CKD

G107-5908-A 2023.09.08

Handling Precautions

EtherNet/IP Compatible Serial Transmission Device

TVG series JA4*

(OPP8-A2EN / OPP8-A2EN-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.

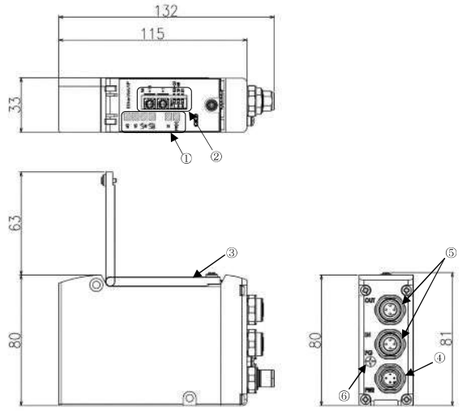
⚠ CAUTION

- 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	
Model	OPP8-A2EN	OPP8-A2EN-P
Unit power voltage	21.6 VDC to 26.4 VDC (24VDC±10%)	
Unit power current consumption	90mA or less (all points ON at 24VDC)	
Valve power voltage	22.8 VDC to 26.4 VDC (24 VDC+10%, -5%)	
Valve power 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 output)	-COM (PNP output)
Number of input/output points	32	
IP address settings	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: 3rd octet only and in the range of 0 and 1. (2) Sets by rotary switch: 4th octet only. (3) Sets by software: Sets all 1st to 4th octet.	
Output settings in the event of a communication error	Hold (All points outputs held) /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/s² 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℃ to 55℃	
Ambient humidity	30% to 85% RH (no dew condensation)	
Atmosphere	No corrosive gas	
Communication protocol	EtherNet/IP compliant	
Baud rate/ Communication method	Auto setting (100M/ 10Mbps, full duplex / half duplex) Note: 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/ 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
Indicate the status of the device and network with MS, NS, L/A IN, L/A OUT, ST and PW(V).

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

③ Cover
Protects the LEDs and switches.

④ Unit/valve power plug (M12I 1 port【PWR】A-cord: 4pins)
Connects unit/valve power socket.

⑤ Network connector socket (M12I 2 ports【IN, OUT】D-cord:4 pins)
Transmits EtherNet/IP communication to the next device or receives it from the previous device.

⑥ FG Terminal
Connects FG(frame grounding) to the terminal.

3. LED indicators and switch settings

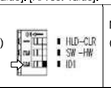
3.1 LED indicators
These LEDs indicate the status of the product and network. Refer to the following table for the description of LED indicators.

LED	Indication
MS	Indicates the status of the device related to EtherNet/IP with the LED (green, red) lighting. (off, on, blinking) (Green on at normal communication)
NS	Indicates the status of the communication related to EtherNet/IP with the LED (green and red) lighting. (off, on, blinking) (Green on at normal communication)
L/A IN	Indicates the status of the EtherNet/IP port (IN side) with LED (green, yellow) lighting. (off, on, fast blinking)
L/A OUT	Indicates the status of the EtherNet/IP port (OUT side) with the LED (green, yellow) lighting. (off, on, fast blinking)
ST	Green on when the unit power is on.
PW(V)	Green on when the valve power is on.Note: This indicator is disabled when the unit power is off.

3.2 Switch settings
- Operation mode settings
Select whether to use the switch settings (hardware settings) or the software setting value for the IP address.

Switch name		Settings
SW-HW (DIP switch No.2) [Operation mode setting]		Sets the operation mode. ON: Software setting OFF: Hardware setting (set by switches)

- IP address settings (Operation mode setting OFF: Hardware setting)
Sets the IP address of the device. The IP address is 192.168. [ID1 set value]. [NA set value].
Note: The NA set value "FF" shifts to DHCP mode. Also, the NA set value "00" is an invalid address.
The IP address is 192.168. [ID1 set value]. [NA set value].

Switch name	ID1 (DIP switch No.3)	NA 16, 1 1 (Rotary switch)
		
Setting range	ON :1 OFF:0	01 to FE (Hex) 【1 to 254(Dec)】

- Output mode settings (Enabled regardless of operation mode setting: ON/OFF)
Sets the output status when a communication error occurs.

Switch name		Settings
HLD-CLR (DIP switch No.1) [Output mode setting]		Sets the output status when a communication error occurs (such as disconnection and timeout). ON: Hold mode (Hold all points output) OFF: Clear mode (All points OFF)

⚠ CAUTION

- Set switches while the unit power is 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

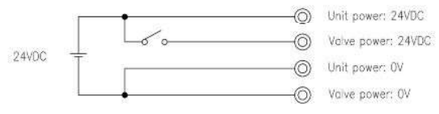
- Check the working voltage and polarity before wiring and energizing.
- If power is supplied to more than one device from one power supply, consider the voltage drop due to cables when selecting and wiring the cables.
- Since the device has no resistance to lightning surges, take measures against surges on the equipment side. For AC power model, use it in an installation category II environment.

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, originator(scanner) unit, hub, etc. used. Always understand their specifications thoroughly before wiring.
For details, refer to the instruction manual of the originator(scanner) unit manufacturer and ODVA.

4.2 Connecting and wiring to the unit/valve power plug
In this product, the unit power supply and the valve power supply are separated.
Each power supply is connected by an M12 connector (socket). The following figures (1) to (3) are examples of the connection for each power supply.
Note: Power connector is not supplied with the product. Separately purchase a power connector that satisfies the specifications.

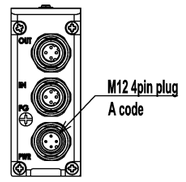
(1)When unit and valve power supplies are shared.

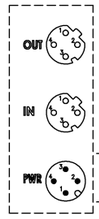
(2)When only the valve power is turned ON/OFF.



(3)When unit and valve power supplies are isolated.

Follow the steps below to connect the power cables to the power plug.
<Power cable>
① After confirming safety, stop network communication and turn off all peripheral equipment.
② Refer to the following figure and wire the cable to the M12 connector.





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

Recommended M12 connector (socket): loose wire type power cable
XS2F-D421-□8□-□ (straight) Mfd by Omron Corporation
Note: □ differs depending on the cable specifications.

Recommended assembly type M12 connector and power cable
21 03 212 2305 M12 Assembly type connector Mfd by HARTING
Cable size : AWG22 to 18, outside diameter of compatible cable : 6 to 8 dia.

⚠ CAUTION

- Check the polarity of the device and the cable terminal before connecting.
- Select the power cable by calculating the current consumption.

4.3 Connecting and wiring to the network connector socket (M12 connector)
Network plug is not supplied with the product. Separately purchase a network plug that satisfies the specifications.
Wiring the network cable to the network plug enables the plug to connect to the network connector socket on the device.

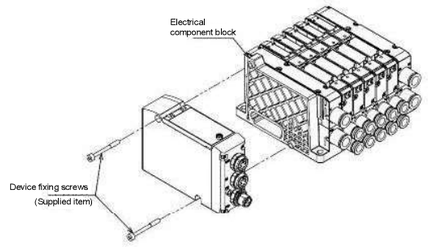
Recommended M12 network cable with RJ45 connector [Cat.5e]
XS5W-T421-□MC-K (straight) Mfd by Omron Corporation
09 45 700 50□□ (straight) Mfd by HARTING
Note: □ differs depending on the cable specifications.

Recommended assembly type connector
21 03 281 1405 Assembly type M12 connector Mfd by HARTING
09 45 151 1100 Assembly type RJ45 connector Mfd by HARTING

Recommended cable [Cat.5e]
09 45 600 01 Industrial Ethernet cable Mfd by HARTING
Note: □ differs depending on the cable specifications.

⚠ CAUTION

- Do not remove the device by pulling cable or connector that may cause cable disconnection or damage.
- An electric shock may occur by touching the electrical wiring connection (bare live part).



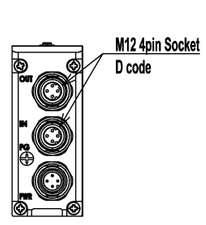
6. Network configuration with EDS (Electronic Data Sheet) file
In order for an EtherNet/IP device to participate in a network, an ESI file containing the device's communication specifications must be installed in the setting tool. For details on installing the EDS file, refer to the instruction manual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

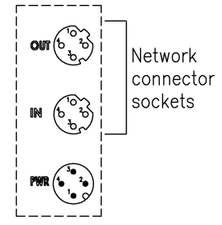
6.1 Registering the device
Before starting, check the IP address and specifications (model name) of the device to be used and install the corresponding EDS file. Set the device referring to the following table for device specifications and EDS file.

Specifications and model names in the EDS file

Item	Specifications	
Model	OPP8-A2EN	OPP8-A2EN-P
Product Name	OPP8-2EN	OPP8-2EN-P
Output type	+COM (NPN)	- COM (PNP)
Number of output points	32 points	
EDS file name	OPP8-A2EN_v0301.eds	OPP8-A2EN-P_v0301.eds

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 and wire the EtherNet/IP compliant cable to the M12 plug (EtherNet/IP compliant).





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

⚠ CAUTION

- 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.

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 socket. The system may start operating suddenly if they are connected while the power is turned on. Be careful of the surroundings and secure safety before performing work.
(3) Assemble the product to the Electrical component block and screw it with the device fixing screws.
(4) 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 unit power and valve power as necessary.
(Note that communication will stop after the next station of the product.)
(3) Unscrew the device fixing screws and slowly remove the device from the electrical component block.

6.2 I/O mapping
There are two types of data: output data sent from the originator(scanner) to the target(adapter) (this product) and input data sent from the target(adapter) to the originator(scanner). This product is an output device that receives output data from the originator(scanner) and outputs it to the valve.
Refer to the following table for I/O mapping.

I/O mapping

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

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

I/O Assembly instance (the input data is dummy)

Item		Specifications	
Model		OPP8-A2EN	OPP8-A2EN-P
Product Name		OPP8-2EN	OPP8-2EN-P
Output data	Instance	101 (Dec)	101 (Dec)
	Size	4 (bytes)	4 (bytes)
Input data Note	Instance	110 (Dec)	110 (Dec)
	Size	2 (bytes)	2 (bytes)

PRECAUTIONS
- To correspond with the requirements of the relevant EC Directive, use AC/DC adapter (e.g., switching power supplies) complying with EMC standards for the unit and valve 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 of the originator(scanner). 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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