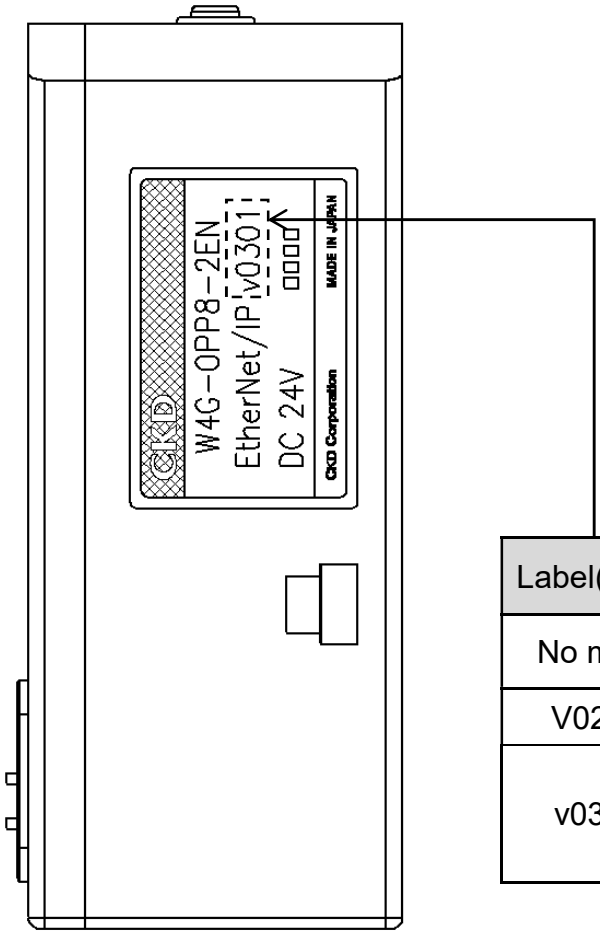
How to check the Instruction Manual to be read

Check the product label on the device and read the Instruction Manual corresponding to the device version.



Label(print)	Instruction Manual to be read
No mark	SM-P00122-A
V0202	
v0301	SM-A68697-A

CKD

Serial Transmission Device

W4G series T7EN
(W4G-OPP8-□EN)

Device Rev 3.1

EtherNet/IP Compatible

INSTRUCTION MANUAL

SM-A68697-A

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

CKD Corporation

PREFACE

Thank you for purchasing **CKD's serial transmission device**. 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 fluid 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.

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

- 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 T7EN (W4G-OPP8- EN) for W4G.
For the originator(scanner) unit and other target(adapter) 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.

■ T7EN (W4G-OPP8- EN)

This is a device for W4G which can connect to the open industrial Ethernet network EtherNet/IP.
Features include the following:

- The device is connected to PLC with only a network cable (Category 5 or higher), allowing significant reduction in wiring man-hours.
- The unit power and the valve power are separated, ensuring easy maintenance.
- The device output status in the event of a communication error can be set by switches. (Hold all points output/ all points OFF).
- The device is available in +COM or -COM specification and 16 or 32-point output or 16-point I/O, allowing for use in a wide variety of applications.

■ EtherNet/IP

EtherNet/IP is an open industrial network that runs the CIP (Common Industrial Protocol), communication protocol for control at the application layer over standard Ethernet. Although its general communication specification is the same as standard Ethernet, using the CIP enables seamless communication even between different networks (DeviceNet, CompoNet, etc.). It also enables multi-vendor interoperability. Features include the following:

- It allows high-speed, large-capacity data communication by cyclic communication (Implicit communication).
- It allows cyclic communication (Implicit communication) at the cycle specified for each application.

For any questions concerning the EtherNet/IP system, refer to the following website run by ODVA.

ODVA (Open DeviceNet Vendor Association)
Website address **https://www.odva.org/**

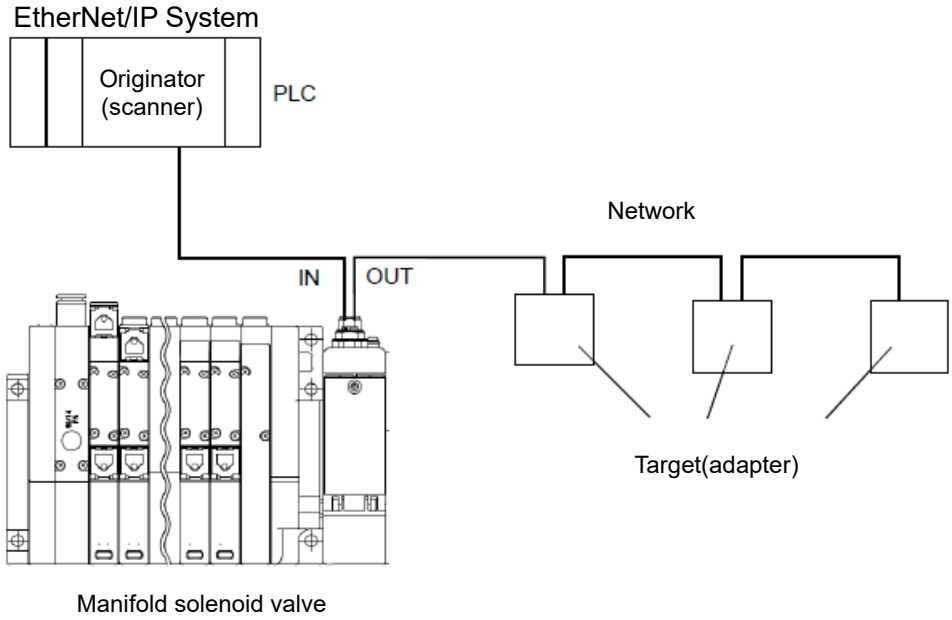
1.1.2 System structure

This system mainly consists of a PLC, originator(scanner) unit, T7EN(W4G-OPP8-□EN) mounted manifold solenoid valve, and peripheral equipment (EtherNet/IP target(adapter) units).

■ Examples of PLC and originator(scanner) unit combination

PLC manufacturer	Compatible PLC	originator(scanner) unit model
Omron Corporation	NJ Series	NJ301/NJ501
Rockwell Automation Japan Co., Ltd.	1769 CompactLogix L3x controller	1769-L30ER
Other originator(scanner) units compatible with EtherNet/IP		

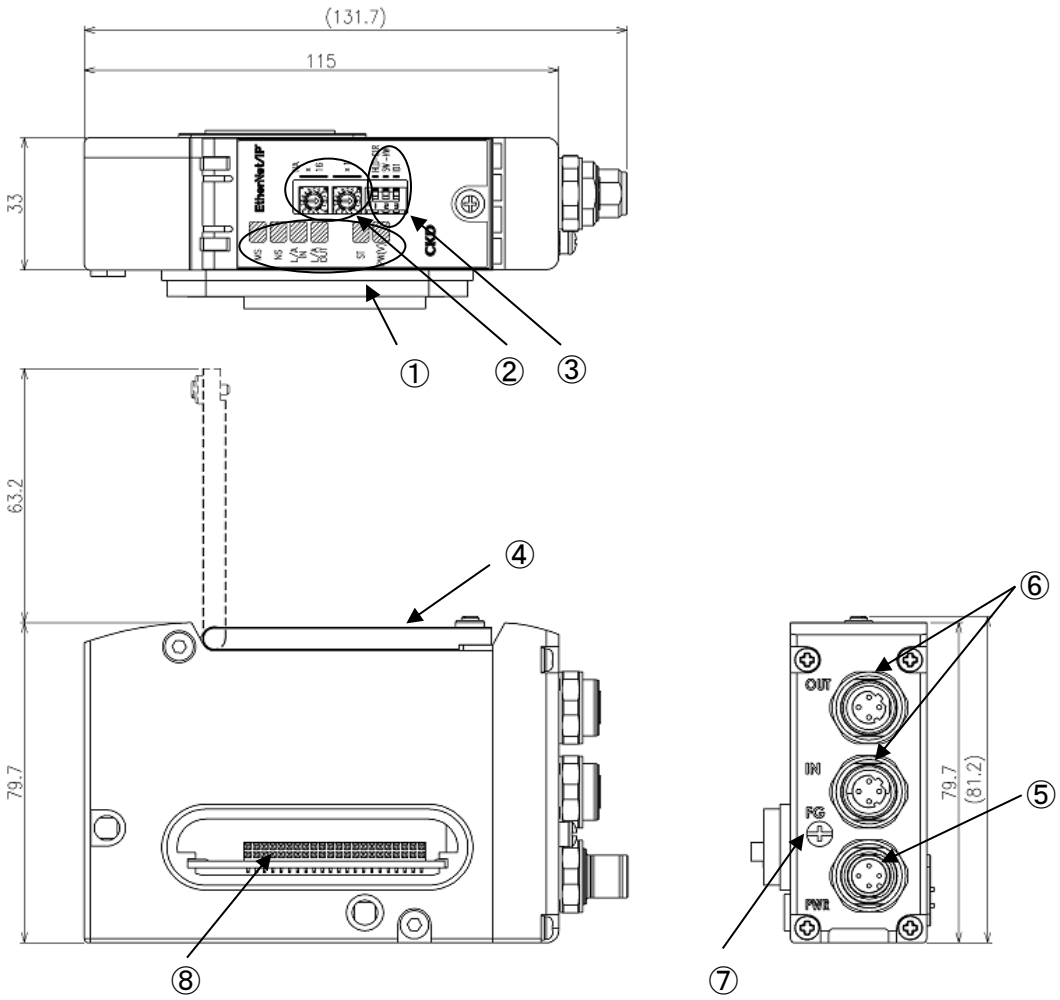
■ Example of basic structure of the system



Originator(Scanner) (master) Requests to open connection and controls target(adapter) unit(dev
Target(Adapter) (device) Receives connection opening requests and controls I/O data and such.

1.2 Part Name

1.2.1 Parts of the device



No.	Part name	Description
①	LED indicators	Indicates the status of the device and network with MS, NS, L/A IN, L/A OUT, ST, and PW(V).
②	Rotary switches	Set the IP address of the device.
③	DIP switches	Set the output mode in the event of a communication error, operation mode, and IP address.
④	Cover	Protects the LEDs and setting switches.
⑤	Unit/valve power plug (M12 x 1 port [PWR] A-code: 4 pins)	Connects unit/valve power socket.
⑥	Network connector sockets (M12 × 2 ports [IN, OUT] D-cord: 4 pins)	IN : Transmits and receives EtherNet/IP communication. OUT: Transmits and receives EtherNet/IP communication. Note: There is no functional difference between the IN and OUT port.
⑦	FG terminal	Connects FG(frame grounding) to the terminal.
⑧	I/O block connector	Connects the device to the I/O block. (* Supported with T7EN□B7 only)

1.2.2 Switches and LED indicators

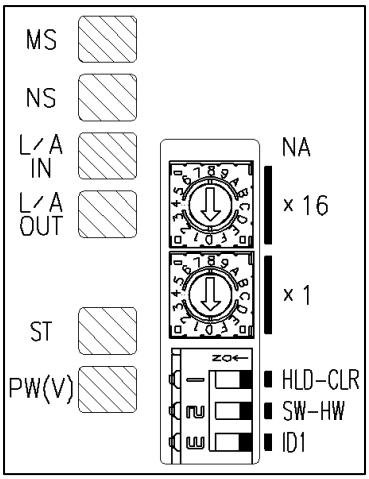
⚠CAUTION

Discharge static electricity from your body before touching the product.
Static electricity may cause damage to the product.

■ Switches

The switches are used to set the IP address of the device and the action taken on the output in the event of a communication error.
This device operates according to the switch settings when the power is turned on.

Switch	Settings
NA x16, x1 (Rotary switch)	Set the IP address of the device. For the setting details, refer to 3.1 “Switch settings”.
ID1 (DIP switch)	
HLD-CLR (DIP switch)	Selects whether to hold (HLD) or make all points off (CLR) the output status when a communication error occurs.
SW - HW (DIP switch)	Select which setting to use for the IP address: switch setting (hardware setting) or software setting.



■ LED indicators

These LEDs indicate the status of the product and network.
Refer to the following table for the description of LED indicators.

Part name	Function	Status	
MS	EtherNet/IP device status	Green blinking	IP address not set or communication setting is in progress
		Green on	Normal condition
		Red blinking	Improper switch setting
		Red on	Device unit failure
NS	Communication status	Green blinking	No link
		Green on	Link detected (Normal communication)
		Red blinking	Communication error (timeout)
		Red on	Duplicate IP address
L/A IN	Link status of EtherNet/IP IN	Off	No link, no data transfer
		Green on	Link detected, but no data transfer
		Green on / yellow rapid blinking	Link detected, and data transferring
L/A OUT	Link status of EtherNet/IP OUT	Off	No link, no data transfer
		Green on	Link detected, but no data transfer
		Green on / yellow rapid blinking	Link detected, and data transferring
ST	Unit power status	Off	Unit power OFF
		Green on	Unit power ON
PW(V)[Note]	Valve power status	Off	Valve power OFF
		Green on	Valve power ON

Note: PW (V) is enable when the unit power is ON.

1.3 Specifications

1.3.1 Communication specifications

Item	Specifications
Communication protocol	EtherNet/IP Compatible
Baud rate	Auto setting (100M/ 10Mbps, full duplex / half duplex) Note: 1000Mbps is not supported.
Communication method	
Communication media	Ethernet cable (Category 5 or higher) Shielded twisted pair cable (EtherNet/IP recommended cable)

1.3.2 Device specifications

The product must be used within the following specifications.

Item		Specifications					
Model		T7EN1 (W4G-OPP8-1EN)	T7EN2 (W4G-OPP8-2EN)	T7ENB7 (W4G-OPP8-7EN-B)	T7ENP1 (W4G-OPP8-1EN-P)	T7ENP2 (W4G-OPP8-2EN-P)	T7ENPB7 (W4G-OPP8-7EN-PB)
Unit power voltage		21.6 VDC to 26.4 VDC (24 VDC ±10%)					
Unit power current consumption		90 mA or less (with all points ON at 24.0 VDC)					
Valve power voltage		22.8 VDC to 26.4 VDC (24 VDC +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 I/O points		0/16 points	0/32 points	16/16 points	0/16 points	0/32 points	16/16 points
IP address setting		IP address: 192. 168. 1. 1 1st octet 2nd octet 3rd octet 4th octet IP address can be set in the range of 1 to 254 (dec), but the target octets are limited by the setting method as described below ① to ③. ① Sets by DIP switch: 3rd octet only and in the range of 0 and 1. ② Sets by rotary switch: 4th octet only. ③ Sets by software: Sets all 1st to 4th octet.					
Output setting when communication error occurs		Hold (all outputs are maintained)/ Clear (all points OFF)					
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 1 minute					
Shock resistance		294.0 m/s^2 for 3 times in 3 directions					
Storage ambient temperature		−20°C to 70°C					
Storage ambient 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					
Communication protocol		EtherNet/IP Compatible					
Baud rate/ Communication method		Auto setting (100M/ 10Mbps, full duplex / half duplex) Note: 1000Mbps is not supported.					
EtherNet/IP Connector		M12, D-code: 4 pins					
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 non-replaceable)					
Operation indicator		LED (communication status, unit power and valve power status)					
Degree of protection		IP65					
Vibration resistance	Durability	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 68.6 m/s^2, whichever smaller.					

* For the delay time, refer to the instruction manual for the originator(scanner) 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.

2. INSTALLATION

2.1 Mounting

⚠CAUTION

Before handling an EtherNet/IP 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; 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.
- 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.
- Make sure to connect the shielding of the network cable to equipotential bonding close to the device.
- Carry out wiring according to the "EtherNet/IP Media Planning and Installation Manual".

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

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

1 Connect the network and power cable.
Check both this Instruction Manual and instruction manuals for PLC and each unit in the system and connect them 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.

2.2 Wiring

2.2.1 Connecting and wiring to the network connector socket

⚠WARNING

Turn off the power before wiring.
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 dedicated network cable that complies with EtherNet/IP 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.

When the network plug is not used, make sure to cover it with water-resistant cap.

Although the EtherNet/IP network uses a standard Ethernet cable and has flexible wiring methods, there are limits depending on the wiring material and equipment (originator(scanner), hub, and other devices) used. Always understand their specifications thoroughly before wiring. For more information, refer to the instruction manual issued by the originator(scanner) unit manufacturer or ODVA.
The network plug is not supplied with the product. Separately purchase a network plug that satisfies the specifications.
By wiring the network cable to a network plug, that plug can be connected to the network connector socket on the device.

<Recommended cable with plug [Cat.5e]>
<Recommended M12 network cable with RJ45 connector [Cat.5e]>

Manufacturer	Model
HARTING Co., Ltd.	09 45 700 50□□
Omron Corporation	XS5W-T421-□MC-K

* □ differs depending on the cable specifications.

<Recommended M12 assembly type connector>

Manufacturer	Model
HARTING Co., Ltd.	21 03 281 1405

<Recommended RJ45 assembly type connector>

Manufacturer	Model
HARTING Co., Ltd.	09 45 151 1100

<Recommended cable [Cat.5e]>

Manufacturer	Model
HARTING Co., Ltd.	09 45 600 01□□

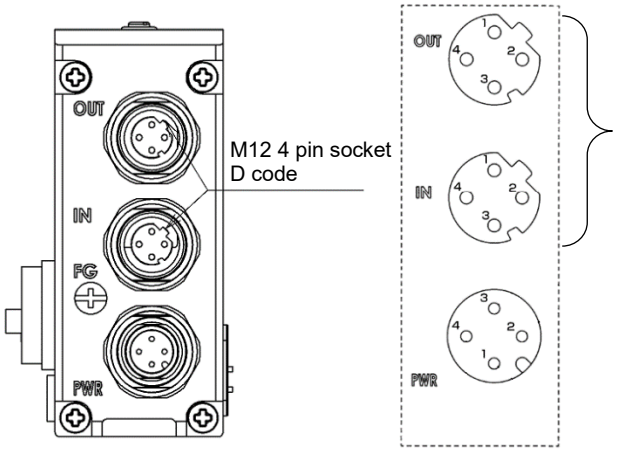
* □ differs depending on the cable specifications.

■ Connecting the network cable

Follow the steps below to connect the network cables to the network socket.

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

2 Refer to the figure below to wire the EtherNet/IP compliant cable to the M12 connector.



Port	Pin	Signal	Function
IN/ OUT	1	TD+	Transmission data, plus
	2	RD+	Reception data, plus
	3	TD-	Transmission data, minus
	4	RD-	Reception data, minus

2.2.2 Connecting and wiring to the unit/valve power plug

⚠CAUTION

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 slave 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.

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

Install the terminal block so that it comes before the power plug.

In this product, the unit power and the valve power supply are separated. In addition, each power supply is connected by an M12 connector (socket).

* Power connector is not supplied with the product. Separately purchase a power connector that satisfies the specifications.

Unit power

This electrical power is for operating the device. Use 21.6 VDC to 26.4 VDC power supply with the least noise.

Valve power

This electrical power is for operating the solenoid valve. Use 22.8 VDC to 26.4 VDC power with the least noise.

Recommended power socket

<Recommended M12 connector (socket)-loose wire type power cable>

Manufacturer	Model
Omron Corporation	XS2F-D421-□8□-□

* □ differs depending on the cable specifications.

<Recommended M12 connector (socket)>

Manufacturer	Model
HARTING Co., Ltd.	21 03 212 2305

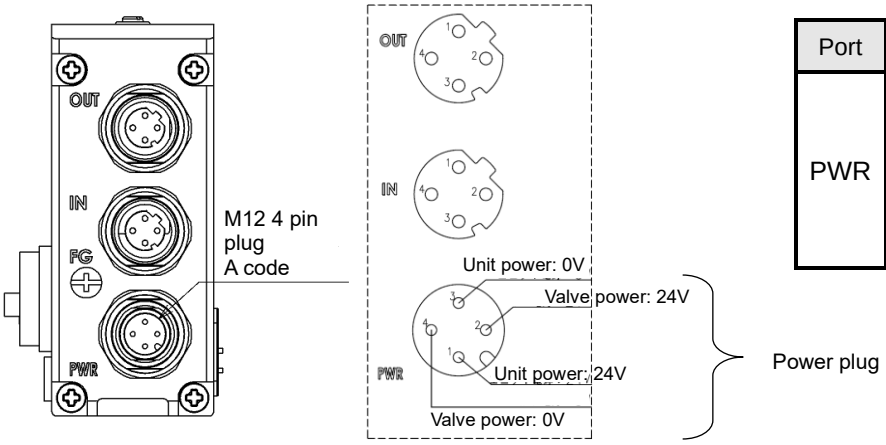
Cable size : AWG22 to 18, outside diameter of compatible cable : 6 to 8 dia.

■ Connecting the power cables

Follow the steps below to connect the unit/valve power cables to the power plug.

1 After confirming safety, turn off the power to be connected to the device.

2 Refer to the figure below and wire the cables to the correct terminals on the power plug (24 V to 24 V, 0 V to 0 V).

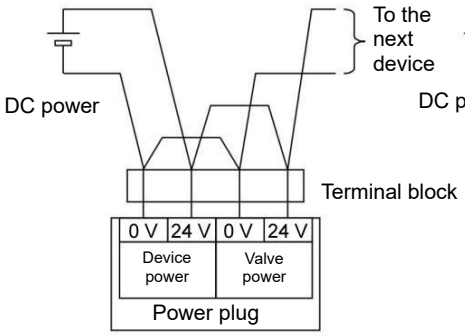


Port	Pin	Function
PWR	1	Unit power: 24V
	2	Valve power: 24V
	3	Unit power: 0V
	4	Valve power: 0V

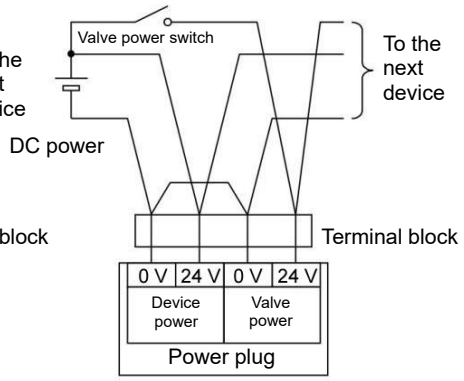
■ Wiring the power cable

Figures 1 to 3 are examples of the wiring for the power plug.
Change the circuit configuration as necessary.

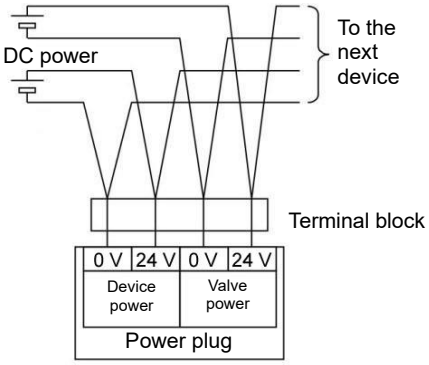
1. Common connection for device power and valve power



2. Connection for turning on/off valve power



3. Separate connection for device power and valve power



3. USAGE

⚠WARNING

Consult CKD about the specifications before using the product outside the designated specifications 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.

Check the address setting value of serial transmission device carefully before use.
Improper address setting 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 Switch settings

⚠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.
Since switch settings are read when the power is turned on, changes made to the settings after turning on the power are not recognized.

Keep the cover of serial transmission device closed except when setting the switches.
The cover may become damaged or foreign matters may enter inside and cause unexpected failure.

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.

3.1.1 IP address setting (Operation mode OFF: Hardware setting)

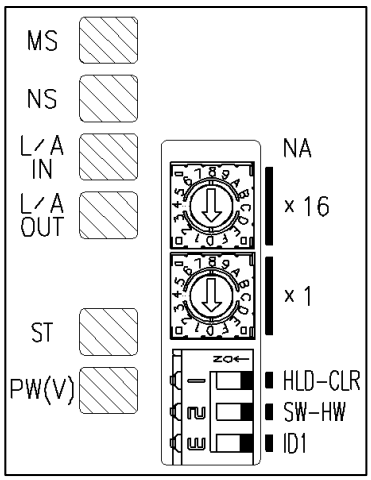
Set the IP address of the device. The IP address is 192.168. [ID1 set value]. [NA set value].
* The NA set value “FF” shifts to DHCP mode.
* The NA set value "00" is an invalid address.
The IP address setting is read when the power is turned on. The IP address cannot be set in duplicate.

IP address: 192.168. [ID1 set value]. [NA set value]

Switch	ID1 (DIP switch no.3)	NA ×16, ×1
Setting range	ON: 1 OFF:0	01 to FE (Hex) [1 to 254 (Dec)]

x16: Upper digit		
Setting (hexadecimal)	⇔	Decimal
0	⇔	0
1	⇔	16
2	⇔	32
3	⇔	48
4	⇔	64
5	⇔	80
6	⇔	96
7	⇔	112
8	⇔	128
9	⇔	144
A	⇔	160
B	⇔	176
C	⇔	192
D	⇔	208
E	⇔	224
F	⇔	240

x1: Lower digit		
Setting (hexadecimal)	⇔	Decimal
0	⇔	0
1	⇔	1
2	⇔	2
3	⇔	3
4	⇔	4
5	⇔	5
6	⇔	6
7	⇔	7
8	⇔	8
9	⇔	9
A	⇔	10
B	⇔	11
C	⇔	12
D	⇔	13
E	⇔	14
F	⇔	15



Example: Setting the IP address to 71 (decimal)
Since 71 = 64+7 and 64 is 4 and 7 is 7 according to the table above, set the upper digit to 4 and lower digit to 7 (47 in hexadecimal).

3.1.2 Output mode setting (enable regardless of operation mode setting ON/OFF)

Sets the action taken on the output status when there is a communication error. The output mode setting is read when the power is turned on.

Switch	Settings
HLD-CLR (DIP switch No.1) [Output mode setting]	Set the action taken on the output when there is a communication error (such as disconnection error and time over). ON : Hold mode (hold all points output) OFF : Clear mode (all points OFF)

3.1.3 Operation mode setting

Select which setting to use for the IP address: switch setting (hardware setting) or software setting.
The operation mode setting is read when the power is turned on.
* When operation mode setting is ON(software setting), IP address setting switch is disabled.
* Regardless of operation mode setting (ON/OFF), output mode setting is enabled.

Switch	Settings
SW - HW (DIP switch No.2) [Operation mode setting]	Set the operation mode. (Refer to 3.2 “Software setting” for details on software settings.) ON : Software setting OFF : Hardware setting (switch setting)

3.2 Software setting

Set the IP address of the device by software.
The initial IP address is 192.168.1.250. When setting by software, set DIP switch No.2 to SW (ON, refer to 3.1.3 Operation mode setting).

* In case of losing track of the IP address set by software, start up the software again after starting up with the hardware settings once. (Start with the initial IP address : 192.168.1.250)
* Do not make initial settings for multiple units at once since it starts with the initial IP address. The duplicate IP address error may occur.
* As long as it is in the software setting, the IP address written in 3.2.1 “IP address settings 1” and 3.2.2 “IP address settings 2” (3) will be retained even if the power is turned off. However, when starting it up in the hardware setting, the IP address set by the software setting returns to the initial value (192.168.1.250) as IP address setting switch is enabled.

3.2.1 IP address setting 1

Set the IP address using the EtherNet/IP CIP service.

1 Set the DIP switch (No.2) to software setting (SW) with the unit power OFF.

2 After confirming safety, turn on the unit power.
(Starts up in software setting. Initial IP address is 192.168.1.250.

3 Write the new IP address referring to the following TCP/IP object class.

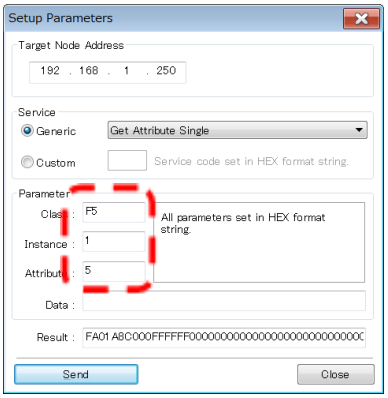
• TCP / IP object class

Class hex (dec)	Instance	Attribute	Description	Size	Initial value hex (dec)
F5 (245)	1	5	IP Address	4 bytes	C0A801FA (192.168.1.250)
			Network Mask	4 bytes	FFFFFF00 (255.255.255.0)
			Gateway Address	4 bytes	00000000 (00.00.00.00)
			Name Server	10 bytes	00000000000000000000
			Name Server2		
			Domain Name		

* Due to the order of the data, calling data based on the table will be as follows.
(Service code [0x0E]): Get_Attribute_Single)
Call result:
FA01A8C000FFFFFF00000000000000000000000000000000

Example) When setting the IP address 10.17.34.01, the data will be as follows.
(Service code [0x10]): Get_Attribute_Single, other data remain as initial values.)
Write data:
0122110A00FFFFFF00000000000000000000000000000000

* Object class and such is described in hexadecimal (hex) or decimal (dec), depending on the tool employed.



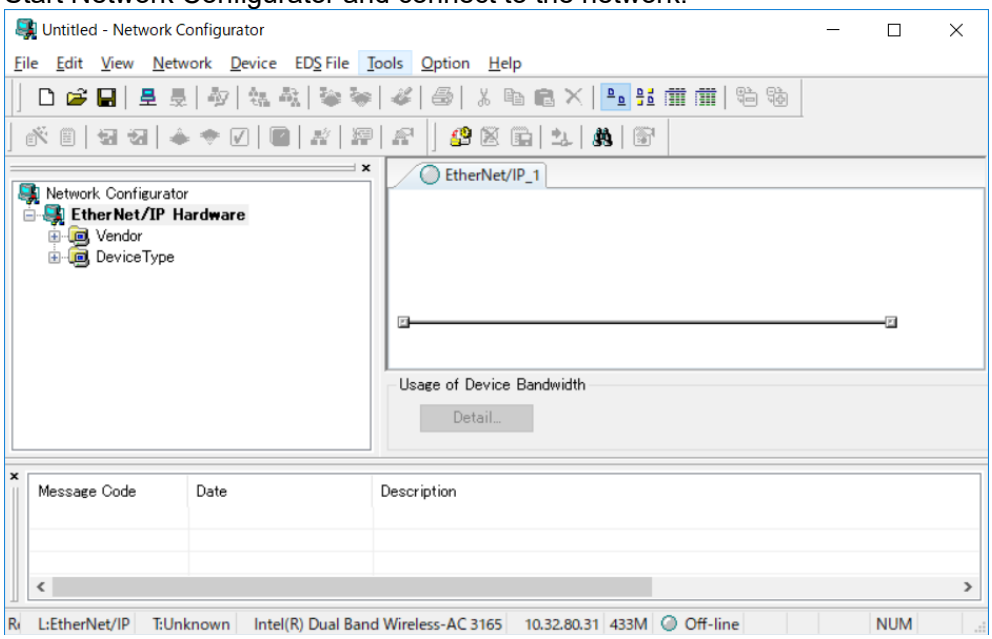
3.2.2 IP address setting 2

Set the IP address using the tool provided by the manufacturer.

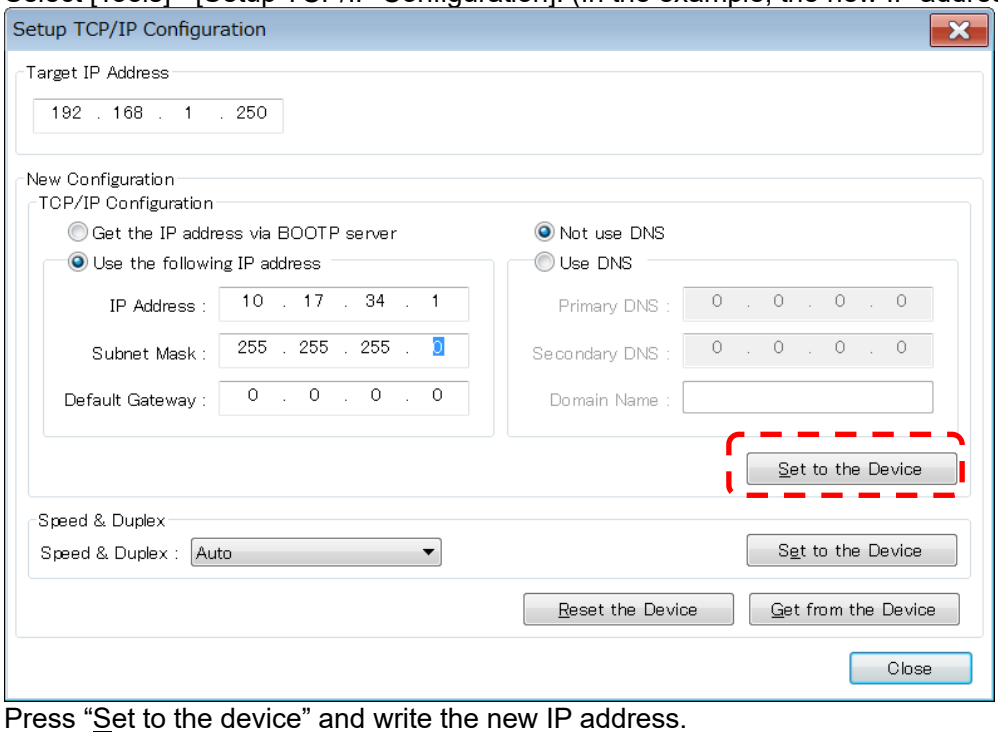
1. Set the DIP switch (No.2) to software setting (SW) with the unit power OFF.
2. After confirming safety, turn on the unit power.
   (Starts up in software setting. Initial IP address is 192.168.1.250.
3. Set the IP address using the tool.
   (Described below is an example of the setting method using the Network Configurator provided by Omron Corporation.)

Setting example (Network Configurator provided by Omron Corporation)

Start Network Configurator and connect to the network.



Select [Tools] - [Setup TCP/IP Configuration]. (In the example, the new IP address is set to 10.17.34.1)



Press “Set to the device” and write the new IP address.

3.3 Setting with EDS (Electronic Data Sheets) file

In order for an EtherNet/IP device to participate in a network, an EDS file containing the device's communication specifications must be installed in the setting tool. For details on installing the EDS file, refer to the instruction manual issued by the originator(scanner) unit manufacturer. Use the latest EDS file to ensure a suitable network configuration. Download the EDS file from the CKD website. (https://www.ckd.co.jp/kiki/jp/)

3.3.1 Registering the device

Before starting, check the IP address and specifications (model name) of the device to be used and install the corresponding EDS file.
Refer to the following table for device specifications and EDS file and set accordingly.

Specifications and the model names in the EDS file

Item	Specifications					
Model	-T7EN1	-T7EN2	-T7ENB7	-T7ENP1	-T7ENP2	-T7ENPB7
Single unit model	W4G-OPP8 -1EN	W4G-OPP8 -2EN	W4G-OPP8 -7EN-B	W4G-OPP8 -1EN-P	W4G-OPP8 -2EN-P	W4G-OPP8 -7EN-PB
Output type	+COM (NPN)			-COM（PNP）		
Number of I/O points	0/16 points	0/32 points	16/16 points	0/16 points	0/32 points	16/16 points
EDS file name	OPP8-1EN _v0301.eds	OPP8-2EN _v0301.eds	OPP8-7EN _v0301.eds	OPP8-1EN-P _v0301.eds	OPP8-2EN-P _v0301.eds	OPP8-7EN-P _v0301.eds

3.4 Correspondence between Device Output No. and PLC Address No.

3.4.1 PLC address correspondence table

This correspondence table uses Omron's PLC as an example.

<T7EN□1(OPP8-1EN-□) (16-point output specification)>

Assigned address in the PLC memory	Output Bit 00 to 15															
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
STD 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
	Output data															

<T7EN□2(OPP8-2EN-□ (32-point output specification)>

Assigned address in the PLC memory	Output Bit 00 to 15																Output Bit 16 to 31															
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
STD 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
	Output data																Output data															

<T7EN□7(OPP8-7EN-□ (16-point I/O specification)>

■ 8-point solenoids, 4 input blocks, and 2 output blocks

* Connect the input block first then output block to the device.

* For the output block, set the rotary switch to 3 and 4 from the device side.

Assigned address in the PLC memory	Output Bit 00 to 15																Input Bit 16 to 31															
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
STD output no.*	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	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																								
Input block																	1-0	1-1	1-2	1-3	2-0	2-1	2-2	2-3	3-0	3-1	3-2	3-3	4-0	4-1	4-2	4-3
Output block									3-0	3-1	3-2	3-3	4-0	4-1	4-2	4-3																
	Output data																Input data															

■ 12-point solenoids, 4 input blocks, and 1 output block

* Connect the input block first then output block to the device.

* For the output block, set the rotary switch to 4 from the device side.

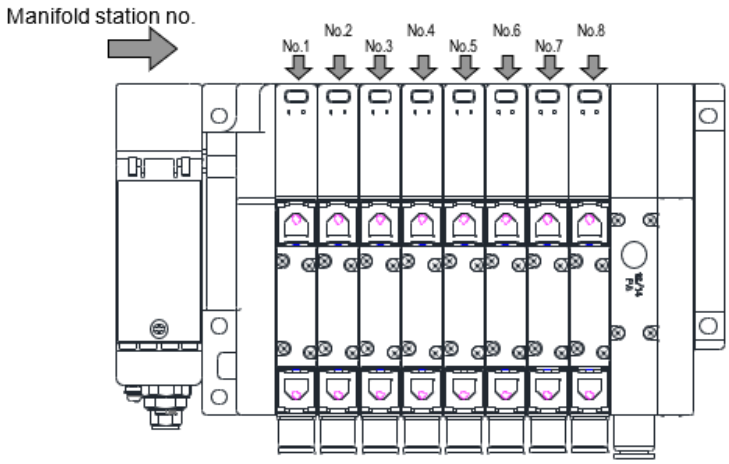
Assigned address in the PLC memory	Output Bit 00 to 15																Input Bit 00 to 15															
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
STD output no.*	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Solenoid output no.	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11	s12																				
Input block																	1-0	1-1	1-2	1-3	2-0	2-1	2-2	2-3	3-0	3-1	3-2	3-3	4-0	4-1	4-2	4-3
Output block													4-0	4-1	4-2	4-3																
	Output data																Input data															

*STD: Serial Transmission Device

3.4.2 Example of valve No. array corresponding to solenoid output No.

In the table below, each valve number (Valve no.) consists of a number (the station number) and an alphabet (a for a-side solenoid and b for b-side solenoid). For example, “1a” refers to 1st station a-side solenoid. Also, “V” stands for “Vacant.”
Manifold stations are numbered in order 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.

< T7EN1, T7ENP1 (16-point output specification)>



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

Standard wiring

- Single solenoid valve

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

- Double solenoid valve

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

- Mixed (both single and double solenoid valves are mounted) [example]

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

- Single solenoid valve

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)

- Double solenoid valve

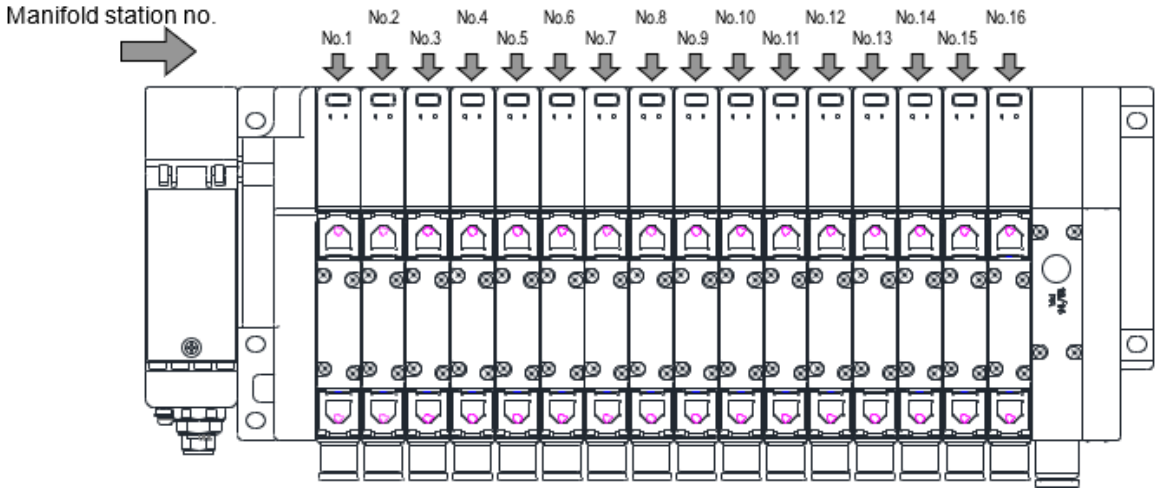
Solenoid output no.	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11	s12	s13	s14	s15	s16
Valve no.	1a	1b	2a	2b	3a	3b	4a	4b	5a	5b	6a	6b	7a	7b	8a	8b

- Mixed (both single and double solenoid valves are mounted) [example]

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)

< T7EN2, T7ENP2 (32-point output specification)>

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



Standard wiring

- Single solenoid valve

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

- Double solenoid valve

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

- Mixed (both single and double solenoid valves are mounted) [example]

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									

Double wiring

- Single solenoid valve

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)

- Double solenoid valve

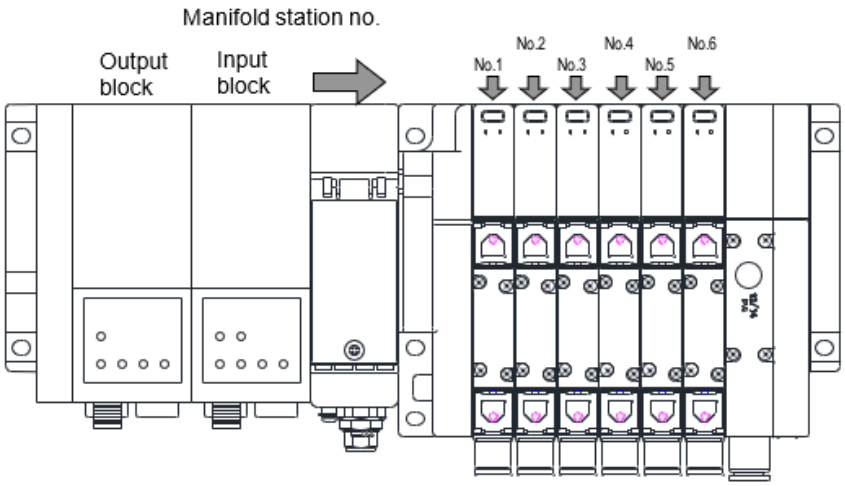
Solenoid output no.	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11	s12	s13	s14	s15	s16	s17	s18	s19	s20	s21	s22	s23	s24	s25	s26	s27	s28	s29	s30	s31	s32
Valve no.	1a	1b	2a	2b	3a	3b	4a	4b	5a	5b	6a	6b	7a	7b	8a	8b	9a	9b	10a	10b	11a	11b	12a	12b	13a	13b	14a	14b	15a	15b	16a	16b

- Mixed (both single and double solenoid valves are mounted) [example]

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	(V)	11a	11b	12a	12b	13a	(V)	14a	(V)	15a	15b	16a	(V)

< T7EN7, T7ENP7 (16 I/O specifications)>

The figure below is an example of mounting six stations of double-solenoid type valves and connecting each 1 of output block and input block. There is no solenoid on the b-side for single-solenoid types.



Standard wiring

- Single solenoid valve

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	4-0	4-1	4-2	4-3

- Double solenoid valve

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	4-0	4-1	4-2	4-3

- Mixed (both single and double solenoid valves are mounted) [example]

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	4-0	4-1	4-2	4-3

Double wiring

- Single solenoid valve

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)	4-0	4-1	4-2	4-3

- Double solenoid valve

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	4-0	4-1	4-2	4-3

- Mixed (both single and double solenoid valves are mounted) [example]

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)	4-0	4-1	4-2	4-3

3.5 Programming

The originator(scanner) unit handles this device as a target(adapter) device (T7EN□1 for 16-point output, T7EN□2 for 32-point output, T7EN□7 for 16-point I/O).

There are two types of data: output data sent from the originator(scanner) unit to the target(adapter) unit and input data sent from the adapter unit to the originator(scanner) unit (in case of this product; T7EN□1 for 16-point output, T7EN □ 2 for 32-point output, T7EN□7 for 16-point I/O). This product is an output device that receives output data from the originator(scanner) unit and outputs to the valve.
The input data is transmitted to the originator(scanner) unit as 2 bytes of reserved data regardless of the model.
Note: Depending on the type of originator(scanner), it is necessary to set to 6 bytes, adding 4 bytes of header to the 2 bytes of reserved data. Refer to the instruction manual issued by the originator(scanner) manufacturer.

Refer to the instruction manual issued by the PLC manufacturer when programming.
Refer to the following table to program the I/O mapping.
The setting made to specify which action to take on the output in the event of an error is a unique function of this device. This output status setting does not affect the program.

Output data mapping

I/O point		Output data	Bit															
			0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
32 points	16 points	**2 bytes**	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
	-	**4 bytes**	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31

Input data mapping

I/O point	Input data	Bit																
		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
16 points	**2 bytes**	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15

For the EtherNet/IP connection settings, use the I/O Assembly instance.
This product uses instances on general-purpose devices.
Refer to the table below for connection settings.

I/O Assembly instance

Item		Specifications					
Model		-T7EN1	-T7EN2	- T7ENB7	-T7ENP1	-T7ENP2	-T7ENPB7
Single unit model		W4G-OPP8 -1EN	W4G-OPP8 -2EN	W4G-OPP8 -7EN-B	W4G-OPP8 -1EN-P	W4G-OPP8 -2EN-P	W4G-OPP8 -7EN-PB
Output data	Instance	100 (Dec)	101 (Dec)	100 (Dec)	100 (Dec)	101 (Dec)	100 (Dec)
	Size	2 (bytes)	4 (bytes)	2 (bytes)	2 (bytes)	4 (bytes)	2 (bytes)
Input data	Instance	110 (Dec)*	110 (Dec)*	110 (Dec)	110 (Dec)*	110 (Dec)*	110 (Dec)
	Size	2 (bytes)*	2 (bytes)*	2 (bytes)	2 (bytes)*	2 (bytes)*	2 (bytes)

* As Input data is dummy data, no value is entered.

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 performing maintenance.

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

⚠CAUTION

Plan and perform daily and periodic inspections so that maintenance can be managed properly.
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 for daily maintenance and what to do when replacing the device. In order to use the product under optimum conditions, clean and inspect the product periodically.

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

■ Inspection

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

<Inspection item>
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 device.

Inspection item	Description	Criteria	Inspection method
Environment	Is the surrounding and in-panel temperature appropriate?	Refer to "1.3.2 Device specifications".	Thermometer
	Is the surrounding and in-panel humidity appropriate?	Refer to "1.3.2 Device specifications".	Hygrometer
	Is there any dust on the unit?	No dust	Visual inspection
Installation	Is the device fixed securely?	No looseness	Phillips screwdriver
	Is the power cable connector fully inserted?	No looseness	Flat blade screwdriver
	Is the network cable connector fully inserted?	No looseness	Visual inspection
	Is the connection cable not broken?	No abnormality in appearance	Visual inspection

■ Checking the device before/after replacing

Each unit (originator(scanner) and the device) is a component that constitutes a part of 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 devices.

<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 settings.

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

■ Output ON counts

The output ON count can be used at maintenance since it is saved in the area shown in the table below.
* The output ON count is saved every 3 minutes. And note that the output ON count shifts depending on the timing of the device turned off.

Model	-T7EN1	-T7EN2	- T7ENB7	-T7ENP1	-T7ENP2	-T7ENPB7
Single unit model	W4G-OPP 8-1EN	W4G-OPP8 -2EN	W4G-OPP8 -7EN-B	W4G-OPP8 -1EN-P	W4G-OPP8 -2EN-P	W4G-OPP8 -7EN-PB
Class	4 (Dec)	4 (Dec)	4 (Dec)	4 (Dec)	4 (Dec)	4 (Dec)
Instance	120 (Dec)	121 (Dec)	120 (Dec)	120 (Dec)	121 (Dec)	120 (Dec)
Attribute	3 (Dec)	3 (Dec)	3 (Dec)	3 (Dec)	3 (Dec)	3 (Dec)

The Output ON count is stored in an array format from the 1st to the 32nd point and is counted from the LSB side.
Note that the acquired data may be reversed depending on the setting tool.

	MSB			LSB
1st point [0]	00000000b	00000000b	00000000b	00000000b
2nd point [1]	00000000b	00000000b	00000000b	00000000b
↓		↓		
32nd point [31]	00000000b	00000000b	00000000b	00000000b

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 connection (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 IP address and the setting made to specify which action to take on the output in the event of communication error, before turning on the unit power.

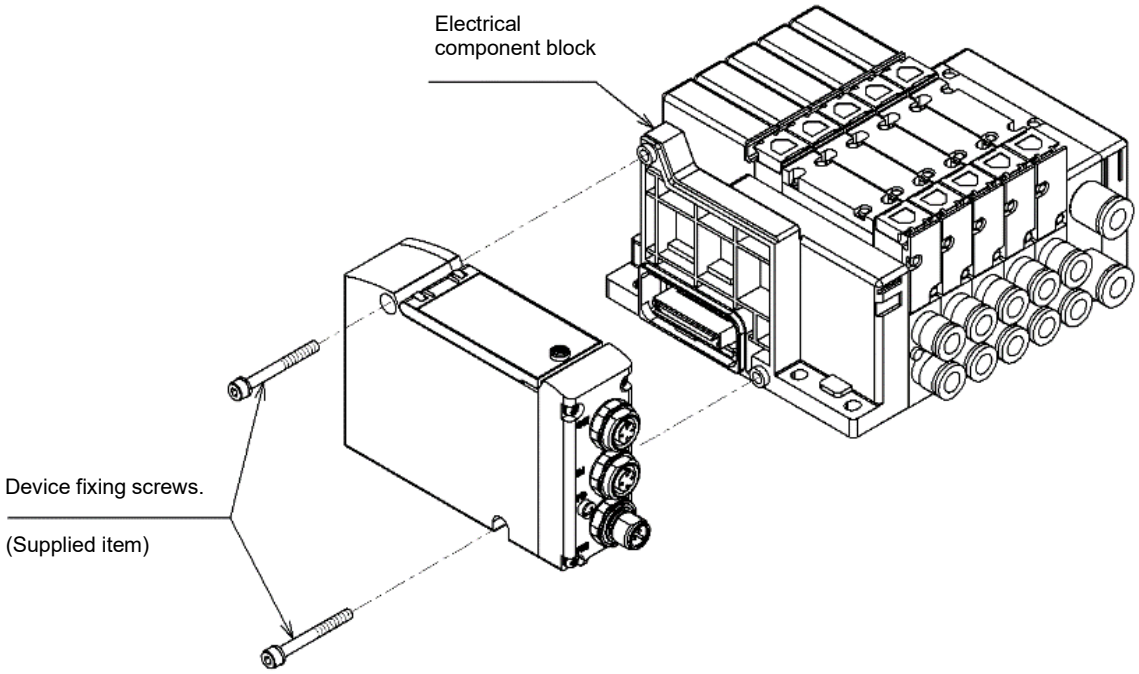
Do not attach or detach the plug while the power is turned on.
These may cause failure or malfunction.

Do not pull out the device by pulling the cable or connector.
A cable disconnection or damage may occur.

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

4.2.1 Removing the product (device)

1. After confirming safety, stop network communication as necessary and turn off all peripheral equipment.
2. After confirming safety, turn off the unit power and valve power as necessary.
3. Remove the network connector plug and the power socket.
4. Remove the mounting screws.
5. Hold and pull out the product slowly.



4.2.2 Mounting the product (device)

1. Set the IP address of the product.
2. Hold the product and insert it slowly by matching the connectors on the electrical component block and the side of the device.
3. Check that the product and the electrical component block are properly connected and tighten the device fixing screws firmly.
   (Appropriate tightening torque 1.2 N·m)
4. Turn off the power (for unit/valve) and connect the network plug and power socket.
   The system may start operating suddenly if the plug and socket are connected while the power is turned on.
   Be careful of the surroundings and secure safety before connecting the connectors.
   Network plug: Reference tightening torque 0.6 N·m
   (Since the torque varies depending on the plug, confirm the plug manufacturer for appropriate torque.)
   Power socket: Reference tightening torque 0.45 N·m
   (Since the torque varies depending on the socket, confirm the socket manufacturer for appropriate torque.)
5. After confirming safety, turn on each power.

5. Troubleshooting

5.1 Problems, Causes, and Solutions

Troubleshooting for this device must be performed 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: ST, PW(V) does not light up.

- Check that the power cable is properly connected and in good condition.
- Check that the supplied power voltage is used within the specified range.
- Check the system and restart(turn off the power and turn on again) the product. If it does not recover, replace the device as it is damaged by a blown fuse inside or such.

■ Fault 2: MS LED is blinking red.

- Check that the operation mode matches the switch settings. Turn off the power and turn on again after checking.

■ Fault 3: MS LED is blinking green (continues for 30 seconds or more).

- It is preparing for communication Check that the network cable is properly connected.

■ Fault 4: MS LED is solid red.

- Check the system and restart(turn off the power and turn on again) the product. Replace the unit if it doesn't recover even after restarting, as it may be broken.

■ Fault 5: NS LED is blinking green (continues for 30 seconds or more).

- It is waiting for communication. Check that the settings on the originator(scanner) are correct and the IP address and subnet mask of the target(adapter) unit are set as intended.

■ Fault 6: NS LED is blinking red.

- Check that there is no noise-generating device, high-voltage line or high-current line near the network cable and this product.
- Check if the network cable is broken and communication timeout has occurred.
- Check that the processing capability and communication cycle time of the hub and originator(scanner) are appropriate, and that communication is stable.

■ Fault 7: NS LED is solid red.

- Check if the IP address is duplicated.

6. WARRANTY PROVISIONS

6.1 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, 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 this Instruction Manual.
- Failure caused by use of the product exceeding its durability (cycles, distance, time, etc.) or caused by consumable parts.
- 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 acts of 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 equipment 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.