Handling Precautions

PROFINET Compatible Serial Transmission Device

T8EP□/ T8EPP□

(OPP7-□EP / OPP7-□EP-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, refer to the instruction manual and product catalog.

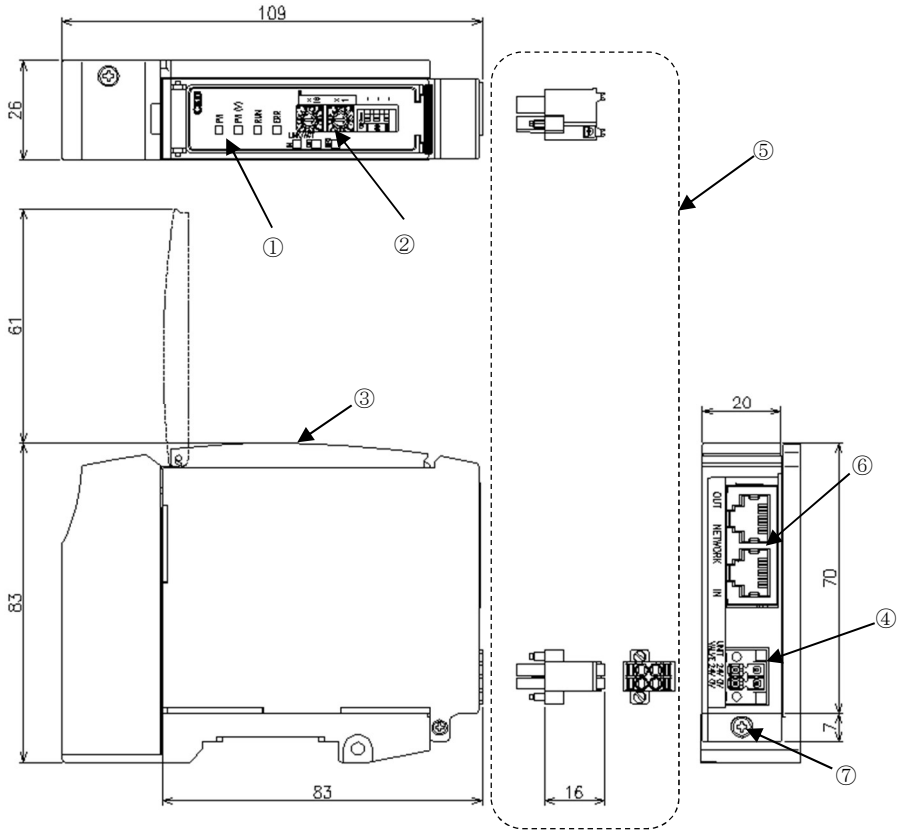
⚠ CAUTION

- System components such as valves and cylinders could malfunction if the device name or IP address setting of the device is incorrect. Always check the device name and IP address setting before starting use.
- Do not touch the live part with bare hands or the electrical wiring (bare live part), as an electric shock may occur.
- Read the instruction manual of the communication system before using the product.
- This product is DC dedicated. Use the product within the specified power voltage.

1. Device specifications : Always operate the device within its specifications.

Item	Specifications			
Manifold model	-T8EP1	-T8EP2	-T8EPP1	-T8EPP2
Single unit model	OPP7-1EP	OPP7-2EP	OPP7-1EP-P	OPP7-2EP-P
Unit power voltage	21.6 VDC to 26.4 VDC (24VDC ±10%)			
Unit power current consumption	90 mA or less (with all points ON: at 24.0 VDC ±10%)			
Valve power voltage	22.8 VDC to 26.4 VDC (24 VDC +10%, -5%)			
Valve power supply current consumption	10 mA or less (with all points OFF) / 15 mA or less (with all points ON at no load)			
Output type	+COM (NPN)		-COM（PNP）	
Number of output points	16 points	32 points	16 points	32 points
Output setting at communication error	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 one minute			
Shock resistance	294.0 m/s^2 for 3 times in 3 directions			
Storage temperature	-20°C to 70°C			
Storage humidity	30% to 85% RH (no dew condensation)			
Ambient temperature	-5°C to 55°C			
Ambient humidity	30% to 85% RH (no dew condensation)			
Ambient atmosphere	No corrosive gas			
Communication protocol	PROFINET IO compliant			
Baud rate	Supports 100Mbps / Full Duplex only			
Output insulation	Photo coupler insulation			
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, unit power and valve power statuses)			

2. Parts of the device



① LED
Indicates the status of the device and network with PW, PW(V), RUN, ERR, LINK ACT(IN/OUT) and INFO.

② Switches
Set the device name by rotary switches.
Note: DIP switches have no function.

③ Cover
Protects the LEDs and switches.

④ Unit/valve power socket
Connects the unit/valve power plug.

⑤ Unit/valve power plug (supplied item)
Connects the unit/valve power cables (24 V).

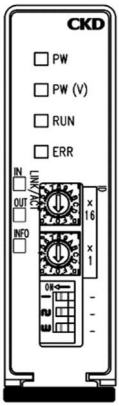
⑥ Network connector socket (RJ45 × 2 ports [IN, OUT]) (Network connector plug is not supplied.)
Ports transmit PROFINET communication to the next device or receive it from the previous device.
Note: There is no difference in the function between input(IN) and output(OUT) ports which only are named to distinguish each port.

⑦ Device fixing screw (M2.5 tapping screw)
Secures the device to the device connecting block.

3. LED indicators and switch settings

3.1 LED indicators

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



LED	Indication
PW	Unit power is ON (Green on at normal condition)
PW(V)	Valve power is ON (Green on at normal condition) Note: This indicator is disabled when the unit power is off.
RUN	Indicates the communication status of the PROFINET with the LED (green) lighting (off, on, blinking). (Lights on at normal communication.)
ERR	Indicates the communication status of the PROFINET with the LED (red) lighting (off, on, blinking). (Lights off at normal communication.)
LINK/ACT IN	Indicates the status of the Ethernet port (IN side) with the LED (green) lighting (off, blinking, fast blinking).
LINK/ACT OUT	Indicates the status of the Ethernet port (OUT side) with the LED (green) lighting (off, blinking, fast blinking)
INFO	Indicates the device status with the LED (red) lighting (off, on, blinking). (Lights off at normal communication.)

3.2 Switch settings

Set the device name of the product.

The device name setting is read when the power is turned on.

The device name cannot be set in duplicate.

Set the device name by referring to the following table.

Switch		Settings	Setting range
ID ×16	Device name setting switch	Set the device name of the serial transmission device. The device name is OPP7-[ID setting value]. Note: If the ID setting value is "00", the device name will be the value written from the PLC. If the device name is not written (initial value), the value will be "OPP7".	00 to FF
ID ×1			

Note: DIP switches no. 1 to 3 have no function.

⚠ CAUTION

- Set the switches with the device power turned off.
- Keep the cover of serial transmission device closed except when setting the switches. The cover may get damaged or foreign matters may enter inside and cause unexpected failure.
- The setting switch is very precise and may be damaged in case of rough handling. The internal circuit board can be easily damaged.

4. Wiring

Function description and connection of the terminal are as following.

⚠ CAUTION

- An electric shock may occur by touching the electrical wiring connection (bare live part). Always power off before wiring. Never touch live parts with wet hands.
- Do not apply tension or impact to the power cable or network cable.
  Long cables can exert unexpected momentum and impact due to its weight, and this can consequently damage the connectors and devices. Take appropriate measures such as secure the wiring to the machine or device midway.
- When wiring, be careful of the following points to prevent problems caused by noise.
  (1) If noise could have an effect, prepare power for each manifold solenoid valve and wire independently.
  (2) Wire the power cable as short as possible.
  (3) Wire the power cables for the product separately from the power cables for noise-generating devices such as inverter motors.
  (4) Do not lay the power cables, network cables, and other power lines parallel to each other.
- Before handling a PROFINET device, make sure to touch a grounded metal part to discharge static electricity from your body. Static electricity may cause damage to the product.

4.1 Communication distance and wiring

Although the PROFINET network uses a standard Ethernet cable and has flexible wiring methods, there are limits depending on the wiring material, and equipment (controller unit, hub, and other devices) used. Always understand their specifications thoroughly before wiring.

(For more information, refer to the instruction manuals provided by the controller unit manufacturer or PROFIBUS & PROFINET International (PI).)

4.2 Connecting and wiring to the unit/valve power socket

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

Supplied power plug

DFMC1,5 / 2-STF-3,5 (1790292)	4-pin connector	Mfd by PHOENIX CONTACT

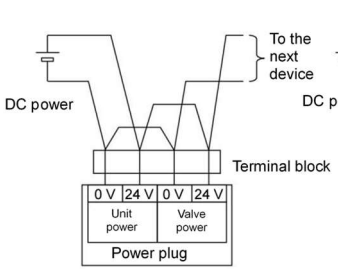
Recommended ferrules and crimping tool

Ferrule (without sleeve): A0,5-10 to 1,5-10	Mfd by PHOENIX CONTACT
Ferrule (with sleeve): AI0,25-10 to 0,75-10	Mfd by PHOENIX CONTACT
Crimping tool (in common): CRIMPFOX6 (1212034)	Mfd by PHOENIX CONTACT

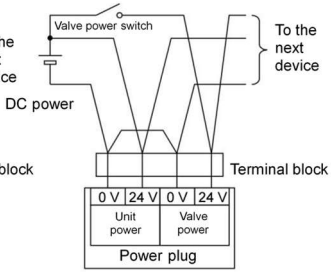
Figures 1 to 3 are examples of the wiring for the power plug.

Change the circuit configuration as necessary.

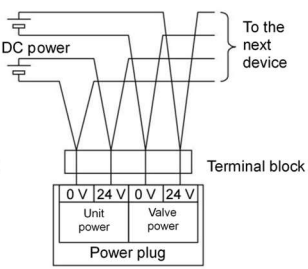
1. Common connection for unit power and valve power



2. Connection for turning on/off valve power



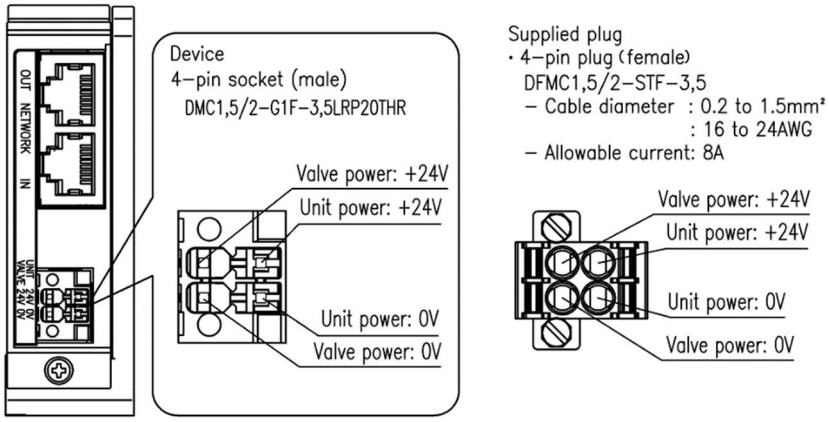
3. Separate connection for unit power and valve power



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

<Unit/Valve power cable>

(1) After confirming safety, turn 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).



⚠ CAUTION

- Check the polarity of the device and the cable terminal before connecting.
- Select the power cable by calculating the current consumption.
- 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 plug is not supplied with the product. Separately purchase a network plug that satisfies the specifications. Wire a 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) Manufactured by JMACS
***: Length, □: Unit, M: meter, C: centimeter

<Recommended assembly type RJ45 connector [Cat.6]>

09 45 151 1560 Assembly type RJ45 connector HARTING Co., Ltd.
09 45 151 1561 Assembly type RJ45 connector (45° angled) HARTING Co., Ltd.

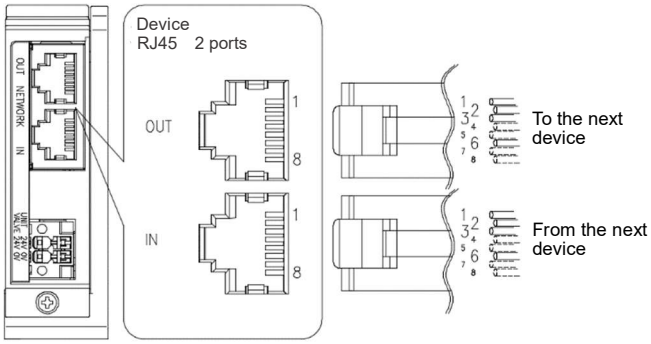
Follow the steps below to connect the network cable to the network plug.

<Network cable>

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

(2) Refer to the following figure to wire the PROFINET compliant cable to the RJ45 plug (PROFINET compliant).

Note: The communication of the product turns off when the previous device is OFF.



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

⚠ CAUTION

- Use a dedicated network cable that complies with PROFINET specifications.
- Provide sufficient bending radius for the network cable and do not bend it forcibly.
- Wire the network cable away from the power lines and high-voltage lines.

5. Maintenance

5.1 Mounting the product (device)

(1) Set the switches of the product.

(2) Turn off the power (for unit/valve) and connect the network plug and power plug.
The system may start operating suddenly if the plug is connected while the power is turned on.
Be careful of the surroundings and secure safety before performing work.

(3) Hold the device and insert it along the guide of the device connecting block, slowly from the near side in the direction of the arrow described in the figure.

(4) After checking that the product and the device connecting block are connected properly, tighten the device fixing screw firmly (appropriate torque: 0.5 N·m).

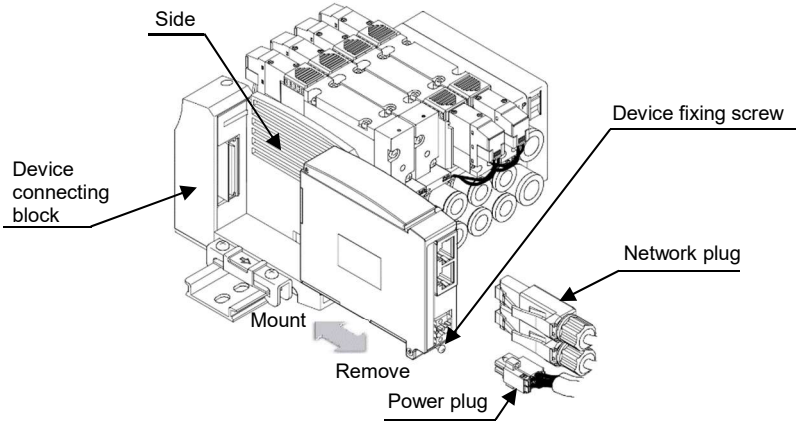
(5) Confirm safety and turn on each power.

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 unit power and valve power as necessary.
(Note that the stations after the product stop communication.)
(3) Remove the network plug and power plug.
(4) Unscrew the device fixing screws.
Note: Be careful not to lose the device fixing screw.
(5) Hold and pull out the product slowly to the near side, in the direction of the arrow described in the figure.

⚠ 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. Settings by GSDML files

In order for the PROFINET device to join the network, it is necessary to register the device to the network using the GSDML file which describes the communication specification of the device. Refer to the instruction manual issued by the controller unit manufacturer for registering the GSDML file.
Use the GSDML file complying with the device version to ensure a suitable network configuration.
The GSDML file can be downloaded from the CKD web site. (https://www.ckd.co.jp/kiki/en/).

6.1 Registering the device

Check the specifications (model name) of the device to be used, as both the device and GSDML file need to be matched before registering.
Refer to the following table for the device specifications and GSDML file and set accordingly.

Specifications and the model names in the GSDML file

Item		Specifications			
Model		T8EP1	T8EP2	T8EPP1	T8EPP2
Single unit model		OPP7-1EP	OPP7-2EP	OPP7-1EP-P	OPP7-2EP-P
Output type		+COM (NPN)		-COM（PNP）	
Number of output points		16-point output	32-point output	16-point output	32-point output
GSDML File	Head Module	OPP7			
	Module	-1EP	-2EP	-1EP	-2EP-

Note: There is no distinction between model names in the GSDML file for +COM and -COM.

6.2 I/O mapping

There are two types of data: the output data sent from the controller unit to a device (this product) and the input data sent from the device to the controller unit. The product is an output device that receives output data from the controller unit and outputs it to the valve. Refer to the following table for mapping of output data.

Refer to the following table to program the I/O mapping. (There is no remote input for the product).

I/O mapping in "STEP7", configuration tool made by Siemens AG.

	Output number																													
	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
1 byte	QB a								QB a+1								QB a+2								QB a+3							
2 bytes	QW a																QW a+2															
4 bytes	QD a																															

Note: a is the starting number of the Q address set in “STEP7”.

PRECAUTIONS

- To correspond with the requirements of the relevant EC Directive, use power adapter (e.g., switching power supplies) complying with EMC standards for the valve and 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 performing work.
- For the delay time, refer to the instruction manual for the controller 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.
- Wire the power cable and network cable properly within its specifications to avoid any incorrect wiring.
- Do not apply tension or impact to the power cable or network cable.
- 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 a 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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