CKD

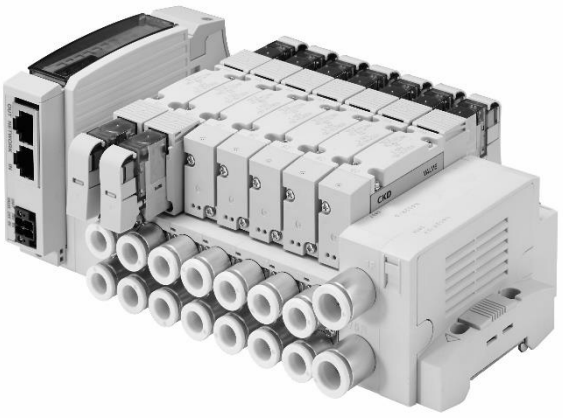
Serial Transmission Slave Unit

4GR Series T8EC
(OPP7-□EC)

Compatible with EtherCAT

INSTRUCTION MANUAL

SM-A29251-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.

PREFACE

Thank you for purchasing CKD's serial transmission slave unit. This Instruction Manual contains basic matters such as installation and usage instructions inodeer 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.

Inodeer 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 slave unit (OPP7-□EC) for 4GR.
For master unit and other slave units 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 inodeer to use the valves correctly.

■ T8EC(OPP7-□EC)

This solenoid valve system is equipped with a slave unit (N4G*(R)-T8EC**), the EtherCAT open field network system. (This is specified by EtherCAT Technology Group : hereafter referred to as ETG) The following features are provided.

- The Slave Unit is connected to PLC with only a network cable (Category 5 or higher), allowing significant reduction in the number of man-hours associated with wiring.
- Unit power and Valve power are separated, ensuring easy maintenance work.
- The slave station address can be selected from a hard switch setting or setting written in from the PLC.
- The Slave Unit is available in +COM or -COM output type and 16 or 32 output points, allowing it to be used in a wide variety of applications.
- The Slave Unit is mounted by inserting it into a slot on the manifold block and secured with just one screw, allowing reduction in the number of man-hours associated with maintenance.

■ EtherCAT

EtherCAT is a network that uses the EtherCAT Slave Controller to send and receive data at a high speed. This network enables super-high speed communication that differs from the conventional Ethernet communication.

The EtherCAT specifications have been standardized with several international standards (IEC61158, IEC61784, IEC61800, ISO15745), and is also a SEMI Standard (E54.20). The EtherCAT Technology Group has maintained that the EtherCAT technology will be open for various users.

EtherCAT is a registered trademark and patented technology licensed by Beckhoff Automation GmBH, Germany.

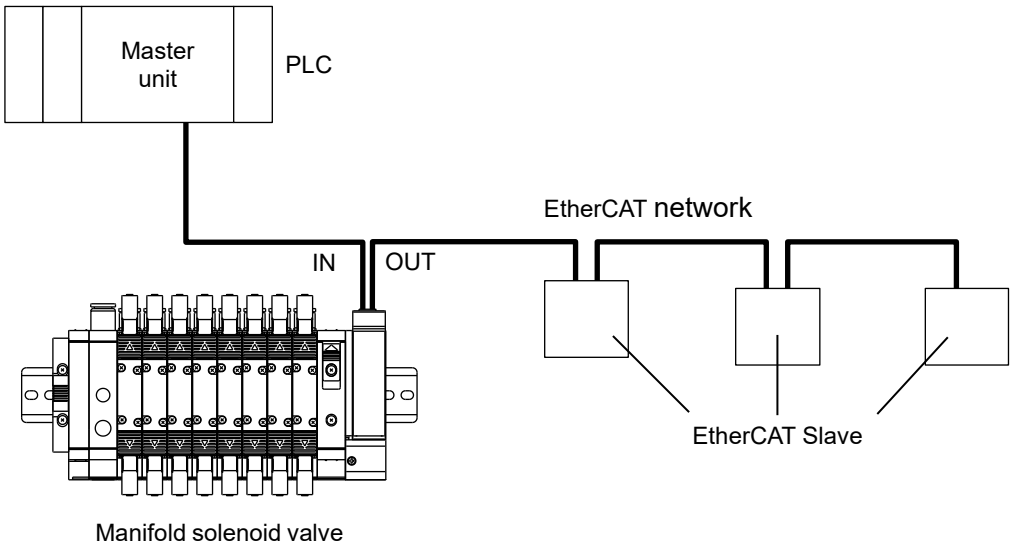
1.1.2 System structure

This system chiefly consists of sequencer body, Master Unit Solenoid valve N4G*(R)-T8EC** and peripheral equipment.

■ Examples of PLC and master unit combination

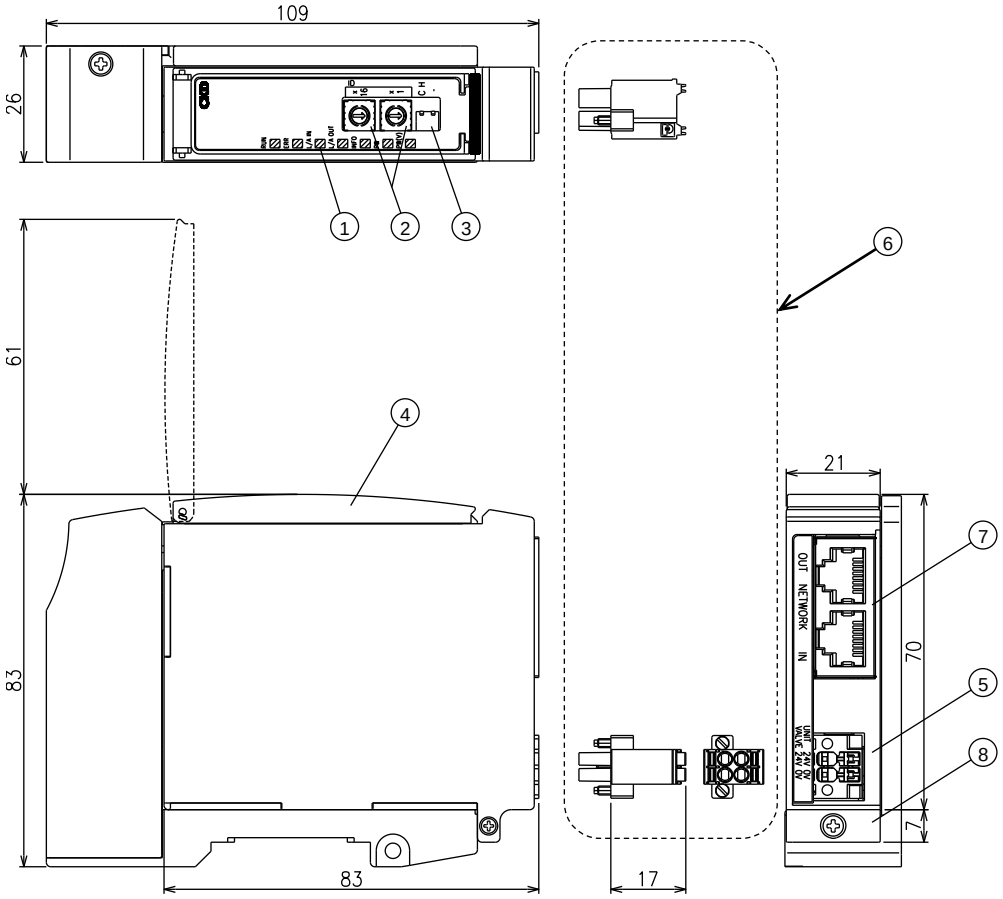
Manufacturer	Compatible PLC	Master unit model
OMRON	NJ series	NJ301/NJ501
Beckhoff Automation GmbH & Co. KG	TwinCAT PLC	
Other equipment compatible with EtherCAT		

■ Fundamental structure of the system



1.2 Part Name

1.2.1 Parts of the slave unit



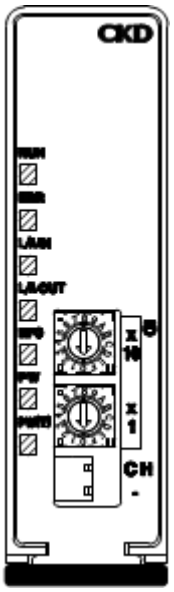
No.	Part name	Description
①	LED indicators	Indicate the status of the slave unit and network with RUN、ERR、L/A IN、L/A OUT、INFO、PW、PW(V) .
②	Rotary switches	Set the node address of the slave station.
③	Slide switch	Set the operation when communication is abnormal.
④	Cover	This clear cover protects the status monitoring lights and the switches This cover can be opened and closed with a single touch.
⑤	Unit/Valve power socket	This is the socket for connecting the Unit/Valve power plug
⑥	Unit / Valve power plug (included)	Unit / Valve power plug : This is the plug for connecting the Unit/Valve power cables (24V)
⑦	Network connector socket (RJ45*2 port [IN,OUT]) (Network connector plug is not included.)	IN： The EtherCAT network cable from the forward station is input to this port. OUT：The EtherCAT network cable is output to the next station from this port. ※If this slave is the EtherCAT terminal station, a network connector plug is not connected to OUT
⑧	Mounting screw (M2.5 tapping screw)	This screw is used to secure the Slave Unit to the connecting block.

1.2.2 Switches and LED indicators

⚠CAUTION

Discharge static electricity that has built up on your body before touching the Slave Unit. Otherwise, static electricity can cause damages to the Slave Unit.

■ Switches



The switches are used to set this Slave Unit ID (Node address) and the output when a communication error occurs.
Turning on the power will load the node address, and Output mode (Duplicate node address cannot be assigned).

Name of switch	Content of Setting
Rotary switches	The Slave Unit's node address is set in the range of 01 to FF (Hex) [1 to 255 (Dec)]. The high-order address is set with x16, and the low-order address is set with x1. When the node address is set to "00" (default state), the node address is set from the master.
Slide switch	Select whether to hold (H) the output state or clear (C) the output when a communication error occurs.

■ LED indicators

The state of the product and the network is indicated.
Please refer to the following table for LED indication.

LED	Function	State	
RUN	EtherCAT State	OFF Green blinking Green single flash Green flickering Green on	:INIT :PRE-OPERATIONAL :SAFE-OPEATIONAL :BOOTSTRAP :OPERATIONAL
ERR	Communication state	OFF Red double flash Red blinking	:Normal communication :Problem in communication (WD Time-out) :Problem in communication
L/A IN	EthetCAT IN link state	OFF Green on Green flickering	:NO LINK, NO ACTIVITY :LINK, NO ACTIVITY :LINK, ACTIVITY
L/A OUT	EthetCAT OUT link state	OFF Green on Green flickering	:NO LINK, NO ACTIVITY :LINK, NO ACTIVITY :LINK, ACTIVITY
INFO	Model difference	Red double flash	:Model difference
PW	Unit power supply state	OFF Green on	:Power OFF :Power ON
PW(V)	Valve power supply state	OFF Green on	:Power OFF :Power ON

1.3 Specifications

1.3.1 Communication specifications

Item	Specification
Communication Protocol	EtherCAT (Unsynchronization)
Baud rate	Full-duplex 100Mbps
Communications media	Ethernet cable (Category 5 or higher) Shielded twist pair cable
Node address range	Switch is set to “00” : 65,535 nodes (max)
Topology	Daisy chain
Communications distance	Distance between nodes : 100m (max)

1.3.2 Slave unit specifications

Always operate this product within its product specifications.

Item		Specification			
Model number		T8EC1 (OPP7-1EC)	T8EC2 (OPP7-2EC)	T8ECP1 (OPP7-1EC-P)	T8ECP2 (OPP7-2EC-P)
Unit power supply voltage		DC21.6～26.4V(DC24V ±10%)			
Unit power current consumption		110mA or less (@24.0VDC with all points ON)			
Valve power supply voltage		DC22.8～26.4V(DC24V +10%、-5%)			
Valve power current consumption		10mA or less (all points OFF) 15mA or less under no load conditions (all points ON)			
Output type (polarity)		NPN (+common output)		PNP (-common output)	
Number of output points		16	32	16	32
Node Address setting		By switch 01~FF (Hex)【1~255 (Dec)】 By master 01～FFFF(Hex)【1～65535(Dec)】(By switch “00”) *1			
Switch used for specifying the state of output after error		Hold (All outputs are maintained.) / Clear (All outputs are turned off.)			
Insulation resistance		30MΩ or more at 500VDC between external terminals and body			
Withstand voltage		500VAC applied between external terminals and body for 1 minute.			
Shock resistance		294.0m/S^2 for 3 times in each direction of X, Y, Z			
Storage temperature		-20 to 70°C			
Storage humidity		30 to 85%RH (no dew condensation)			
Ambient temperature		-5 to 55°C			
Ambient humidity		30 to 85%RH (no dew condensation)			
Atmosphere		No corrosive gas			
Communication protocol		EtherCAT (Unsynchronization *2)			
Baud rate (bit/s)		Full-duplex 100Mbps			
Output insulation type		Photo coupler insulation			
Maximum load current		40mA / output			
Leakage current		0.1mA or less			
Residual voltage		0.5V or less			
Fuse rating		Valve power: 24V, 3A Unit power: 24V, 2A (Both fuses not replaceable)			
Display		LED(communication status, unit and valve power supply status *3)			
Protective structure		IP20			
Vibration proof	Durability	10Hz to 150Hz to 10Hz, 1 octave/min., 15 sweeps each in X, Y, Z directions with 0.75mm half-amplitude or 98.0m/s^2, whichever smaller			
	Malfunction	10Hz to 150Hz to 10Hz, 1 octave/min., 4 sweeps each in X, Y, Z directions with 0.5mm half-amplitude or 68.6m/ s^2, whichever smaller			

*1. Slave follows address restriction from a master. Switch is "00", when node address is set from the master.

*2. Slave doesn't have a synchronous mode. (Slave doesn't have a DC mode and SM mode）

*3. The prescriptive voltage is necessary to a unit power supply for slave's display.

※ For the delay time, refer to the instruction manual of the master unit. The transmission delay as a system depends on the PLC scan time and other devices connected to the same network.

※ heck the solenoid valve specifications for the response time of the solenoid valve.

※ The OFF time of the solenoid valve is delayed by about 20 msec because the slave station has a built-in surge absorption circuit.

2. INSTALLATION

2.1 Mounting

⚠CAUTION

Before handling an EtherCAT 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.

Wire the power cable and network cable properly within its specifications.
Incorrect wiring may cause the slave unit to malfunction or break.

Make sure 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 unit, 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 slave unit.

2.2 Wiring

2.2.1 Connecting and wiring to the network connectors

⚠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 DeviceNet 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.

The standard Ethernet cable can be used with EtherCAT, and the wiring methods are flexible. However, there are limits according to the wiring material, devices, master and hub, etc., being used. Always understand the specifications thoroughly and wire the devices correctly. (Refer to the manuals issued by the master unit manufacturer and ETG (EtherCAT Technology Group).)
The communication plug is not enclosed with this product. Purchase a communication plug that meets the specifications.
Wire the communication cable to the communication plug and connect it to the communication socket on the slave unit。

Recommended cable with RJ-45 connector [Cat.5e]

Manufacturer	Cable	Model
JMACS	Industrial Ethernet Cable	ETP-SB-S***□
		***:Length, □:unit M=METRE C=CENTIMETER

Recommended assembly type RJ45 connector [Cat.6]

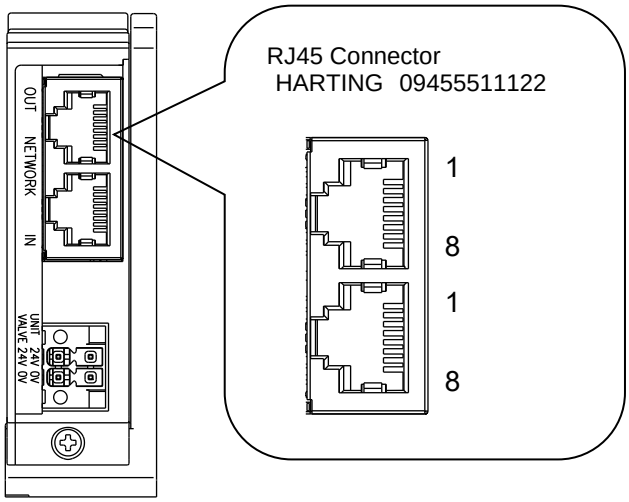
Manufacturer	Connector	Model
HARTING	Assembly type RJ45 connector	09 45 151 1560
HARTING	Assembly type RJ45 connector (angled)	09 45 151 1561

■ Wiring of network cable

Connect the network cables to the network connector plug according to the following instructions.

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

2 Connect the EtherCAT cable to network connector plug according to the illustrations below.



Slave

Port	PIN	Signal	Significance
IN/ OUT	1	TD+	Transmission data +
	2	TD-	Transmission data -
	3	RD+	Reception data +
	4	Not used.	Not used.
	5	Not used.	Not used.
	6	RD-	Reception data -
	7	Not used.	Not used.
	8	Not used.	Not used.

2.2.2 Connecting and wiring to the valve power plug

⚠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 slave unit 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.

Use a terminal block when crossover wiring power cables.

Unit/Valve power plug is included in the package with this product. Power is wired by connecting the Unit power cable and the Valve power cable to the power plug, and then connecting the power plug to the power socket on the Slave Unit.

Unit power
Of the power supply necessary to operate the Slave Unit, 21.6VDC to 26.4VDC, use one with the least noise.

Valve power
Of the power supply necessary to operate the Valve (load), 22.8VDC to 26.4VDC, use one with the least noise.

*When the bulb power is turned on, the bulb lamp may light up for a moment, but this does not turn the bulb body on and off.

Power plug included

Name	Model	Manufacturer
4 contacts	DFMC1,5/2-STF-3,5(1790292)	Phoenix Contact

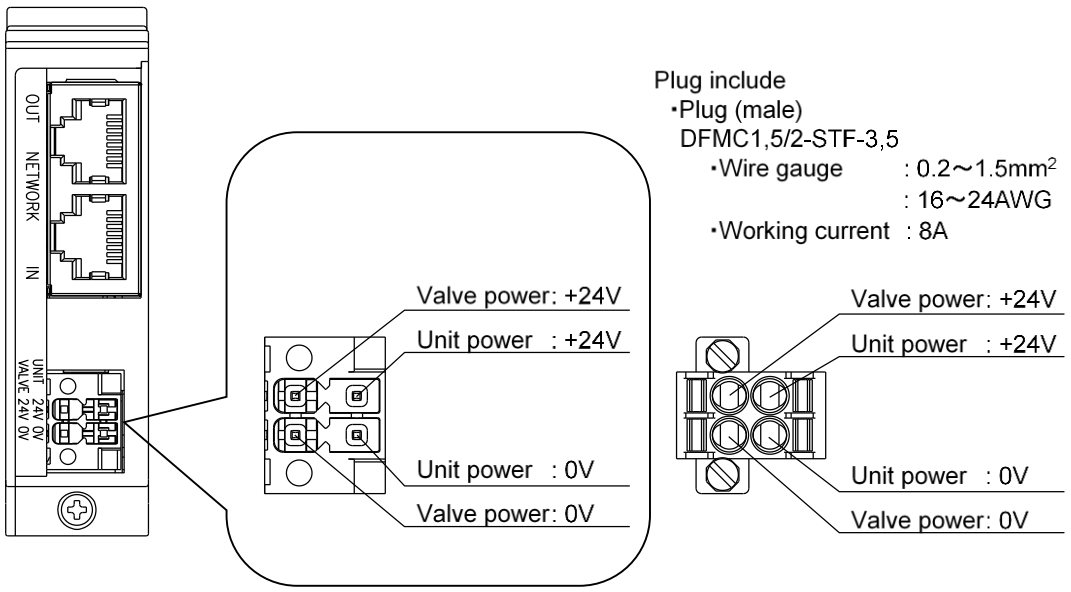
Recommended ferrules and crimping plier

Name	Mdel	Manufacturer
Ferrule (without sleeve)	A0.5-10～1.5-10	Phoenix Contact
Ferrule (with sleeve)	AI0.25-10～0.75-10	Phoenix Contact
Crimpling plier (common)	CRIMPFOX6(1212034)	Phoenix Contact

■ Wiring of power cable

Connect the Unit/Valve power cables to the power plug according to the following instructions.

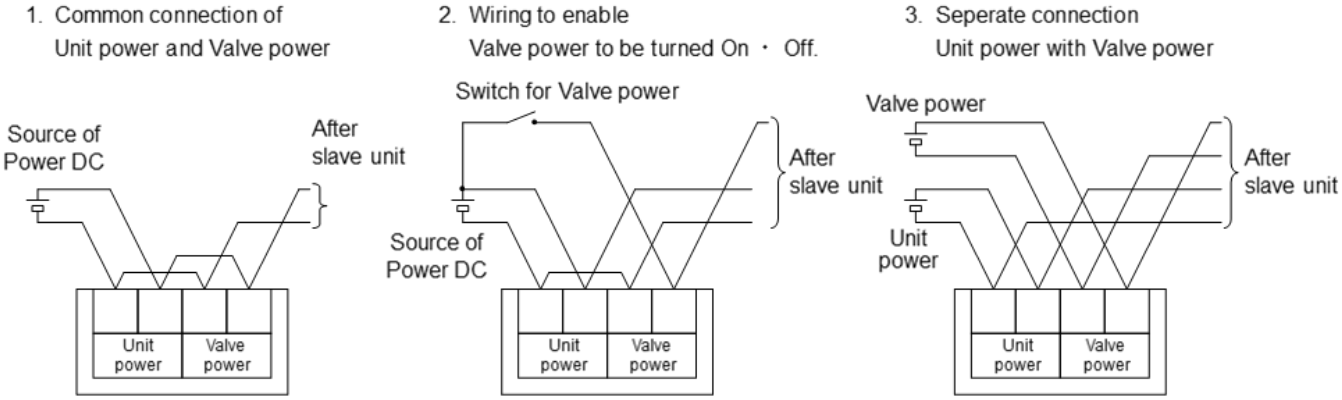
1. After confirming safety, turn off the power to be connected to the Slave Unit.
2. Attach a terminal such as a ferrule to the power cable as necessary.
3. Connect the power cable's 24V power line to the power plug's 24V terminal and the 0V power line to the 0V terminal according to the illustrations below.
4. After connecting the power plug to power socket on the Slave Unit, fix the connector fixing screw of the plug. (Reference clamping torque (0.25N・m)).



Slave

■ Wiring of power cable

The illustrations below are examples of power supply to two or more slave units from power source(s) at a single location. You may try other variations as required.



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 slave unit.

Carefully check the address setting value of serial transmission slave unit 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 communication 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 slave unit 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.

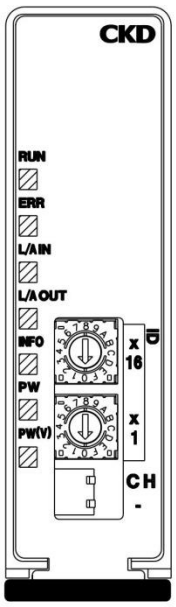
3.1.1 Switche setteing of Node address

Sets this Slave unit's node address (ID).
When the node address is set to "00" (default state), the node address is set from the master.
The node address setting is read in when the power is turned ON. The node address cannot be set in duplicate.

Switches	ID.【Node address】 ×16, ×1
Setting Method	01~FF (Hex) 【1～255(Dec)】

×16 : high-order		
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

×1 : low-order		
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 node address to 71 (decimal)
71 = 64+7 (according to table above): Set high-order to 4 and low-order to 7 [47 (hexadecimal)].

3.1.2 Switche setting of other

Using this switch, specify the output when an error occurs.

Switches	Setting Method
C H [Output mode setting]	Specifies whether to hold or clear the output when an error (bus line error time-over, etc.) occurs. OFF(0) : Hold mode ON(1) : Clear mode

3.2 Setting with ESI (EtherCAT Slave Information) File

In order for an EtherCAT device to participate in the network, the network must be registered using an ESI file containing the device's communication specifications. Refer to the User's Manual issued by the master unit manufacturer for details on registering the ESI file. Use the latest ESI file to ensure a suitable network configuration.

ESI file name (OPP7-*EC-*): CKD_OPP7.xml
(This ESI file contains the data for four models.)

> ∗ The following INDEXes are for future expansion, and cannot be used at this time.
> 0x1010、0x1011、0x10F1、0x1A00、0x1A01、0x1C12、0x1C13、0x1C32、0x1C33、0x3000、
> 0x3001、0x3010、0x3011、0x3020、0x3021、0x3030、0x3031、0x3032、0x6000

3.2.1 Registering the device

Before starting, the node address and specifications (model name) of the device being used must be checked and the matching device and ESI file must be registered.
Refer to the following table for the device specifications and ESI file, and set accordingly.

The specification and the model name in the ESI file.

Item	Specification			
Model	T8EC1	T8EC2	T8ECP1	T8ECP2
Slave model	OPP7-1EC	OPP7-2EC	OPP7-1EC-P	OPP7-2EC-P
Output type (polarity)	+COM(NPN)		-COM(PNP)	
Number of output points	16	32	16	32
The model name in the ESI file	OPP7-1EC	OPP7-2EC	OPP7-1EC-P	OPP7-2EC-P

3.3 Correspondence of the Slave Unit output No. and PLC address No.

3.3.1 Correspondence table showing the correspondence between the channels in PLC internal memory and the output points.

The explanation for this correspondence table is based on the OMRON PLC as an example.
The case when the serial transmission slave address is set to “node address 1” is shown.

< N4G*(R)-T8EC*1 (16 points output)>

Occupied channel in the PLCinternal memory	Output Bit 00～15															
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
Slave Unit 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 1 word

<T8EC2、T8ECP2 (32 points output>

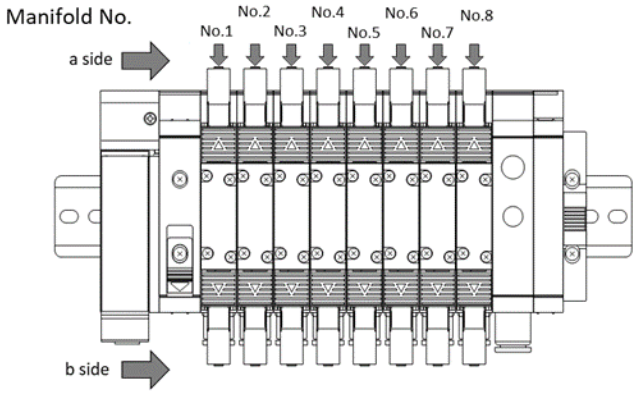
Occupied channel in the PLCinternal memory	Output Bit 00～15																Output Bit 16～31															
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Slave Unit output No.	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**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 1 word Output data 2 word

3.3.2 Example of Valve No. assignments corresponding to Slave Unit Solenoid Output No.

The numbers in valve No. 1a, 2a, 2b… indicate the station No.1 station No.2 and so on, while the alphabets (a) and (b) mean, respectively the solenoid on the side (a) and the solenoid on the side (b).
The numbers in the valve solenoid No. (1a, 1b, 2a, 2b, …) indicate the station numbers such as station No.1, station No.2, and so on; while the alphabets 'a' and 'b' mean, respectively, the solenoid on the a-side and the solenoid on the b-side of the "double-solenoid type" valve.

< N4G*(R)-T8EC*1>



Note: The figure above is an example of mounting 8 stations of double-solenoid type valves on the manifold. There is no solenoid on the b-side for single-solenoid types. Depending on the valve model selected by the customer, the appearance and the maximum number of stations will differ.

Standard wiring

- When all valves mounted on the manifold are single-solenoid types:

Solenoid Output No.	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11	s12	s13	s14	s15	s16
Valve solenoid 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-solenoid types:

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

- When both single- and double-solenoid type valves are mounted on the manifold. (one such example is shown below)

Solenoid Output No.	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11	s12	s13	s14	s15	s16
Valve solenoid 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-solenoid types:

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

Note: “B” indicates a blank station

- When all valves mounted on the manifold are double-solenoid types:

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

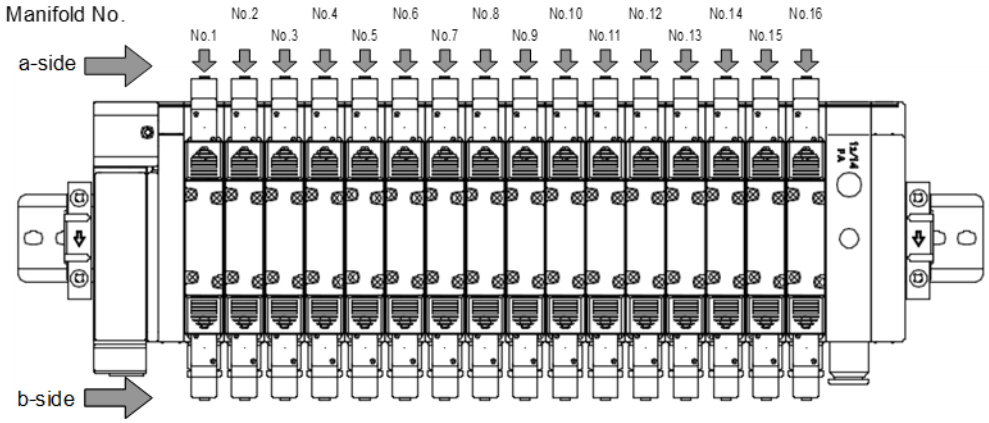
- When both single- and double-solenoid type valves are mounted on the manifold (one such example is shown below):

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

Note: “B” indicates a blank station

< N4G*(R)-T8EC*2>

Note: The figure above is an example of mounting 16 stations of double-solenoid type valves on the manifold. There is no solenoid on the b-side for single-solenoid types.



Standard wiring

- When all valves mounted on the manifold are single-solenoid types:

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

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

- When both single- and double-solenoid type valves are mounted on the manifold (one such example is shown below):

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

Double wiring

- When all valves mounted on the manifold are single-solenoid types:

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

- When all valves mounted on the manifold are double-solenoid types:

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

- When both single- and double-solenoid type valves are mounted on the manifold (one such example is shown below):

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

3.4 Programming

The Master Unit handles this Slave Unit as a Slave device
(16-point output … T8EC*1, 32-point output … T8EC*2).

There are two types of data: the PDO (process Data Objects) output data sent from the master station to the slave device, and the input data sent from the slave device to the master station.

Refer to the manual issued by the PLC manufacturer when designing the program.
Refer to the following table and program the I/O mapping.
Setting of the output status at an error, a function unique to this slave station, is not related to the program.

Output data mapping

Points		Output data	Bit															
			0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
32	16	1word	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
	—	2word	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31

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 slave unit for daily maintenance and what to do when replacing the unit. 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 slave unit if they are left in contact with the unit 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 unit.

Inspection items	Inspection details	Criteria	Inspection method
Environment	Is the surrounding and in-panel temperature appropriate?	Refer to "1.3.2 Slave unit specifications".	Thermometer
	Is there any accumulated dust?	No dust	Visual inspection
Installation	Is the slave unit fixed securely?	No looseness	Hexagonal wrench
	Is the power cable connector fully inserted?	No looseness	Visual inspection
	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 slave unit before/after replacing

Each unit (master and slave) is a device that constitutes a part of a network.
If any unit 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 units.

< Inspection items>
If a fault is detected and the unit is replaced with a new one, check if the new unit has no abnormality. Also, confirm the slave unit settings.

< Settings for replacement slave unit>
For the switches on the replacement slave unit, confirm the specifications and set the same settings as the previous unit.

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 slave unit node address and the setting made to specify which action to take on the output in the event of communication error before turning on the communication power.

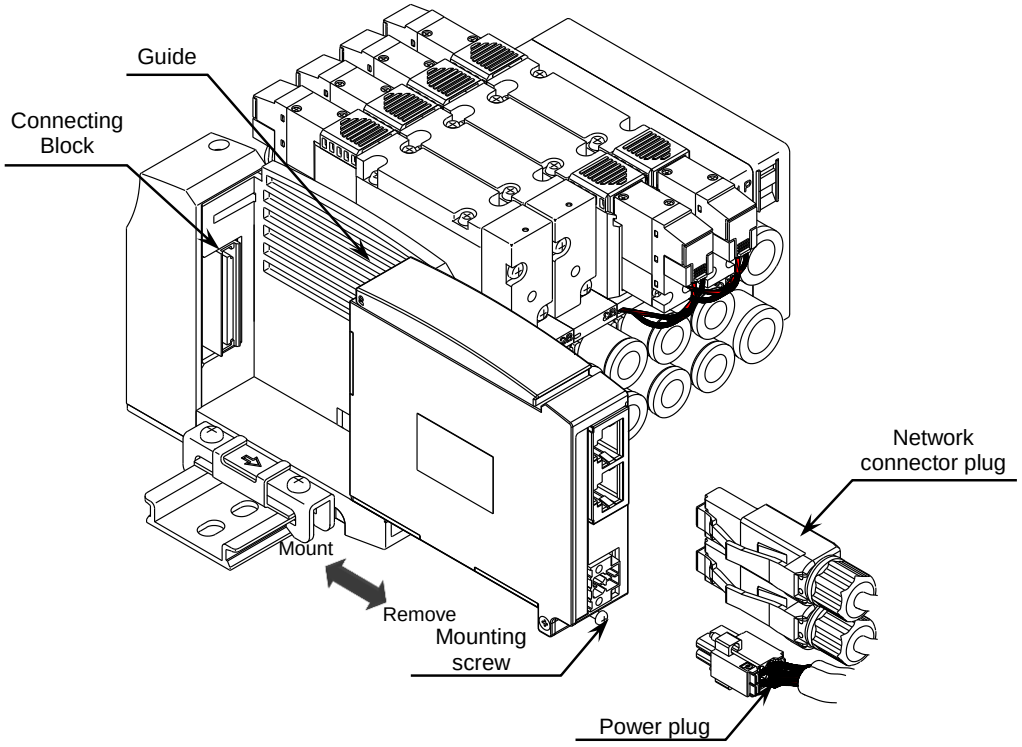
Do not attach or detach the connector while the power is turned on.
These may cause failure or malfunction.

Do not pull out the slave unit by pulling the cable or connector.

This may cause cable disconnectionodeamage.

4.2.1 Removing the Slave Unit

1. After confirming safety, stop network communication and turn off all peripheral equipment as necessary.
2. After confirming safety, turn off Unit power and Valve power as necessary.
   (If the Slave Unit is the last slave and its power is turned off, the power supply to terminating resistance will stop and communication throughout the whole system may become unstable or even stop.)
3. Remove the Slave Unit mounting screw. Since this mounting screw is a fall-prevention type, stop loosening it as soon as it detaches from the Slave Unit connecting block.
4. Hold the Slave Unit and slowly pull it out in the direction of arrow.
5. Remove the network connector plug and the power plug.



4.2.2 Mounting the Slave Unit

1. Set the STATION No. of the Slave Unit.
2. Make sure the power (for both Unit and Valve) is turned off, and after confirming safety, attach the network connector plug and the power plug. Attaching the plugs while the power is turned on may cause the components in the system to move suddenly.
   (Network connector plug tightening torque 0.4N・m (Check with the plug manufacturer as it depends on the communication plug))
   (Power plug adequate tightening torque: 0.25N·m)
3. Hold this product and insert it slowly in the direction of the arrow.
4. Make sure the Slave Unit and the connecting block are connected and tighten the Slave Unit mounting screw firmly. (Adequate tightening torque: 0.5N·m)
5. After confirming safety, turn on the Unit power and Valve power.

5. Troubleshooting

5.1 Problems, Causes, and Solutions

Troubleshooting for this slave station must be carried out for the entire system instead of the single unit. The system could start operating suddenly depending on the communication state. Pay special attention and ensure safety during the maintenance work.

■ Fault 1：PW, PW(V) is not lit.

- Check that the power cable is connected and not disconnected.
- Check that the supplied power voltage is within the specified range.

■ Fault 2：ERR LED flashes.

- Check that the power is supplied to the PLC.
- Check that there are no problems with the communication cable or connector connection state (broken or disconnected).
- Check that the communication cable complies with EtherCAT .
- Check that the transmission distance complies with EtherCAT.
- Check that there are no noise-generating devices or high-voltage wires near the communication line.
- Check that the SII data (ESI file) written into this product using TWINCAT PLC is correct.

■ Fault 3：INFO LED flashes.

- Check that the SII data (ESI file) written into this product using TWINCAT PLC is correct.

■ Fault 4：RUN LED is not lit.

- Check that the product name in the configuration matches this product name (polarity).
- Check that the IN and OUT cable connections are correct. (OUTs are connected together.)
- Check the node address setting state (incorrect or duplicate). If the setting has been changed, turn the power OFF and ON.

■ Fault 5：The status does not return to the output mode setting state when a communication error occurs.

- After setting a switch, turn the power OFF and ON.

6. WARRANTY PROVISIONS

6.1 Warranty Conditiony

■ 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 customers.