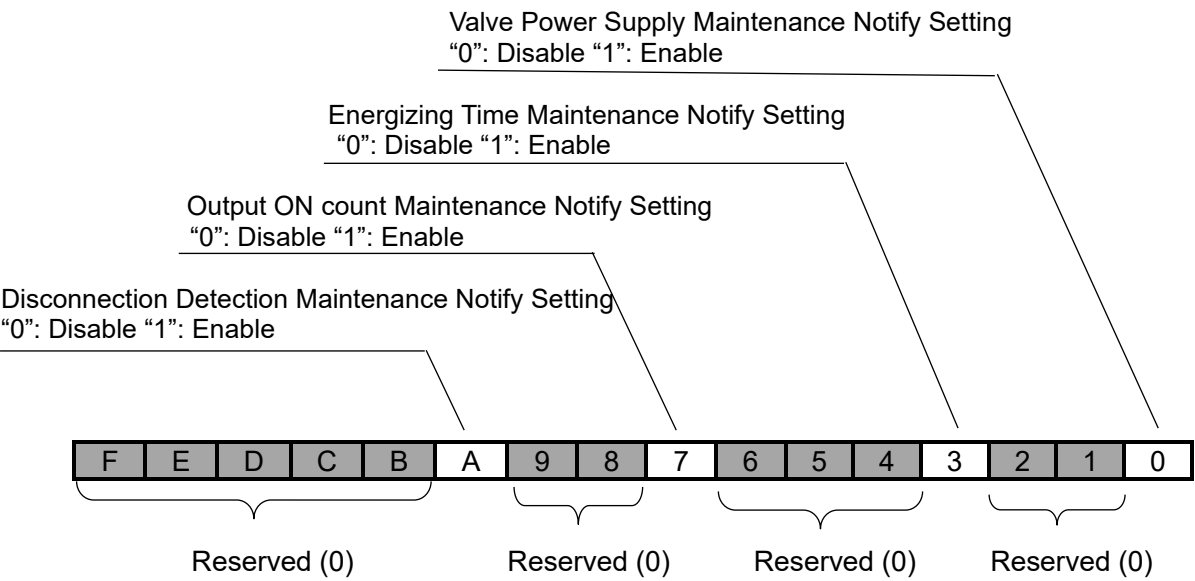
Valve Power Supply Maintenance Notify Setting
"0": Disable "1": Enable

Energizing Time Maintenance Notify Setting
"0": Disable "1": Enable

Output ON count Maintenance Notify Setting
"0": Disable "1": Enable

Disconnection Detection Maintenance Notify Setting
"0": Disable "1": Enable

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

Reserved (0)   Reserved (0)   Reserved (0)   Reserved (0)

Bit	Item	Description
0	Valve Power Supply Maintenance Notify Setting	0：Disable 1：Enable Sets whether to monitor the valve power status.
1	Reserved	0
2	Reserved	0
3	Energizing Time Maintenance Notify Setting	0：Disable 1：Enable Sets whether to monitor energizing time
4	Reserved	0
5	Reserved	0
6	Reserved	0
7	Output ON count Maintenance Notify Setting	0：Disable 1：Enable Sets whether to monitor the valve ON count.
8	Reserved	0
9	Reserved	0
A	Disconnection Detection Maintenance Notify Setting	0：Disable 1：Enable Sets whether to monitor communication status.
B-F	Reserved	0

■ Forced output settings

This function can be used when valve output needs to be changed temporary, or the equipment is installed. Output the specified valve in arbitrary state, not with the valve state being sent by the master unit cyclically.
* The valve output set by this function is cleared in the event of communication error, depending on the selected status of the switch setting (1) [Output setting in the event of communication error] of "1.2.2 Switches and LED indicators" .(By [Value Setting Communications Error] (No2 of the table in "3.2.3 Parameter") or when the unit power is turned off, reconfigure the setting as the setting will be cleared.))

No.	Item	Description
7	Forced Output Setting	Sets the point to output arbitrarily.
8	Forced Output Data	Sets the output status of valve.

Example) Following tables show the case when the solenoid output S0 is set to OFF, the output S15 is set to ON, and the rest output S01 to S14 are set to the value of cyclic data. (for 16-point output)

Forced Output Setting:

MSB   LSB

S15	S14	S13	S12	S11	S10	S9	S8	S7	S6	S5	S4	S3	S2	S1	S0
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

0: Cyclic output data - Enable, 1: Forced output data - Enable

Forced Output Data:

MSB   LSB

S15	S14	S13	S12	S11	S10	S9	S8	S7	S6	S5	S4	S3	S2	S1	S0
1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0

0: OFF / 1: ON

Valve output (output data monitor):

MSB   LSB

S15	S14	S13	S12	S11	S10	S9	S8	S7	S6	S5	S4	S3	S2	S1	S0
1	"C"	"C"	"C"	"C"	"C"	"C"	"C"	"C"	"C"	"C"	"C"	"C"	"C"	"C"	0

0: OFF, 1: ON, "C": Cyclic output data

Since the forced output data is Enable for the valves S0 and S15, only the two valves are output the forced output value, and the cyclic output value is output for the other valves.

3.2.4 Observation

Following items can be re-set and monitored.
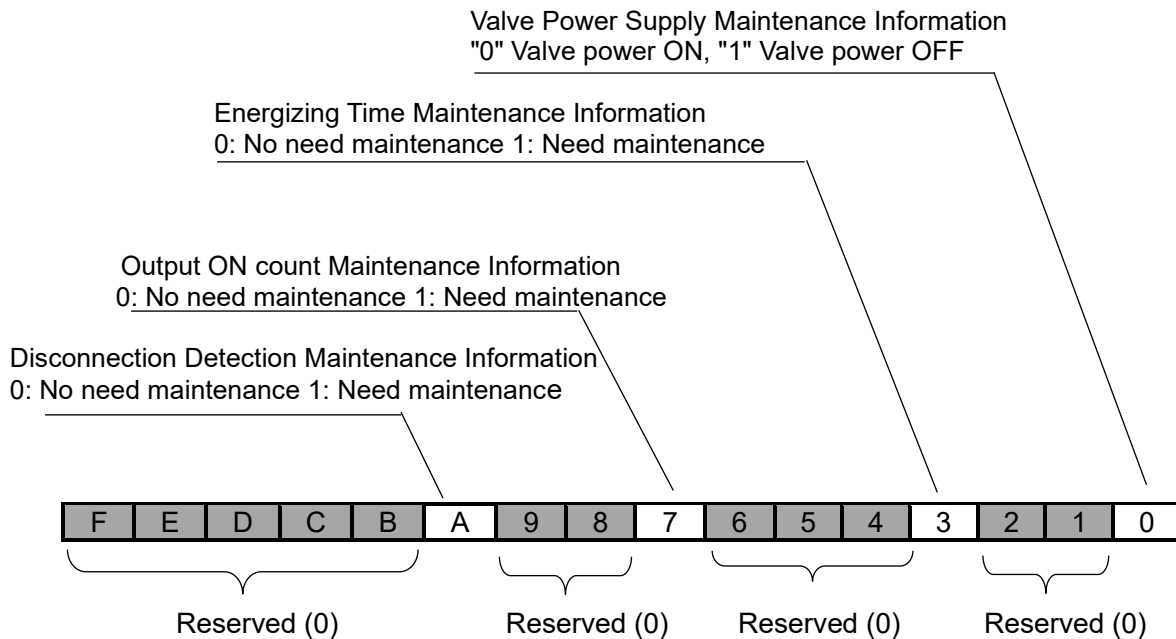Use maintenance function after enabling [Maintenance setting].

No.	Item	Description
10	Device Reset	Resets the device. It is treated the same as turning OFF/ON the device.
11	Application Reset	Resets the application. Initializes the valve ON count of all the valves.
12	Restore Factory Setting	Resets to the factory settings. The energizing time is not initialized.
13	Output Reset	Select and reset the valve output individually. Initializes the output ON count of the corresponding valve.
14	Output Data Monitor	Indicates the current valve output status. The forced output value is included.
15	Maintenance Monitor	Notifies maintenance information.
16	Energizing Time Monitor	Indicates energizing time of the device. Unit [s] Note 1
17	Communications Error Value Setting	Indicates the valve output setting at communication error. 0: All points OFF 1: Final output data 2: All points ON 3: Cyclic output data last received 4: Output the value set in [No2: Value Setting Communications Error] of "3.2.3 Parameter".
18	Cyclic Output Data	Indicates the data received by cyclic communication from the master unit.
19	Output Off_On Cycles Maintenance Monitor	0: No need maintenance 1: Need maintenance Becomes "1: Need maintenance" when [Output Off_On Cycles] ≥ [Output Off_On Cycles Maintenance Threshold] in [Output Off_On Cycles Maintenance Setting].
20	Output Off_On Cycles	Indicates the output ON count for each valve.
21	Valve Power Supply Monitor	Valve Power ON: Valve power supply is ON. Valve Power OFF: Valve power supply is OFF Indicates valve power status.

* Note1: As initial status, energization time of factory delivery inspection may add.

■ Maintenance monitor

Maintenance monitor is 2 bytes data.
Check the maintenance status of each device when maintenance monitor indicates "1: Need maintenance".

Valve Power Supply Maintenance Information
"0" Valve power ON, "1" Valve power OFF

Energizing Time Maintenance Information
0: No need maintenance 1: Need maintenance

Output ON count Maintenance Information
0: No need maintenance 1: Need maintenance

Disconnection Detection Maintenance Information
0: No need maintenance 1: Need maintenance

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

Reserved (0)   Reserved (0)   Reserved (0)   Reserved (0)

Bit	Item	Description
0	Valve Power Supply Maintenance Information	0: Valve power ON 1: Valve power OFF Indicates valve power status.
1	Reserved	0
2	Reserved	0
3	Energizing Time Maintenance Information	0: No need maintenance (Energizing Time Maintenance Threshold > Energizing Time Monitor) 1: Need maintenance (Energizing Time Maintenance Threshold ≤ Energizing Time Monitor) Notifies [Energizing Time Maintenance Information] by comparing energizing time [Energizing Time Monitor] value and [Energizing Time Maintenance Threshold].
4	Reserved	0
5	Reserved	0
6	Reserved	0
7	Output ON count Maintenance Information	0: No need maintenance ([Output ON count Maintenance Threshold] > [Output ON count] (minimum value)) 1: Need maintenance ([Output ON count Maintenance Threshold] ≤ output ON count (minimum value)) Notify valve ON count maintenance information by comparing [Output ON count] and [Output ON count Maintenance Threshold] of each valve. Setting with each valve is needed to notify maintenance information. Set [Output ON count Maintenance Setting] to "1: Execute maintenance monitor". When plural valves are set to "1: Execute maintenance monitor", and if there is a valve with [Output ON count] ≤ [Output ON count Maintenance Threshold] condition, the [Output ON count maintenance information] becomes "1: Need maintenance".
8	Reserved	0
9	Reserved	0
A	Disconnection Detection Maintenance Information	0: No need maintenance 1: Need maintenance Indicates the status of the network cable. If the network cable is broken, the maintenance information becomes "1".
B-F	Reserved	0

■ **Output ON count Maintenance Monitor**

No.	Item	Description
3	Output Off_On Cycles Maintenance Threshold	Sets the valve cycle count for notifying maintenance information to Maintenance Monitor. Sets this threshold to use the maintenance function. (Initial value 0 disables maintenance function)
4	Maintenance Setting	Sets the maintenance items which to inform. (Initial value: 0x0000 (no maintenance information notice))
6	Output Off_On Cycles Maintenance Setting	0: Stop maintenance monitor 1: Execute maintenance monitor By setting [Output Off_On Cycles Maintenance Setting] to "1: Execute maintenance monitor", each valve can be checked altogether whether it is the time for maintenance. Note that [Output Off_On Cycles Maintenance Monitor] becomes "0: No need maintenance" when [Output Off_On Cycles Maintenance Setting] is OFF.
19	Output Off_On Cycles Maintenance Monitor	0: No need maintenance 1: Need maintenance Becomes "1: Need maintenance" when [Output Off_On Cycles] ≥ [Output Off_On Cycles Maintenance Threshold] in [Output Off_On Cycles Maintenance Setting].

Example) For 16-point output
Set to notify the maintenance when the valve ON count of any solenoid valve among S0 to S7 becomes 100000 or more. Valve ON count of S0 and S8 became 100000 and more.

Output Off_On Cycles Maintenance Setting:

MSB   LSB

S15	S14	S13	S12	S11	S10	S9	S8	S7	S6	S5	S4	S3	S2	S1	S0
0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1

0: Stop maintenance monitor 1: Execute maintenance monitor

Output ON count Maintenance Threshold: 100000
[Output ON count Maintenance Threshold] is in common for all the valves.

Output Off_On Cycles Maintenance Monitor:

MSB   LSB

S15	S14	S13	S12	S11	S10	S9	S8	S7	S6	S5	S4	S3	S2	S1	S0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

0: No need maintenance 1: Need maintenance

While the valve ON count of S0 and S8 are 100000 or more, the bit that requires maintenance is output only for S0 since S8 is not in the maintenance monitoring status.

3.2.5 Diagnosis

Following items can be diagnosed.
Investigate the cause by referring to the event code and take measures.

Event code	Variation	Device status	Cause	Measures
0x1830	Notification	Maintenance Require	The number of times the valve output is turned on has reached the threshold.	Maintains the valve.
0x1832	Notification	Maintenance Require	The energization time of the device has reached the threshold.	Maintains the device.
0x1835	Notification	Out of specification	Valve power is not supplied.	Check the valve power supply.
0x4000	Error	Failure	The IO-Link driver temperature is rising.	Check the connection of the IO-Link wiring and turn the unit power off and on again.
0x4210	Warning	Out of specification	The excessive heat of IO-Link driver has been detected	Check the connection of the IO-Link wiring.
0x5000	Error	Failure	Read/Write error of EEPRPM has been occurred.	Turn the unit power off and then on again. If the error reoccurs even after turning the unit power off and then on again, contact CKD.
0x5111	Warning	Out of specification	The IO-Link communication voltage has dropped.	Check the communication (power supply) voltage.
0x7710	Error	Failure	A short circuit error has occurred in the network cable.	Check the connection of the IO-Link wiring and turn the unit power off and on again.

3.3 Correspondence between the device unit output No. and PLC address No.

3.3.1 PLC address correspondence table

This correspondence table uses OMRON PLC as an example.

< T8KC□1 (16-point output specification)>

PLC memory assigned address	Octet[1]								Octet[0]							
	00	01	02	03	04	05	06	07	00	01	02	03	04	05	06	07
Serial Transmission Device **Output No.**	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Solenoid output No.	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11	s12	s13	s14	s15	s16

< T8KC□2 (32-point output specification)>

| PLC memory assigned address	Octet[3]								Octet[2]								Octet[1]								Octet[0]							
	00	01	02	03	04	05	06	07	00	01	02	03	04	05	06	07	00	01	02	03	04	05	06	07	00	01	02	03	04	05	06	07
Serial Transmission Device **Output No.**	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Solenoid output No.	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11	s12	s13	s14	s15	s16	s17	s18	s19	s20	s21	s22	s23	s24	s25	s26	s27	s28	s29	s30	s31	s32

▌3.3.2 Example of valve No. array corresponding to solenoid output No.

The valve No.1a, 1b, 2b, … indicate the station numbers such as station No.1, station No.2, and so on; while the alphabets 'a' and 'b' mean, respectively, the solenoid on the a-side and the solenoid on the b-side of the "double-solenoid type" valve. Also, "V" stands for "vacant".
Manifold stations are numbered from left to right with the piping port towards the user (refer to the figure below).
As appearance and maximum number of stations differ depending on the solenoid valve model, check individual specifications.

<T8KC1, T8KCP1 (16-point output specification)>
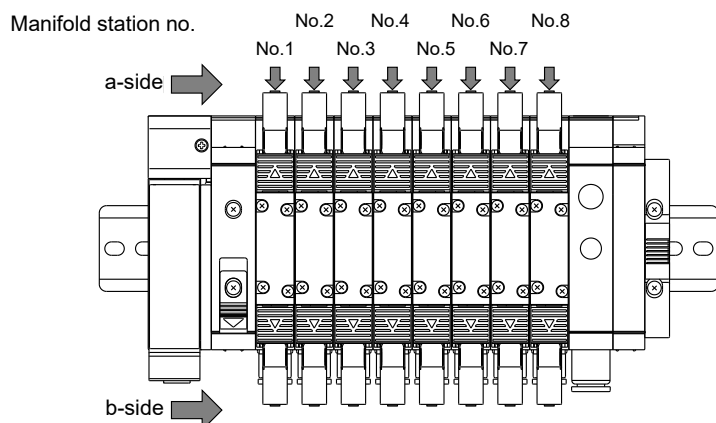
The figure is an example of mounting eight stations of double-solenoid type valves.
There is no solenoid on the b-side for single-solenoid type.

Standard wiring

• When all valves mounted on the manifold are single solenoids:

Solenoid output No.	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	S11	s12	s13	s14	s15	s16
Valve No.	1a	2a	3a	4a	5a	6a	7a	8a	9a	10a	11a	12a	13a	14a	15a	16a

• When all valves mounted on the manifold are double solenoids:

Solenoid output No.	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	S11	s12	s13	s14	s15	s16
Valve No.	1a	1b	2a	2b	3a	3b	4a	4b	5a	5b	6a	6b	7a	7b	8a	8b

• When both single and double solenoids valves are mounted on the manifold (an example is shown above)

Solenoid output No.	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	S11	s12	s13	s14	s15	s16
Valve No.	1a	2a	3a	3b	4a	4b	5a	6a	7a	7b	8a	9a	10a	10b	11a	11b

Double wiring

• When all valves mounted on the manifold are single solenoids:

Solenoid output No.	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	S11	s12	s13	s14	s15	s16
Valve No.	1a	(V)	2a	(V)	3a	(V)	4a	(V)	5a	(V)	6a	(V)	7a	(V)	8a	(V)

• When all valves mounted on the manifold are double solenoids:

Solenoid output No.	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	S11	s12	s13	s14	s15	s16
Valve No.	1a	1b	2a	2b	3a	3b	4a	4b	5a	5b	6a	6b	7a	7b	8a	8b

• When both single and double solenoids valves are mounted on the manifold (an example is shown above)

Solenoid output No.	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	S11	s12	s13	s14	s15	s16
Valve No.	1a	(V)	2a	(V)	3a	3b	4a	4b	5a	(V)	6a	(V)	7a	7b	8a	(V)

<T8KC2, T8KCP2 (32-point output specification)>

> The figure is an example of mounting sixteen stations of double-solenoid type valves.
> There is no solenoid on the b-side for single-solenoid type.

Standard wiring

- When all valves mounted on the manifold are single solenoids:

Solenoid output No.	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11	s12	s13	s14	s15	s16	s17	s18	s19	s20	s21	s22	s23	s24	s25	s26	s27	s28	s29	s30	s31	s32
Valve No.	1a	2a	3a	4a	5a	6a	7a	8a	9a	10a	11a	12a	13a	14a	15a	16a	17a	18a	19a	20a	21a	22a	23a	24a	25a	26a	27a	28a	29a	30a	31a	32a

- When all valves mounted on the manifold are double solenoids:

Solenoid output No.	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11	s12	s13	s14	s15	s16	s17	s18	s19	s20	s21	s22	s23	s24	s25	s26	s27	s28	s29	s30	s31	s32
Valve No.	1a	1b	2a	2b	3a	3b	4a	4b	5a	5b	6a	6b	7a	7b	8a	8b	9a	9b	10a	10b	11a	11b	12a	12b	13a	13b	14a	14b	15a	15b	16a	16b

- When both single and double solenoids valves are mounted on the manifold (an example is shown above)

Solenoid output No.	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11	s12	s13	s14	s15	s16	s17	s18	s19	s20	s21	s22	s23	s24	s25	s26	s27	s28	s29	s30	s31	s32
Valve No.	1a	2a	3a	3b	4a	4b	5a	6a	7a	7b	8a	9a	10a	10b	11a	11b	12a	13a	14a	14b	15a	15b	16a	(V)	(V)	(V)	(V)	(V)	(V)	(V)	(V)	(V)

Double wiring

- When all valves mounted on the manifold are single solenoids:

Solenoid output No.	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11	s12	s13	s14	s15	s16	s17	s18	s19	s20	s21	s22	s23	s24	s25	s26	s27	s28	s29	s30	s31	s32
Valve No.	1a	(V)	2a	(V)	3a	(V)	4a	(V)	5a	(V)	6a	(V)	7a	(V)	8a	(V)	9a	(V)	10a	(V)	11a	(V)	12a	(V)	13a	(V)	14a	(V)	15a	(V)	16a	(V)

- When all valves mounted on the manifold are double solenoids:

Solenoid output No.	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11	s12	s13	s14	s15	s16	s17	s18	s19	s20	s21	s22	s23	s24	s25	s26	s27	s28	s29	s30	s31	s32
Valve No.	1a	1b	2a	2b	3a	3b	4a	4b	5a	5b	6a	6b	7a	7b	8a	8b	9a	9b	10a	10b	11a	11b	12a	12b	13a	13b	14a	14b	15a	15b	16a	16b

- When both single and double solenoids valves are mounted on the manifold (an example is shown above)

Solenoid output No.	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11	s12	s13	s14	s15	s16	s17	s18	s19	s20	s21	s22	s23	s24	s25	s26	s27	s28	s29	s30	s31	s32
Valve No.	1a	(V)	2a	(V)	3a	3b	4a	4b	5a	(V)	6a	(V)	7a	7b	8a	(V)	9a	(V)	10a	10b	11a	11b	12a	(V)	13a	(V)	14a	14b	15a	15b	16a	(V)

3.4   Programming

This device unit is treated as a 16-point output module: T8KC□1, 32-point output module: T8KC□2 from the master unit.

There is output data (set to Process Data Out) transmitted from the master unit to the device (this product: T8KC□1 as 16-point output and T8KC□2 as 32-point output). This device unit acts as an output device which transmits the output data to valves after receiving it from the master unit. (There is no input data).

Refer to the instruction manual issued by the PLC manufacturer when programming.
Refer to the following table to program the I/O mapping.

Output data mapping

Output point		Process Data OUT (bit)							
		bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
16 points	Octet 1	07	06	05	04	03	02	01	00
	Octet 0	15	14	13	12	11	10	09	08
32 points	Octet 3	07	06	05	04	03	02	01	00
	Octet 2	15	14	13	12	11	10	09	08
	Octet 1	23	22	21	20	19	18	17	16
	Octet 0	31	30	29	28	27	26	25	24

3.5 Operation

3.5.1 Displaying the set parameters

This is an operation example to display the set parameters using PLC software (OMRON: CX_Configurator FDT).
For detailed operation, refer to the operation manual of Omron Corporation.
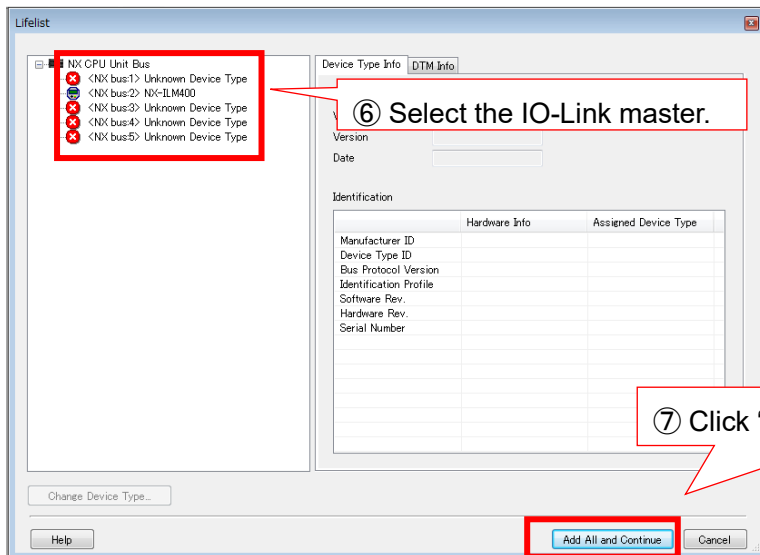
Step (1)
Read the PLC into [My Network] file.
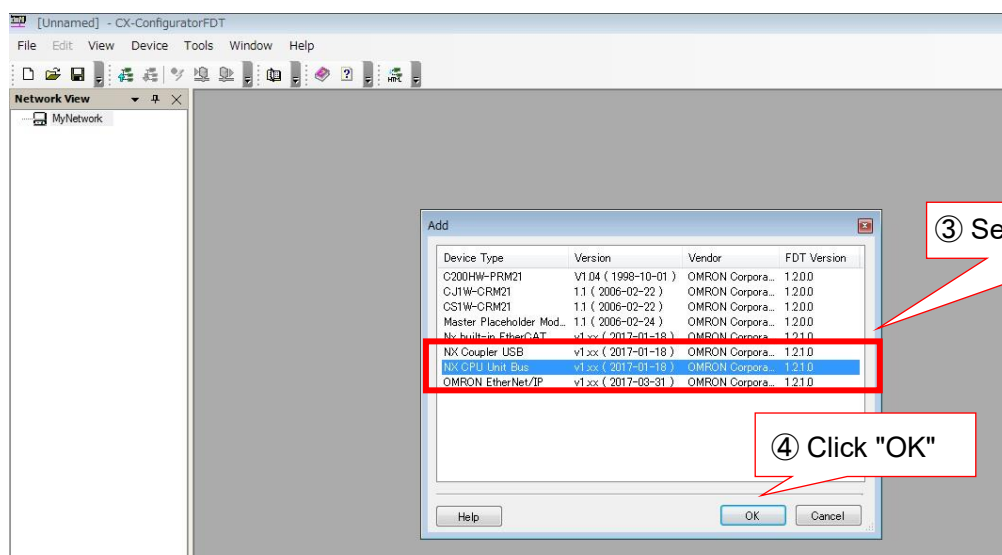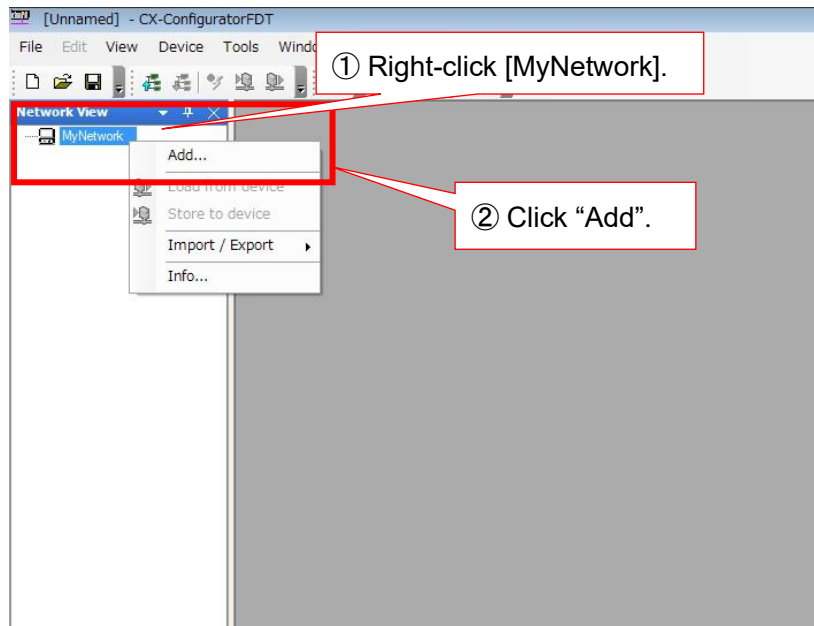
Step (2)
Read the connected device unit.

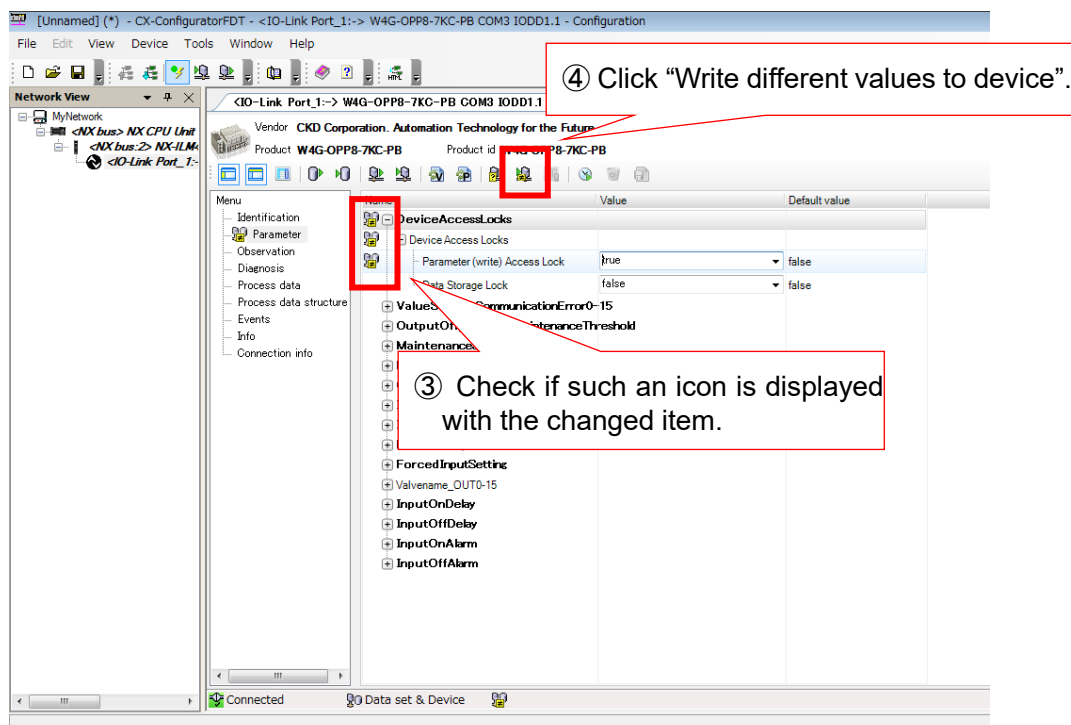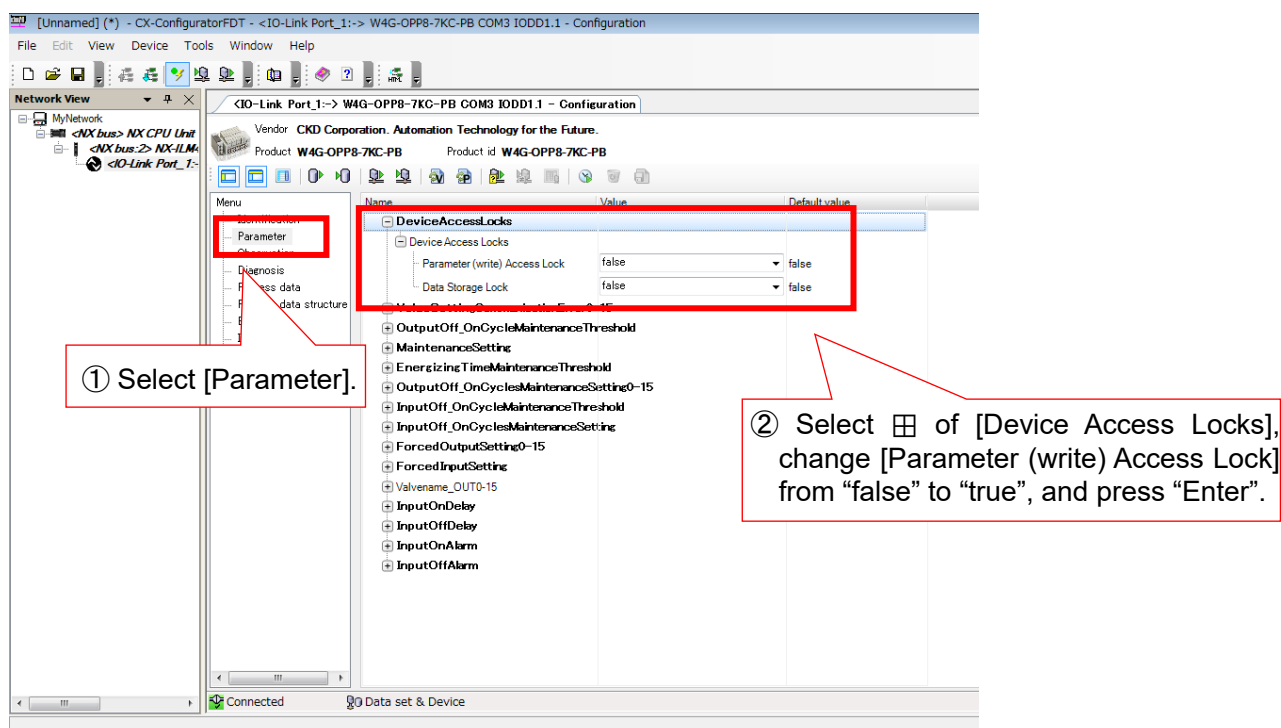① Right-click the read PLC.

② Select "Configuration".

③ Select the current connection method between the PC and PLC.

④ Click "OK".

⑤ Select "Scan" → "Create Network".

⑥ Select the IO-Link master.

⑦ Click "Add All and Continue".

⑧ Select the device unit.

⑨ Click "Add All and Continue".

⑩ Right-click the device unit.

⑪ Select "Go online".
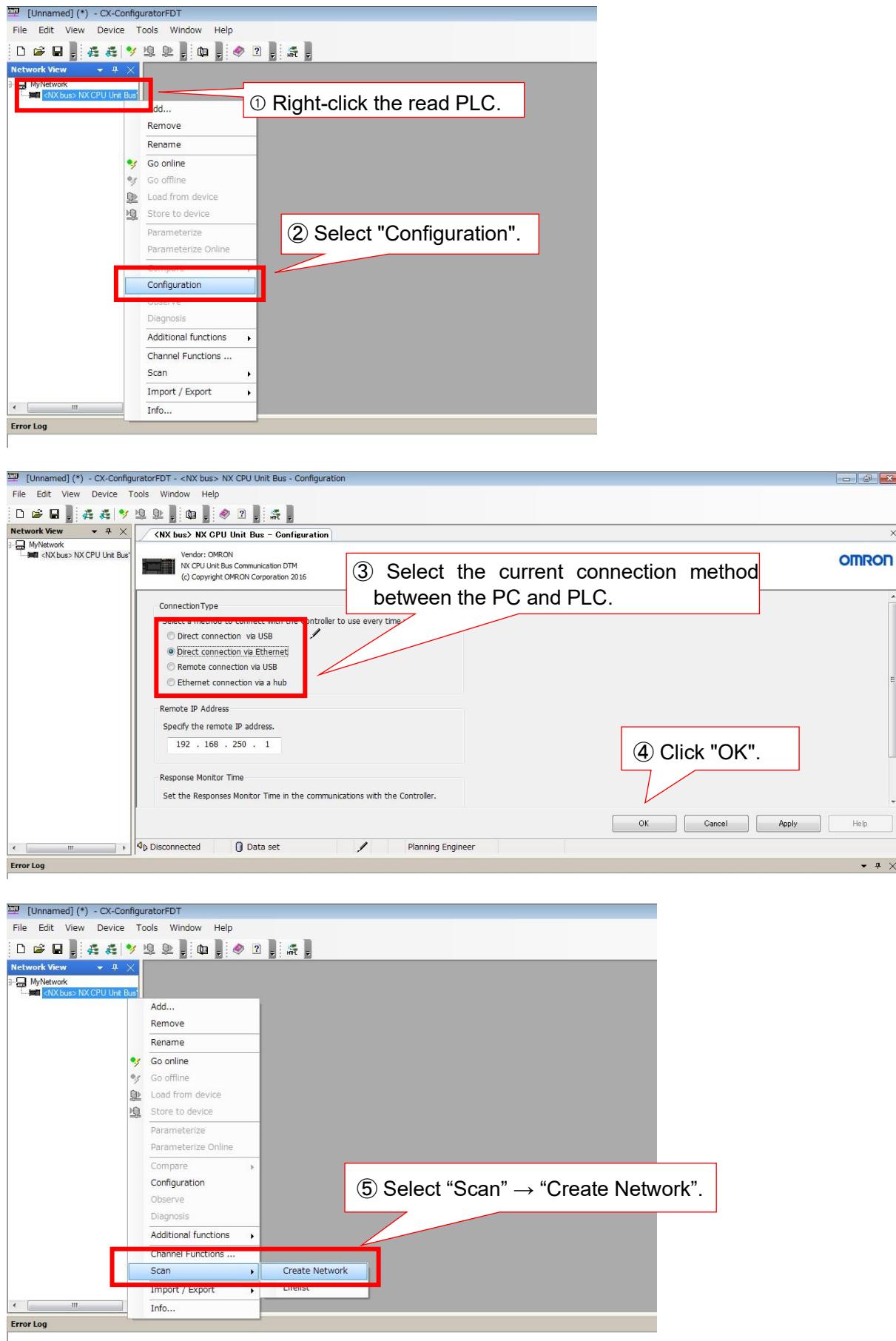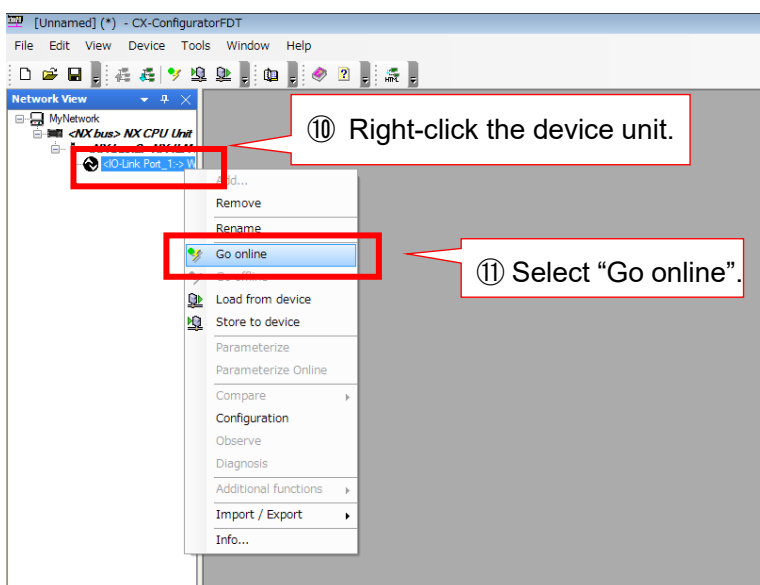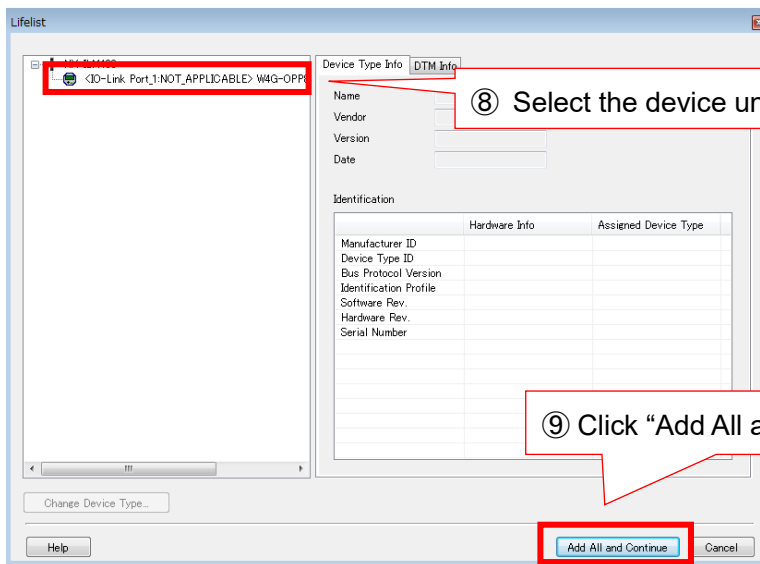
Step (3)
Reads out and displays the set parameters of the device unit.

① Double-click the device unit

② Click "Read from device (Upload)"
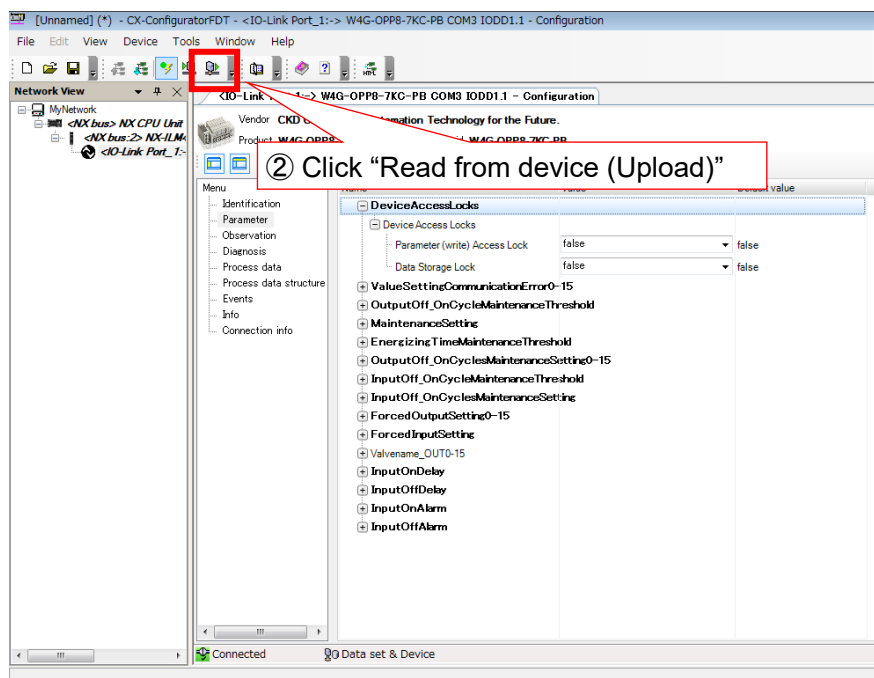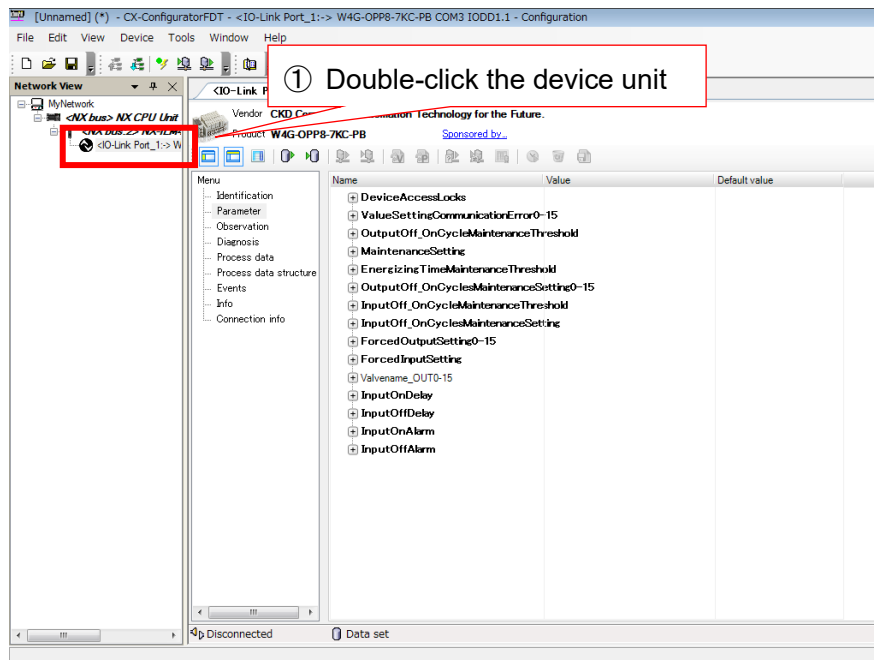
3.5.2 Changing the set parameters

This subsection describes how to enable Device Access Locks function as an example.
Run the changing after performing "3.5.1 Displaying the set parameters".

① Select [Parameter].

② Select ⊞ of [Device Access Locks], change [Parameter (write) Access Lock] from "false" to "true", and press "Enter".

④ Click "Write different values to device".

③ Check if such an icon is displayed with the changed item.

4. MAINTENANCE AND INSPECTION

⚠ WARNING

Turn off the power, stop the supply of compressed air and make sure that there is no residual pressure before conducting maintenance.

Do not disassemble, modify, or repair the product.
　　These may cause failure or malfunction.

⚠ CAUTION

Regularly perform daily and periodic inspections to correctly maintain product performance.
　　If maintenance is not properly managed, the product's functions may deteriorate significantly and this may lead to faults (such as short service life, damage, and malfunction) or accidents.

Do not drop or apply excessive vibrations or shocks to the product.
　　These may cause damage because parts inside the product are made to precise specifications.

4.1　Periodic Inspection

This section describes the cleaning and inspection of the device unit for daily maintenance and what to do when replacing the unit. Conduct the periodic cleaning and inspection to use the product in the optimum condition.

■ Cleaning

1 For daily cleaning, wipe the product with a soft dry cloth.

2 When stains cannot be removed by wiping with a dry cloth, moisten the cloth with diluted neutral detergent (2%), wring it, and wipe the stains again.

3 Objects such as rubber, vinyl, or tape may stain the device unit if they are left in contact with the unit for a long period. Remove such objects when cleaning if they are leaving stain on the product.

■ Inspection

Conduct inspection once or twice a year.
If using the product in an environment where temperature or humidity is extremely high or in a dusty environment, conduct inspections at a shorter interval.

<Inspection items>
Inspect the following items to make sure that each item satisfies the criteria.
If any item does not meet the criteria, improve the surrounding environment or adjust the unit.

Inspection items	Inspection details	Criteria	Inspection method
Environment	Is the surrounding and in-panel temperature appropriate?	Refer to 1.3.2 "Device unit specifications".	Thermometer
	Is there any accumulated dust?	No dust	Visual inspection
Installation	Is the device unit fixed securely?	No looseness	Phillips screwdriver
	Is the IO-Link plug fully inserted in the socket?	No looseness	Flat blade screwdriver
	Is the network cable fully inserted in the IO-Link plug?	No looseness	Visual inspection
	Is the connection cable not broken?	No abnormality in appearance	Visual inspection

■ Checking the device unit before/after replacing

Each unit (master and device) is a device that constitutes a network.
If any unit fails, immediately perform recovery work to prevent the entire network from being affected. To restore the network function as fast as possible, it is recommended to prepare spare units.

<Inspection items>
If a fault is detected and the unit is replaced with a new one, check if the new unit has no abnormality.
Also, confirm the device unit settings.

<Settings for replacement device unit>
For the switches on the replacement device unit, confirm the specifications and set the same settings as the previous unit.

4.2   Removing and Mounting

⚠ WARNING

Turn off the power and completely release the pressure before removing or adding a manifold solenoid valve.

Thoroughly read and understand this Instruction Manual before removing and adding the manifold solenoid valve.

Do not touch the electrical wiring (bare live part).
　An electric shock may occur.

Do not touch live parts with bare hands.
　An electric shock may occur.

⚠ CAUTION

Check the device unit station number and the output setting in the event of communication error before turning on the unit power.

Do not attach or detach the plug while the power is turned on.
　These may cause failure or malfunction.

**Do not pull out the device unit by pulling the cable or connector.**
　This may cause cable disconnection or damage.

Fully loosen the plug fixing screw before removing the plug.
　After inserting the plug, tighten the plug fixing screw securely.

4.2.1 Removing the product (device unit)

1 After confirming safety, stop network communication as necessary and turn off all peripheral equipment.

2 After confirming safety, turn off the power of the master and the valve as necessary.

3 Loosen the device unit fixing screw. Since it is a fall prevention screw, stop loosening when it detaches from the device unit connecting block.

4 Hold and pull out the product slowly in the direction of the arrow.

5 Remove the IO-Link plug.
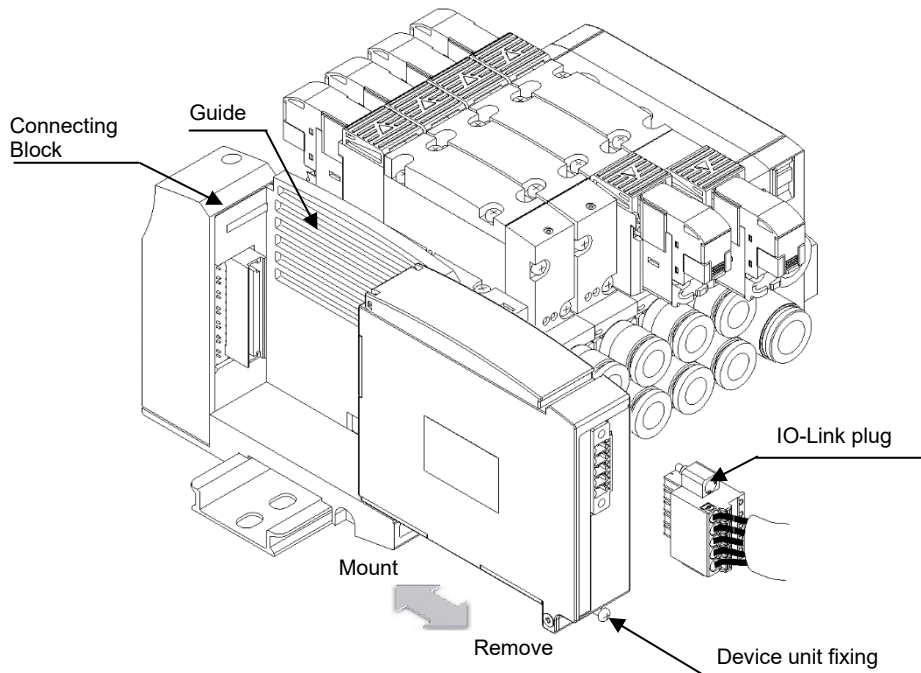
4.2.2 Mounting the product (device unit)

1 Set the switches of the unit.

2 Connect the IO-Link plug with the power (for the master/valve) turned off.
The system may operate suddenly if the plug is connected while the power is turned on.
Be careful of the surroundings and secure safety before performing work.
Reference tightening torque: 0.4 N·m (Since it varies depending on the plug, consult the plug manufacturer.)

3 Hold the product and insert it slowly in the direction of the arrow.

4 Check that the product and device unit connecting block are properly connected and tighten the device unit fixing screw firmly.
(Appropriate tightening torque: 0.5 N·m)

5 Confirm safety and turn on each power.

5. Troubleshooting

5.1   Problems, Causes, and Solutions

Troubleshooting for this device unit must be carried out not only for the single unit but for the entire system.
The system may start operating suddenly depending on the communication state. Use extreme care and ensure safety during maintenance.

■ Fault 1: PW(V) LED does not light up

- Check that the valve power cable is properly connected and not broken.
- Check if the supplied power voltage is within the specified range.

■ Fault 2: COM LED does not light up

- Check that the power to PLC is turned on.
- Check that the network cable is compatible with IO-Link.
- Check that transmission distance is compatible with IO-Link.
- Check that there is no noise-generating device or high-voltage line near the network cable.

■ Fault 3: ST LED lights up

- Check that there is any problem (such as damage or disconnection) with the connection of the network cable and connector.
- Contact to CKD if the condition doesn't change even after turning the power on and off.

■ Fault 4: ST LED is blinking

- Check the maintenance status by Maintenance Monitor(No.15 of "3.2.4. Observation".

6. WARRANTY PROVISIONS

6.1 Warranty Conditions

■ Scope of warranty

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.

Note that the following failures are excluded from the warranty scope:

- 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 this Instruction Manual.
- 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.

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.

6.2 Warranty period

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