CKD

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Handling Precautions

EtherCAT Compatible Serial Transmission Device

TVG series JA3*

(OPP8-A2EC / OPP8-A2EC-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

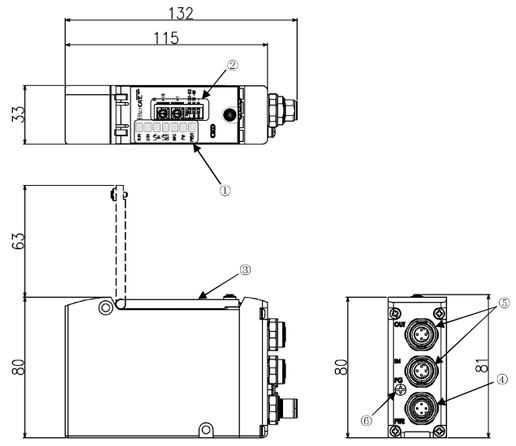
- Do not touch the live part with bare hands or the electrical wiring (bare live part), as an electric shock may occur.
- Read the instruction manual of the communication system before using the product.
- This product is DC dedicated. Use the product within the specified power supply voltage.

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

Item	Specifications	
Model	OPP8-A2EC	OPP8-A2EC-P
Unit power voltage	21.6 VDC to 26.4 VDC (24VDC±10%)	
Unit 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 (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	32 points	32 points
Node address settings	With switches: 01 to FF (Hex) [1 to 255 (Dec)] Note 1	
Output setting when communication error occurs	Hold(all output points are hold) / Clear(all output points are 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 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	EtherCAT (asynchronous type)	
Transmission rate	100 Mbps	
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 status, Unit power and valve power status)	

Note 1: Device follows address restrictions of the MainDevice. The node address is set from the MainDevice when "00" is set.

2. Dimensional outline drawing



① LED
Indicate the status of the device and network with RUN, ERR, L/A IN, L/A OUT, INFO, PW, and PW(V).

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

③ Cover
Protects the LEDs and switches.

④ Unit/valve power plug (M12 1 port【PWR】A-cord: 4pins)
Connects unit/valve power socket.

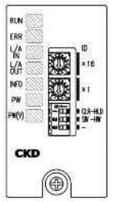
⑤ Network connector sockets (M12 2 ports【IN, OUT】D-cord:4 pins)
Transmit EtherCAT communication to the next device or receive it from the previous device.

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

3. LED indicators and switch settings

3.1 LED indicators

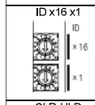
These LEDs indicate the status of the product and network. Refer to the following table for the description.



LED	Indication
RUN	Indicates the communication status of the EtherCAT with the LED (green) lighting (off, on, blinking). (Green on at normal communication.)
ERR	Indicates the error status of the EtherCAT with the LED (red) lighting (light off, light on, blinking). (Lights off at normal communication.)
L/A IN	Indicates the status of the EtherCAT port (IN side) with the LED (green) lighting (off, on, blinking(fast)).
L/A OUT	Indicates the status of the EtherCAT port (OUT side) with the LED (green) lighting (off, on, blinking(fast)).
INFO	Indicates the notification status from the device with the LED (red) lighting. (Lights off at normal communication.)
PW	Lights on when the unit power is on. (Green on at normal condition.)
PW(V)	Lights on when the valve power is on. (Green on when the valve power is turned on.) (This indicator is disable when the unit power is off.)

3.2 Switch settings

These switches set the output status in the event of a communication error and node address of the product.
The setting is read into memory at power-up.
Refer to the following table for the settings of each switch.

Part name		Settings	Setting specification range
ID x16 x1 	Node address setting switches	Set the node address of the device. The node address is set from the MainDevice when "00" is set.	01 to FF
CLR-HLD 	Communication error output setting switch	Sets the output status in the event of a communication error (such as disconnection and timeout). This switch is enabled when the SW-HW switch is OFF. ON: Clear (all points OFF) OFF: Hold (hold all points output)	ON or OFF
SW-HW 	Operation mode setting switch	Sets the operation mode in the event of a communication error. ON: Software settings OFF: Hardware settings (sets with CLR-HLD switch)	ON or OFF

Note: DIP switch No. 3 has no function.

⚠ 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

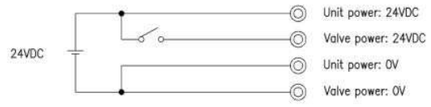
Although the EtherCAT network uses a standard Ethernet cable and has flexible wiring methods, there are limits depending on the wiring material, equipment, MainDevice, hub, etc. used. Always understand their specifications thoroughly before wiring.
(For details, refer to the instruction manual issued by the MainDevice manufacturer and ETG.)

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.

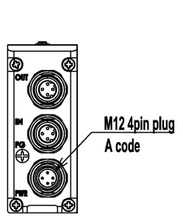


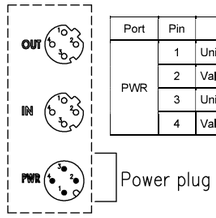
(3)When unit and valve power supplies are isolated.

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 type — 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 Assembled RJ45 connector — Mfd by HARTING

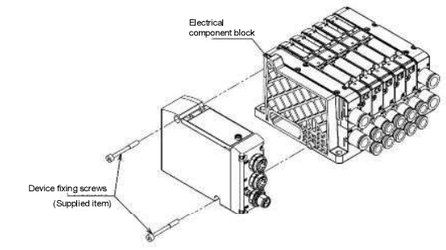
Recommended cable [Cat.5e]
09 45 600 01□□ Industrial Ethernet cable — Mfd by HARTING
Note: □ differs depending on the cable specifications.

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 following stations next to this unit stop communication.)
(3) Unscrew the device fixing screws and slowly remove the device from the electrical component block.

⚠ CAUTION

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



6. Settings by ESI file

In order for the EtherCAT device to join the network, it is necessary to register the device to the network using the ESI file which describes the communication specification of the device. Refer to the instruction manual of the MainDevice manufacturer for registering the ESI file. Use the ESI file that matches the device version used to ensure a suitable network configuration.

ESI file name (for OPP8-A2EC-*): CKD_OPP8_(*).xml
(The above ESI file contains data for two models.)
Note that (*) means the device version.

6.1 Registering the device

Check the node address and specifications (device name) of the device before registering, as both the device and ESI file need to be matched.

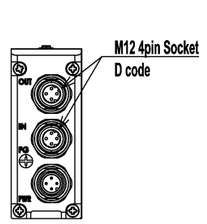
Specifications and the model name in the ESI file

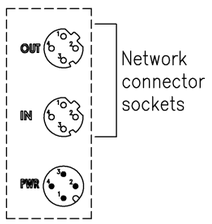
Item	Specifications	
Model	OPP8-A2EC	OPP8-A2EC-P
Device name	OPP8-2EC	OPP8-2EC-P
Output type	+COM (NPN)	-COM(PNP)
Number of input/output points	32 points	32 points

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 EtherCAT compliant cable to the M12 plug (EtherCAT 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 EtherCAT 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 node address and other 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.

6.2 I/O mapping

There are two types of data: the PDO (Process Data Objects) output data sent from the MainDevice to a device (this product) and the input data sent from the device to the MainDevice.
The product is an output device that receives output data from the MainDevice and output to the valve.
Refer to the following table for I/O mapping.

I/O mapping

Number of output points		Bit															
	Output	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

Note: With the standard wiring of the double solenoid valve, the A-solenoid close to the product is assigned output data 00, and the B-solenoid is assigned output data 01 in order.

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 MainDevice. 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 the product, please contact the following or the nearest sales office.

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