CKD

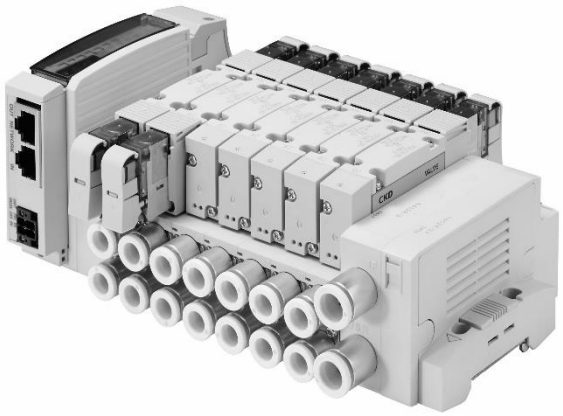
Serial Transmission Slave Unit

4GR series T8EF
(4GR-OPP7-□EF)

CC-Link IE Field Compatible

INSTRUCTION MANUAL

SM-A36597-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.

CKD Corporation

PREFACE

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

In order 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 T8EF(4GR□-OPP7-□EF) for 4GR.
For master units 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 in order to use the valves correctly.

■ T8EF (4GR-OPP7-□EF)

This is a slave unit for 4GR which can connect to the open field network CC-Link IE Field specified by the CC-Link Partner Association (hereinafter referred to as CLPA).
The slave unit has the following features:

- The slave unit is connected to PLC with only a network cable (Category 5e or higher), allowing significant reduction in wiring man-hours.
- The unit power and the valve power are separated, ensuring easy maintenance.
- The station number and network number of the slave unit can be set with a hard switch.
- The slave unit is available in +COM or -COM specification and 16 or 32 output points, allowing wide variety of applications.
- The slave unit is a slot-in structure and is fixed with just one screw, allowing reduction in maintenance man-hours.

■ CC-Link IE Field

The Ethernet-based open network CC-Link IE Field is a high-speed and large-capacity network integrating distributed control, I/O control, safety control, and motion control.

CC-Link IE Field is a part of CC-Link IE Network, realizes easier network connection of Ethernet devices.
Utilizing SLMP (Seamless Message Protocol) also enables seamless coordination freely between upper information and lower field layers realizing visualization of the system.

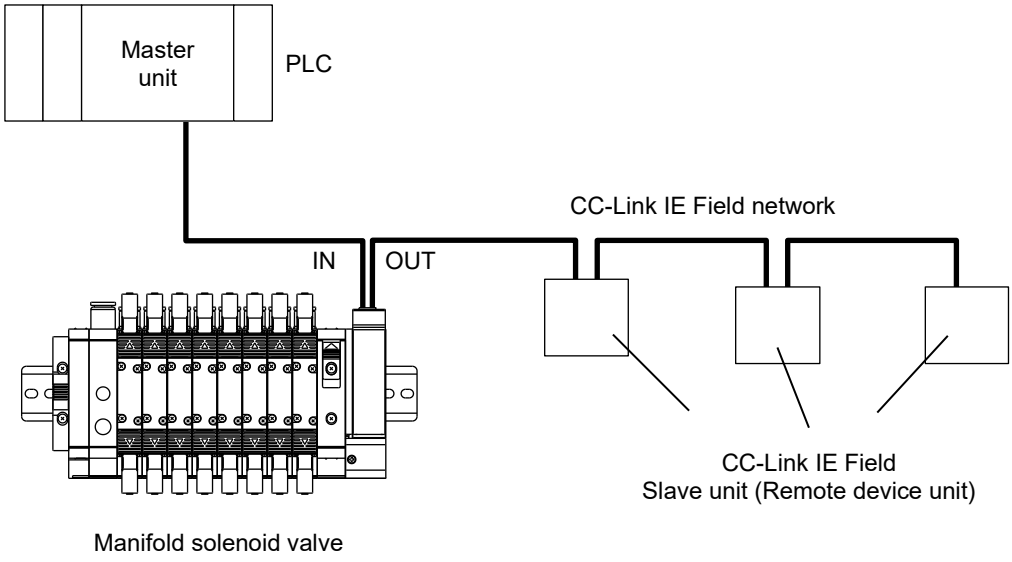
1.1.2 System structure

This system mainly consists of a PLC, master unit, T8EF(4GR-OPP7-□EF) mounted manifold solenoid valve, and peripheral equipment (CC-Link IE Field slave units).

■ Examples of PLC and master unit combination

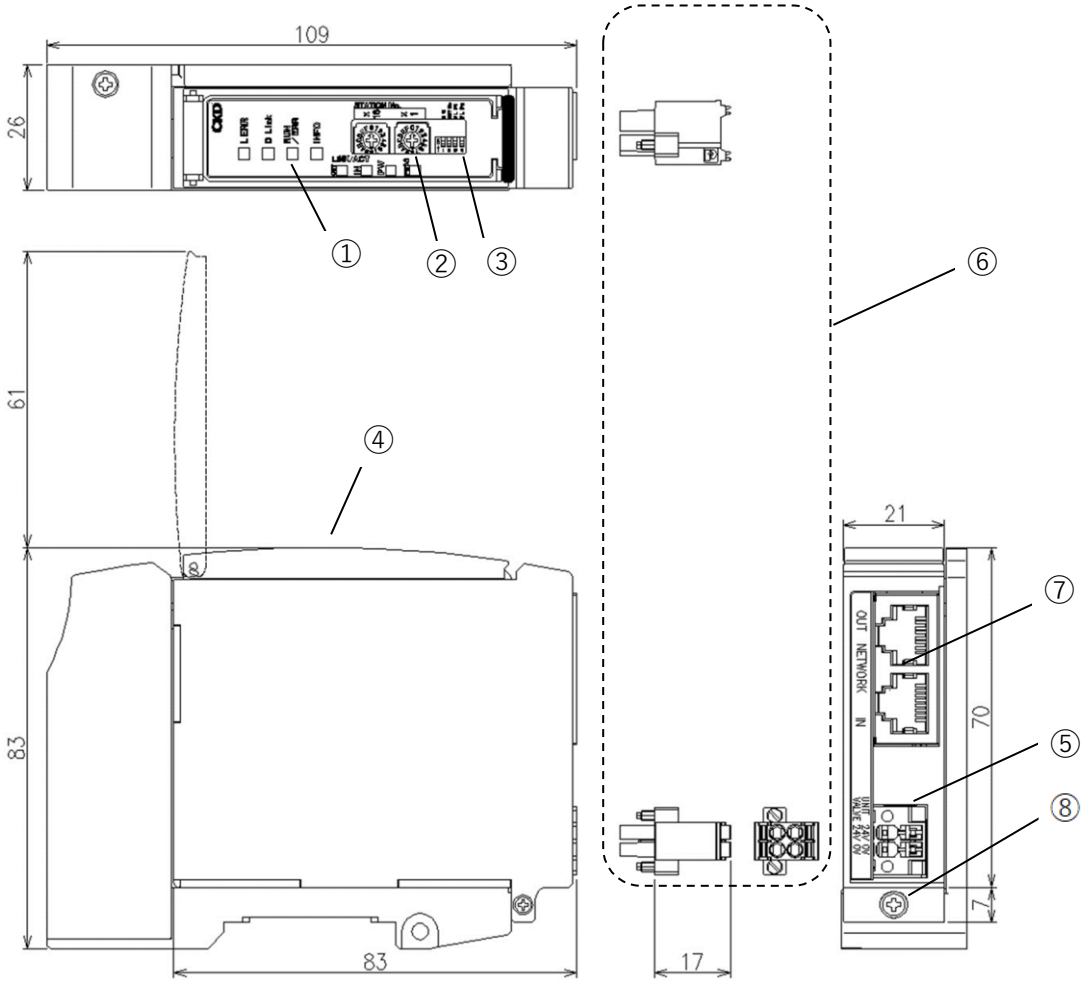
PLC manufacturer	Compatible PLC	Master unit model
Mitsubishi Electric Corporation	MELSEC-R Series	RJ71GF11-T2
	MELSEC-Q series	QJ71GF11-T2

■ Example of basic structure of the system



1.2 Part Name

1.2.1 Parts of the Slave Unit



No.	Part name	Description
①	LED Indicators	L ERR, D Link, RUN/ERR, LINK/ACT OUT, LINK/ACT IN, INFO, PW, PW(V) Indicate slave unit status and network status by LEDs.
②	Rotary switches	Set the station number of the slave unit.
③	Slide switches	Set the operation at communication error, network number, and Fast link-up function.
④	Cover	Protects the LED Indicators and the switches. Hinged and can be flipped open and close.
⑤	Unit/valve power socket	Connects the unit/valve power plug.
⑥	Unit/valve power plug	Connects the unit/valve power cables (24 V).
⑦	Network connector socket (RJ45 × 2 ports)	Connects to the other unit.
⑧	Slave unit mounting screw (M2.5 Taptite)	Secures the slave unit to the slave unit connecting block.

1.2.2 Switches and LED indicators

⚠CAUTION

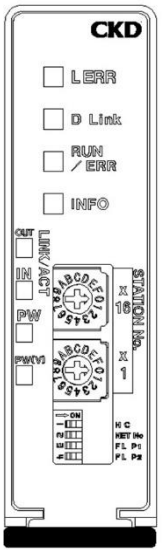
Discharge static electricity from your body before touching the product.
Static electricity may cause damage to the product.

■ Switches

These switches set the slave unit station number and the output in the event of communication error. Set the switch with the power off.

Switches	Settings
Rotary switches	Set the station number of the slave unit. Refer to 3.1.1. “Station number setting” for the setting.
Slide switch (HC)	Sets the output status when a communication error occurs. Refer to 3.1.2. “Output setting in the event of communication error” for the setting.
Slide switch (NET No.)	Sets the network number. Refer to 3.1.3. “Network number setting” for the setting.
Slide switch (F.L P1/ F.L P2)	Sets Fast link-up function. Refer to 3.1.3. “Network number setting” for the setting.

* The slide switch is ON when it is in the left position in the right figure.



■ LED indicators

These LEDs indicate slave unit status and network status.

LED	Function	Status	
L ERR	Link error	Red on	Network error occurred at P1 (OUT) or P2 (IN)
D Link	Data link	Off	Has not connected to network yet.
		Green on	Data link is in process.
		Green blinking	Data link is stopped.
RUN/ERR	Operating status	Off	In initializing
		Red blinking	Station number or network number error occurred.
		Red on	In parallel off.
		Green on	Operating normally.
INFO	Notification	Red blinking	Forced output setting is in process.
		Red blinking (slow)	Notifies maintenance.
		Red blinking (fast)	Detected Internal hardware abnormality.
		Red flashing (twice-flashing)	Detected switch operation.
LINK/ACT OUT、IN	OUT(P1)、IN(P2) Link status	Off	Neither link nor activity status
		Green on	Link detected.
		Yellow blinking	Activity detected.
PW	Unit power status	Off	Unit power OFF
		Green on	Unit power ON
PW(V)	Valve power status	Off	Valve power OFF
		Green on	Valve power ON

1.3 Specifications

1.3.1 Communication specifications

Item	Specifications
Communication protocol	CC-Link IE Field
Transfer rate (Baud rate)	1000Mbps
Communication media	Ethernet cable (Category 5e or higher) Shielded twisted pair cable
Maximum number of network	239
Maximum number of connectable stations	Slave unit: 120 units
Network topology	Line, star, ring type
Distance between nodes	Up to 100m

1.3.2 Slave unit specifications

The product must be used within the following specifications.

Item		Specifications			
Model No.		T8EF1 (4GR-OPP7-1EF)	T8EF2 (4GR-OPP7-2EF)	T8EFP1 (4GR-OPP7-1EF-P)	T8EFP2 (4GR-OPP7-2EF-P)
Unit power voltage		21.6 VDC to 26.4 VDC (24 VDC ±10%)			
Unit power current consumption		140 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 (all points OFF) 15 mA or less (under no load with all points ON)			
Output type		NPN output (+COM)		PNP output (-COM)	
Number of output points		16 points	32 points	16 points	32 points
Insulation resistance		Between external terminals and the case: 30 MΩ or more with 500 VDC			
Withstand voltage		Between external terminals and the case: 500 VAC for one minute			
Shock resistance		294.0 m/s^2 for 3 times in 3 directions			
Storage ambient temperature		-20°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)			
Atmosphere		No corrosive gas			
Output insulation		Photo coupler insulation			
Max. load current		40 mA/1 point			
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)			
Degree of protection		IP30			
Vibration resistance	Durability	10 Hz to 150 Hz to 10 Hz, 1 octave/min., 15 sweeps each in X, Y, Z directions with 0.75 mm half-amplitude or 98.0 m/s^2, whichever smaller.			
	Malfunction	10 Hz to 150 Hz to 10 Hz, 1 octave/min., 4 sweeps each in X, Y, Z directions with 0.5 mm half-amplitude or 73.5 m/s^2, whichever smaller.			

* For the delay time, refer to the instruction manual for the master 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 slave unit.

2. INSTALLATION

2.1 Mounting

⚠CAUTION

Before handling the 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 connector socket

⚠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 CC-Link IE Field 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.

Although the CC-Link IE Field network uses a standard Ethernet cable and has flexible wiring methods, there are limits depending on the wiring material and equipment (master, hub, and other devices) used. Make sure to understand these specifications before wiring. For details, refer to the instruction manuals issued by the master unit manufacturer or CLPA (CC-Link Partner Association).

The network plug is not supplied with the product. Separately purchase a network plug that satisfies the specifications.
By wiring the network cable to a network plug, that the plug can be connected to the network connector socket on the slave unit.

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

Manufacturer	Cable	Model
JMACS Japan Co., Ltd.	Industrial Ethernet cable (double shielded)	CCNC-IEF-24-S***□
		***: Length, □: M = meter or C = centimeter

Recommended assembly type RJ45 connector: Category 6

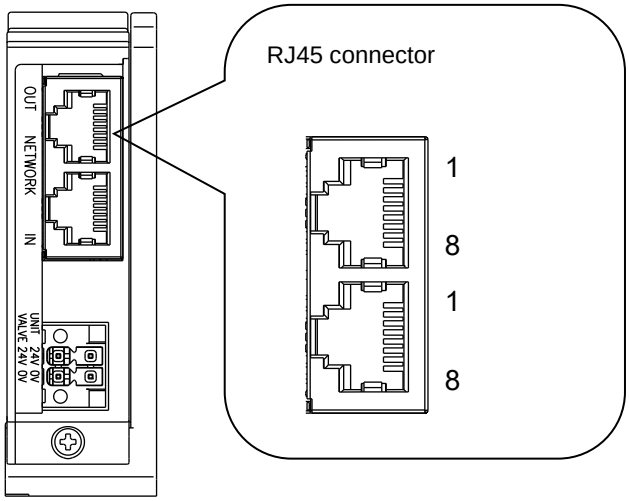
Manufacturer	Connector	Model
HARTING Co., Ltd.	Assembly type RJ45 connector	09 45 151 1560
HARTING Co., Ltd.	Assembly type RJ45 connector (45° angled)	09 45 151 1561

■ Connecting the network cable

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

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

2 Refer to the figure below and connect the CC-Link IE Field compliant cable to the RJ45 plug (CC-Link IE Field compliant).



Slave unit

Port	Pin	Signal	Function
IN/ OUT	1	BI_DA+	Sent/received data, plus
	2	BI_DA-	Sent/received data, minus
	3	BI_DB+	Sent/received data, plus
	4	BI_DC+	Sent/received data, plus
	5	BI_DC-	Sent/received data, minus
	6	BI_DB+	Sent/received data, minus
	7	BI_DD+	Sent/received data, plus
	8	BI_DD-	Sent/received data, minus

2.2.2 Connecting and wiring to the unit/valve power socket

⚠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 (remote device 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.

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

Unit power
This electrical power is for operating the slave unit. Use 21.6 VDC to 26.4 VDC power with the least noise.

Valve power
This electrical power is for operating the solenoid valve. Use 22.8 VDC to 26.4 VDC power with the least noise.

Supplied power plug

Part name	Model No.	Manufacturer
4-pin connector	DFMC1,5/2-STF-3,5(1790292)	PHOENIX CONTACT

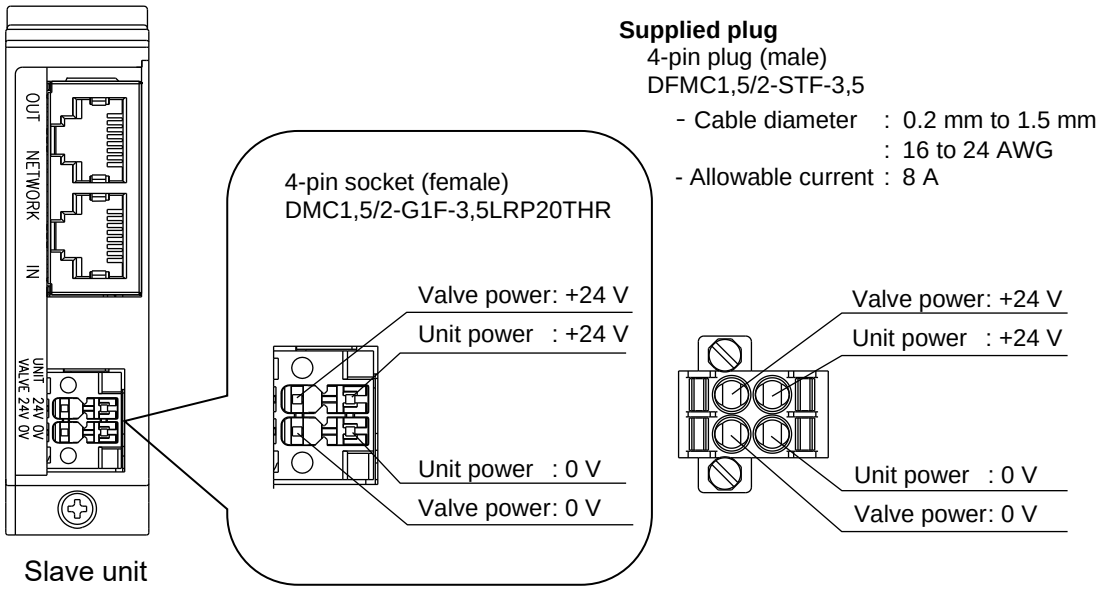
Recommended ferrules and crimp tools

Part name	Model No.	Manufacturer
Ferrule (without sleeve)	: A0.5-10 to 1.5-10	PHOENIX CONTACT
Ferrule (with sleeve)	: AI0.25-10 to 0.75-10	PHOENIX CONTACT
Crimping tool (in common)	CRIMPFOX6(1212034)	PHOENIX CONTACT

■ Connecting the power cables

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

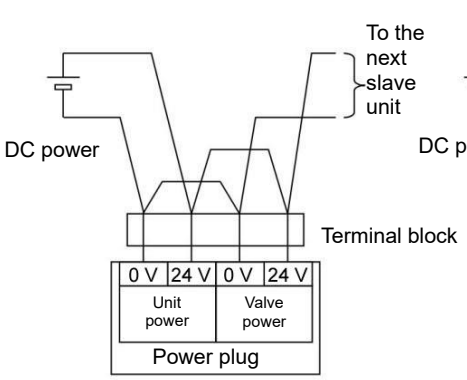
1. After confirming safety, turn off the power to be connected to the slave
2. unit.
3. Attach a terminal such as a ferrule to the cable to be connected as necessary.
4. Refer to the figure below and wire the cables to the correct terminals on the power plug (24 V to 24 V, 0 V to 0 V).
5. Connect the power plug to the power socket and secure the plug flange with the appropriate tightening torque (0.25 N·m).



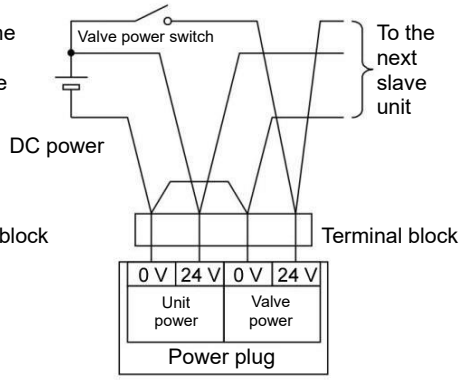
■ Wiring the power cable

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

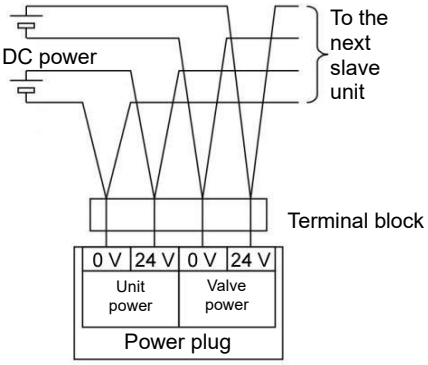
1. Common connection for unit power and valve power



2. Connection for turning on/off valve power



3. Separate connection for unit power and valve power



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 hard switch settings of serial transmission slave unit before use.
Setting improper 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 unit 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 adapter (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 Station number setting

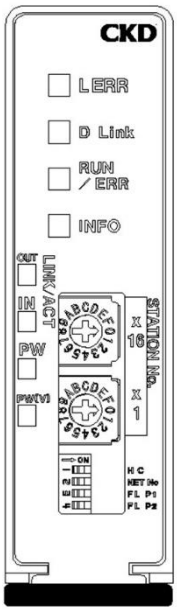
Set the station number of the slave unit.
To set the station number with the engineering tool, set the rotary switch to "00".

Switch	STATION No. ×16、×1
Setting range	01 to 78 (Hex) [1 to 120 (Dec)]

The setting is in hexadecimal.
Refer to the following table for converting the value.

x16 Switch		
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

x1 Switch		
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 the address to 71 (decimal)
Since 71 = 64 + 7, set the x16 switch to 4 and the x1 switch to 7.

Setting the station number with engineering tool

1. Make sure the tool can communicable with master unit. (The factory setting station number is [1])
2. Execute the parameter processing with the engineering tool and change the station number to the desired value.
   *Refer to the manual of engineering tool for specific operation.
3. Restart this product with the changed station number by turning the power off and on.

3.1.2 Output setting in the event of communication error

Set the output status when a communication error occurs.
This setting becomes enable when the rotary switch is set to [01 to 78 (hexadecimal)] for the station number setting.
The setting with the engineering tool becomes enable when the station number is set to [00].
(The factory setting is all points OFF when the station number is set to [00])

Switches	Settings
HC (Output mode setting)	Sets the output status when a communication error occurs (such as line disconnection and timeout). ON : Hold mode OFF : Clear mode

Output setting in the event of communication error with engineering tool

1. Make sure the tool can communicable with master unit by setting the rotary switch to [00] referring to the station number setting.
2. Execute the parameter processing with the engineering tool and change OutputCommFaultEnable and OutputCommFaultValue to the desired value.
   *Refer to the manual of engineering tool for specific operation.
   *Changes made with the engineering tool will be reflected immediately.

3.1.3 Network number setting

Set the network number.

Switches	Settings
NET No. Network number setting	Sets the network number. ON : Network number 1 OFF : Software setting (factory setting is 1 and can be changed by parameter setting)

Setting the network number with engineering tool

1. Make sure the tool can communicable with master unit by turning the NET No. switch to OFF.
2. Execute the parameter processing with the engineering tool and change the network number to the desired value.
3. Restart this product with the changed network number by turning the power off and on.
   *Refer to the manual of engineering tool for specific operation.

3.1.4 Fast link-up function setting

Set enable/disable of fast link-up function.

Switches	Settings
FL P1/P2	Sets fast link-up function. ON : Enable OFF : Disable

The fast link-up function is a function that shortens the data link time to the master unit when the power is turned on.
To use the fast link-up function, a master unit and slave unit supporting the function are required. Contact each unit manufacturer for the applicable modules and settings.

Precautions for use

- Disable the fast link-up function for the port directly connect to the master unit.
- Connect the function enabled port with the same enabled port of another device. Connecting to a function disabled port does not link up.
- Connect to a port with a different port number when connecting to another device. (Example : Connect with P1 and P2)
- Connecting to ports with the same number does not link up: both are P1 or P2.

3.2 Settings by CSP+ system profile

Using the CSP+ file sets this product easily with the engineering tool.
*Refer to the manual of engineering tool for handling CSP+ file.

CSP+ file name: 0x0104_OPP7(CC-Link IE Field) series.zip

The above file includes the following models.
- OPP7-1EF
- OPP7-1EF-P
- OPP7-2EF
- OPP7-2EF-P

Refer to the following table for selecting the model.

Item	Model name in CSP+ file			
	OPP7-1EF	OPP7-2EF	OPP7-1EF-P	OPP7-2EF-P
Model No.	T8EF1	T8EF2	T8EFP1	T8EFP2
Output type	NPN output (+COM)		PNP output (-COM)	
Number of output points	16 points	32 points	16 points	32 points

3.2.1 Parameter acquisition/setting

Using the CSP+ file sets and acquire parameters with the engineering tool.
*Refer to the manual of engineering tool for operation.

Acquire and set the following parameters.
Only some of the parameters are applicable for parameter setting. "✓" in the setting column indicate the corresponding parameters.

Product Information

Parameters	Description	Settings
ModelCode	Indicates product code.	
SoftwareVersion	Indicates software version.	

Network Information

Parameters	Description	Settings
NetworkMode	Indicates the network number setting mode. Hardware switch : Switch settings Software settings : Value set in parameter setting	
NetworkNo	Indicates the current network number. The value is shown when it is changed in the parameter setting.	✓
NodeMode	Indicates the setting mode of station number. Hardware switch : Switch settings Software settings : Value set in parameter setting	
NodeNo	Indicates the current station number. The value is shown when it is changed in the parameter setting.	✓
FLU P1/P2	Indicates the status of fast Link-up function. Enable : Function enable Disable : Function disable	

Product Status

Parameters	Description	Settings
MaintenanceEnable	Sets the maintenance monitoring item (*1). Enable : Monitoring Disable : Not monitoring	✓
MaintenanceDetEFt	Indicates status of the maintenance monitoring item (*1). DetEFting : Monitoring conditions are satisfied UndetEFted : Monitoring conditions are not satisfied	
EnergizationTime	Indicates the total time (energization time) that the power of this product was ON. (Unit: second)	
EnergizationTimeThershold	Sets the value for determining energization time monitoring. (Unit: second)	✓
ValvePower	Indicates valve power status.	

*1 Following table indicates each item of maintenance monitoring and monitoring conditions.

Parameters	Description	Monitoring condition
Valve power supply error	Valve power failure	When valve power supply is OFF.
Error	Moderate error	When an internal hardware error is detected.
Warning	Minor error	When the switch is operated.
Energization time monitoring	Energization time monitoring	When EnergizationTime exceeds EnergizationTimeThreshold.
Output count/time monitoring	Output monitoring	When any of OutputOnCountDetEFt or OutputOnTimeDetEFt becomes DetEFting.

Output

Parameters	Description	Settings
OutputIo	Indicates each output status.	
OutputCyclic	Indicates the output status notified by the master.	
OutputForcedEnable	Sets the forced output of each output. Enable : Outputs the value set in OutputForcedValue.) Disable : No output	✓
OutputForcedValue	Sets the output value when the forced output of each output is enabled.	✓
OutputCommFaultMode	Indicates the output setting mode at the time of communication error with the master. Hardware switch : Switch settings Software settings : Value set in parameter setting	
OutputCommFaultEnable	Sets output pattern of each output at the time of communication error with the master. Output value at communication error: OutputCommFaultValue Hold : Hold the pattern	✓ *2
OutputCommFaultValue	Sets each output when “Output value at communication error” is selected for the output pattern at the time of communication error with the master.	✓ *2
OutputOnCountEnable	Sets whether to monitor the ON count of each output. Enable : Monitor ON count Disable : Do not monitor.	✓
OutputOnCountDetEFt	Indicates the ON count monitoring status of each output DetEFting : OutputOnCount exceeds OutputOnCountThreshold UndetEFted : Other than the above.	
OutputOnCountThreshold	Sets the value for determining the ON count monitoring of each output. *Value is common to all outputs. No individual setting.	✓
OutputOnCount_No00~No31	Indicates the number of times each output has turned ON.	✓
OutputOnTimeEnable	Sets whether to monitor the ON time of each output. Enable : Monitor ON time Disable : Do not monitor.	✓
OutputOnTimeDetEFt	Indicates the ON time monitoring status of each output DetEFting : OutputOnTime exceeds OutputOnTimeThreshold UndetEFted : Other than the above.	
OutputOnTimeThreshold	Sets the value for determining the ON time monitoring of each output. (Unit: second) *Value is common to all outputs. No individual setting.	✓
OutputOnTime_No00~No31	Indicates the total time that each output was ON. (Unit: second)	✓

*2 Setting is available only when OutputCommFaultMode is Software settings.

3.3 Remote setting

3.3.1 Remote input/output

Following table indicate examples of allocation from RY0. There is no remote input (RX).

Remote input/output	Parameters	Solenoid output No.	
		T8EF□1 (4GR-OPP7-1EF□)	T8EF□2 (4GR-OPP7-2EF□)
RY0	No00	s1	s1
RY1	No01	s2	s2
RY2	No02	s3	s3
RY3	No03	s4	s4
RY4	No04	s5	s5
RY5	No05	s6	s6
RY6	No06	s7	s7
RY7	No07	s8	s8
RY8	No08	s9	s9
RY9	No09	s10	s10
RYA	No10	s11	s11
RYB	No11	s12	s12
RYC	No12	s13	s13
RYD	No13	s14	s14
RYE	No14	s15	s15
RYF	No15	s16	s16
RY10	No16	-	s17
RY11	No17	-	s18
RY12	No18	-	s19
RY13	No19	-	s20
RY14	No20	-	s21
RY15	No21	-	s22
RY16	No22	-	s23
RY17	No23	-	s24
RY18	No24	-	s25
RY19	No25	-	s26
RY1A	No26	-	s27
RY1B	No27	-	s28
RY1C	No28	-	s29
RY1D	No29	-	s30
RY1E	No30	-	s31
RY1F	No31	-	s32

3.3.2 Remote register

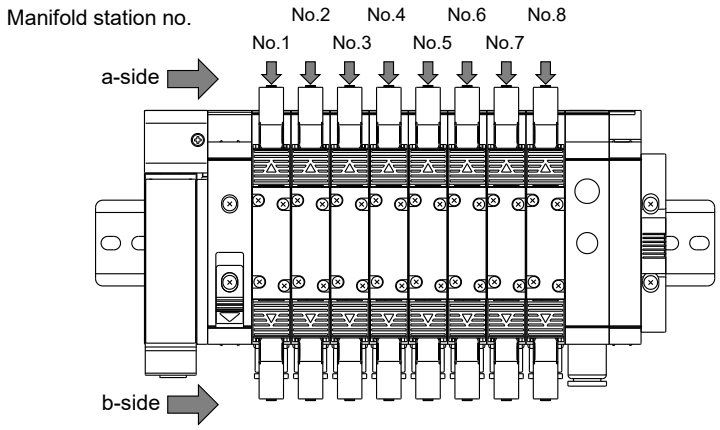
Following table indicate examples of allocation from RWr0. There is no remote register (RWw) from the master to this product.

<table>
<tr><th>Remote register</th><th>Parameters</th></tr>
<tr><td>RWr0</td><td>Indicates status of the maintenance monitoring item.
<table>
<tr><th>Bit</th><th>15~8</th><th>7</th><th>6</th><th>5</th><th>4</th><th>3</th><th>2</th><th>1</th><th>0</th></tr>
<tr><td>Item</td><td>0</td><td>Output monitoring</td><td>0</td><td>Energization time monitoring</td><td>0</td><td>Minor error</td><td>Moderate error</td><td>0</td><td>Valve Power failure</td></tr>
</table>
* Each bit becomes 1 when monitoring condition is satisfied.
* Refer to the product status of “3.2.1 Parameter acquisition/setting” for details of monitoring conditions.</td></tr>
<tr><td>RWr1~3</td><td>(Reserved)</td></tr>
</table>

3.3.3 Example of valve No. array corresponding to solenoid output No.

In the table below, each valve number consists of a number (the station number) and an alphabet (the a-side solenoid or the b-side solenoid). For example, “1a” refers to 1st station a-side solenoid. Also, “E” stands for “Empty”.
Manifold stations are numbered from left to right with the piping port towards the user (refer to the figure below).
As appearance and maximum number of stations differ depending on the solenoid valve model, check individual specifications.

<T8EF1, T8EFP1 (16 output point)>



The figure is an example of mounting eight stations of double-solenoid type valves.
There is no solenoid on the b-side for single-solenoid type.

Standard wiring

- When all valves mounted on the manifold are single solenoids:

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

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

- When both single and double solenoids valves are mounted on the manifold (an example is shown above)

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

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

- When all valves mounted on the manifold are double solenoids:

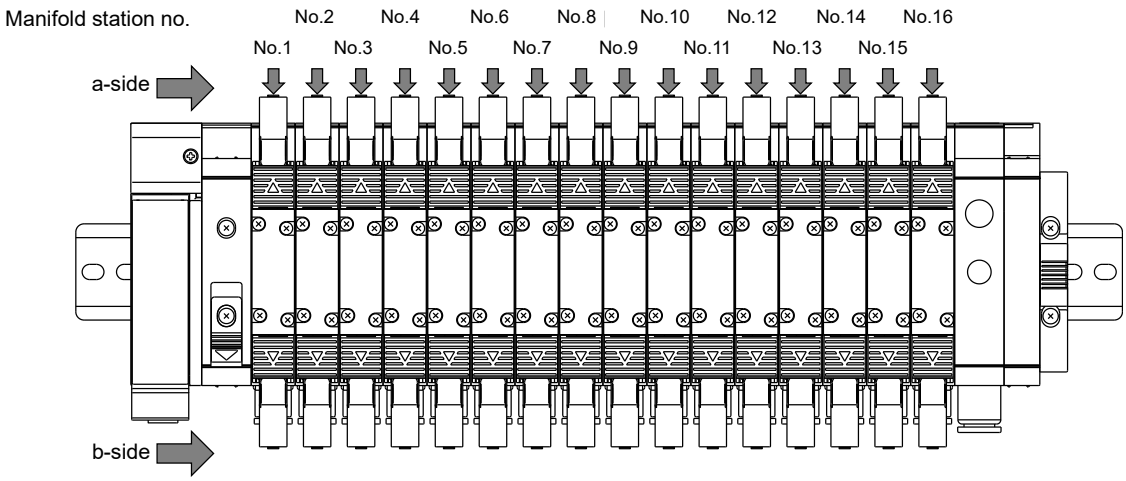
Solenoid Output No.	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11	s12	s13	s14	s15	s16
Valve no.	1a	1b	2a	2b	3a	3b	4a	4b	5a	5b	6a	6b	7a	7b	8a	8b

- When both single and double solenoids valves are mounted on the manifold (an example is shown above)

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

<T8EF2, T8EFP2 (32 output point)>

The figure is an example of mounting sixteen stations of double-solenoid type valves.
There is no solenoid on the b-side for single-solenoid type.



Standard wiring

- When all valves mounted on the manifold are single solenoids:

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
Valve no.	1a	2a	3a	4a	5a	6a	7a	8a	9a	10a	11a	12a	13a	14a	15a	16a	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 solenoids:

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
Valve no.	1a	1b	2a	2b	3a	3b	4a	4b	5a	5b	6a	6b	7a	7b	8a	8b	9a	9b	10a	10b	11a	11b	12a	12b	13a	13b	14a	14b	15a	15b	16a	16b

- When both single and double solenoids valves are mounted on the manifold (an example is shown above)

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
Valve no.	1a	2a	3a	3b	4a	4b	5a	6a	7a	7b	8a	9a	10a	10b	11a	11b	12a	13a	14a	14b	15a	15b	16a									

Double wiring

- When all valves mounted on the manifold are single solenoids:

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
Valve no.	1a	(E)	2a	(E)	3a	(E)	4a	(E)	5a	(E)	6a	(E)	7a	(E)	8a	(E)	9a	(E)	10a	(E)	11a	(E)	12a	(E)	13a	(E)	14a	(E)	15a	(E)	16a	(E)

- Double solenoid valve

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
Valve no.	1a	1b	2a	2b	3a	3b	4a	4b	5a	5b	6a	6b	7a	7b	8a	8b	9a	9b	10a	10b	11a	11b	12a	12b	13a	13b	14a	14b	15a	15b	16a	16b

- Mixed (both single and double solenoid valves are mounted) [example]

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
Valve no.	1a	(E)	2a	(E)	3a	3b	4a	4b	5a	(E)	6a	(E)	7a	7b	8a	(E)	9a	(E)	10a	(E)	11a	11b	12a	12b	13a	(E)	14a	(E)	15a	15b	16a	(E)

3.4 Programming

This slave station is treated as a remote device 16-point output unit: T8EF□1, 32-point output unit: T8EF□2 from the master unit. (Occupies 1 station each)

There are two types of I/O data: RY data (remote output) transmitted from a master to a slave unit (in case of this product; T8EF□1 for 16-point output and T8EF□2 for 32-point output) and RX data (remote input) transmitted from a slave to a master unit.
This slave unit acts as an output device which receives remote output data from the master unit and transmits it to valves.
(There is no remote input).

Refer to the instruction manual issued by the PLC manufacturer when programming.
Refer to the following table to program the I/O mapping.
The setting made to specify which action to take on the output in the event of an error is a unique function of this slave unit. This output status setting does not affect the program.

Output data mapping

I/O point		Output data	Bit															
			RY□0	RY□1	RY□2	RY□3	RY□4	RY□5	RY□6	RY□7	RY□8	RY□9	RY□A	RY□B	RY□C	RY□D	RY□E	RY□F
32 points	16 points	**1 word**	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
	-	**2 words**	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	Phillips screwdriver
	Is the power cable connector fully inserted?	No looseness	Flat blade screwdriver
	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 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 station number and the output setting in the event of communication error before turning on the unit power.

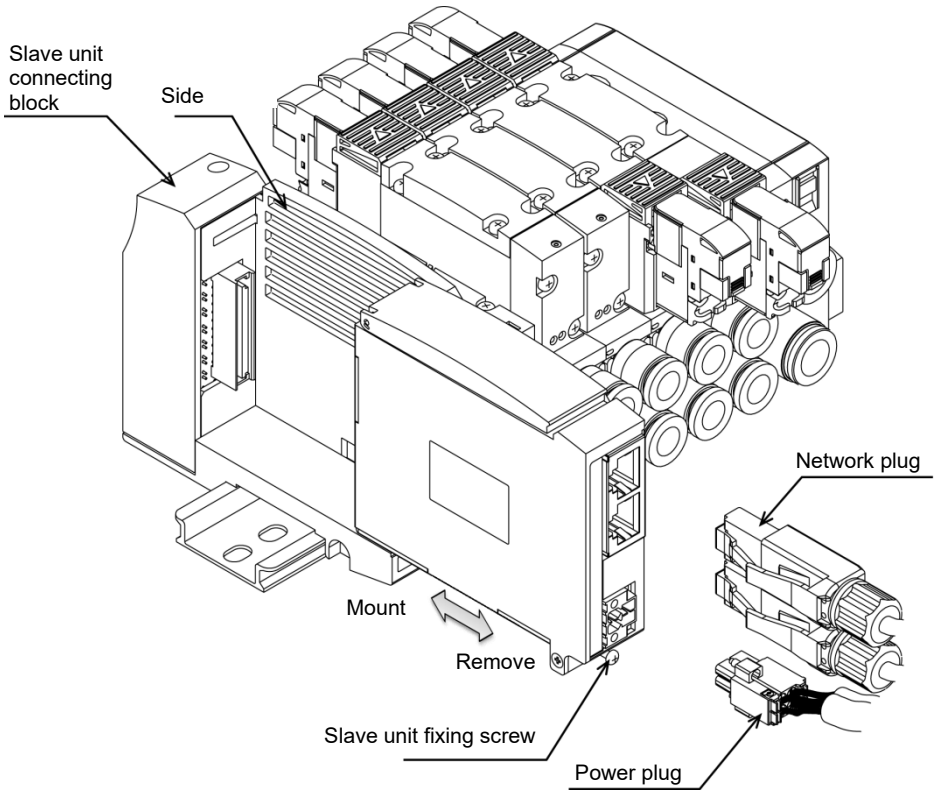
Do not attach or detach the plug while the power is turned on.
These may cause failure or malfunction.

Do not pull out the slave unit by pulling the cable or connector.
This may cause cable disconnection or damage.

Fully loosen the plug fixing screw before removing the plug.
After inserting the plug, tighten the plug fixing screw securely.

4.2.1 Removing the product (slave unit)

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.
3. Loosen the slave unit fixing screw. Since it is a fall prevention screw, stop loosening when it detaches from the slave unit connecting block.
4. Hold and pull out the product slowly in the direction of the arrow.
5. Remove the network plug and power plug.



4.2.2 Mounting the product (slave unit)

1. Set the station number of the product.
2. Turn off the power (for unit/valve) and connect the network plug and power plug.
   The system may operate suddenly if the plugs are connected while the power is turned on.
   Be careful of the surroundings and secure safety before performing work.
   Network plug: Reference tightening torque is 0.4 N·m (Since it varies depending on the plug, consult the plug manufacturer.)
   Power plug: Appropriate tightening torque is 0.25 N·m
3. Hold the product and insert it slowly in the direction of the arrow.
4. Check that the product and slave unit connecting block are properly connected and tighten the slave unit fixing screw firmly.
   (Appropriate tightening torque is 0.5 N·m)
5. After confirming safety, turn on each power.

5. TROUBLESHOOTING

5.1 Problems, Causes, and Solutions

Troubleshooting for this slave unit must be carried out not only for the single unit but for the entire system. The system may start operating suddenly depending on the communication state. Use extreme care and ensure safety during maintenance.

■ Fault 1: PW, PW(V) does not light up.

- Check that the power cable is properly connected and in good condition (not broken).
- Check if the supplied power voltage is within the specified range.

■ Fault 2: ERR LED is on.

- Check that the power to the master unit is turned on.
- Check that there is any problem (such as damage or disconnection) with the connection of the network cable and connector.
- Check that the network cable is compatible with CC-Link IE Field network.
- Check that transmission distance is compatible with CC-Link IE Field network.
- Check that there are no noise-generating devices or high-voltage lines near the communication line.

■ Fault 3: ERR LED is blinking.

- Check that the station number or network number is set correctly.

■ Fault 4: L ERR LED is on.

- Check that the power to the master unit is turned on.
- Check that there is any problem (such as damage or disconnection) with the connection of the network cable and connector.
- Check that the ring topology is connected correctly.

■ Fault 5: D Link LED does not light up.

- Check that the power to the master unit is turned on.
- Check that the data link from the master has been stopped.
- Check the status of the device connecting to and the connection port when the fast link-up function is enabled.

■ Fault 6: INFO LED is blinking.

<Blinking>

- Check the status of the device enabled in the maintenance monitoring setting.

<Repeat twice-flashing>

- In case the switch has been operated, return the switch to the original state or turn the power off and on.

<Rapid flashing>

- Internal hardware is malfunctioning. Replace the unit if the condition doesn't change even after turning the power off and on.

6. WARRANTY PROVISIONS

6.1 Warranty Conditions

■ 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 customer.