Handling Instructions

EtherNet/IP Compatible Serial Transmission Device T8EN□ / T8ENP□ (OPP7-□EN / OPP7-□EN-P)

Thank you for purchasing CKD product.
Please review the precautions in this handling instructions thoroughly for safe operation of this product.
Incorrect usage may result in malfunction and dangers.
Keep this Instruction in a safe and convenient place for future reference.
For further information, please refer to the instruction manual and product catalog.

⚠ **CAUTION**

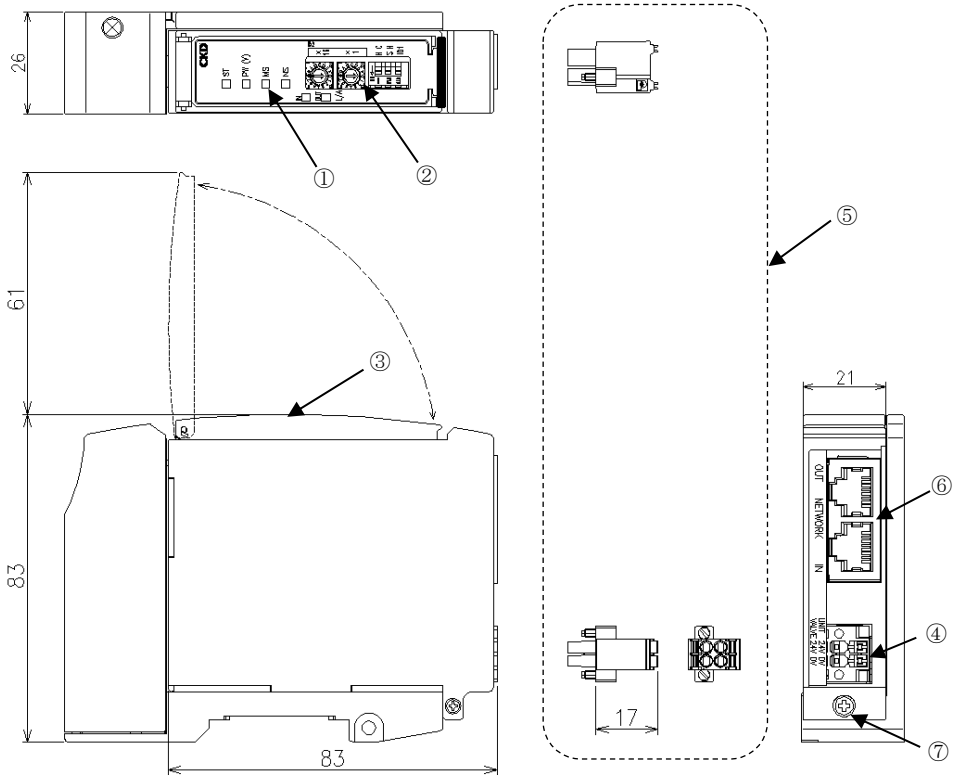
- An electric shock may occur by touching the electrical wiring connection (bare live part). Keep the power off during wiring. Never touch these live parts with wet hands.
- Thoroughly read and understand the instruction manual for the network system to be used before using the serial transmission device.
- System components such as valves and cylinders could malfunction if the address setting of the device is incorrect. Always check the address setting before starting use.
- This product is DC dedicated. Use the product within the specified power supply voltage.

1. Device specifications

Always operate this sever device within its product specifications.

Item	Specifications			
Model No.	-T8EN1	-T8EN2	-T8ENP1	-T8ENP2
Single device model No.	OPP7-1EN	OPP7-2EN	OPP7-1EN-P	OPP7-2EN-P
Device power supply voltage	21.6 VDC to 26.4 VDC (24VDC±10%)			
Device power current consumption	90 mA or less (at 24 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) 15 mA or less (with no load and all points ON)			
Output type	+COM (NPN)		-COM (PNP)	
Number of output points	16 points	32 points	16 points	32 points
IP address setting	IP address: 192 . 168 . 1 . 0 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: Third octet only and in the range of 0 and 1. (2) Sets by rotary switch: Fourth octet only. (3) Sets by software: Sets all 1st to 4th octet.			
Output setting when a 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			
Storage ambient temperature	-20℃ to 70℃			
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			
Transfer rate (Baud rate)/ Communication method	Auto setting (100M/ 10Mbps, full duplex / half duplex) * Incompatible with 1000Mbps			
Output insulation	Photo coupler insulation			
Leakage current	0.1 mA or less			
Residual voltage	0.5 V or less			
Fuse	Valve power: 24V, 3A/ Device power: 24V, 1A (both fuses are non-replaceable)			
Operation indicator	LED (communication status, device power and valve power status)			

2.Dimensional outline drawing



① LED
MS, NS, L/A IN, L/A OUT, ST, PW(V)
Indicate device status and network status by LEDs.

② Switches
Set the IP address of the device by rotary switches.
Set the output mode, operation mode, and IP address in the event of a communication error.

③ Cover
Protects the LEDs and the switches.

④ Device/valve power socket
Connects the device/valve power plug.

⑤ Device/valve power plug (included in the device)
Connects the device/valve power cables (24 V).

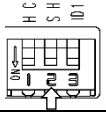
⑥ Network connector socket (RJ45 × 2 ports [IN, OUT]) (Network connector plug is not included.)
Transmits EtherNet/IP communication to the next sever or receives it from the previous device.
Note: There is no difference in the function between input(IN) and output(OUT) ports which only named to distinguish each port.

⑦ Device mounting screw (M2.5 tap tight)
Secures the device to the device connecting block.

3. Switches and LED indicators

3.1 Operation mode setting

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

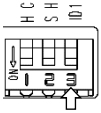
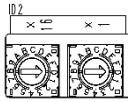
Switches	Settings
S H (DIP switch No.2) [Operation mode setting] 	Sets the operation mode. ON: software setting OFF: hardware setting (switch setting)

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

Set the device IP address. The IP address is 192.168. [ID1]. [ID2].

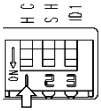
* The ID2 set value “FF” shifts to DHCP mode.

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

Switches	ID1 (DIP switch No.3) 	ID2 (rotary switch): × 16, × 1 
Setting range	ON :1 OFF:0	01 to FE (Hex) 【1 to 254(Dec)】

3.3 Output mode setting (Enable regardless of operation mode setting: ON/OFF)

Sets the output status when a communication error occurs.

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

CAUTION

- Make sure to set the switches with the device power off.
- Keep the cover on the device closed except when setting the switches. Otherwise, foreign matter may enter into the internal circuit from the cover and cause unexpected failure, or the cover itself may get damaged. Be extremely careful not to allow any foreign matter to enter the device when setting the switches.
- The setting switch is very precise and may be damaged in case of rough handling. Also, never touch the internal circuit board when setting the switches.

3.4 LED indicators

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

Part name	Indication
MS	Indicates the status of the device related to EtherNet/IP with the LED (green and red) lighting (light off, on, and rapid flashing) * Note: (Green on at normal communication)
NS	Indicates the communication status related to EtherNet/IP with the LED (green and red) lighting (green on at normal communication)
L/A IN	Indicates the status of the Ethernet port (IN side) with LED (green and yellow) lighting (light off, on, rapid flashing)
L/A OUT	Indicates the status of the Ethernet port (OUT side) with LED (green and yellow) lighting (light off, on, rapid flashing)
PW(V)	Lights on when the valve power is on.
ST	Lights on when the device power is on.

4. Wiring

Describe function and connection of the terminals.

CAUTION

- An electric shock may occur by touching the electrical wiring connection (bare live part). During wiring, keep the power off. Never touch live parts with wet hands.
- Do not subject the power cables and network cables to tension and impact. Long cables can exert unexpected momentum and impact due to its weight, and this can consequently damage the connectors and devices. Take preventative measures such as securing the cables part way along its length to reduce inertia.
- To prevent noise problems, keep the following in mind when wiring:
  (1) If noise could have an effect, prepare power for each manifold solenoid valve and wire independently.
  (2) Do not make the power and FG cables needlessly long but wire them with the shortest possible lengths.
  (3) Do not share power with noise generating devices such as inverters and motors.
  (4) Do not lay the power cables, network cables, and other power lines parallel to each other.
- Discharge static electricity that has built up on your body by touching a grounded metal object before handling the Ethernet/IP device. Static electricity may cause damage to the product.

4.1 Communication distance and wiring

Although the EtherNet/IP network uses a standard Ethernet cable and has flexible wiring methods, there are limits depending on the wiring material, equipment, clients, hub, and other devices used. Always understand these specifications thoroughly before wiring. For details, refer to the instruction manual of the master(client) unit manufacturer and ODVA.

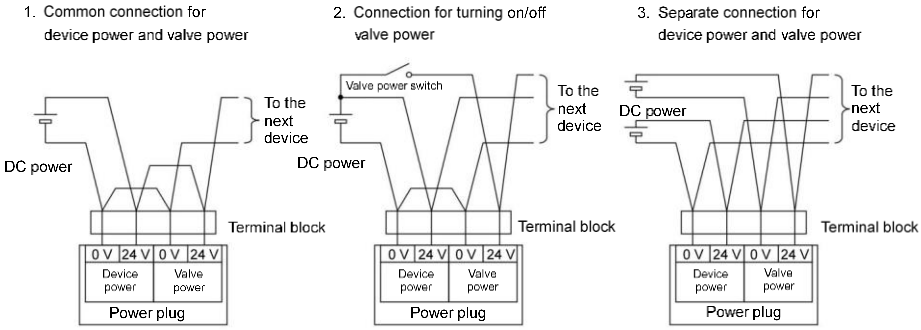
4.2 Connecting and wiring to the device/valve power socket

A power plug is supplied with this product. Wire the power cables for device and valve to the plug and connect the plug to the power socket on the device.

Supplied power plug

DFMC1,5/2-STF-3,5（1790292）4-pin connector	by PHOENIX CONTACT
Recommended ferrules and crimping tool	
Ferrule (without sleeve): A0.5 ~ 1,5-10	by PHOENIX CONTACT
Ferrule (with sleeve): AI0.25 ~ 0.75-10	by PHOENIX CONTACT
Crimping tool (in common): CRIMPFOX6 (1212034)	by PHOENIX CONTACT

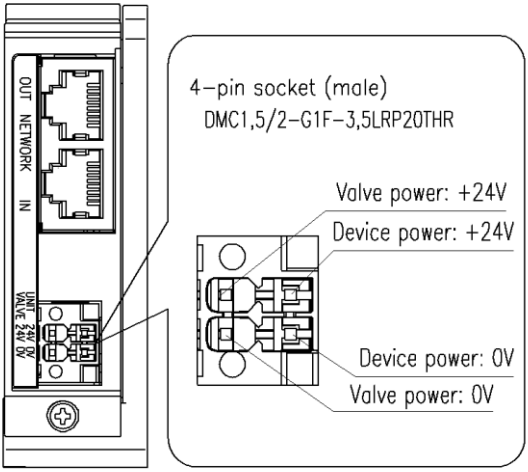
The following figures 1 to 3 are examples of the wiring for the power plug. Change the circuit configuration as necessary.



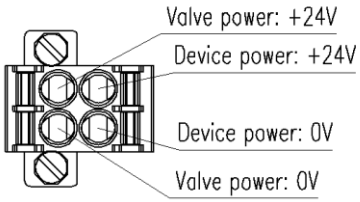
Follow the steps below to connect the device/valve power cables to the power plug.

<Device/Valve power cable>

(1) After confirming safety, power off the power supply connected to the device.
(2) Attach a terminal such as a ferrule to the power cable when needed.
(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).



Supplied plug
- 4–pin plug (female)
  DFMC1,5/2–STF–3,5
  – Cable diameter : 0.2 to 1.5mm
    : 16 to 24AWG
  – Allowable current: 8A



CAUTION

- Check the polarity of this product and the cable terminal before connecting.
- Calculate the current consumption before selecting the appropriate power cable.
- Consider the voltage drop due to cables when selecting and wiring the cables if power is supplied to more than one device from one power supply.
- Secure the specified power supply voltage by taking countermeasures, such as wiring the power cables in multiple systems or installing other power supplies, if a voltage drop cannot be avoided.
- Wire the power cables at the terminal block placed in front of the power plug, when crossover wiring.

4.3 Connecting and wiring to the network connector socket (RJ45 connector)

Network connector plug is not supplied with this product. Separately purchase a network connector plug that satisfies the specifications. Wire the network cable to the plug and connect the plug to the network socket on the device.

<Recommended cable with plug [Cat.5e]>

ETP-SB-S***□ Industrial Ethernet cable (double shielded) by JMACS

***: Length, □: M = meter or C = centimeter

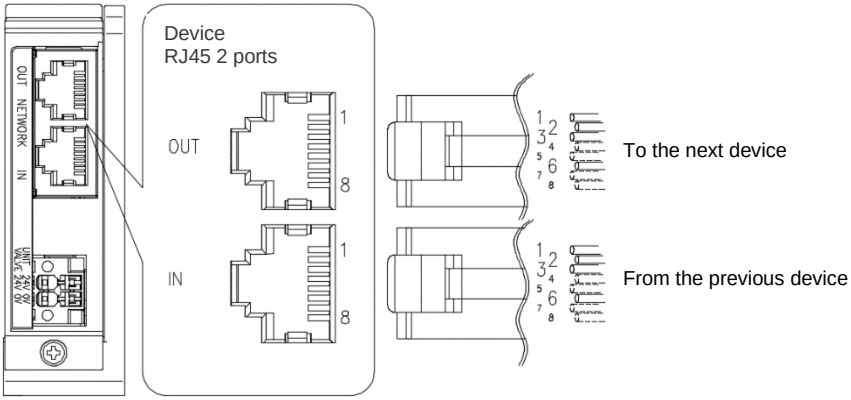
Follow the steps below to connect the network cable to the network plug.

<Network cable>

(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).
(3) Connect the power plug to the power socket and secure the plug flange with the appropriate tightening torque (0.2 N·m).

Note: There is no difference in the function between input (IN) and output (OUT) ports which only named to distinguish each port.

Note: When the previous device is OFF, network of this device turns OFF.



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

CAUTION

- Make sure to 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.

5. Removing and Mounting

5.1 Mounting the product (device)

(1) Set the station number and other switch settings for this 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.
(3) Hold the device and mount it along the guide of the connecting block slowly from the near side.
(4) Check that the product and device connecting block are connected properly and tighten the device fixing screw firmly.
(Appropriate tightening torque 0.5 Nm)
(5) After confirming safety, turn on each power supply.

5.2 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.
(Note that following stations next to this device stop communication.)

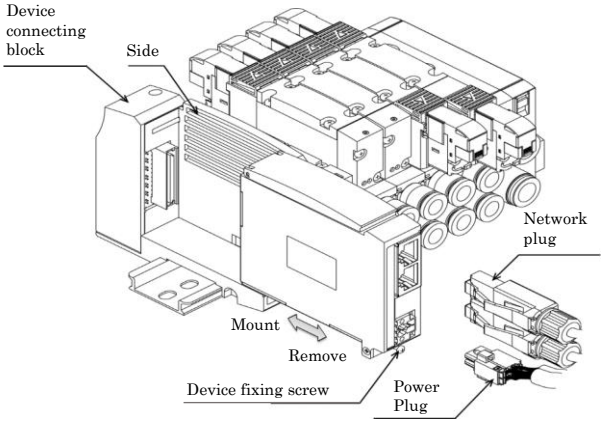
(3) Loosen the device fixing screw.
Note: Please be careful not to lose device fixing screw.

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

(5) Remove the network connector plug and the power plug.

CAUTION

- Do not remove the device by pulling cable or connector that may cause cable disconnection or damage.
- Fully loosen the plug fixing screw before removing the plug.
  Also, when mounting the device, tighten the plug fixing screw securely after inserting the plug.
- An electric shock may occur by touching the electrical wiring connection.



6. 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. Refer to the instruction manual issued by the client unit manufacturer for installing the EDS file. Use the latest EDS file to ensure a suitable network configuration. The latest EDS file can be downloaded from the CKD web site.
(https://www.ckd.co.jp/kiki/en/).

6.1 Registering the device

Check the IP address and specifications (model name) of the device to be used before installing 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-point output	32-point output	16-point output	32-point output
EDS file name	OPP7-1EN.eds	OPP7-2EN.eds	OPP7-1ENP.eds	OPP7-2ENP.eds

6.2 I/O mapping

There are two types of data: output data sent from the client unit to the device (this product) and input data sent from the device to the client unit. This product is an output device that receives output data from the client unit and outputs the data to the valve.

Refer to the following table for I/O mapping.

Output data mapping

I/O points		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 (the input data is dummy)

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)

PRECAUTIONS

-To correspond with the requirements of the relevant EC Directive, use AC/DC server (e.g., switching power supplies) complying with EMC standards for the valve and the device power supplies.
-The system or solenoid valve (cylinder) may operate suddenly when powering on and off. Be careful of the surroundings and secure safety before starting.
-For the communication delay time, refer to the user's manual of the client unit. Transmission delay as a system varies depending on the PLC scan time and devices connected to the same network.
-Check the valve specification for the response time of the solenoid valve.
-The solenoid valve OFF time is delayed by approximately 20 msec due to the surge absorbing circuit integrated in the device.
-Wire the power cable and network cable properly within its specifications to avoid any incorrect wiring.
-Do not subject the power cables and network cables to tension and impact.
-Make sure that cables and connectors are securely connected before turning on the power.
-Do not disassemble, modify, or repair the product as that may cause failure or malfunction.
-Do not drop or apply excessive vibrations or shocks to the product as the part inside are made precisely.
-Do not attach or detach the connector while the power is ON as that may cause failure or malfunction.
-Mold and rust may develop on the product if it is exposed to high humidity during transportation. Include moisture absorbers and tightly seal the package.
-For inquiries regarding this product, please contact the following or the nearest sales office.

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