CKD

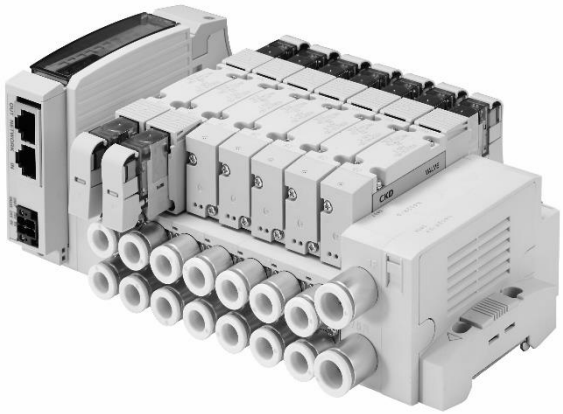
# Serial Transmission Device

## 4GR series T8EN
## (4GR-OPP7-□EN)
## Device Rev 3.1

**EtherNet/IP Compatible**

# INSTRUCTION MANUAL

SM-A59223-A/1



- 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.

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

- In applications for nuclear power, railroad system, aviation, ship, vehicle, medical equipment, and equipment that directly touches beverage or food.
- For special applications that require safety including amusement equipment, emergency shut-off circuit, press machine, brake circuit, and safety measures.
- For applications where life or properties may be adversely affected and special safety measures are required.

**Do not handle the product or remove pipes and devices until confirming safety.**

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

# CONTENTS

# 1. PRODUCT OVERVIEW

## 1.1 System Overview

### 1.1.1 System features

Make sure to read the instruction manual for each product.
This Instruction Manual mainly describes the device T8EN(4GR□-OPP7-□EN) for 4GR.
For master devices and other devices that are connected in the same system as the product, read the instruction manuals issued by each manufacturer.
For manifold solenoid valves, make sure to read both this Instruction Manual and the instruction manual for the solenoid valve to fully understand the functions and performance in order to use the valves correctly.

#### ■ T8EN (4GR-OPP7-□EN)

4GR-OPP7-□EN is an device for 4GR that can be connected to EtherNet/IP, an Ethernet open network system. Features include the following:

- The device is connected to PLC with only an Ethernet cable (Category 5 or higher), allowing significant reduction in wiring man-hours.
- The device power and the valve power are separated, ensuring easy maintenance.
- When a communication error occurs, the device output status can be set by a switch. (Hold / All points OFF)
- The device is available in +COM or -COM specification and 16 or 32 output points, allowing wide variety of applications.
- The device is a slot-in structure and is fixed with just one screw, allowing reduction in maintenance man-hours.

#### ■ EtherNet/IP (ODVA)

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.

If you have 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/

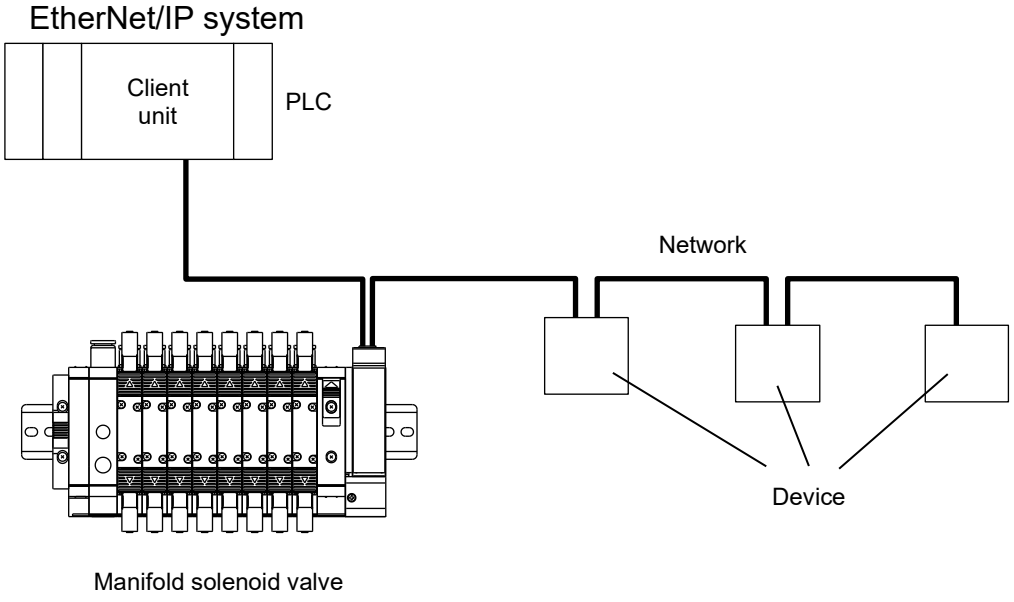
## 1.1.2 System structure

This system mainly consists of a PLC, client(master) unit, T8EN(4GR-OPP7-□EN) mounted manifold solenoid valve, and peripheral equipment (EtherNet/IP devices).

### ■ Examples of PLC and client(master) unit combination

| PLC manufacturer | Compatible PLC | Client unit model |
|---|---|---|
| Omron Corporation | NJ Series | NJ301/NJ501 |
| Rockwell Automation Inc. | 1769 CompactLogix L3x controller | 1769-L30ER |
| Other client units compatible with EtherNet/IP | | |

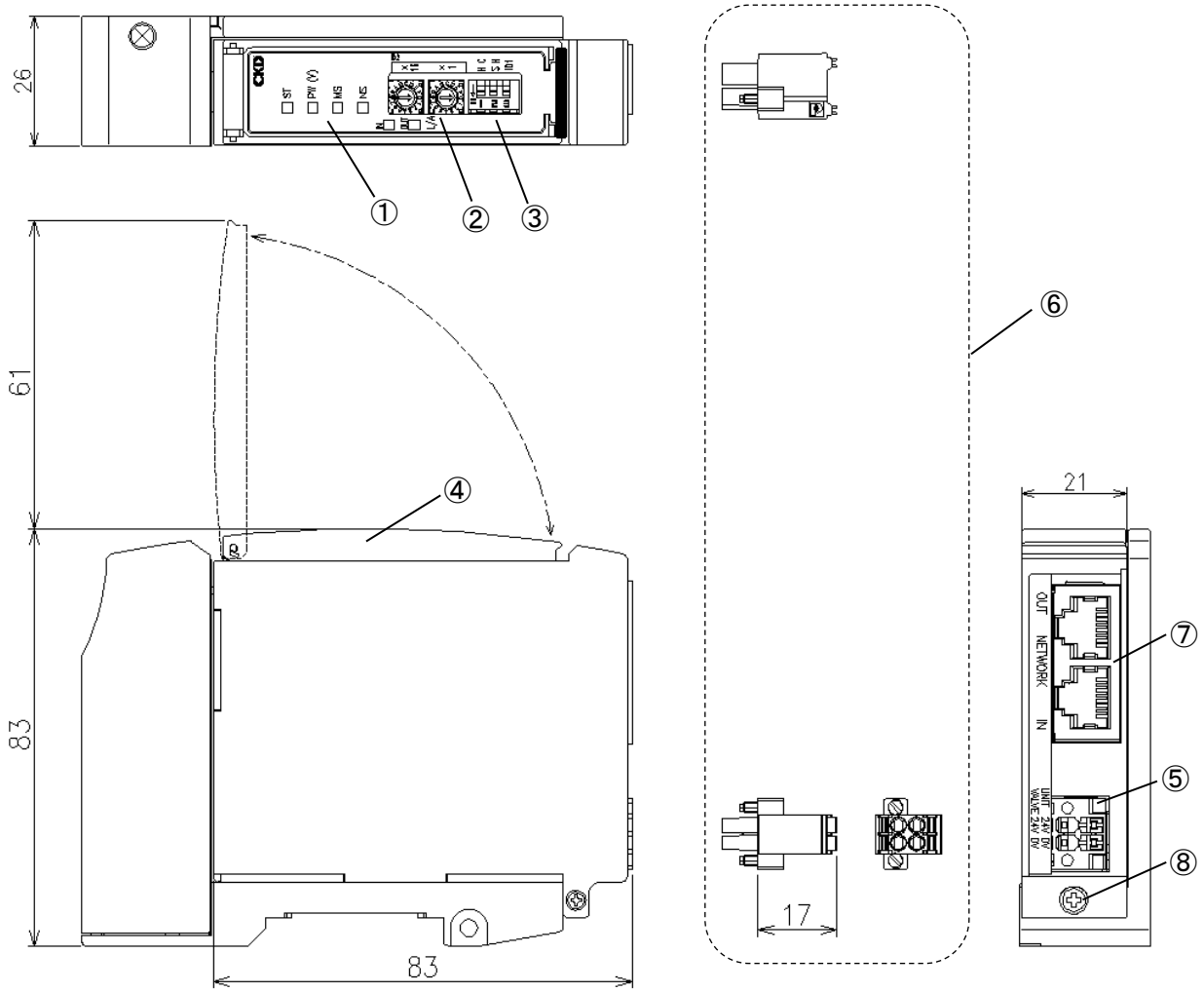
### ■ Example of basic structure of the system




Client (master) Requests to open connection and controls devices.
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 | Indicate the status of the device and network with MS, NS, L/A IN, L/A OUT, ST, and PW(V). |
| ② | Rotary switch | Sets the device IP address. |
| ③ | Slide (DIP) switch | Sets the output mode, operation mode, and IP address when a communication error occurs. |
| ④ | Cover | Protects the LED indicators and setting switches. |
| ⑤ | Device/valve power socket | Connects the device/valve power plug. |
| ⑥ | Device/valve power plug (supplied item) | Connects the device/valve power cables (24 V). |
| ⑦ | Network connector socket (RJ45×2 ports【IN, OUT】) Network plug is not supplied with the product. | IN: Sends and receives EtherNet/IP communication.<br>OUT: Sends and receives EtherNet/IP communication.<br>* There is no functional difference between the IN and OUT ports. |
| ⑧ | Device mounting screw (M2.5 Taptite) | Secures the slave unit to the slave unit connecting block. |

## 1.2.2 Switches and LED indicators

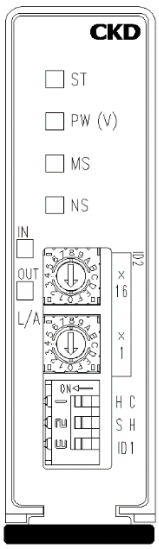
**⚠CAUTION**

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

### ■ Switches

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

| Switches | Settings |
|---|---|
| ID2: x16, x1<br>Rotary switch | Sets the device IP address.<br>For the setting details, refer to 3.1 Switch Settings. |
| ID1 (DIP switch) | |
| S (DIP switch)<br>H | Selects whether to use switch (hardware setting, H) or software (software setting, S) when setting the IP address. |
| H (DIP switch)<br>C | Selects whether to hold (H) or clear (C) the output status when a communication error occurs. |




### ■ 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 Display of state | Green blinking | IP address not set or during communication setting |
| | | Green on | Normal |
| | | Red blinking | Improper switch setting |
| | | Red on | Device 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 at EtherNet/IP IN | Off | No link, no data transfer |
| | | Green on | Link detected, no data transfer |
| | | Green on / yellow flickering | Link detected, data transferring |
| L/A OUT | Link status at EtherNet/IP OUT | Off | No link, no data transfer |
| | | Green on | Link detected, no data transfer |
| | | Green on / yellow flickering | Link detected, data transferring |
| PW(V) | Valve power state | Off | Valve power OFF |
| | | Green on | Valve power ON |
| ST | Device power state | Off | Device power OFF |
| | | Green on | Device power ON |

# 1.3 Specifications

## 1.3.1 Communication specifications

| Item | Specifications |
|---|---|
| Communication protocol | EtherNet/IP Compatible |
| Transfer rate (Baud rate) | Auto setting (100M/ 10Mbps, full duplex / half duplex)<br>* Incompatible with 1000Mbps |
| Communication method | |
| Communication media | Ethernet cable (Category 5 or higher)<br>Shielded twist pair cable (EtherNet/IP recommended cable) |

## 1.3.2 Device specifications

The product must be used within the following specifications.

| Item | | Specifications | | | |
|---|---|---|---|---|---|
| Model No. | | T8EN1 (4GR-OPP7-1EN) | T8EN2 (4GR-OPP7-1EN) | T8ENP1 (4GR-OPP7-1EN-P) | T8ENP2 (4GR-OPP7-2EN-P) |
| Device power voltage | | 21.6 VDC to 26.4 VDC (24 VDC ±10%) | | | |
| Device power current consumption | | 90 mA or less (at 24.0 VDC with all points ON) | | | |
| 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)<br>15 mA or less (with no load and all points ON) | | | |
| Output type | | NPN output (+COM) | | PNP output (-COM) | |
| Number of output points | | 16 points | 32 points | 16 points | 32 points |
| IP address setting | | IP address: 192 (1st octet) . 168 (2nd octet) . 1 (3rd octet) . 0 (4th octet)<br>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.<br>① Sets by DIP switch: Third octet only and in the range of 0 and 1.<br>② Sets by rotary switch: Fourth octet only.<br>③ Sets by software: Sets all 1st to 4th octet. | | | |
| Output setting when communication error occurs | | Hold (all outputs are maintained)/ Clear (all outputs are cleared) | | | |
| Insulation resistance | | Between external terminals and the case: 30 MΩ or more with 500 VDC | | | |
| Withstand voltage | | Between external terminals and the case: 500 VAC for one minute | | | |
| Shock resistance | | 294.0 m/s$^2$ for 3 times in 3 directions | | | |
| Ambient storage temperature | | −20°C to 70°C | | | |
| Ambient storage humidity | | 30% to 85% RH (no dew condensation) | | | |
| Ambient temperature | | -5°C to 55°C | | | |
| Ambient humidity | | 30% to 85% RH (no dew condensation) | | | |
| Atmosphere | | No corrosive gas | | | |
| Communication protocol | | EtherNet/IP Compatible | | | |
| Transfer rate (Baud rate)/ Communication method | | Auto setting (100M/ 10Mbps, full duplex / half duplex)<br>* Incompatible with 1000Mbps | | | |
| EtherNet/IP Connector | | RJ45 8-pin modular connector x 2 ports | | | |
| 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/ Device power: 24V, 1A<br>(Both fuses are non-replaceable) | | | |
| Operation indicator | | LED (communication status, device power and valve power status) | | | |
| Degree of protection | | IP30 | | | |
| 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/s2, 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 client(master) unit. Transmission delay as a system varies depending on the PLC scan time and other devices connected to the same network.
* For the response time of the solenoid valve, check the solenoid valve specifications.
* Solenoid valve Off response 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 such as secure the wiring to the machine or device midway.

**To prevent noise problems, keep the following in mind when wiring:**

- If noise could have an effect, prepare power for each manifold solenoid valve and wire separately.
- Wire the power cable as short as possible.
- Wire the power cables for the product separately from the power cables for noise-generating devices such as inverter motors.
- Wire the power cable and network cable away from other power lines as much as possible.
- Be sure to connect the shielding of the network cable to equipotential bonding close to the device.
- Wire 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 cable and power cable.
Check all this Instruction Manual, the instruction manuals for PLC and each device, and connect the cable properly.
Incorrect connection may cause not only a system failure but also serious fault to the other devices.

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

# 2.2 Wiring

## 2.2.1 Connecting and wiring to the network connector socket

**⚠WARNING**

**Carry out wiring with the power turned off.**
An electric shock may occur by touching the electrical wiring connection (bare live part).

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

**Thoroughly read and understand this instruction manual before working on electrical wiring.**

**⚠CAUTION**

**Check the working voltage and polarity before wiring and energizing.**

**Take measures against lightning surges on the device side.**
The product has no resistance to lightning surges.

**Use a 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.**

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 (client(master)s, hub, and other devices) used. Make sure to understand these specifications before wiring. For details, refer to the instruction manual of client(master) device 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]>**

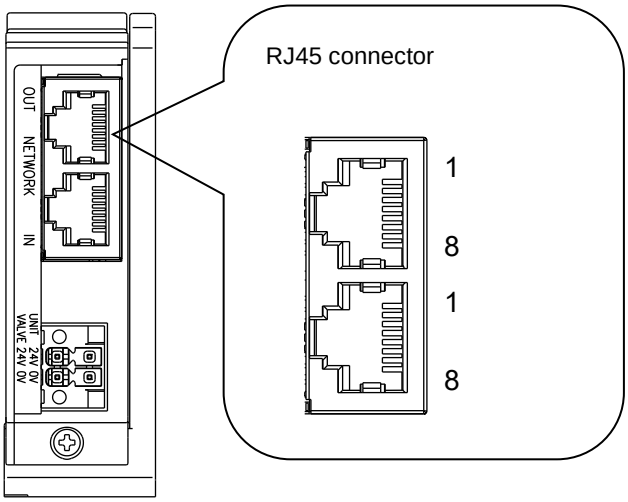
| Manufacturer | Cable | Model |
|---|---|---|
| JMACS Japan Co., Ltd. | Industrial Ethernet cable (double shield) | ETP-SB-S***□ |
| | | ***: Length, □: M = meter or C = centimeter |

## ■ Connecting the network cable

Follow the steps below to connect the network cable to the network plug.

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

***2*** Refer to the following figure to wire the EtherNet/IP cable to the RJ45 plug (EtherNet/IP compliant).




| Port | Pin | Signal | Function |
|---|---|---|---|
| IN/ OUT | 1 | TD+ | Transmission data, plus |
| | 2 | TD- | Transmission data, minus |
| | 3 | RD+ | Received data, plus |
| | 4 | Unused | Unused |
| | 5 | Unused | Unused |
| | 6 | RD- | Received data, minus |
| | 7 | Unused | Unused |
| | 8 | Unused | Unused |

## 2.2.2 Connecting and wiring to the device/valve power socket

**⚠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 device (remote I/O device) 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.

The power plug is supplied with the product. The device/valve power cables are wired to the supplied power plug and that plug is connected to the power socket on the device.

**Device power**
This electrical power is for operating the device. Use 21.6 VDC to 26.4 VDC power 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.

※ Although the indicator on the valve may light up instantaneously when the valve power is turned on, the valve itself will not be turned on or off.

**Supplied power plug**

| Part name | Model No. | Manufacturer |
|---|---|---|
| 4-pin connector | DFMC1,5/2-STF-3,5(1790292) | PHOENIX CONTACT |

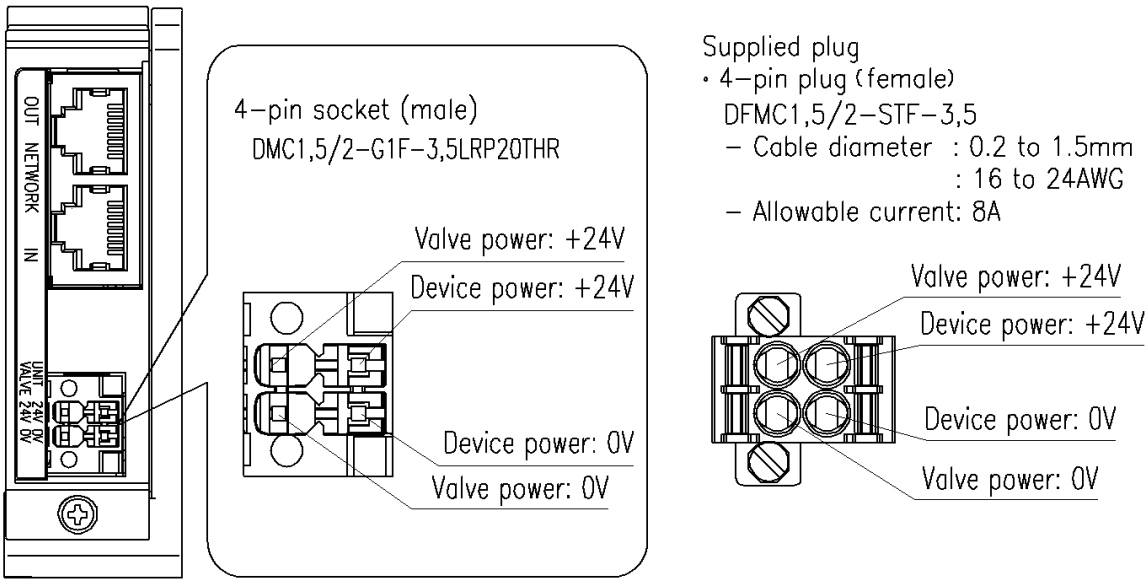
**Recommended ferrules and crimp tools**

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

## ■ Connecting the power cables

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

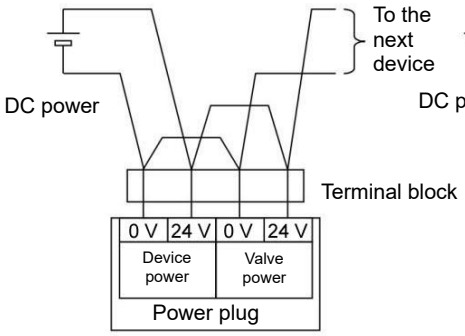
1. After confirming safety, turn off the power to connect to the device.
2. Attach a terminal such as a ferrule to the cable to be connected as necessary.
3. Refer to the figure below and wire the cables to the correct terminals on the power plug (24 V to 24 V, 0 V to 0 V).
4. Connect the power plug to the power socket and secure the plug flange with the appropriate tightening torque (0.2 N·m).



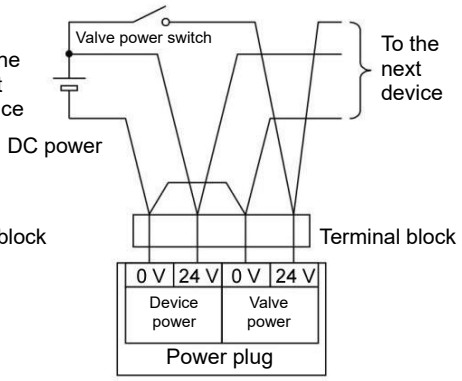

## ■ Wiring the power cable

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

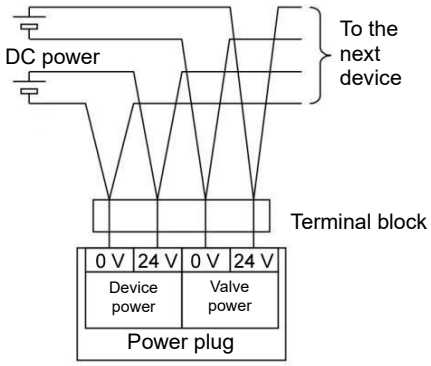
1. Common connection for device power and valve power




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 under conditions not specified for the product or for special applications.**

**⚠CAUTION**

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

**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 Setting the Switches

**⚠CAUTION**

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

**Set switches while device 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 setting OFF: Hardware setting)

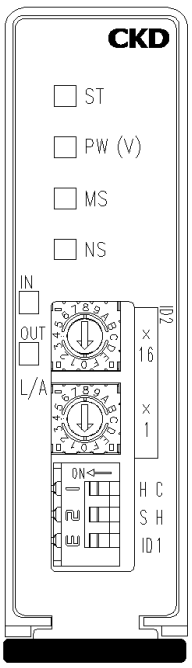
Set the device IP address (ID1, ID2). The IP address is 192.168. [ID1]. [ID2].
* The ID2 set value “FF” shifts to DHCP mode.
* The ID2 set value "00" is an invalid address.
IP address setting is read when the power is turned on. Duplicate IP address cannot be assigned.

IP address:192.168. [ID1]. [ID2]

| Switches | ID1 (DIP switch No.3) | ID2 (Rotary switch): × 16, × 1 |
|---|---|---|
| Setting range | ON: 1<br>OFF:0 | 01 to FE (hex)<br>[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: To set the IP address to 71 (decimal)
Since 71 = 64+7, upper digit is set to 4 and lower digit is set to 7 [47 (hexadecimal)] according to the table above.

### 3.1.2 Output mode setting (Able regardless of operation mode setting is ON/OFF)

Set the output status when a communication error occurs.

| Switches | Settings |
|---|---|
| H C<br>(DIP switch No.1)<br>[Output mode setting] | Sets the output status when a communication error occurs (such as line disconnection and timeout).<br>ON : Hold mode<br>OFF : Clear mode |

### 3.1.3 Operation mode setting

Select which setting to use for the IP address: switch setting (hardware setting) or software setting.
* 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.

| Switches | Settings |
|---|---|
| S H<br>(DIP switch No.2)<br>[Operation mode setting] | Sets the operation mode. (Refer to 3.2 for details of software setting)<br>ON : software setting<br>OFF : hardware setting (switch setting) |

# 3.2 Software setting

Set the device IP address with software.
Initial IP address is 192.168.1.250. When setting with software, set DIP switch No.2 to S (ON, refer to 3.1.3 Operation mode setting).

* In case of losing track of the IP address set with 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 devices at once since it starts with the initial IP address. The duplicate IP address conflicts may occur.
* As long as it is with software setting mode, the IP address written in 3.2.1 and 3.2.2 (3) below will be retained even if the power is turned off. However, when starting it with the hardware setting, the IP address set by the software returns to the initial value (192.168.1.250) as IP address setting switches become 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 (S) while the device power is OFF.

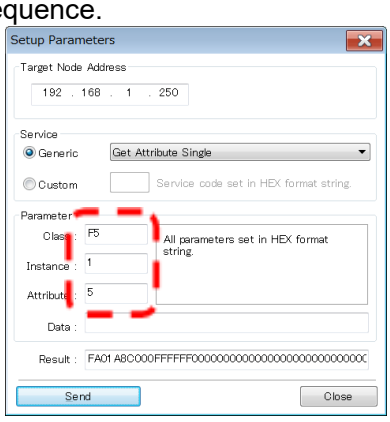
***2*** After confirming safety, turn on the device power.
(Start with software setting. Initial IP address is 192.168.1.250.

***3*** Write the needed 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 | 4bytes | C0A801FA (192.168.1.250) |
| | | | Network Mask | 4bytes | FFFFFF00 (255.255.255.0) |
| | | | Gateway Address | 4bytes | 00000000 (00.00.00.00) |
| | | | Name Server | 10bytes | 00000000000000000000 |
| | | | Name Server2 | | |
| | | | Domain Name | | |

* Calling data based on the table will be as follows, due to the data sequence.
(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.

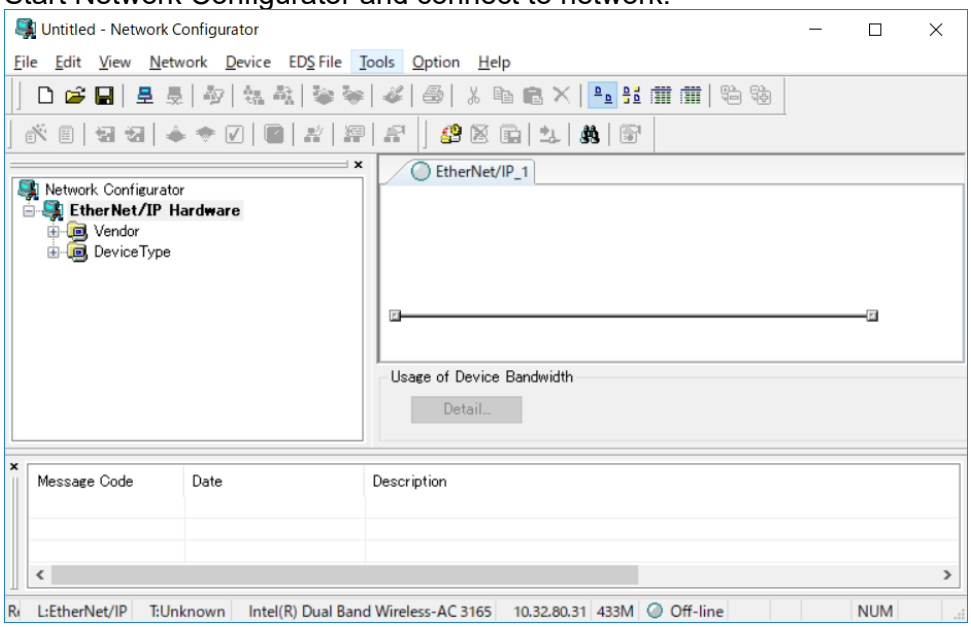
## 3.2.2 IP address setting 2

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

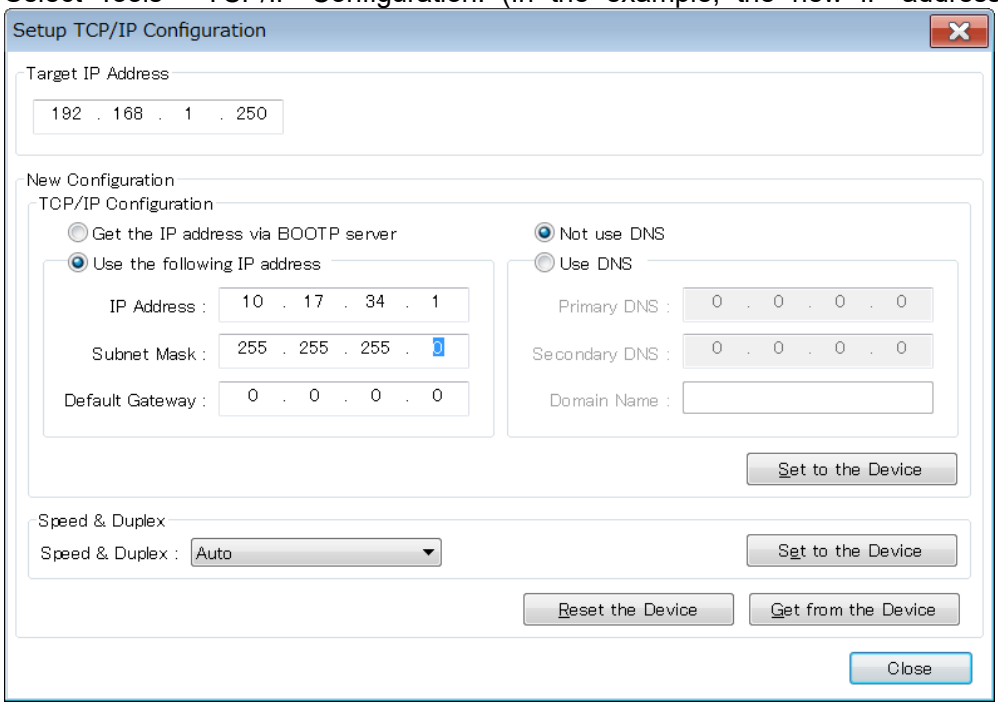
1. Set the DIP switch (No.2) to software setting (S) while the device power is OFF.
2. After confirming safety, turn on the device power.
   (Start with software setting. Initial IP address is 192.168.1.250.)
3. Set the IP address using the tool.
   (Below is an example of the setting method using Network Configurator provided by Omron Corporation.)

**Setting example (Network Configurator provided by Omron Corporation)**

Start Network Configurator and connect to network.




Select Tools - 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 Network configuration with EDS (Electric Data Sheet) 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 client(master) unit manufacturer. For the latest EDS file to download, refer to CKD website for component products (https://www.ckd.co.jp/kiki/en/). Use the latest EDS file to ensure a suitable network configuration.

## 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 the device specifications and EDS file.

**Specifications and model names in the EDS file**

| Item | Specifications | | | |
|---|---|---|---|---|
| Model No. | -T8EN1 | -T8EN2 | -T8ENP1 | -T8ENP2 |
| Single device model no. | OPP7-1EN | OPP7-2EN | OPP7-1EN-P | OPP7-2EN-P |
| Output type | +COM (NPN) | | +COM (NPN) | |
| Number of output points | 16 points | 32 points | 16 points | 32 points |
| EDS file | OPP7-1EN.eds | OPP7-2EN.eds | OPP7-1EN-P.eds | OPP7-2EN-P.eds |

# 3.4 Correspondence between the device output number and PLC address No.

## 3.4.1 PLC address correspondence table

This correspondence table uses OMRON PLC as an example.

**< T8EN□1(OPP7-1EN-□) (for 16 points output)>**

| Assigned address to the PLC memory | Output Bit 00 to 15 | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 |
| Device Output No. | **0** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** |
| Solenoid output No. | **s1** | **s2** | **s3** | **s4** | **s5** | **s6** | **s7** | **s8** | **s9** | **s10** | **s11** | **s12** | **s13** | **s14** | **s15** | **s16** |

Output data

**< T8EN□2(OPP7-2EN-□) (for 32 points output)>**

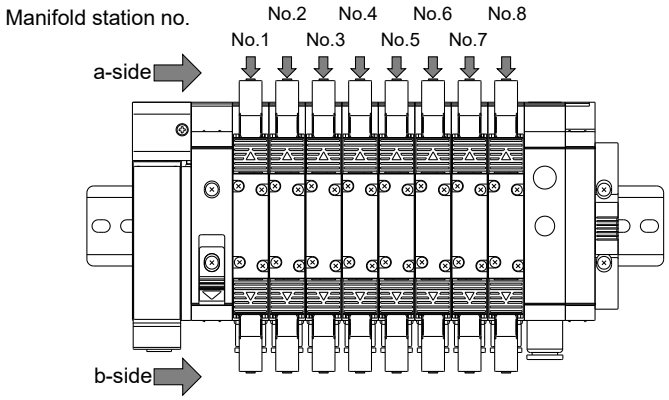
| Assigned address to the PLC memory | Output Bit 00 to 15 | | | | | | | | | | | | | | | | Output Bit 16 to 31 | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 00 | 01 | 02 | 03 |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

Output data Output data

## 3.4.3 Example of valve No. array corresponding to solenoid output No.

In the table below, each valve number consists of a number (the station number) and an alphabet (the a-side solenoid or the b-side solenoid). For example, “1a” refers to 1st station a-side solenoid. Also, “E” stands for “Empty”.
Manifold stations are numbered from left to right with the piping port towards the user (refer to the figure below).
As appearance and maximum number of stations differ depending on the solenoid valve model, check individual specifications.

**< T8EN1, T8ENP1 (16 output point)>**




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

**Standard wiring**

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

| Solenoid Output No. | s1 | s2 | s3 | s4 | s5 | s6 | s7 | s8 | s9 | s10 | s11 | s12 | s13 | s14 | s15 | s16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Valve no. | 1a | 2a | 3a | 4a | 5a | 6a | 7a | 8a | 9a | 10a | 11a | 12a | 13a | 14a | 15a | 16a |

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

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

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

| Solenoid Output No. | s1 | s2 | s3 | s4 | s5 | s6 | s7 | s8 | s9 | s10 | s11 | s12 | s13 | s14 | s15 | s16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Valve no. | 1a | 2a | 3a | 3b | 4a | 4b | 5a | 6a | 7a | 7b | 8a | 9a | 10a | 10b | 11a | 11b |

**Double wiring**

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

| Solenoid Output No. | s1 | s2 | s3 | s4 | s5 | s6 | s7 | s8 | s9 | s10 | s11 | s12 | s13 | s14 | s15 | s16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Valve no. | 1a | (E) | 2a | (E) | 3a | (E) | 4a | (E) | 5a | (E) | 6a | (E) | 7a | (E) | 8a | (E) |

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

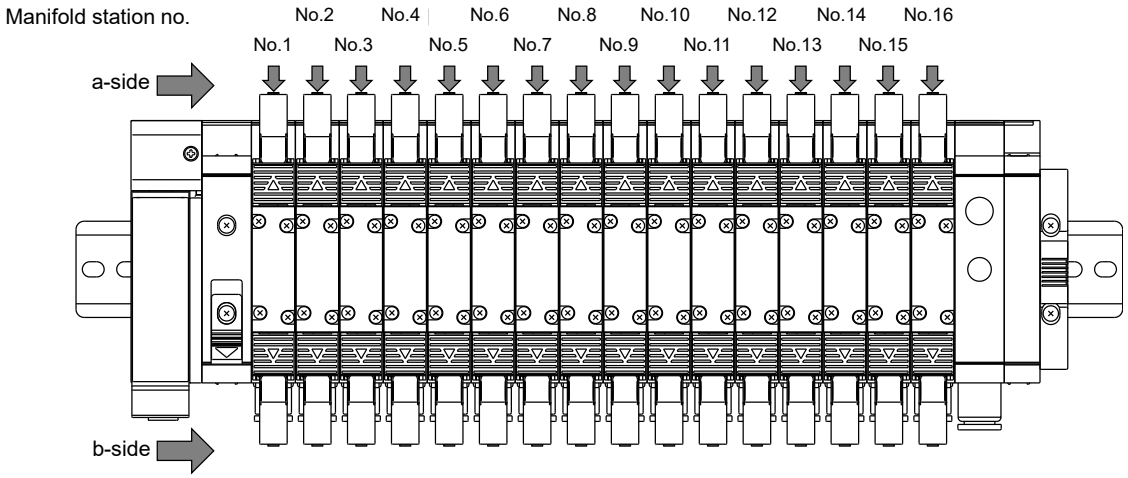
| Solenoid Output No. | s1 | s2 | s3 | s4 | s5 | s6 | s7 | s8 | s9 | s10 | s11 | s12 | s13 | s14 | s15 | s16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Valve no. | 1a | 1b | 2a | 2b | 3a | 3b | 4a | 4b | 5a | 5b | 6a | 6b | 7a | 7b | 8a | 8b |

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

| Solenoid Output No. | s1 | s2 | s3 | s4 | s5 | s6 | s7 | s8 | s9 | s10 | s11 | s12 | s13 | s14 | s15 | s16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Valve no. | 1a | (E) | 2a | (E) | 3a | 3b | 4a | 4b | 5a | (E) | 6a | (E) | 7a | 7b | 8a | (E) |

**< T8EN2, T8ENP2 (for 32 points output)>**

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




### Standard wiring

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

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

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

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

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

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

### Double wiring

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

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

- 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 | (E) | 2a | (E) | 3a | 3b | 4a | 4b | 5a | (E) | 6a | (E) | 7a | 7b | 8a | (E) | 9a | (E) | 10a | (E) | 11a | 11b | 12a | 12b | 13a | (E) | 14a | (E) | 15a | 15b | 16a | (E) |

# 3.5 Programming

The client(master) unit handles this device as a server device (T8EN□1 for 16-point output, T8EN□2 for 32-point output).

There are two types of data: output data sent from the client(master) unit to the device (this product: 16-point output: T8EN□1 for 16-point output and T8EN□2 for 32-point output), and input data sent from the device to the client(master) unit. This product is an output device that receives output data from the client(master) unit and outputs to the valve (no input data).

* Depending on the type of client(master), it is necessary to set to 6 bytes, which is 2 bytes of reserved data and 4 bytes of header. Refer to the instruction manual issued by the client(master) 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, which 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 | 2bytes | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 |
| | - | 4bytes | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 |

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

**I/O Assembly instance**

| Item | | Specifications | | | |
|---|---|---|---|---|---|
| Model No. | | -T8EN1 | -T8EN2 | -T8ENP1 | T8ENP2 |
| Single device model No. | | OPP7-1EN | OPP7-2EN | OPP7-1EN-P | OPP7-2EN-P |
| Output data | Instance | 100 (dec) | 101 (dec) | 100 (dec) | 101 (dec) |
| | Size | 2 (bytes) | 4 (bytes) | 2 (bytes) | 4 (bytes) |
| Input data | Instance | 110 (dec) | 110 (dec) | 110 (dec) | 110 (dec) |
| | Size | 2 (bytes) | 2 (bytes) | 2 (bytes) | 2 (bytes) |

# 4. MAINTENANCE AND INSPECTION

**⚠WARNING**

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

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

**⚠CAUTION**

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

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

## 4.1 Periodic Inspection

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

### ■ Cleaning

1. For daily cleaning, wipe the product with a soft dry cloth.
2. When stains cannot be removed by wiping with a dry cloth, moisten the cloth with diluted neutral detergent (2%), wring it, and wipe the stains again.
3. Objects such as rubber, vinyl, or tape may stain the product if they are left in contact with it for a long period. Remove such objects when cleaning if they are leaving stain on the product.

### ■ Inspection

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

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

| Inspection items | Inspection details | 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 accumulated dust? | 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 device (client(master) and device) is a device that constitutes a part of a network.
If any device 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 device is replaced with a new one, check if the new device 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 count

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

| Model No. | -T8EN1 | -T8EN2 | -T8ENP1 | -T8ENP2 |
|---|---|---|---|---|
| Single device model no. | OPP7-1EN | OPP7-2EN | OPP7-1EN-P | OPP7-2EN-P |
| Class | 4 (Dec) | 4 (Dec) | 4 (Dec) | 4 (Dec) |
| Instance | 120 (Dec) | 121 (Dec) | 120 (Dec) | 121 (Dec) |
| Attribute | 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 it 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 (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 when a communication error occurs before turning on the device power.**

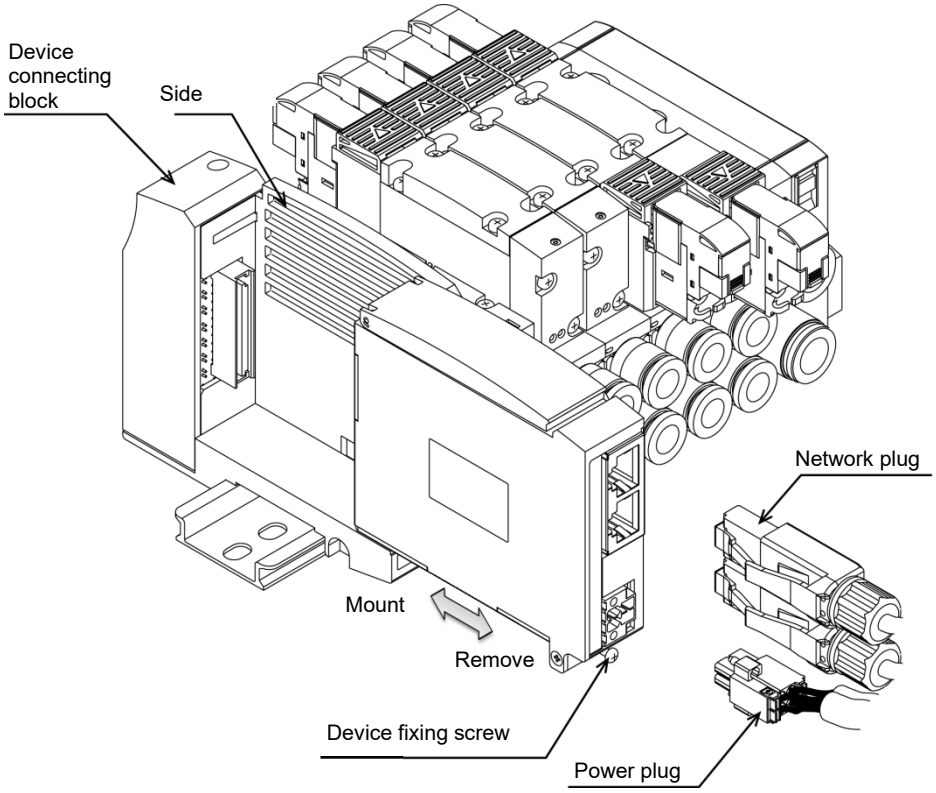
**Do not attach or detach the plug while the power is turned on.**
These may cause failure or malfunction.

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

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

## 4.2.1 Removing the product (device)

1. After confirming safety, stop network communication as necessary and turn off all peripheral equipment.
2. After confirming safety, turn off the device power and valve power as necessary.
3. Loosen the device fixing screw.
   Note: Be careful not to lose the server unit fixing screw
4. Hold and pull out the product slowly in the direction of the arrow.
5. Remove the network plug and power plug.




## 4.2.2 Mounting the product (device)

1. Set the station number of the product.
2. Turn off the power (for device/valve) and connect the network plug and power plug.
   The system may operate suddenly if the plugs are connected while the power is turned on.
   Be careful of the surroundings and secure safety before performing work.
   Power plug: Appropriate tightening torque is 0.2 N·m
3. Hold the product and insert it slowly in the direction of the arrow.
4. Check that the product and device connecting block are properly connected and tighten the device fixing screw firmly.
   (Appropriate tightening torque is 0.5 N·m)
5. After confirming safety, turn on each power.

# 5. Troubleshooting

## 5.1 Problems, Causes, and Solutions

Troubleshooting for this device must be carried out not only for the single device 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 if the supplied power voltage is within the specified range.
- Check the system and restart the product. Replace the device if it doesn't recover, as a fuse may be blown in the device.

### ■ Fault 2: MS LED red blinking

- Check that the operation mode matches the setting switch. Restart the system after checking.

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

- Check that the network cable is properly connected and the communication mode has been confirmed.

### ■ Fault 4: MS LED red on

- Check the system and restart the product. Replace the device if it doesn't recover, as it may be broken.

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

- Waiting for communication. Check that the settings on the client(master) are correct and the IP address and subnet mask of the device are set as intended.

### ■ Fault 6: NS LED red blinking

- Check that there is no noise-generating device, high-voltage line or high-current line near the network cable and this device.
- 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 client(master) device are appropriate, and that communication is stable.

### ■ Fault 7: NS LED red on

- Check if the IP address is duplicated.

# 6. WARRANTY PROVISIONS

## 6.1 Warranty Conditions

### ■ Scope of warranty

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

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

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

### ■ Confirmation of product compatibility

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

### ■ Others

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

## 6.2 Warranty period

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