CKD

TVG Series
Serial Transmission Device

IO-Link Wireless Compatible

Instruction Manual

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.

2023-07-27 SM-A68890

PREFACE

Thank you for purchasing CKD's "TVG Series" Serial Transmission Device (IO-Link Wireless Compatible).

This Instruction Manual contains basic matters related to the operation of this product 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.

- This Instruction Manual is intended for the engineer who installs and sets the product.
  The product is intended to be handled by a person who has extensive knowledge and experience in the following:
  - Electrical (electrician or equivalent)
  - Industrial network communications used
  - FA system in general
  - Each system that uses manifold valves, FA networks, etc.

  CKD shall not be responsible for accidents caused by persons who selected or used the product without knowledge or sufficient training.
- Product specifications and appearances presented in this Instruction Manual are subject to change without notice.
- 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 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:

- ISO 4414, JIS B 8370, JFPS 2008 (the latest edition of each standard)
- The High Pressure Gas Safety Act, the 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, handling that is not described in this Instruction Manual may lead to an accident. 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.

Some statements classified as "CAUTION" may still lead to serious results depending on the situation.
All statements that follow these labels are important and must be observed.

<Types of warning symbols>

	A general mark indicating a prohibited (not permitted) action.		A mark prohibiting people from touching objects or equipment.
	A mark prohibiting people from putting their fingers into openings.		A general mark warning people of dangers such as electric shock and burns.
	A mark warning people of dangers that occur when starting an automatic equipment.		A general mark indicating that a specific course of action must be taken.
	A mark indicating that an instruction manual must be read carefully.		A mark indicating that the earth terminal must be connected to the ground.

Other general precautions, tips on using the product, or technical information and terminology are indicated by the following icon.

- Contains useful information such as general precautions, supplementary information, and reference information.

Precautions on Safety

DANGER

Do not use the product for the following purposes:

- Medical equipment for maintaining, caring for, etc., human life and the body
- Mechanisms and mechanical devices for the purpose of moving and transporting people
- Critical safety parts for mechanical devices

WARNING

Do not modify the product or perform additional work on the product.

- Modification or additional work may not only pose a risk of fire or electric shock, but it may also cause the product to fail to meet the specifications described in this Instruction Manual.

Do not handle the product or mounting and removing devices until confirming safety.

- Inspect and service the machine and devices after confirming the safety of the entire system related to the product. Also, be careful not to get an electric shock by turning OFF the power to the equipment or the applicable equipment.
- Since there may be hot or live parts even after operation has stopped, use extreme care when handling the product or mounting and removing devices.

Customers using implantable medical devices should not come close to the product until it's confirmed to be safe.

- Radio waves emitted by the product may adversely affect implantable medical devices such as implantable cardiac pacemakers and implantable defibrillators.
  Customers using implantable medical devices should contact the manufacturer of the medical devices before using the product.

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 and should be handled with care.

Use the product within the specifications.

- The product must not be used beyond its specifications.
- The product is intended for use as a device or part for general industrial machinery. It is not intended for use under the conditions or in environments 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.
  - ◎ For use under the conditions or in environments other than those specified or outdoors.
  - ◎ 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.
- Because the product communicates via radio waves, the communication may be temporarily interrupted due to the surrounding environment and how the product is used. CKD is not responsible for any secondary failure that may result in human injury or damage to other equipment or devices.

Precautions on Radio Law

<Important matters on wireless device>

The product has obtained a certification of construction type **Note 1** as a wireless device based on the Radio Law.
The following statements must be observed when using the product.

Note 1: There is no need for customers to apply for a license, etc. to use the product.

- Do not disassemble or modify. Disassembly and modification are prohibited by law.
- The product complies with the Radio Law of Japan.
  When using it outside of Japan, please contact us separately.
  For the latest information, check the catalog on the following website.
  URL: https://www.ckd.co.jp

This device complies with part 15 of the FCC Rules.
Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Precautions on Export

Check the "Precautions on Export" listed at the beginning of each of CKD catalogs.
General catalogs are also available on our website.

<When checking the pneumatic valve general catalog on the website>
Select "Pneumatic valve general" on the "General catalog" page following the URL below, and search for "Export" to display the corresponding page.
URL: https://www.ckd.co.jp/kiki/jp/general_catalog/

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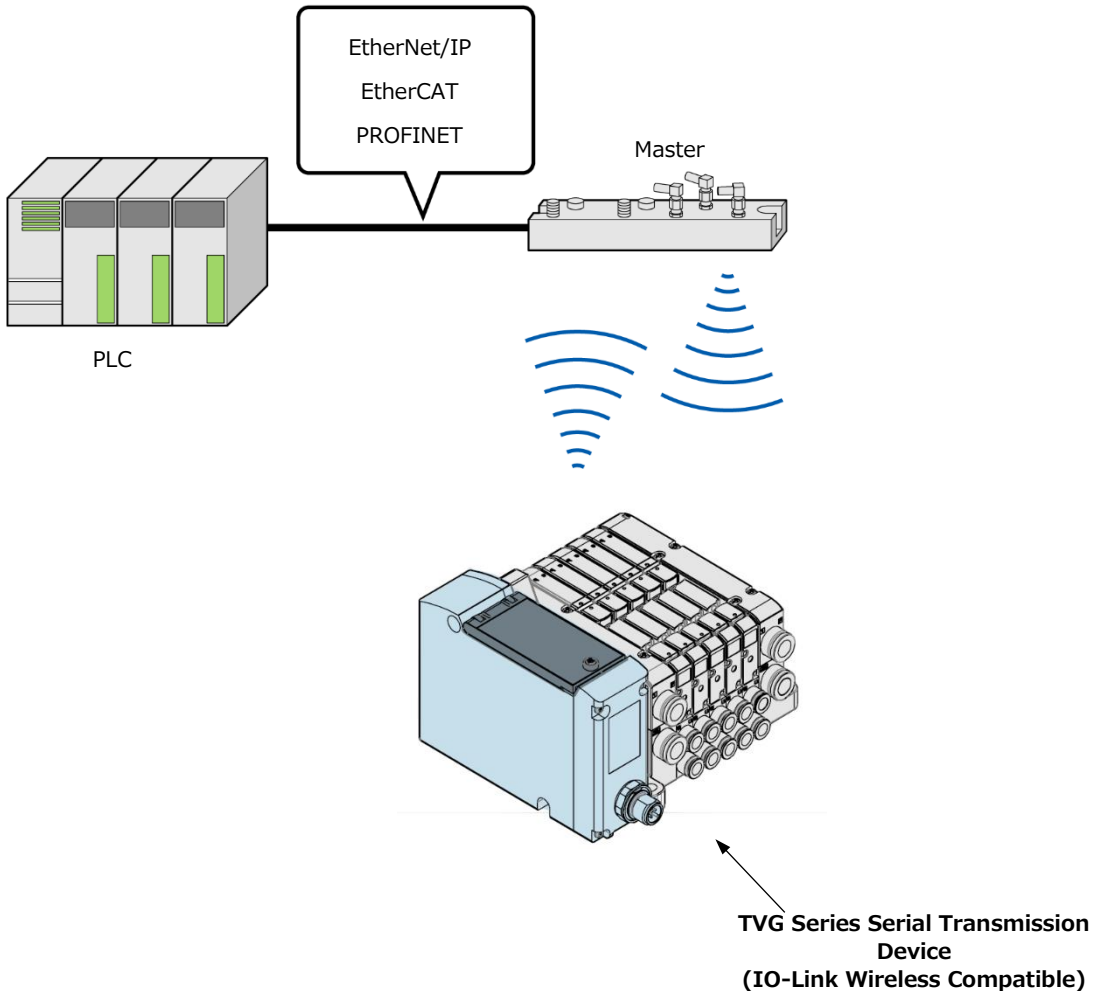
1. PRODUCT OVERVIEW

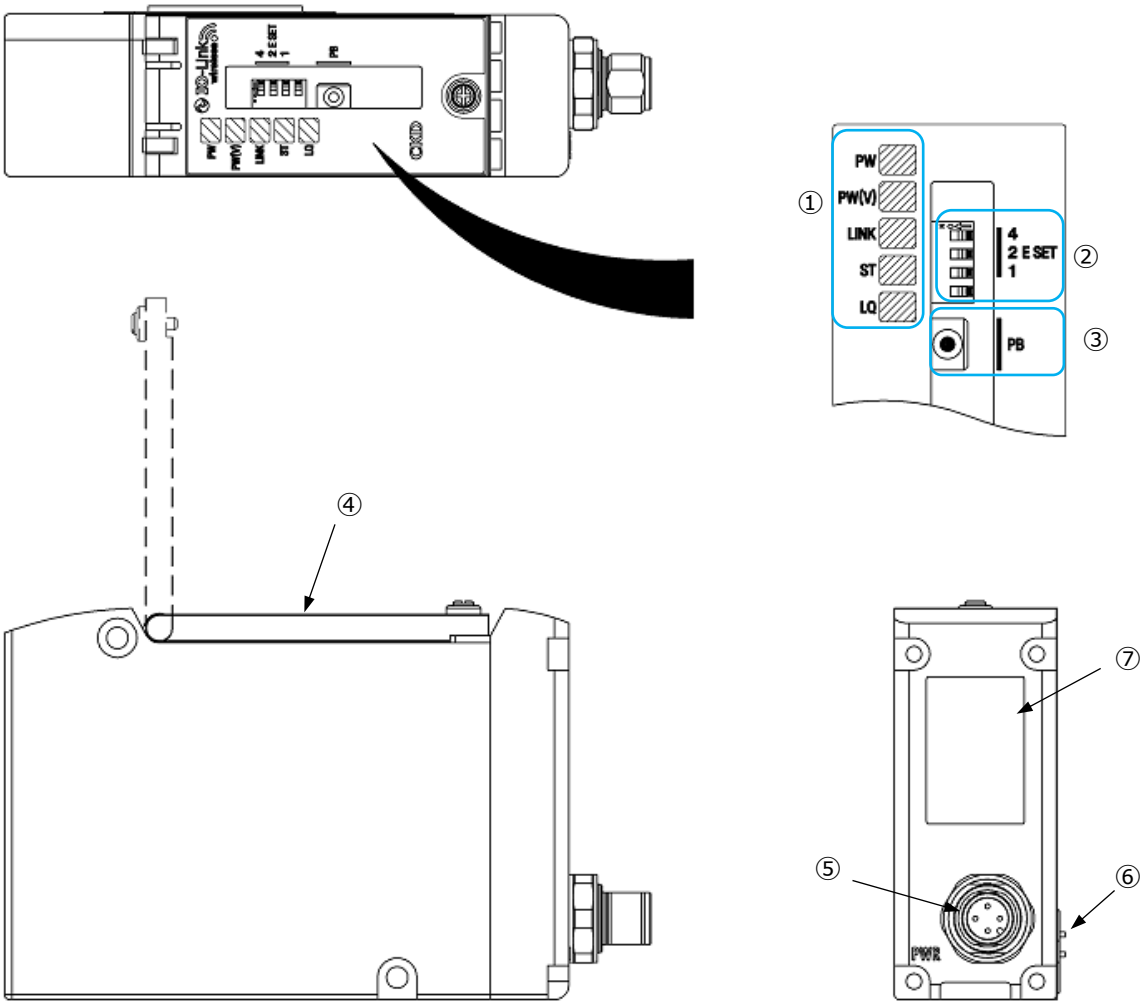
1.1. System structure

<The TVG Series Serial Transmission Device (IO-Link Wireless Compatible)>
This is a device that wirelessly connects valves, etc. used in equipment to the master. By mediating the master on Ethernet, it become possible to exchange information between the valve and the higher-level control device.

- Company names and product names mentioned herein are trademarks or registered trademarks of each company.



1.2. Part Name



No.	Name	Description
①	LED indicator	Indicates the status of the product and the network with PW, PW(V), link, ST, LQ.
②	DIP switch	Sets the valve operation at communication error.
③	Pairing button	Performs pairing with the master and restarting of the product.
④	Cover	Protects LEDs, DIP switches and pairing buttons.
⑤	Unit/valve power plug (M12 x 1 port (PWR) A code)	Connects the unit/valve power cable.
⑥	Valve connect connector	Connects the product to the valve.
⑦	Unique ID	This is the number used by the master to identify the product.

1.2.1. LED

There are five LED indicators: PW, PW(V), LINK, ST, and LQ.
Refer to the following table for details.

<LED indicator>

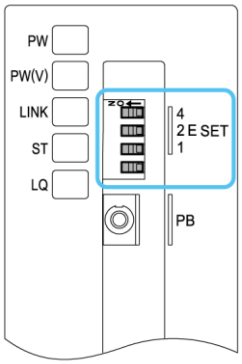
Item	LED	Status
PW	Green off	Unit power OFF
	Green on	Unit power ON
PW(V)	Green off	Valve power OFF
	Green on	Valve power ON
LINK	Green off	Unit power OFF
	Green blinking	Establishing communication
	Green on	Communication not established
ST	Red off	Normal status
	Red blinking	Maintenance required **Note 1**
	Red on	Error **Note 1**
LQ	All off	Unit power OFF or communication not established
	Green on	Communication quality "Good"
	Yellow on	Communication quality "Average"
	Red on	Communication error

Note 1: In the event of a simultaneous occurrence, prioritizes and indicates "Error".

1.2.2. DIP switch

DIP switch sets the output when an IO-Link Wireless communication (hereafter communication) error occurs.

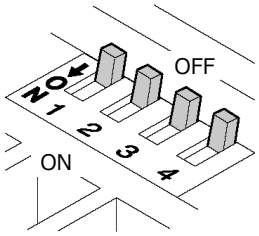
There are two ways to set the output at communication error: Hardware mode using DIP switch and software mode using parameters.



DIP switch

In the cover

<DIP switch>

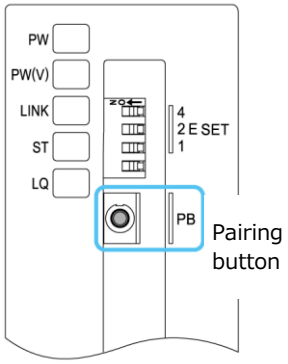
Appearance	No.	Content	Description
	1	E SET 4	For details, refer to **<Output settings at communication error>**
	2	E SET 2	
	3	E SET 1	
	4		

<Output settings at communication error>

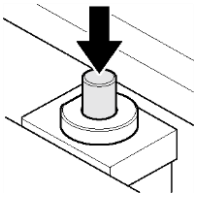
E SET			Mode	Valve operation at communication error
4	2	1		
OFF	OFF	OFF	Hardware mode	All points OFF
	OFF	ON		Final output data (including forced output)
	ON	OFF		All points ON
	ON	ON		The last received ProcessDataOut value
ON	Reserved	Reserved	Software mode	Value Setting at Communication Error Value set in "4.3. On-request Data (Service data)"

1.2.3. Pairing button

Long-press the pairing button to pair with the master or restart the product.



<Pairing button>

Appearance	Press time (s)	Operation
	0 < .... ≦ 3	Does not operate
	3 < .... ≦ 10	Requests pairing to master
	10 < .... ≦ 30	Does not operate
	30 <	Restarts

<When conducting pairing>

After putting the master in the receiving status for pairing, long-press the pairing button on the product to request pairing.
For the operation method of the master, refer to the Instruction Manual of the master.

2. Installation

This section describes the precautions to be taken in the installation environment and method in order to use the product correctly.

DANGER

Do not use the product in the presence of hazardous materials such as ignitable, flammable, and explosive things.

- It may cause fire, other things to catch fire, or an explosion.

Do not work with wet hands.

- There is a risk of electric shock.

Prevent water and oil from splashing onto the product.

When mounting the product, secure the workpiece while steadily holding the product and the workpiece.

- Tipping, falling, or abnormal operation of the product may result in injury.

For the power, use a regulated DC power supply (DC24V ± 5%).

- Connecting directly to an AC power supply may cause fire, bursting, or damage.

In accordance with "JIS B 9960-1:2019(IEC 60204-1:2016) Safety of machinery - Electrical equipment of machines - Part 1: General requirements", an overcurrent protection device (such as a circuit breaker for wiring or a circuit protector) should be installed on the primary power supply of wiring.

Reference: Excerpt from JIS B 9960-1:2019 "7.2.1 General Information"
Overcurrent protection shall be provided where the circuit current may exceed the rated value of the component or the allowable current of the conductor, whichever is smaller. Details of the rated value or set value to be selected are provided in section 7.2.10.

WARNING

Do not mount the product to combustible materials.
- Mounting to or near combustible materials may cause fire.

Do not place or insert heavy objects on the cable.
- If the cable sheath is torn or excessive stress is applied to it, it may lead to poor conduction and insulation deterioration.

Do not use nor store it in the presence of strong electromagnetic waves or radiation.
- It may cause malfunction or failure.

Do not tip over, vibrate, or apply shock while transporting because precision devices are built in it.
- It may cause damage to parts.

Do not disassemble or modify the products other than those specified in this manual.
- This may not only pose a risk of injury, malfunction or failure, but also cause the product to fail to meet the specifications such as this Instruction Manual.

If the machine stops in the event of system abnormality such as an emergency stop and power outage, design safety circuits or safety devices to prevent damage to equipment, personal injury, etc.

The wiring of the product should be checked in this Instruction Manual or in the relevant instruction manual to ensure that there are no wiring errors or loose connectors.
- There is a risk of abnormal operation and overcurrent flow. Excessive current may cause abnormal operation, damage, or fire.

Check that the wiring is insulated.
- There is a risk of abnormal operation and overcurrent flow. Excessive current may cause abnormal operation, damage, or fire.

Make sure there is no contact with other lines, earth faults, or insulation failure between terminals.
- There is a risk of abnormal operation and overcurrent flow. Excessive current may cause abnormal operation, damage, or fire.

Mount in a dry area indoors.
- Damp areas can cause electrical leakage or fire.

CAUTION

Do not use it in environments where ferromagnetic fields are generated.
- It may cause malfunction.

Do not perform voltage resistance tests or insulation resistance tests on the device to which the product is mounted.
- In terms of circuit design, the product will be damaged if voltage resistance tests and insulation resistance tests are performed on the equipment to which the product is mounted. If voltage resistance tests or insulation resistance tests are required as a device, remove the product before performing it.

Do not save nor store it in atmospheres exposed to ultraviolet rays, corrosive gases, salts, etc.
- It may cause performance deterioration and deterioration of strength due to rust.

Do not install it in a location where large vibration or shock is transmitted.
- Transmission of large vibration or shock may cause malfunction.

Do not use in places where condensation occurs due to sudden changes in ambient temperature.
- It may cause malfunction or deteriorate its strength.

Do not hold any moving parts or cables of the product during transportation or mounting.
- It may cause injury or disconnection.

Do not bend the fixing cable repeatedly.
- Use movable cables for repeated bending.

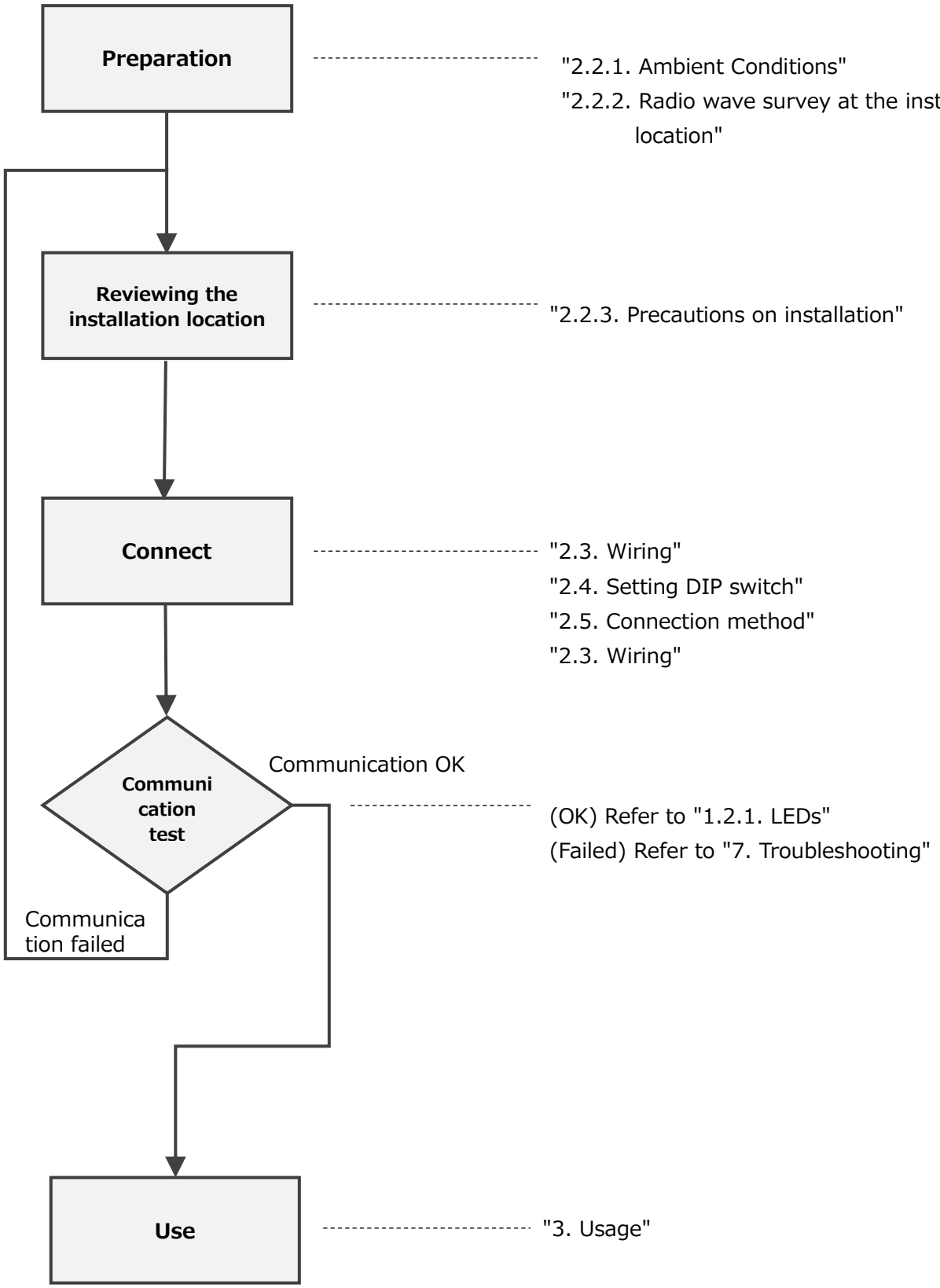
Make sure that no inductive noise is applied to the wiring.
- Avoid places where high currents and ferromagnetic fields are generated.
- Do not use the same piping/wiring (by multicore cable) with large motor power lines other than the product.
- Do not use the same piping/wiring with the inverter power and wiring parts used for robots, etc. Apply frame ground to the power.

Secure space necessary for maintenance and inspection.
- If not secured, maintenance and inspection will not be possible, and it may cause the equipment to stop or result in it getting damaged, or cause injury.

It is the responsibility of the customer to confirm compatibility of the product with any system, machinery, or device used by the customer.
- If the power is shared, surge currents may be applied to the output parts and may cause damage.
  If it is not possible to use a separate power supply, connect the surge absorbing element directly in parallel to all inductive loads.

2.1. Procedures to implement the wireless device

Complete the following procedures to implement the product:

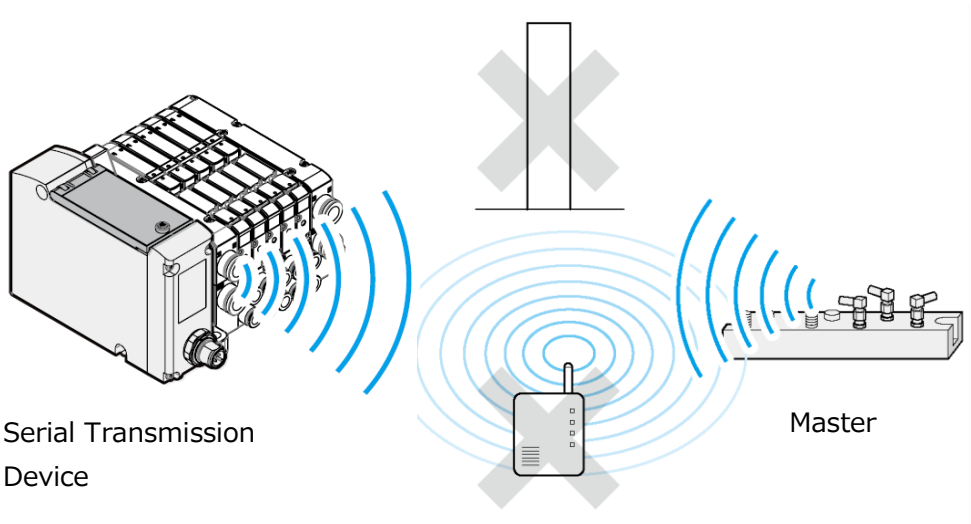


2.2. Environment

2.2.1. Ambient conditions

Install the product in a location that meets the following requirements:

- Install the product in the place where no radio wave interference object is present nearby or at the location not surrounded by radio wave interference object.
  If there is a radio wave interference object between the product and the master, the communication distance will be reduced.
  <Major radio wave interference objects>Metal plate, metal piping, metal shelves, reinforced concrete, people, water, etc.
- A location where there are no devices transmitting or receiving radio waves nearby, such as transceivers.



Devices that transmit or receive other radio waves.

- A location where there are no devices or equipment nearby that may malfunction due to radio waves from the product.

2.2.2. Radio wave survey at the installation location

■ Survey of other radio systems

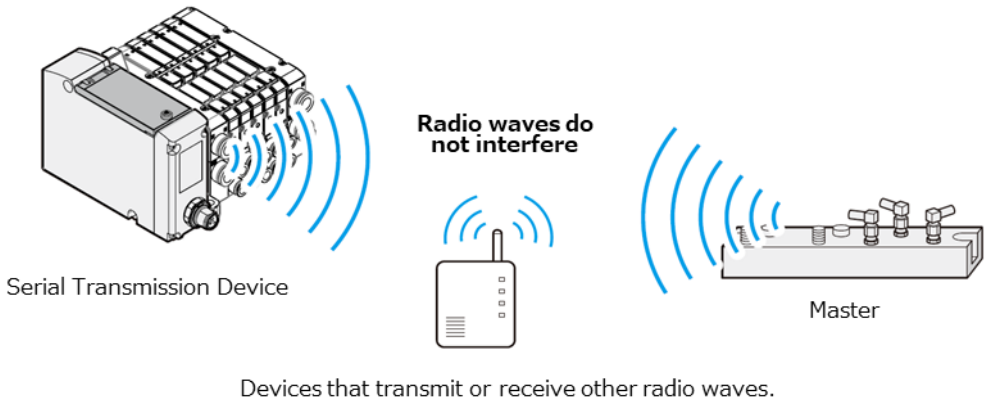
Check that there are no other radio systems using 2.4 GHz band at the installation location of the product.
If another radio system is installed, check the communication channel, communication frequency, etc. to ensure that it can coexist with the product.

<Example of other radio systems>
Wireless LAN, Bluetooth, ZigBee, etc.

■ Confirmation when using multiple radio systems

<Construction method of multiple radio systems>

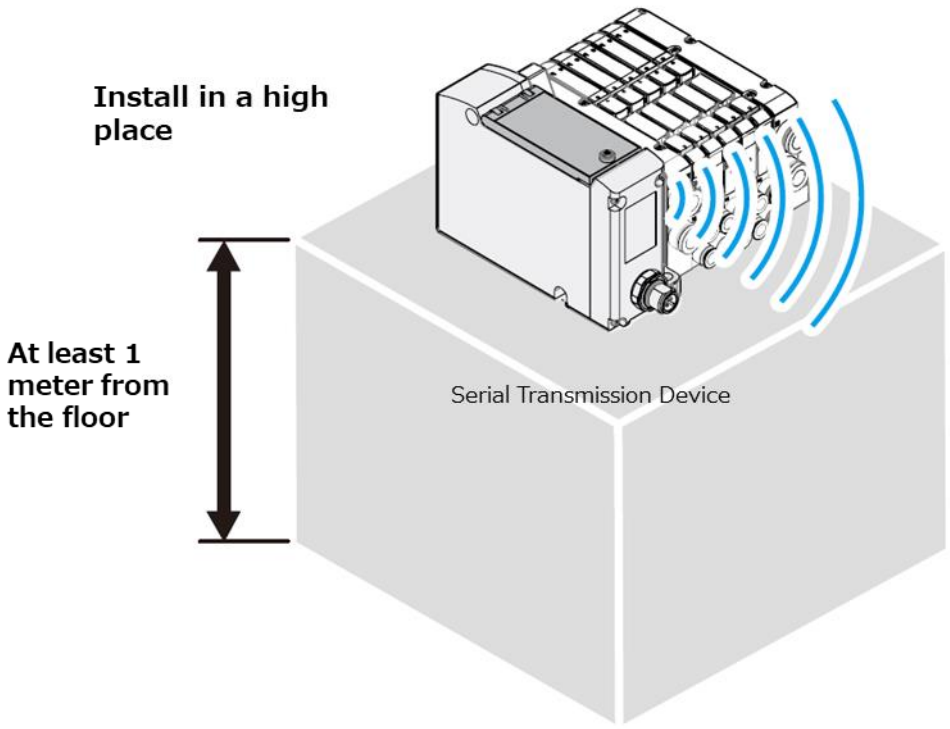
- Use the blacklisting function to separate communication channels.
  For details, refer to the Instruction Manual of the master.
- Use it at a distance of at least 10 meters from other radio systems.



2.2.3. Precautions on installation

To maximize the wireless performance of the product, install the product to be in the following conditions:

- **Install the product in a position where the antenna of the master can be seen**
  It is difficult for radio waves to wraparound where the antenna cannot be seen.
- **Install the product in a high place**
  Install the product away from the floor to send radio waves farther.
  (It is recommended to separate it at least 1 meter.)



2.3. Wiring

WARNING

Do not touch the charging part with your bare hands.
- There is a risk of electric shock.

Wire the power cables after the device has been mounted.
- It may cause electric shock.

Wire the power cables after the power supply to be connected is OFF.
- An electric shock may occur by touching the electrical wiring connection.

The wiring must be done by professional engineers.

Thoroughly read and understand this Instruction Manual before working on electrical wiring.

CAUTION

Secure a sufficient bending radius for the power cable and do not bend it forcibly.

Take measures against lightning surges on the device side.
- The product has no resistance to lightning surges.
- AC voltage models must be used in an installation category II environment.

Insert the connector correctly to prevent the connecting of the power cable from becoming loose or disconnected.
- It may cause fire, electric shock accidents, or malfunction of the devices.

Check the working voltage and polarity before wiring.
- Incorrect wiring may cause a failure.

Calculate the current consumption to select the power cable.
- Heat may be generated or damaged during operation.

Do not apply tension or shock to the power cable.
- If the wiring is long, the cable weight or shock may cause an unexpected force and result in damage to the connector or device. Take appropriate measures; for example, secure the wiring to the machine or device midway.

CAUTION

When wiring, be careful of the following points to prevent problems caused by noise.

- If noise could have an effect, prepare power for each manifold solenoid valve and wire independently.
- Do not make the power cables unnecessarily long. Wire the power cable as short as possible.
- Separate the power wiring of the product from the wiring of the devices that generate noise such as inverter motor.
- Wire the power cable separated from other power lines as much as possible.

Wire the power cable properly within its specifications.

- Incorrect wiring may cause damage or malfunction of the product.

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.

Install a terminal block when multi-drop wiring of the power cables is needed.

2.3.1. Connecting power cable

Follow the procedures below when connecting the power cable to the product:

CAUTION

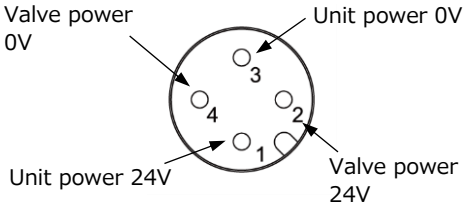
- Connecting the unit/valve power connector with the power supply ON may cause the system to operate suddenly.

1. Power OFF

Switch the power supply OFF.

2. Pin wiring of power connector

Wire the 24V wire of the unit/valve power cable to the 24V terminal of the power connector and the 0V wire to the 0V terminal, as shown in the table below.

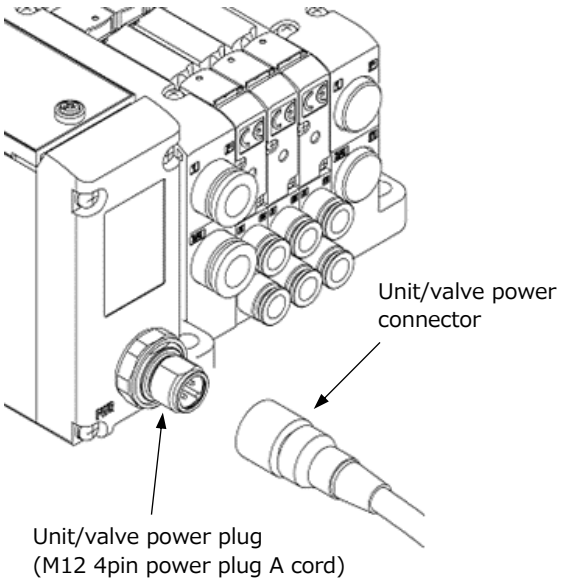
Pin wiring diagram	Port	Pin	Function
	PWR	1	Unit power 24V
		2	Valve power 24V
		3	Unit power 0V
		4	Valve power 0V

3. Connecting unit/valve power connector

Connect the pin-wired unit/valve power connector to the unit/valve power plug.

(Appropriate tightening torque: 0.45 N·m) Note 1

Note 1: The tightening torque is different depending on the connector used. Check the connector manufacturer.

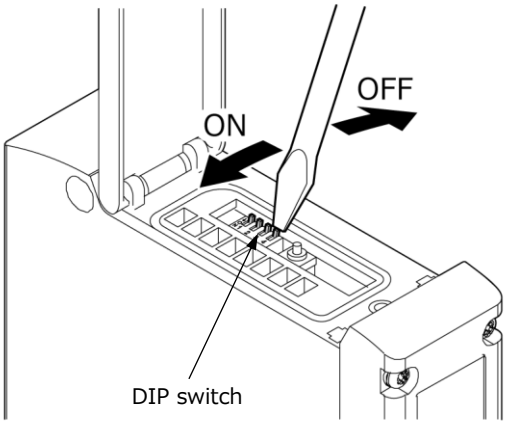


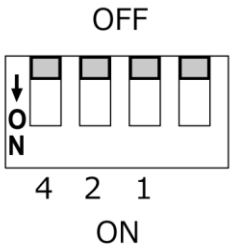
2.4. Setting DIP switch

- Do not use sharp objects to switch the DIP switch.

1. Setting DIP switch

Set the DIP switch by switching it with a flat blade screwdriver.
For the settings, refer to "**1.2.2. DIP switch**".





2. Turn OFF-ON (restart) the power

2.5. Connection method

Before using the product, check that it is connected through a communication test.

2.5.1. Connecting with pairing button

The product and the master can be connected easily with the pairing button.
For the press time and operation details, refer to "**1.2.3. Pairing button**".

1. Master power ON

Turn the master power ON.

2. Turn the power of the product ON

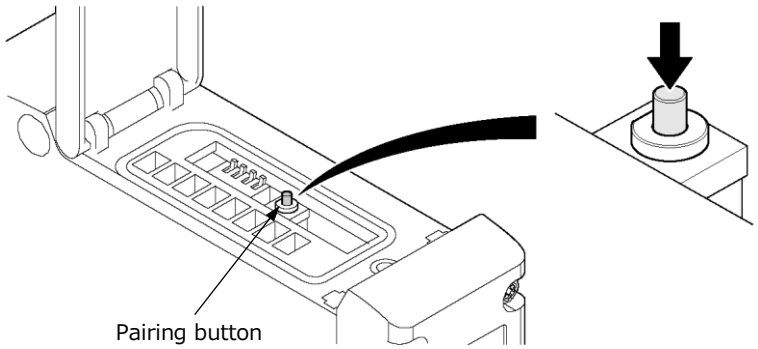
Turn the power of the product ON.

3. Start pairing the master

Put the master in the receiving status.
For the pairing button of the master, refer to the Instruction Manual of the master.

4. Start pairing the product

Long-press the pairing button on the product for at least 3 seconds to pair with the master.



- Do not long-press for more than 30 seconds because the product will restart.
- The amount of time it takes until the pairing button must be pressed on the product from when the master is ready to be paired is different depending on the specifications of the master.

5. Connection completed

The connection between the product and the master is completed.

2.5.2. Connecting by master tool

Conduct pairing using the master setting tool.
For details on the setting methods, refer to the Instruction Manual of the master.

1. Start the tool

Start the tool you use.

2. Set with the tool

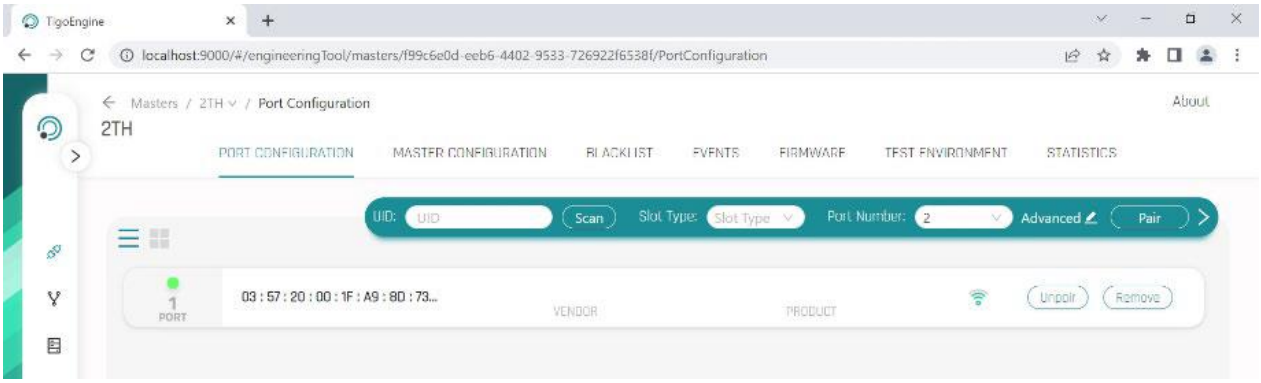
Input the necessary information and set with the tool.

3. Turn the power of the product ON

Turn the power of the product ON.

4. Connect to the master

Use the tool to pair the master with the product.



5. Connection completed

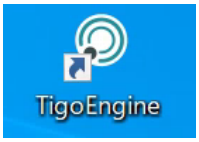
The connection between the product and the master is completed.

- It is also possible to set and connect the UniqueID from the PLC. For details, refer to the Instruction Manual of the master.

An example is shown with TigoEngine of CoreTigo.
For details, refer to the Instruction Manual of TigoEngine.

1. Start TigoEngine

Start the tool.



2. Set with the tool

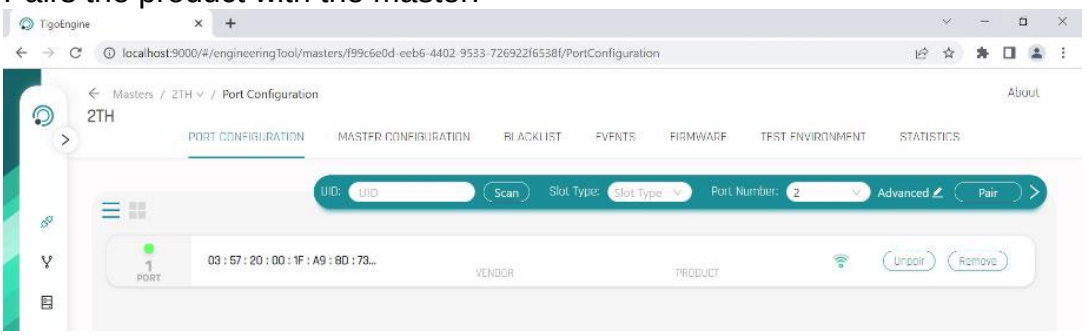
Input the necessary information and set with the tool.

3. Turn the power of the product ON

Turn the power of the product ON.

4. Connect to the master

Pairs the product with the master.



5. Connection completed

The connection between the product and the master is completed.

3. USAGE

WARNING

Consult CKD about the specifications before using the product outside the designated specifications or for a special application.

CAUTION

Thoroughly read and understand the instruction manual for the network system to be used before using the product.

Be careful of the surroundings and ensure safety before turning the power on or off.
- The system may operate suddenly.

Before touching the device, discharge static electricity from your body.
- Static electricity may cause damage to the product.

Set switches while the unit power is turned off.
- The switch settings are read when the power is turned on, so changes to the settings after the power is turned on are not recognized.

Keep the cover of the setting switch closed at all times except when setting the switches.
- Failing to do so may result in unexpected faults such as the cover getting damaged or foreign objects entering the interior through the cover part.

Be careful not to allow any foreign matter to enter inside when setting the switches.
- Unexpected failure may result.

Do not handle switches roughly.
- Switches are precision devices and can be easily damaged.

Do not touch the internal circuit board when setting the switches.
- The internal circuit board can be easily damaged.

3.1. When using PLC

The product can be operated from a PLC.
The master tool can also read and write the parameters of the product. (Refer to 3.2 “Reading and Writing Parameters using the Master Tool)

The procedures for use are as in the table below.

No.	Procedure	Reference
①	Connection between the PLC and the master	3.1.1 Setting network 3.1.2 Setting Input/Output
②	Setting PLC	3.1.3 Creating global variables
③	Process data registration for the device unit	3.1.4 Registering process data
④	Ladder program creation in PLC	3.1.5 Creating process data

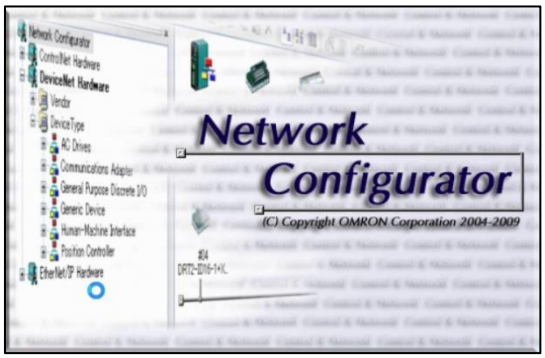
This Instruction Manual describes specific procedures using OMRON PLC compatible to Ethernet/IP.

3.1.1. Setting network

An example is shown with OMRON NJ Series. It is only required when the setting is integrated online.
When adding to an existing network, be careful not to delete the existing settings.

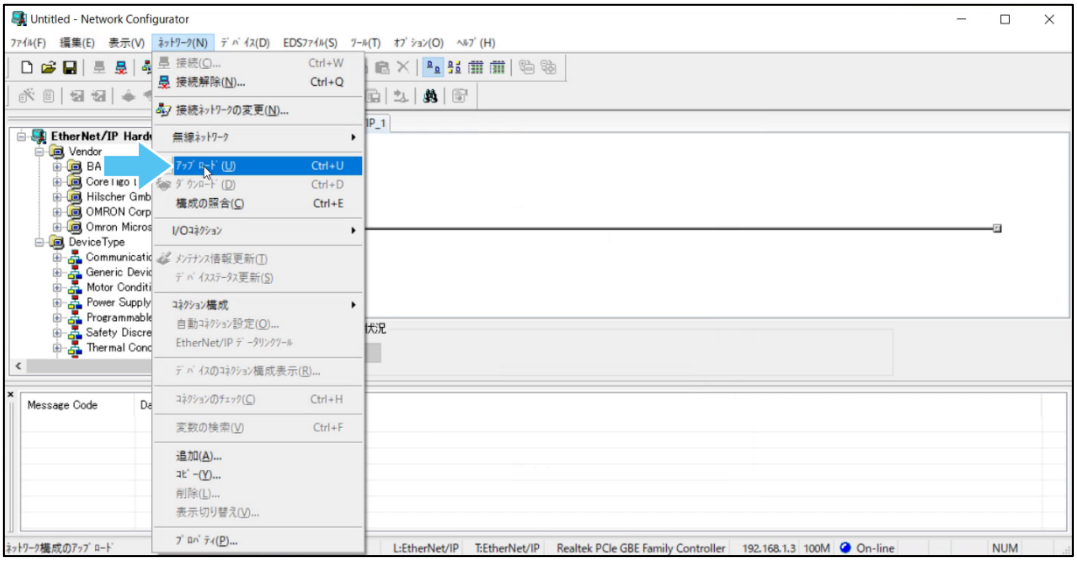
1. Start Network Configurator software

Start the software.



2. Uploading network

Upload the network.



3. Checking connection

Check that the settings have been integrated correctly and that they are completed.

3.1.2. Setting Input/Output

Set Input/Output tags.

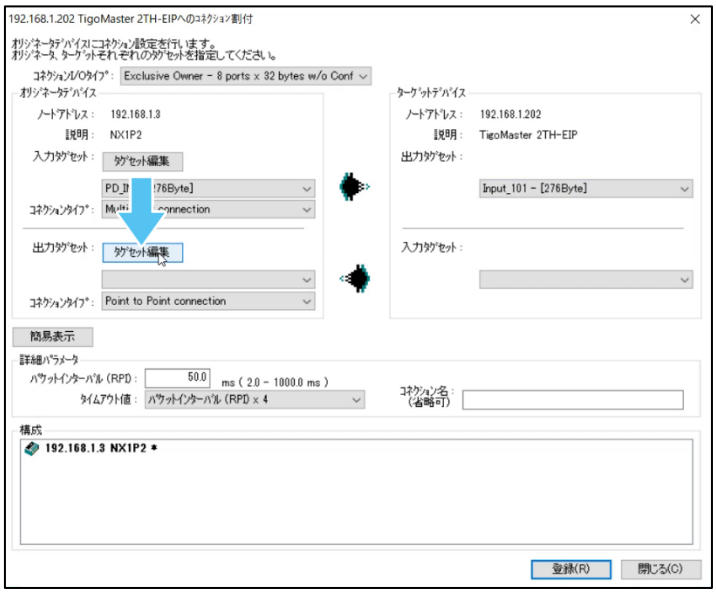
1. Setting input tag

Set each item in the connection's allocation window and click [Register].
When registered, click [Close] to close the window.

Item	Content
Tag name	Please enter a tag name of your choice
Size	Please enter the applicable size

2. Setting output tag

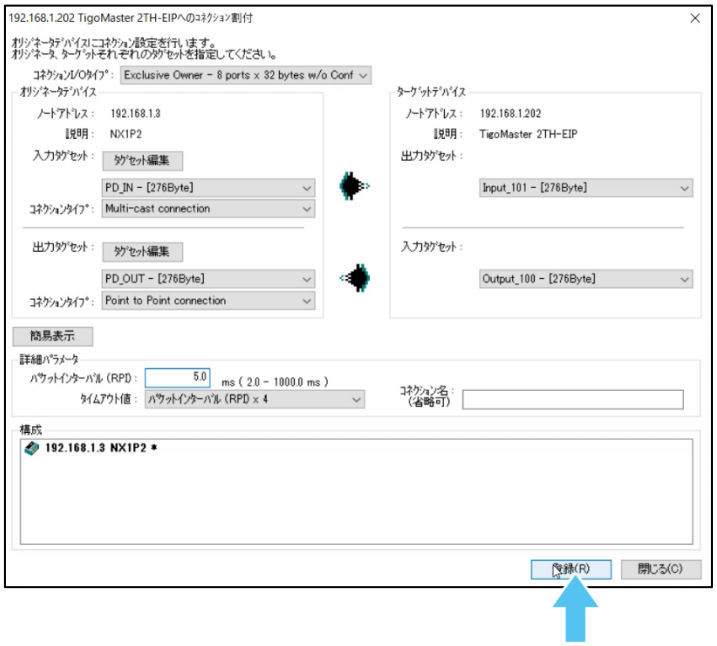
Set the output tags as in procedure 1.



Item	Content
Tag name	Please enter a tag name of your choice
Size	Please enter the applicable size

3. Allocating connections

Set each item in the connection's allocation window and click [Register].
When registered, click [Close] to close the window.



4. Transferring setting data to PLC

Transfer setting data to PLC.

- Depending on the settings on [Connection I/O Type], pairing is required again when the power of the product is on again.

3.1.3. Creating global variables

Use Sysmac Studio software to set Input/Output data areas.

1. Starting Sysmac Studio software

Start Sysmac Studio software and select a project.

2. Displaying global variables window

Click "Global Variables" in the side menu.

3. Inputting global variable (input)

Click Global Variables window and input the global variable.

Item	Content
Name	PD_IN
Data type	ARRAY[0..275] OF BYTE (Align the size with the ones set as the tag.)
Network release	Input
Comment	PDinput

4. Inputting global variable (output)

Click Global Variables window and input the global variable.

Item	Content
Name	PD_OUT
Data type	ARRAY[0..275] OF BYTE (Align the size with the ones set as the tag.)
Network release	Output
Comment	PDoutput

3.1.4. Registering process data

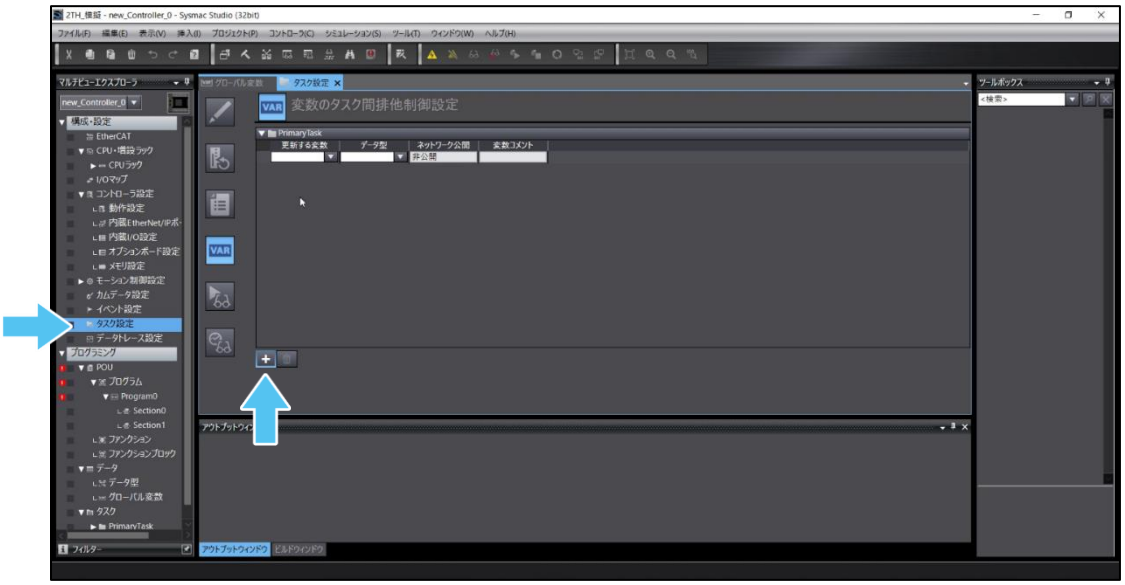
Register process data.

1. Displaying task settings window

Click "Task Settings" in the side menu.

2. Adding process data

Click [+] to add.



3. Setting process data (input)

Click "Variables to update" and select "PD_IN" to set it.

4. Setting process data (output)

Set "PD_OUT" as in procedure 3.

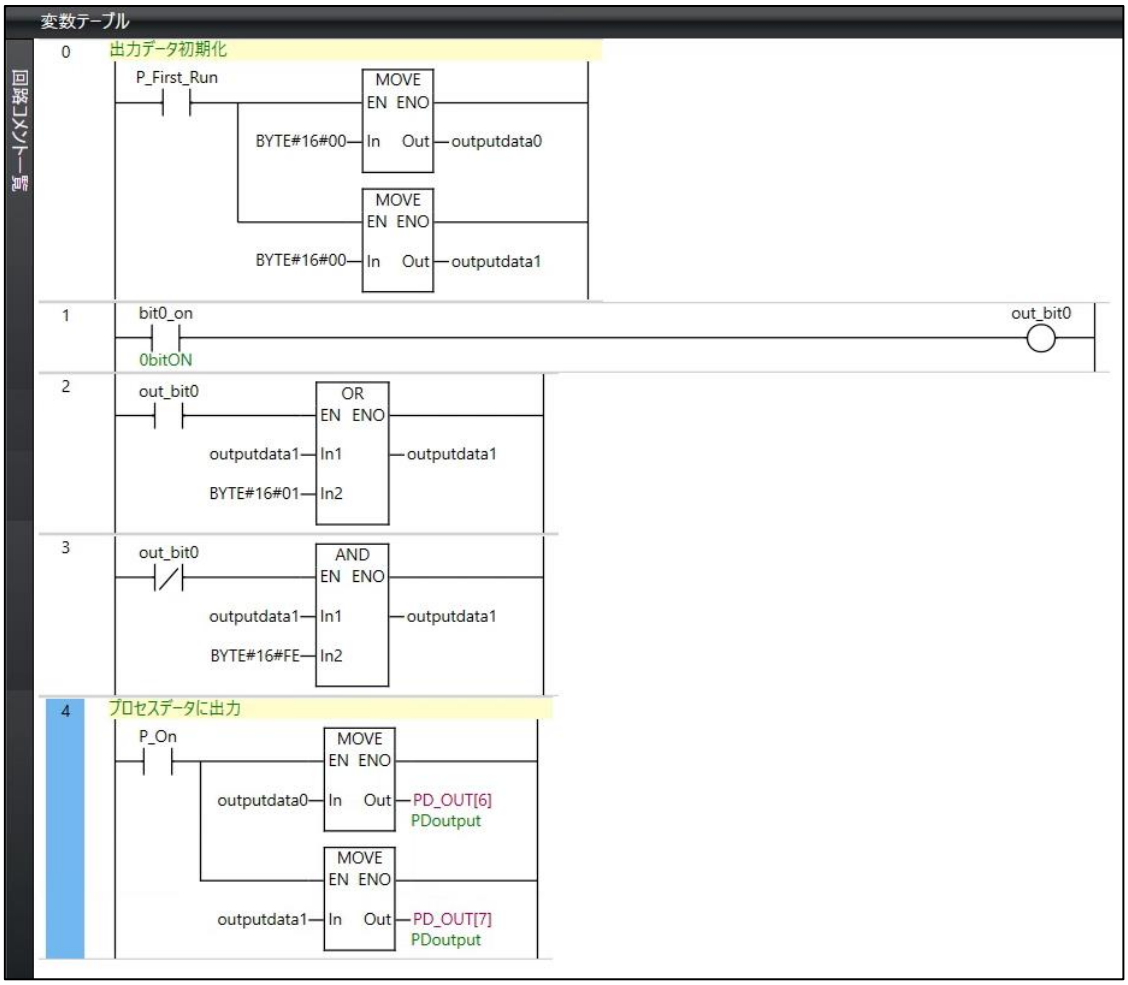
- When setting the process data, be careful to match the size and the tag name created in 3.1.2 "Input/Output Settings".

3.1.5. Creating process data

Create process data (output/input) in PLC.

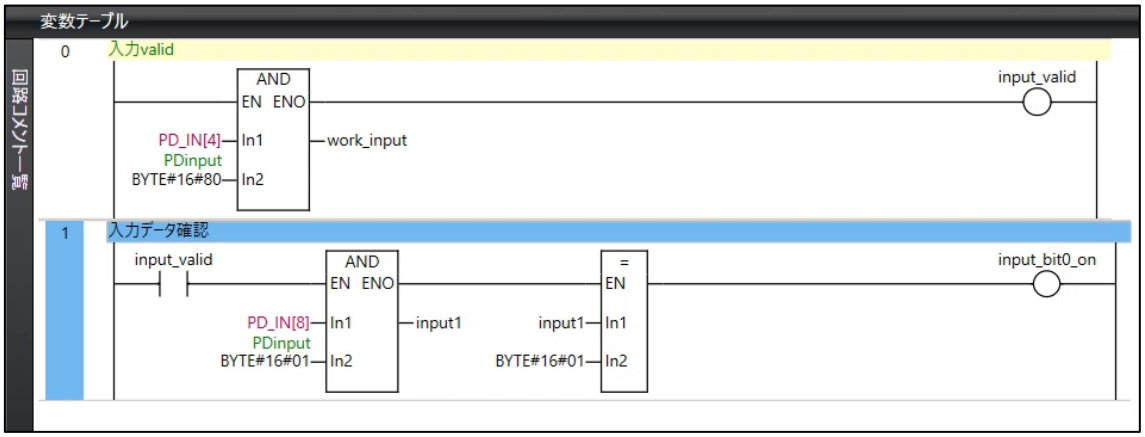
1. Creating process data (output)

Refer to the figure below and create process data (output) in the variable table.



2. Creating process data (input)

Refer to the figure below and create process data (input) in the variable table.



3.2. Reading and writing data using master tool

The master tool can also read and write the data (parameters) of the product.
For details on the operation method, refer to the Instruction Manual of the master.

1. Start the tool

Start the tool you use.

2. Connect to the master

Connect to the master.

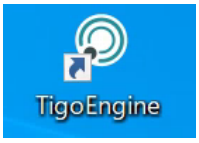
3. Reading out or writing in parameters of the product

Read out or write in the data necessary.

An example is shown with TigoEngine of CoreTigo.
For details, refer to the Instruction Manual of TigoEngine.

1. Start TigoEngine

Start the tool.

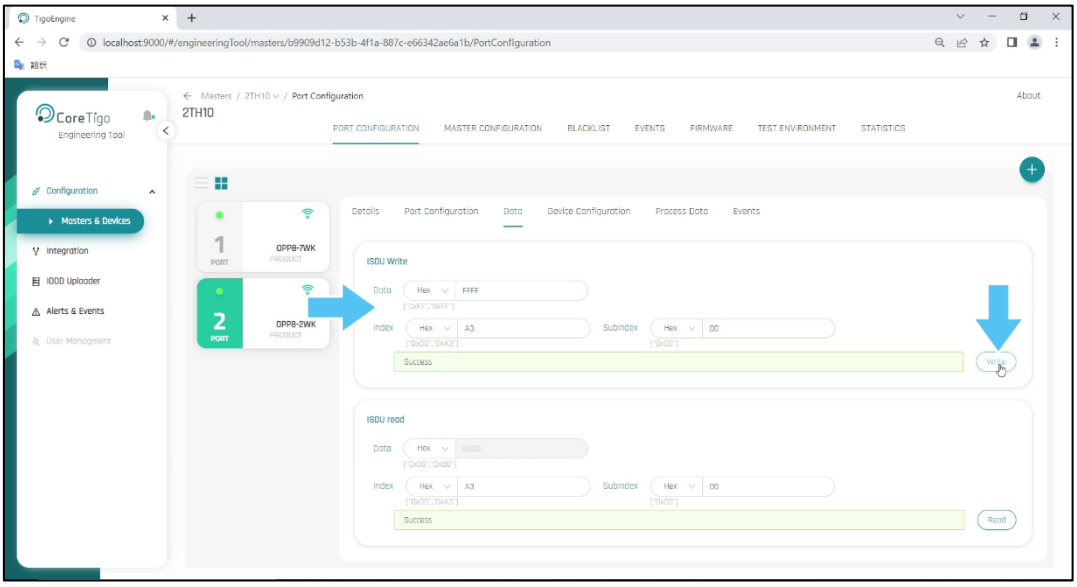


2. Connect to the master

Input the master information in the Master Connection window.
After inputting the information, click [Connect].

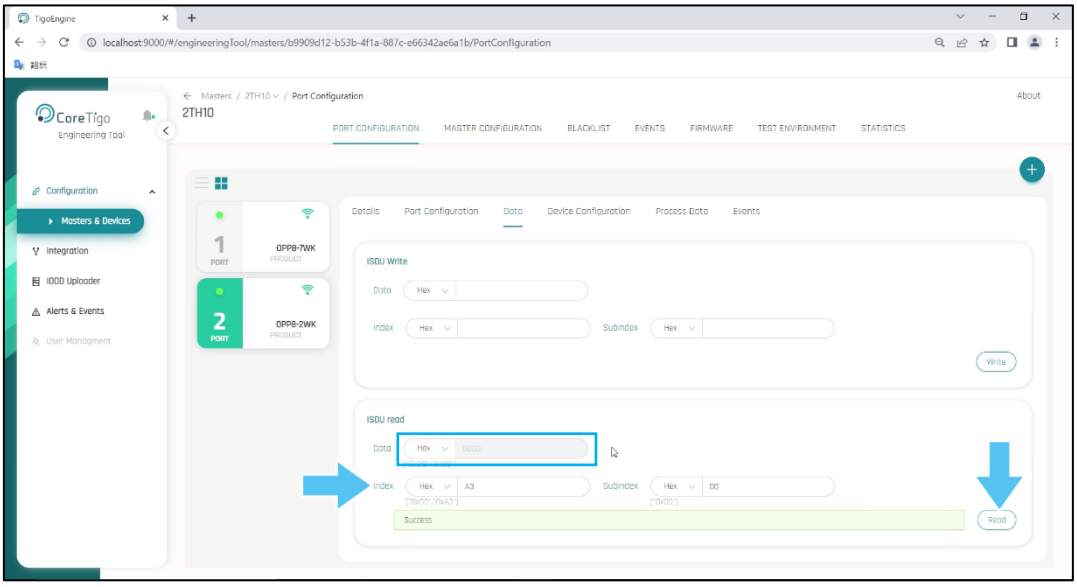
3. Writing in parameters

Enter [Date], [Index], and [Subindex] in the ISDU Write and click [Write].
If writing in is successful, [Success] is displayed in the message field.



4. Reading out parameters

Enter [Index]「 and [Subindex] in the ISDU read and click [Read].
If read out is successful, the Date registered in procedure 3 is displayed in [Date].



4. IO-LINK WIRELESS COMMUNICATION DATA

The product responds to messages from the master through communication.

<Communication data>

Data	Period	Content
ProcessData	Periodic	Cyclic data Receive valve output data from master (ProcessDataOut)
On-Request Data (Service data)	Non-periodic	Read and write the product parameters
On-Request Data (Event)		Indicate errors, warnings, and notifications

4.1. IODD file

4.1.1. Obtaining IODD file

This is a file that describes the communication specifications of IO-Link device.

For information on the method to install the IODD file, refer to the instruction manual of the master manufacturer.
Use the latest IODD file to configure a suitable network.

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

4.1.2. IODD file name

Refer to the following table for IODD files.

<List of model number>

Number of points	Output type	Product model number	IODD file name
Output 32 points	NPN	OPP8-A2WK	CKD-OPP8-2WK
	PNP	OPP8-A2WK-P	CKD-OPP8-2WK-P

※ “-yyyymmdd-IODDvvv” is indicated at the end of each IODD file name.
yyyy: Year (AD, 4 digits)
mm: Month
dd: Day
vvv: IO-Link version (currently “1.1”)

4.2. Process Data

Products with valve outputs only are ProcessDataOut only.

■ OPP8-A2WK

<Number of output points: 32 points output (ProcessDataOut)>

The byte sequence is set sequentially, starting with data [0] and ending with [3].

ProcessDataOut																
Data	**[3]**								**[2]**							
Bit	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7
Data name	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	Valve outputs 0-15															
Data range	0x0000 to 0xFFFF															
Format	Boolean															
Data	**[1]**								**[0]**							
Bit	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7
Data name	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
	Valve outputs 16-32															
Data range	0x0000 to 0xFFFF															
Format	Boolean															

4.3. On-Request Data (Service data)

Refer to the following table for details on the parameters used for On-Request Data.

<List of parameter command>

Index (dec)	Item	Access	Data length	Format	Data	DS
0x0000	DirectParameter Page1	R	**Note 1**	RecordT	**Note 1**	
0x0002	SystemCommand	W	1octet	UIntegerT	-	
0x0003	DataStorage	R/W	Variable	RecordT	-	
0x0010(16)	VendorName	R	max. 64octets	StringT	CKD Corporation	
0x0011(17)	VendorText	R	max. 64octets	StringT	https://www.ckd.co.jp/kiki/jp/	
0x0012(18)	ProductName	R	max. 64octets	StringT	**Note 2**	
0x0013(19)	ProductID	R	max. 64octets	StringT	**Note 2**	
0x0014(20)	ProductText	R	max. 64octets	StringT	**Note 2**	
0x0015(21)	SerialNumber	R	max. 64octets	StringT		
0x0016(22)	HardwareRevision	R	max. 64octets	StringT	1.0	
0x0017(23)	FirmwareRevision	R	max. 64octets	StringT	2.01	
0x0018(24)	ApplicationSpecific Tag	R/W	Min.16,max. 32octets	StringT	**********	○
0x0020(32)	ErrorCount	R	1octet	UIntegerT	-	
0x0024(36)	DeviceStatus	R	2octets	UIntegerT	-	
0x0025(37)	DetailedDevice Status	R	60octets	Array of 3 Octetstring	All octets 0x00: Error/Warning No Octet 1: EventQualifier Octet 2,3: EventCode	
0x0028(40)	ProcessData Input	R	PD length	Device specific	Subindex=0 only	
0x0029(41)	ProcessData Output	R	PD length	Device specific	Subindex=0 only	

Note 1: The format of the values for each item is in accordance with the provisions of IO-Link.
Note 2: Refer to P47 for Product Name, Product ID, and Product Text.

<SystemCommand>

Command	Command Name
0x80(128)	Device Reset
0x81(129)	Application Reset
0x82(130)	Restore factory settings
0x83(131)	Back to box
0xA0(160)	Output Off_On Cycles Reset 0
0xA1(161)	Output Off_On Cycles Reset 1
0xA2(162)	Output Off_On Cycles Reset 2
0xA3(163)	Output Off_On Cycles Reset 3
0xA4(164)	Output Off_On Cycles Reset 4
0xA5(165)	Output Off_On Cycles Reset 5
0xA6(166)	Output Off_On Cycles Reset 6
0xA7(167)	Output Off_On Cycles Reset 7
0xA8(168)	Output Off_On Cycles Reset 8
0xA9(169)	Output Off_On Cycles Reset 9
0xAA(170)	Output Off_On Cycles Reset 10
0xAB(171)	Output Off_On Cycles Reset 11
0xAC(172)	Output Off_On Cycles Reset 12
0xAD(173)	Output Off_On Cycles Reset 13
0xAE(174)	Output Off_On Cycles Reset 14
0xAF(175)	Output Off_On Cycles Reset 15
0xB0(176)	Output Off_On Cycles Reset 16
0xB1(177)	Output Off_On Cycles Reset 17
0xB2(178)	Output Off_On Cycles Reset 18
0xB3(180)	Output Off_On Cycles Reset 19
0xB4(181)	Output Off_On Cycles Reset 20
0xB5(182)	Output Off_On Cycles Reset 21
0xB6(183)	Output Off_On Cycles Reset 22
0xB7(184)	Output Off_On Cycles Reset 23
0xB8(185)	Output Off_On Cycles Reset 24
0xB9(186)	Output Off_On Cycles Reset 25
0xBA(187)	Output Off_On Cycles Reset 26
0xBB(188)	Output Off_On Cycles Reset 27
0xBC(189)	Output Off_On Cycles Reset 28
0xBD(190)	Output Off_On Cycles Reset 29
0xBE(191)	Output Off_On Cycles Reset 30

Command	Command Name
0xBF(192)	Output Off_On Cycles Reset 31

Product Name	Product ID	Product Text
OPP8-2WK	OPP8-2WK	Outputs32 NPN Wireless
OPP8-2WK-P	OPP8-2WK-P	Outputs32 PNP Wireless

<Output> (Hereinafter, data length is bit)

Index (dec)	Item	Data length	Access	Sub Index	Bit	Subindex Name	Data	Content	DS
0x0040 (64)	Value Setting at Communication Error (OUT0-15)	32	R/W	1	16	Value Setting at Communication Error1	**Note 1**	Output settings at communication error (0-15)	○
				2	16	Value Setting at Communication Error2			
0x0041 (65)	Value Setting at Communication Error (OUT16-31)	32	R/W	1	16	Value Setting at Communication Error3	**Note 1**	Output settings at communication error (16-31)	○
				2	16	Value Setting at Communication Error4			
0x0044 (68)	Output Off_On Cycles	1024	R	1	32	Output Off_On Cycles 0	0 to 4294967295	Output Off_On cycle valve 0	
				2	32	Output Off_On Cycles 1	0 to 4294967295	Output Off_On cycle valve 1	
				3	32	Output Off_On Cycles 2	0 to 4294967295	Output Off_On cycle valve 2	
				4	32	Output Off_On Cycles 3	0 to 4294967295	Output Off_On cycle valve 3	
				5	32	Output Off_On Cycles 4	0 to 4294967295	Output Off_On cycle valve 4	

Index (dec)	Item	Data length	Access	Sub Index	Bit	Subindex Name	Data	Content	DS
0x0044 (68) **(Continued)**	Output Off_On Cycles	1024	R	6	32	Output Off_On Cycles 5	0 to 4294967295	Output Off_On cycle valve 5	
				7	32	Output Off_On Cycles 6	0 to 4294967295	Output Off_On cycle valve 6	
				8	32	Output Off_On Cycles 7	0 to 4294967295	Output Off_On cycle valve 7	
				9	32	Output Off_On Cycles 8	0 to 4294967295	Output Off_On cycle valve 8	
				10	32	Output Off_On Cycles 9	0 to 4294967295	Output Off_On cycle valve 9	
				11	32	Output Off_On Cycles 10	0 to 4294967295	Output Off_On cycle valve 10	
				12	32	Output Off_On Cycles 11	0 to 4294967295	Output Off_On cycle valve 11	
				13	32	Output Off_On Cycles 12	0 to 4294967295	Output Off_On cycle valve 12	
				14	32	Output Off_On Cycles 13	0 to 4294967295	Output Off_On cycle valve 13	
				15	32	Output Off_On Cycles 14	0 to 4294967295	Output Off_On cycle valve 14	
				16	32	Output Off_On Cycles 15	0 to 4294967295	Output Off_On cycle valve 15	
				17	32	Output Off_On Cycles 16	0 to 4294967295	Output Off_On cycle valve 16	
				18	32	Output Off_On Cycles 17	0 to 4294967295	Output Off_On cycle valve 17	
				19	32	Output Off_On Cycles 18	0 to 4294967295	Output Off_On cycle valve 18	
				20	32	Output Off_On Cycles 19	0 to 4294967295	Output Off_On cycle valve 19	

Index (dec)	Item	Data length	Access	Sub Index	Bit	Subindex Name	Data	Content	DS
0x0044 (68) **(Continued)**	Output Off_On Cycles	1024	R	21	32	Output Off_On Cycles 20	0 to 4294967295	Output Off_On cycle valve 20	
				22	32	Output Off_On Cycles 21	0 to 4294967295	Output Off_On cycle valve 21	
				23	32	Output Off_On Cycles 22	0 to 4294967295	Output Off_On cycle valve 22	
				24	32	Output Off_On Cycles 23	0 to 4294967295	Output Off_On cycle valve 23	
				25	32	Output Off_On Cycles 24	0 to 4294967295	Output Off_On cycle valve 24	
				26	32	Output Off_On Cycles 25	0 to 4294967295	Output Off_On cycle valve 25	
				27	32	Output Off_On Cycles 26	0 to 4294967295	Output Off_On cycle valve 26	
				28	32	Output Off_On Cycles 27	0 to 4294967295	Output Off_On cycle valve 27	
				29	32	Output Off_On Cycles 28	0 to 4294967295	Output Off_On cycle valve 28	
				30	32	Output Off_On Cycles 29	0 to 4294967295	Output Off_On cycle valve 29	
				31	32	Output Off_On Cycles 30	0 to 4294967295	Output Off_On cycle valve 30	
				32	32	Output Off_On Cycles 31	0 to 4294967295	Output Off_On cycle valve 31	
0x004B (75)	Output Off_On Cycles Maintenance Threshold	32	R/W	-	-	-	0 to 4294967295	output Off_On cycle maintenance threshold value	○
0x00C0 (192)	Cycle Output Data 0-15	16	R	-	-	-	0:OFF 1:ON	Valve output data monitor 0-15	
0x00C1 (193)	Cycle Output Data 16-31	16	R	-	-	-	0:OFF 1:ON	Valve output data monitor 16-31	

Index (dec)	Item	Data length	Access	Sub Index	Bit	Subindex Name	Data	Content	DS
0x00C2 (194)	Forced Output Setting 0-15	16	R/W	-	-	-	0: Valve output data enabled 1: Force output data enabled	Forced output setting 0-15	
0x00C3 (195)	Forced Output Setting 16-31	16	R/W	-	-	-	0: Valve output data enabled 1: Force output data enabled	Forced output setting 16-31	
0x00C4 (196)	Forced Output Data 0-15	16	R/W	-	-	-	0:OFF 1:ON	Forced output data 0-15	
0x00C5 (197)	Forced Output Data 16-31	16	R/W	-	-	-	0:OFF 1:ON	Forced output data 16-31	
0x00C6 (198)	Output Off_On Cycles Maintenance Setting 0-15	16	R/W	-	-	-	0: Maintenance monitoring stop 1: Maintenance monitoring execute	Output Off_On cycle maintenance settings 0-15	○
0x00C7 (199)	Output Off_On Cycles Maintenance Setting 16-31	16	R/W	-	-	-	0: Maintenance monitoring stop 1: Maintenance monitoring execute	Output Off_On cycle maintenance settings 16-31	○
0x00C8 (200)	Output Off_On Cycles Maintenance Monitor 0-15	16	R	-	-	-	0: No maintenance required 1: Maintenance required	Output Off_On cycle maintenance monitor 0-15	
0x00C9 (201)	Output Off_On Cycles Maintenance Monitor 16-31	16	R	-	-	-	0: No maintenance required 1: Maintenance required	Output Off_On cycle maintenance monitor 16-31	
0x00CA (202)	Valve Name (0-15)	1024	R/W	1	64	Valve Name 0	8 characters (ASCII)	Valve name 0	○
				2	64	Valve Name 1	8 characters (ASCII)	Valve name 1	○
				3	64	Valve Name 2	8 characters (ASCII)	Valve name 2	○
				4	64	Valve Name 3	8 characters (ASCII)	Valve name 3	○

Index (dec)	Item	Data length	Access	Sub Index	Bit	Subindex Name	Data	Content	DS
0x00CA (202) (Continued)	Valve Name (0-15)	1024	R/W	5	64	Valve Name 4	8 characters (ASCII)	Valve name 4	○
				6	64	Valve Name 5	8 characters (ASCII)	Valve name 5	○
				7	64	Valve Name 6	8 characters (ASCII)	Valve name 6	○
				8	64	Valve Name 7	8 characters (ASCII)	Valve name 7	○
				9	64	Valve Name 8	8 characters (ASCII)	Valve name 8	○
				10	64	Valve Name 9	8 characters (ASCII)	Valve name 9	○
				11	64	Valve Name 10	8 characters (ASCII)	Valve name 10	○
				12	64	Valve Name 11	8 characters (ASCII)	Valve name 11	○
				13	64	Valve Name 12	8 characters (ASCII)	Valve name 12	○
				14	64	Valve Name 13	8 characters (ASCII)	Valve name 13	○
				15	64	Valve Name 14	8 characters (ASCII)	Valve name 14	○
				16	64	Valve Name 15	8 characters (ASCII)	Valve name 15	○
0x00CB (203)	Valve Name (16-31)	1024	R/W	1	64	Valve Name 16	8 characters (ASCII)	Valve name 16	○
				2	64	Valve Name 17	8 characters (ASCII)	Valve name 17	○
				3	64	Valve Name 18	8 characters (ASCII)	Valve name 18	○
				4	64	Valve Name 19	8 characters (ASCII)	Valve name 19	○
				5	64	Valve Name 20	8 characters (ASCII)	Valve name 20	○
				6	64	Valve Name 21	8 characters (ASCII)	Valve name 21	○
				7	64	Valve Name 22	8 characters (ASCII)	Valve name 22	○
				8	64	Valve Name 23	8 characters (ASCII)	Valve name 23	○
				9	64	Valve Name 24	8 characters (ASCII)	Valve name 24	○

Index (dec)	Item	Data length	Access	Sub Index	Bit	Subindex Name	Data	Content	DS
0x00CB (203) (Continued)	Valve Name (16-31)	1024	R/W	10	64	Valve Name 25	8 characters (ASCII)	Valve name 25	○
				11	64	Valve Name 26	8 characters (ASCII)	Valve name 26	○
				12	64	Valve Name 27	8 characters (ASCII)	Valve name 27	○
				13	64	Valve Name 28	8 characters (ASCII)	Valve name 28	○
				14	64	Valve Name 29	8 characters (ASCII)	Valve name 29	○
				15	64	Valve Name 30	8 characters (ASCII)	Valve name 30	○
				16	64	Valve Name 31	8 characters (ASCII)	Valve name 31	○
0x00CE (206)	Valve Power Supply Monitor	8	R	-	-	-	0:OFF 1:ON	Valve power monitor	

*1Note 1: The contents of each "SubIndex Name" and "Output value at communication error".

	SubIndex Name		Output value at communication error
	1	2	
Data	0	0	OFF
	1	0	ON
	0	1	Final output data
	1	1	Final reception ProcessDataOut

<Maintenance>

Index (dec)	Item	Data length	Access	Sub Index	Bit	Subindex Name	Data	Content	DS
0x00A0 (160)	Output Data Monitor 0-15	16	R	-	-	-	0 to 65535 0:OFF 1:ON	Output data monitor 0-15	
0x00A1 (161)	Output Data Monitor 16-31	16	R	-	-	-	0 to 65535 0:OFF 1:ON	Output data monitor 16-31	
0x00A3 (163)	Maintenance Setting	16	R/W	-	-	-	0: Disabled 1: Enabled	Maintenance settings	○
0x00A4 (164)	Maintenance Monitor	16	R	-	-	-	0: No maintenance required 1:Maintenance required	Maintenance Monitor	
0x00A5 (165)	Energizing Time Monitor	32	R	-	-	-	0 to 4294967295	Unit energizing time monitor	
0x00A6 (166)	Energizing Time Maintenance Threshold	32	R/W	-	-	-	0 to 4294967295	Unit energizing time maintenance threshold value	○
0x00A7 (167)	Communications Error Value setting	8	R	-	-	-	0:HW_Clesr 1:HW_Hold_st 2:HW_ON 3:HW_Hold_or 4:SW	Output settings at communication error	

*1, *2, and *3 represent the corresponding input/output points.

<List of IO-Link Wireless specific parameter command>(hereinafter, data length is in bytes)

Index (dec)	Item	Data length	Access	Sub Index	Bit	Subindex Name	Data	Data Format	I/O	DS
0x5001 (20481)	**Note 1**	9	**Note 1**	0x00	-	-	**Note 1**	**Note 1**	-	
	UniqueID	9	R	0x01	-	-	**Note 2**	OctetString T9	-	
0x5002 (20482)	**Note 1**	4	**Note 1**	0x00	-	-	**Note 1**	**Note 1**	-	
	IMATime (TimeBase)	2	R/W	0x01	-	-	**Note 2**	UIntegerT8	-	
	IMATime (Multiplier)	2	R/W	0x02	-	-	**Note 2**	UIntegerT8	-	
	MaxRetry	1	R/W	0x03	-	-	**Note 2**	UIntegerT8	-	
	TxPower	1	R/W	0x04	-	-	**Note 2**	UIntegerT8	-	
0x5003 (20483)	**Note 1**	2	**Note 1**	0x00	-	-	**Note 1**	**Note 1**	-	
	LQI_D.	1	R	0x01	-	-	**Note 2**	UIntegerT8	-	
	RSSI_D	1	R	0x02	-	-	**Note 2**	IntegerT8	-	
0x5005 (20485)	**Note 1**	12	**Note 1**	0x00	-	-	**Note 1**	**Note 1**	-	
	RadioVendor ID	2	R	0x01	-	-	similar to VendorID	OctetString T2	-	
	RadioModule ID	2	R	0x02	-	-	Vendor specific similar to DeviceID	OctetString T2	-	
	RadioHW Revision	4	R	0x03	-	-	vendor specific	OctetString T4	-	
	RadioSW Revision	4	R	0x04	-	-	vendor specific	OctetString T4	-	

Note 1: Provides access to the entire Index.
Note 2: The format of the values for each item is in accordance with the provisions of IO-Link.

4.4. On-Request Data (Event)

There are three types of events:

<Event type>

Event type	Risk level	Meaning
Error	Heavy	Error
Warning	Medium	Warning
Notification	Light	Notifications

<Event details>

Index	Item	Type	Content
0x5000	Hardware malfunction	Error	Loss of non-volatile memory, etc. are being generated
0x1830	Output Off_On cycle exceeded	Notification	Valve output Off_On cycle exceeds the output Off_On cycle threshold value
0x1832	Energizing time exceeded	Notification	Unit energizing time exceeds the threshold value
0x1835	Valve power failure	Notification	The voltage at the valve power is low
0x7710	Communication error	Error	Communication is not established or a communication error is generated

5. FUNCTION

This chapter describes the various functions and the settings of the product.

5.1. Valve output

The data of ProcessDataOut received from the master is output to the valve.

5.1.1. Monitor function

<Monitor regarding valve output>

Index(dec)	Item	Data	Content
0x00A0(160)	Output Data Monitor (0-15)	0:OFF 1:ON	Monitor the output value of the current valve (including the content of the forced outputs)
0x00A1(161)	Output Data Monitor (16-31)	0:OFF 1:ON	Monitor the output value of the current valve (including the content of the forced outputs)
0x00C0(192)	Valve output data monitor (0-15)	0:OFF 1:ON	Monitor the output data received from the master
0x00C1(193)	Valve output data monitor (16-31)	0:OFF 1:ON	Monitor the output data received from the master

5.1.2. Forced output function

Use the forced output function when you want to set the output of the valve simply when starting up the device.
The forced output function sets what valve outputs are to be performed to the forced output data.

<Monitor and settings related to the forced output function>

Index(dec)	Item	Data	Content
0x00C2(194)	Forced Output Settings (0-15)	0: Forced output data disabled 1: Forced output data enabled	Set whether the forced output function is to be used (valve outputs 0-15)
0x00C3(195)	Forced Output Settings (16-31)	0: Forced output data disabled 1: Forced output data enabled	Set whether the forced output function is to be used (valve outputs 16-31)
0x00C4(196)	Forced output data (0-15)	0:OFF 1:ON	Output value of the forced output (Valve output 0-15)
0x00C5(197)	Forced output data (16-31)	0:OFF 1:ON	Output value of the forced output (Valve output 16-31)

■ Example of output

<Example of forced output function>

	Output																Hexadecimal
Solenoid output No.	**15**	**14**	**13**	**12**	**11**	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**	
Valve output data	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0xFF00
Forced output setting	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0x5555
Forced output data	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	0xF00F
Valve operation	1	1	1	1	1	0	1	0	0	0	0	0	0	1	0	1	0xFA05

5.1.3. Output Off_On cycle

With output Off_On cycle, the number of times the valve has been turned OFF→ON are counted.

<Monitor and settings related to the output Off_On cycle function>

Index(dec)	Item	Data	Content
0x0044(68)	Valve output Off_On cycle	0 to 4294967295	Monitor Off_On cycle of each valve
0x004B(75)	Output Off_On cycle Maintenance threshold value	Settings range 0 to 4294967295	Set the threshold value for valve output Off_On cycle When the set value is 0, no comparison is made between the threshold value and the valve output Off_On cycle
0x00C6(198)	Output Off_On cycle Maintenance settings (0-15)	0: Maintenance monitoring stop 1: Maintenance monitoring execute	Compare the valve output Off_On cycle with the output Off_On cycle maintenance threshold value, and set whether or not the maintenance output is to be performed
0x00C7(199)	Output Off_On cycle Maintenance settings (16-31)	0: Maintenance monitoring stop 1: Maintenance monitoring execute	Compare the valve output Off_On cycle with the output Off_On cycle maintenance threshold value, and set whether or not the maintenance output is to be performed
0x00C8(200)	Output Off_On cycle Maintenance monitor (0-15)	0: No maintenance required 1: Maintenance required	When the following three points are met, set the bit of the corresponding valve to "1" • Maintenance setting (bit7 with Index=0x00A3) is "1 (enabled)" • When the output Off_On cycle maintenance setting is "1 (maintenance monitoring execute)" • If the "Valve output Off_On cycle" is larger than or equal to the "Output Off_On cycle maintenance threshold value"
0x00C9(201)	Output Off_On cycle Maintenance monitor (16-31)	0: No maintenance required 1: Maintenance required	When the following three points are met, set the bit of the corresponding valve to "1" • Maintenance settings (bit7 with Index=0x00A3) is "1 (enabled)" • When the output Off_On cycle maintenance setting is "1 (maintenance monitoring execute)" • If the "Valve output Off_On cycle" is larger than or equal to the "Output Off_On cycle maintenance threshold value"

<Method to clear output Off_On cycle count value>

When clearing the output Off_On cycle count value, switch ON [Output Off_on cycles Reset (0 to 31)] under [System Command] for each point on the valve.

- Clear each point on the valve.
  Example: When clearing "Output Off_On Cycles 0", switch ON "Output Off_On Cycles Reset 0".

5.2. Power monitoring monitor

5.2.1. Unit energizing time monitoring

Monitor the energizing time of the unit.

<Unit energizing time monitoring monitor and settings>

Index(dec)	Item	Data	Content
0x00A5(165)	Unit energizing time monitor	Count range: 0 to 4294967295	Count up energizing time of the unit in 1[s] increments
0x00A6(166)	Unit energizing time threshold value	Setting range: 0 to 4294967295	Set the threshold value for the unit energizing time If 0, no comparison is made with the unit energizing time monitor

5.2.2. Valve power monitoring

Monitor the valve power.

<Valve power monitor>

Index(dec)	Item	Data	Content
0x00CE(206)	Valve power monitor	0: Valve Power OFF 1: Valve Power ON	Monitor the valve power voltage

5.3. Maintenance

5.3.1. Maintenance settings

<Maintenance settings>

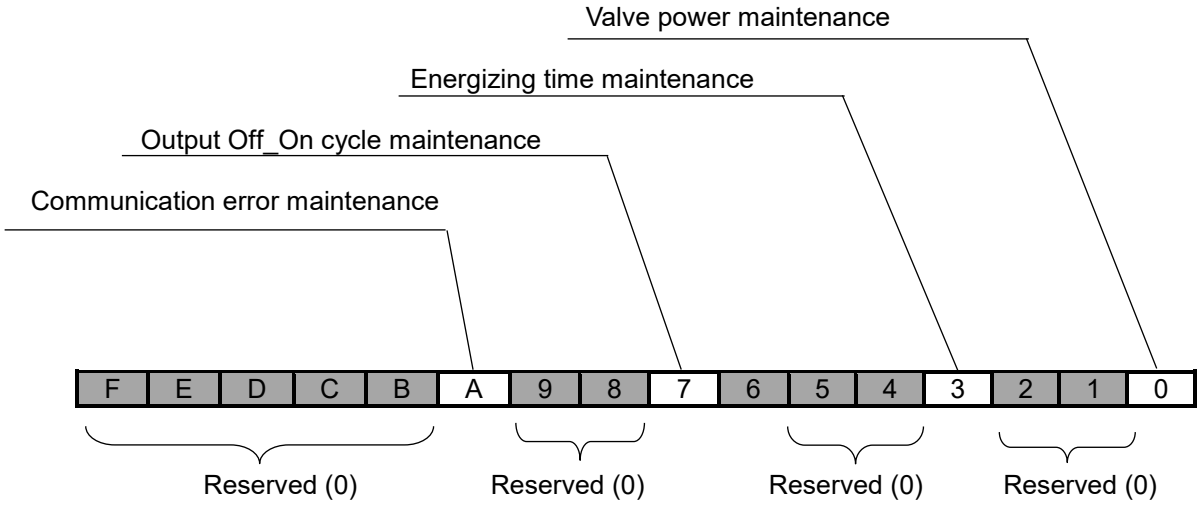
Index(dec)	Bit	Item	Data	Content
0x00A3(164)	0	Valve power maintenance	0: Disabled 1: Enabled	Set whether to monitor the status of the valve power
	3	Energizing time maintenance	0: Disabled 1: Enabled	Set whether the energizing time is to be monitored
	7	Output Off_On cycle maintenance	0: Disabled 1: Enabled	Set whether output Off_On cycle is to be monitored
	A	Communication error maintenance	0: Disabled 1: Enabled	Set whether communication error is to be monitored

<Maintenance monitor>

Index(dec)	Bit	Item	Data	Content
0x00A4(164)	0	Valve power maintenance monitor	0: No maintenance required 1: Maintenance required	When the valve supply is OFF, bit0 is "1"
	3	Energizing time Maintenance monitor	0: No maintenance required 1: Maintenance required	If the unit energizing time monitor is above or equal to the unit energizing time maintenance threshold value, bit3 is "1"
	7	Output Off_On cycle maintenance monitor	0: No maintenance required 1: Maintenance required	If there are valves where output Off_on cycle is larger than or equal to the threshold value, bit7 is "1"
	A	Communication error maintenance monitor	0: No maintenance required 1: Maintenance required	In the case of a communication error, bitA is "1"

■ **Maintenance settings data**

The maintenance settings and the maintenance monitor consist of 2 byte data.
Change the bit of the maintenance item to be used from "0" disabled → "1" enabled.



5.4. Settings

5.4.1. Valve name settings

Name of each valve can be set so that the application of the valve can be identified on the monitor.
Valve names are divided in 0 to 15 points valves and 16 to 31 points valves.

※ For 16 point outputs and 16 point input/output, the valve name (16-31) is not used.

<Setting items on valve name>

Index(dec)	Item	Data	Remarks
0x00CA(202)	Name of valves 0 to 15	8bytes	Valve 0 (Subindex=1) to
0x00CB(203)	Name of valves 16 to 31	8bytes	Valve 16 (Subindex=1) to

<Conditions of the valve name>

Function	Item	Content
Valve name	Number of characters	8 characters
	Type of character	Alphanumeric characters (uppercase and lowercase characters are discriminated)
	Change	Write in/read out possible
	Initial value	“******** " (Asterisk 8 characters)

6. MAINTENANCE / INSPECTION

WARNING

Do not disassemble or modify the products other than those specified in this Instruction Manual.
- This may not only pose a risk of injury, malfunction or failure, but also cause the product to fail to meet the specifications such as this Instruction Manual.

Do not remove or attach wiring or connectors while the power is turned on.
- It may cause malfunction, failure, or electric shock.

Do not work with wet hands.
- There is a risk of electric shock.

Do the wiring after the product has been mounted.
- It may cause electric shock.

Turn off the power, stop the supply of compressed air and make sure that there is no residual pressure before working.
Check the voltage with a tester, etc. when at least 5 minutes have passed after the power has been switched off.
- It may cause injury or accident.
- It may cause electric shock.

CAUTION

When performing maintenance, inspection, or repair, make sure that the people around you know to make sure that the power is not turned on by a third person.

Wiring and inspection must be done by professional engineers.
Use a power cable that is sufficiently capable of maximum instantaneous current.
- Heat may be generated or damaged during operation.

Perform a periodic inspection (1 to 2 times per year) to confirm normal operation.
If there are signs of an abnormal amount of heat, smoking, abnormal odors, abnormal noises or vibrations coming from this product, turn off the power immediately.
- Damage to the product or a fire may occur.

Perform routine and periodic inspections in a routinely to ensure that maintenance management is carried out correctly.
- If maintenance management is not done sufficiently, the function of the product will deteriorate significantly, leading to short life, damage, malfunction, and accidents.

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

6.1. Periodic inspection

This section describes methods of cleaning, inspection, and handling when replacing the product as the daily maintenance of devices. In order to use the product under optimum conditions, perform periodic cleaning and inspection.

6.1.1. Cleaning method

- For daily cleaning, wipe the product with a dry, soft cloth.
- When stains cannot be removed by wiping with a dry cloth, moisten the cloth with diluted neutral detergent (2%) with water, wring it, and wipe the stains again.
- Remove any stains on the product during cleaning.

- Objects such as rubber, vinyl, or tape may stain the product if they are left in contact with the product for a long period.
- Using benzene, thinner, etc. may damage the surface or cause the display to disappear.

6.1.2. Inspection method

Perform inspection once or twice a year.
However, if the product is used in extremely hot, humid or dusty environments, shorten the inspection interval.

<Inspection items>

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

Inspection item	Inspection contents	Judgment criteria	Inspection method
Environment	Is the surrounding and in-panel temperature appropriate?	Refer to "9.1.1 Basic specifications"	Thermometer
	Is there any accumulated dust?	There is no dust	Visual inspection
Mounting status	Is the product fixed securely?	There is no looseness	Hexagonal wrench
	Is the power cable connector fully inserted?	There is no looseness	Visual inspection
	Is the connection cable not broken?	No abnormality in appearance	Visual inspection
Power/voltage	Check the power system and ensure it is used within the specified power and specified voltage	Refer to "9.1.1 Basic specifications"	Tester

6.2. Removing and mounting

WARNING

Turn off the power and completely release the pressure before removing or mounting a valve.
Thoroughly read and understand this Instruction Manual before removing and mounting the valve.
Do not touch the electrical wiring part (live part).
- It may cause injury or accident.
- It may cause electric shock.

Do not touch the charging part with your bare hands.
- There is a risk of electric shock.

CAUTION

Before handling the product, 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 shock to the power 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; for example, secure the wiring to the machine or device midway.

When wiring, be careful of the following points to prevent problems caused by noise.
- If noise could have an effect, prepare power for each manifold solenoid valve and wire independently.
- Do not make the power cables unnecessarily long. Wire the power cable as short as possible.
- Separate the power wiring of the product from the wiring of the devices that generate noise such as inverter motor.
- Wire the power cable separated from other power lines as much as possible.

Wire the power cable properly within its specifications.
- Incorrect wiring may cause damage or malfunction of the product.

When the power is turned on, check the output settings at communication error.
Do not attach or detach the connector while the power is turned on.
- These may cause failure or malfunction.

Do not pull out the product by pulling the cable or connector.
- It may cause disconnection or damage.

Make sure that all connection cables, connectors, etc. are securely installed before energizing.

6.2.1. Removing method

1. Power OFF

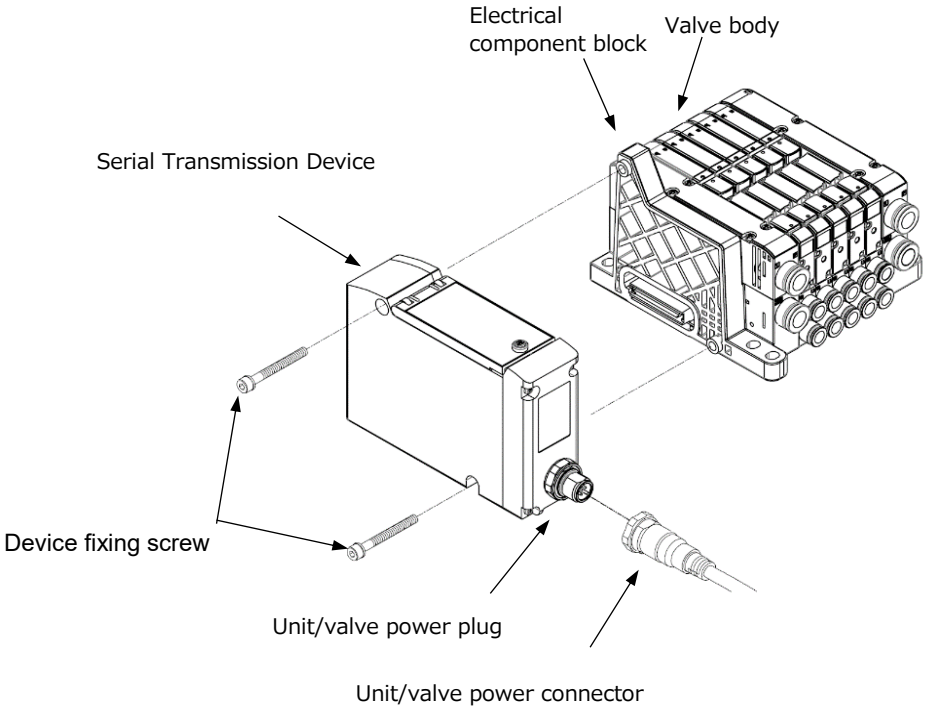
Switch the power supply OFF.

2. Remove the unit/valve power connectors

Remove unit/valve power connector from the unit/valve power plug.

3. Disconnect the product from the valve

Loosen the device fixing screws (2) and disconnect the product from the connector on the electrical component block.



6.2.2. Mounting method

CAUTION

- Connecting the unit/valve power connector with the unit power ON may cause the system to operate suddenly.

1. Connecting the product and the valve

Connect the product to the connector of the electrical component block and mount it with two device unit fixing screws.
(Appropriate tightening torque 1.2Nm)

2. Connecting unit/valve power connector

Connect the unit/valve power connector to the unit/valve power plug.

3. Power ON

Confirm safety and turn on power.

6.3. Precautions on product disposal

CAUTION

When disposing of the product, comply with local laws and regulations pertaining to disposal and cleaning of wastes and have an industrial waste disposal company dispose of the product.

7. TROUBLESHOOTING

If the product does not operate as intended, check the table below for a possible solution.

<LED>

LED	Operation	Factors	Corrective actions
PW	Off	Unit power voltage low	The unit power voltage is low. Check that the power cable is properly connected and in good condition.
			Check that the supplied power voltage is used within the specified range.
PW(V)	Off	Valve power voltage low	The voltage at the valve power is low. Check that the power cable is properly connected and in good condition.
			Check that the supplied power voltage is used within the specified range.
LINK	On	Communication not established	Execute pairing.
ST	On	Communication error	Communication with the master is unstable. Review the master and the product environment again. Refer to "2.2. Environment"
		Equipment failure	Replace the product if the condition doesn't change even after turning the power on and off. Contact to CKD if the problem doesn't change even after replacing it.
ST	Blinking	Maintenance factors present	The item you are setting for maintenance has reached a threshold value.
LQ	Off	Communication not established	Execute pairing.
	Red on	Communication error	Communication with the master is unstable. Review the master and the product environment again. Refer to "2.2. Environment"
All lamps	All off	Power voltage low	Power voltage is low. Check that the power cable is properly connected and in good condition.
			Check that the supplied power voltage is used within the specified range.

※ If the problem is not resolved even after conducting inspections and taking corrective actions, contact your nearest CKD sales office or distributor.

<Operation>

Failure	Cause	Corrective actions
Valve does not operate normally	Power voltage low	Check that PW(V) LED is turned on green. If off, refer to “7. Troubleshooting <LED>”.
	Communication error	Check that LINK LED is blinking green. If Green on, refer to “7. Troubleshooting <LED>”.
	Connection error	Check the connection with the valve.
	Equipment failure	Replace the product.
	Valve failure	Replace the valve.
	Master failure	Replace the master.
	Program error	Check the PLC. Check the ladder program.
Cannot operate on PLC	Configuration error	Check that Master and PLC is connected.
	Communication error	Check that LINK LED is blinking green. If Green on, refer to “7. Troubleshooting <LED>”.
	Error lamp program error (PLC)	Check the communication cable between the PLC and the master.
		Check the PLC settings and power.
		Check the ladder program.
	Communication error	Check that LINK LED is blinking green. If Green on, refer to “7. Troubleshooting <LED>”.
	Sensor error	Check the sensor being used and the input block.
	Program error	Check the PLC. Check the ladder program.
	Input block failure	Replace the input block.
Unintended valve moves	Connection error	Check the connection with the valve.
	Program error	Check the PLC. Check the ladder program.
	Configuration error	Check that the valve is not switched on by the forced output.

※ If the problem is not resolved even after conducting inspections and taking corrective actions, contact your nearest CKD sales office or distributor.

<Wireless communication>

Failure	Cause	Corrective actions
Pairing cannot be executed	Power failure	Check that PW LED is turned on green. If Green on, refer to “7. Troubleshooting <LED>”.
	Equipment error	Turn off/on the power of the master and the product and execute pairing again.
	Environment	The environment may not be appropriate, such as a long distance between the master and the product, so review the environment. Refer to "2.2. Environment"
	Insufficiency in button press time button failure	Check if the button can perform another function. Try another way to check pairing.
Communication is interrupted	Communication error	Turn off/on the power of the master and the product and execute pairing again.
		The environment may not be appropriate, such as a long distance between the master and the device unit, so review the environment. Refer to "2.2. Environment"

※ If the problem is not resolved even after conducting inspections and taking corrective actions, contact your nearest CKD sales office or distributor.

8. WARRANTY PROVISIONS

8.1. 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, the following failures are excluded from 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 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 caused by reasons unforeseen at the level of technology available at the time of delivery.
- Failure caused by nature and disasters beyond control of CKD.
- Failure caused by incorrect use such as careless handling or improper management.
- 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.

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.

8.2. Warranty Period

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

9. REFERENCE INFORMATION

9.1. Specifications

9.1.1. Basic specifications

Item	Content	
Model number	OPP8-A2WK	OPP8-A2WK-P
Unit power voltage	21.6 VDC to 26.4 VDC (24 VDC ±10%)	
Unit power current consumption	35mA or less (all points ON at 24.0 VDC)	
Valve power voltage	22.8 VDC to 26.4 VDC (24VDC +10%, -5%)	
Valve power current consumption	10mA or less (all points OFF) 15mA or less (all points ON and no load)	
Valve power current consumption (Max. units connected)	550mA or less	
Output type	NPN (+COM)	PNP (-COM)
Output number of points	32 points	
Degree of protection (Valve and I/O block connected)	IP65 / IP67	
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, 3 directions, 3 times	
Storage ambient temperature	-20°C to 70°C (no freezing)	
Storage ambient humidity	30% to 85% RH, (no dew condensation)	
Ambient using temperature	-5°C to 55°C (no freezing)	
Ambient operating humidity	30% to 85% RH, (no dew condensation)	
Atmosphere	No corrosive gas	
Output insulation	Photo coupler insulation	
Leakage current	0.1 mA or less	
Residual voltage	0.5V or less	
Fuses	Valve power: 24V, 3A / Unit power: 24V, 2A (both fuses are not replaceable)	

Item		Content
Operation display		LED indicator (unit power, valve power, communication quality, product status)
Connector		M12 x 4 pin A code
Vibration resistance	**Endurance**	10 Hz to 55 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 55 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.
Overvoltage protection		Category 1
Degree of pollution		3
Use of altitude		2000m or less

※ For delay time, refer to the Instruction Manual of the master.
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 valve, check the valve specifications.

※ Valve Off time is delayed by approximately 20 msec due to the surge absorbing circuit integrated in the device unit.

9.1.2. Communication specifications

Item	Content
Communication protocol	IO-Link Wireless
Communication protocol version	V1.1
Minimum cycle time	5ms
Process Data In data length **Note 1**	0 bytes
Process Data Out data length **Note 1**	4 bytes
Data storage	Maximum 2k bytes
SIO mode support	None
VendorID Note 2	855 (decimal)/0x357 (hexadecimal)

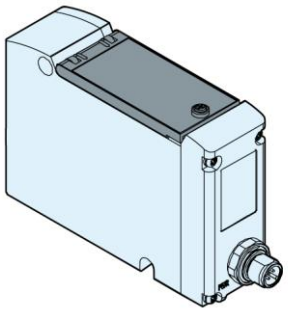
Note 1: When setting data in the master (PLC), if it is not possible to set the table with the data length shown here, map the data table so that it is larger than this data length in general.
Note 2: This is a unique identifier for CKD.

Item	Model number	Content
Device ID Note 1	OPP8-A2WK	0x200107 (hexadecimal)
	OPP8-A2WK-P	0x200108 (hexadecimal)

Note 1: Indicates the product.

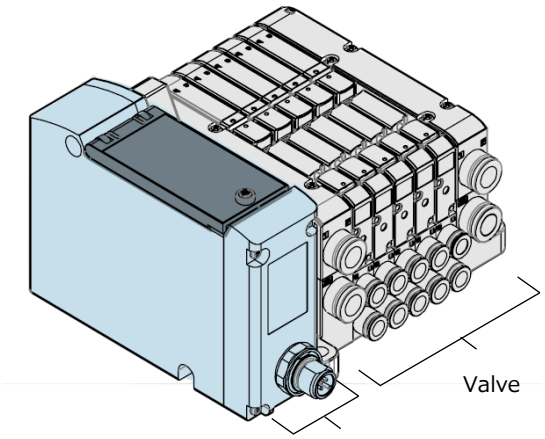
9.2. Appearance

OPP8 Series Serial Transmission Device appearance



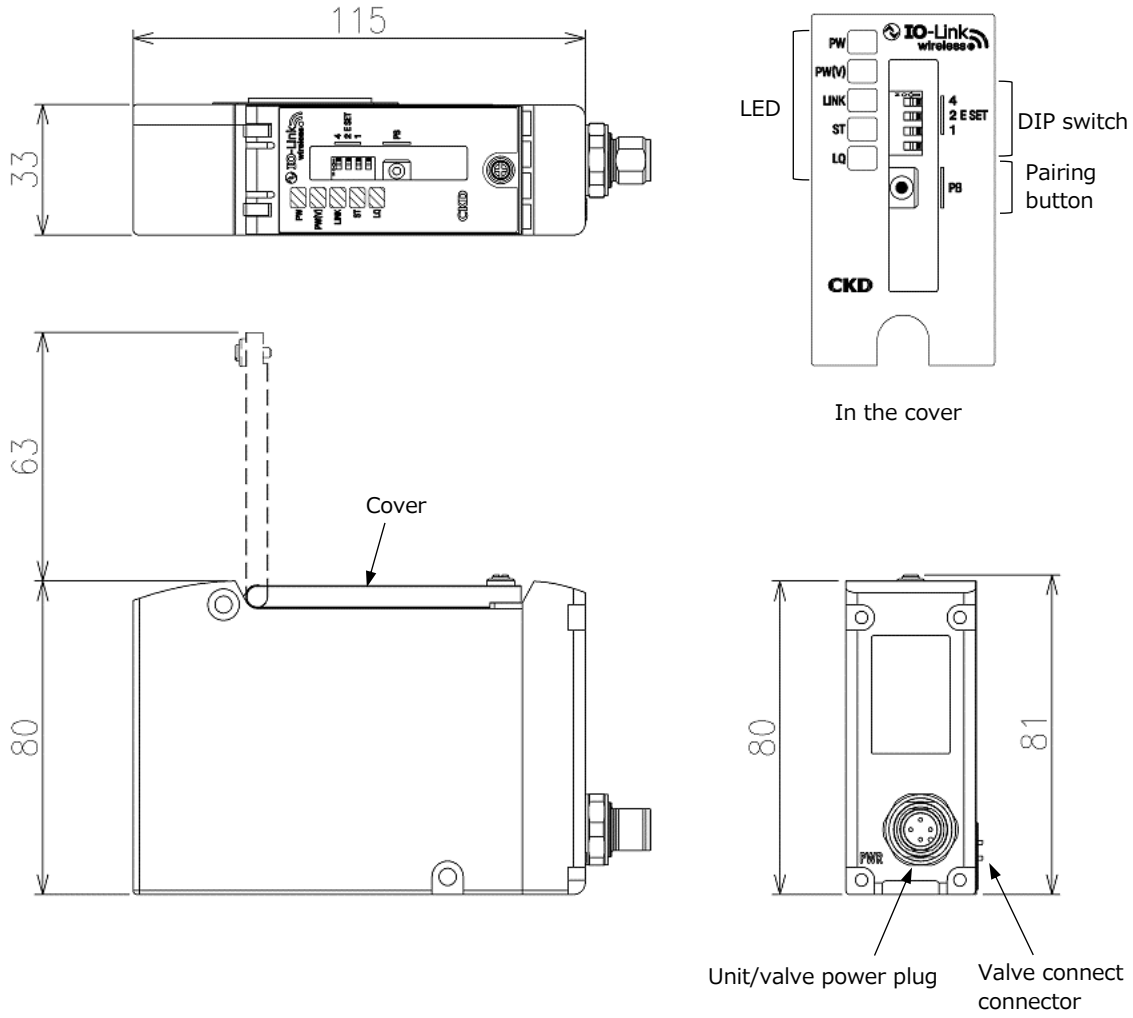
OPP8-A2WK-□

OPP8 with valve appearance



Serial Transmission Device
OPP8-A2WK-□

9.3. Appearance dimensions



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