CKD

SM-P29261-A/1

INSTRUCTION MANUAL

Serial Transmission Slave Unit

4GR Series T8P
(OPP7-□P)

Compatible with PROFIBUS-DP (V0)

- Please read this instruction manual thoroughly before using the product.
- In particular, carefully read the contents related to safety.
- Retain this instruction manual with the product for further consultation whenever necessary.

CKD Corporation

Safety precautions

When designing and manufacturing a device using CKD products, the manufacturer is obligated to manufacture a safe product by confirming safety of the system comprising the following items:

- Device mechanism
- Pneumatic or water control circuit
- Electric control that controls the above

It is important to select, use, handle, and maintain the product appropriately to ensure that the CKD product is used safely.
Observe warnings and precautions to ensure device safety.
Check that device safety is ensured, and manufacture a safe device.

⚠ WARNING

1. This product is designed and manufactured as a general industrial machine part. It must be handled by someone having sufficient knowledge and experience.

2. Use this product within its specifications.

This product cannot be used beyond its specifications. Additionally, the product must not be modified or machined.
This product is intended for use in general industrial devices and parts. Use beyond such conditions is not considered. Consult with CKD for details when using the product beyond the unique specification range, outdoors, or in the following conditions or environments. In any case, measures for safety shall be provided when the vavle malfunctions.

① Use for special applications requiring safety including nuclear energy, railroad, aviation, ship, vehicle, medical equipment, equipment or applications coming into contact with beverage or food, amusement equipment, emergency shutoff circuits, press machine, brake circuits, or for safeguard.
② Use for applications where life or assets could be adversely affected, and special safety measures are required.

3. Observe corporate standards and regulations, etc., related to the safety of device design and control, etc.

ISO4414, JIS B 8370 (pneumatic system rules)
JFPS2008 (principles for pneumatic cylinder selection and use)
Including High Pressure Gas Maintenance Law, Occupational Safety and Sanitation Laws, other safety rules, standards and regulations, etc.

4. Do not handle, pipe, or remove devices before confirming safety.

① Inspect and service the machine and devices after confirming safety of the entire system related to this product.
② Note that there may be hot or charged sections even after operation is stopped.
③ When inspecting or servicing the device, turn off the energy source (air supply or water supply), and turn off power to the facility. Release any compressed air from the system, and pay enough attention to possible water leakage and leakage of electricity.
④ When starting or restarting a machine or device that incorporates pneumatic components, make sure that system safety, such as pop-out prevention measures, is secured.

5. Observe warnings and cautions on the pages below to prevent accidents.

■**The safety cautions are ranked as "DANGER", "WARNING" and "CAUTION" in this section.**

DANGER : When a dangerous situation may occur if handling is mistaken leading to fatal or serious injuries, or when there is a high degree of emergency to a warning.

WARNING : When a dangerous situation may occur if handling is mistaken leading to fatal or serious injuries.

CAUTION : When a dangerous situation may occur if handling is mistaken leading to minor injuries or physical damage.

Note that some items described as "CAUTION" may lead to serious results depending on the situation. In any case, important information that must be observed is explained.

Precautions with regard to guarantee

● Guarantee period

The guarantee period of our product shall be one (1) year after it is delivered to the place specified by the customer.

● Guarantee coverage

If any failure for which CKD CORPORATION is recognized to be responsible occurs within the above warranty period, a substitute or necessary replacement parts shall be provided free of charge, or the product shall be repaired free of charge at the plant of CKD CORPORATION.

However, the guarantee excludes following cases:

① Defects resulting from operation under conditions beyond those stated in the catalogue or specifications.
② Failure resulting from malfunction of the equipment and/or machine manufactured by other companies.
③ Failure resulting from wrong use of the product.
④ Failure resulting from modification or repairing that CKD CORPORATION is not involved in.
⑤ Failure resulting from causes that could not be foreseen by the technology available at the time of delivery.
⑥ Failure resulting from disaster that CKD is not responsible of.

Guarantee stated here covers only the delivered products. Any other damage resulting from failure of the delivered products is not covered by this guarantee.

● Confirmation of product compatibility

Our customer shall be responsible of confirming compatibility of our product used in our customer's system, machinery or device.

⚠ WARNING

- If you have to use the product under conditions that are different from the specified conditions or if you intend to use the product for a special application, be sure to consult us about the product specifications before using the product.
- Before performing maintenance, turn off the power, cut off the compressed air supply, and make sure there is no residual pressure.
- Before increasing or decreasing the number of stations (valves) on the manifold, turn off the power and release pressure.
- Before disassembling or assembling the manifold, read this manual carefully and with full understanding of its contents.
- Before performing electrical wiring, read this manual carefully and with full understanding of its contents.

⚠ CAUTION

- Regularly perform the daily and periodic inspections to correctly maintain product performance.
- Confirm working voltage and polarity before wiring and turning on the power.
- Do not touch electric wiring connections (exposed live parts); this will cause an electric shock. During wiring, keep the power off. Also, do not touch these live parts with wet hands.
- This product does not meet the surge immunity requirements specified in EN61000-4-5 for CE marking. Please provide appropriate protective measures against lightning surges on the device side.
- The valve and cylinders, etc., could malfunction if the serial transmission slave station address setting is incorrectly set. Always check the address setting before starting use.
- This product is not resistant to the CE Marking surge immunity (EN61000-4-5). Always provide measures on the system side before starting use.
- The valve light may flicker momentarily when the valve power is turned ON (when the power starts). This will not cause the valve to turn ON and OFF.

TABLE OF CONTENTS

4GR Series

T8P(OPP7-□P)

Serial Transmission Type

Instruction Manual No. SM-P29261-A/1

1. PRODUCT

1.1 General outline of the system

1) T8P(OPP7-□P)

The T8P(OPP7-□P) is a slave unit (the Slave Unit) for 4GR series block manifold (the Valve) which can be connected to PROFIBUS-DP (V0), an open field network, or any network that is in conformity with PROFIBUS-DP.

Characteristics are as follow.

(1) The Slave Unit is connected to PLC with only a network cable, allowing significant reduction in the number of man-hours associated with wiring.

(2) Unit power and Valve power are separated, ensuring easy maintenance work.

(3) 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.

(4) The baud rate is automatically detected and set to one of ten rates.
(12M, 6M, 3M, 1.5M, 500k, 187.5k, 93.75k, 45.45k (31.25k), 19.2k, 9.6kbps)

(5) 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.

2) PROFIBUS

PROFIBUS is an open field network system with fast speed and large data frame that connects PLCs used all over the world to field I/O devices and provides fast response times. PLC and PROFIBUS slave units exchange I/O information via PROFIBUS master unit.

PROFIBUS is maintained and controlled by PI (PROFIBUS & PROFINET International), and PROFIBUS specifications are specified in IEC standards (IEC 61158 and IEC 61785).

NOTE: Be sure to read all applicable users' manuals.
This manual mainly describes the Slave Unit T8P(OPP7-□P). Be sure to read the manuals provided by the manufacturer of the master unit and other slave units to be connected to this PROFIBUS-DP system as well.
In addition, regarding the manifold solenoid valve, please read this manual along with the manual for the solenoid valve carefully to fully understand the functions and performance of the Slave Unit to be able to use it properly.

1.2 Network structure

PROFIBUS DP is a technology based on RS 485; therefore, the requirements of RS 485 apply.
PROFIBUS network can be built in multiple segments, and up to 32 stations (including repeaters and master units) can be connected in a single segment. Up to 10 segments, with a maximum of 9 repeaters, can be built in a network. However, check the user's manuals provided by the master unit and repeater manufacturers since the master unit and repeater specifications take precedence.
(For details, refer to the manuals provided by the master unit and repeater manufacturers and PI.)

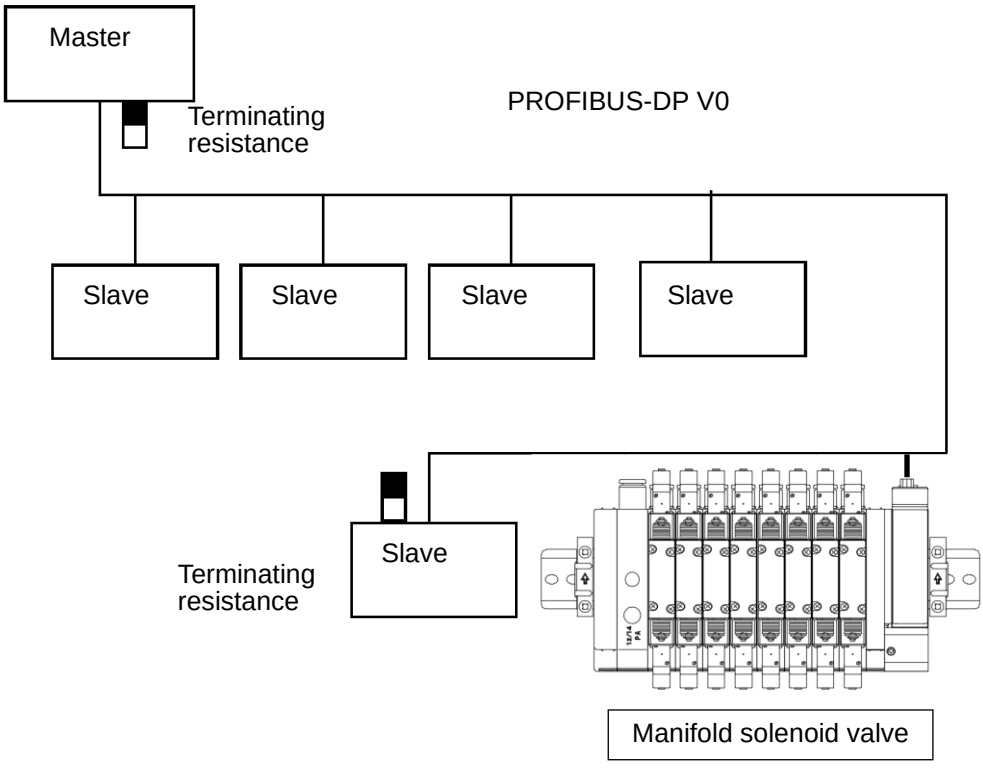
This network mainly consists of a PLC, a master unit, a manifold solenoid valve with T8P(OPP7-□P) mounted, other slave units, and any other peripheral equipment.

- Examples of PLC and master unit combination

Manufacturer	Compatible PLC	Master unit model
Siemens AG	S7-300 series	CPU315-2DP (Combined master interface)
		CPU315-2PN/DP (Combined master interface)
	S7-1200	CM1243-5
Fuji Electric	MICREX-SX series	NP1L-PD1
MITSUBISHI ELECTRIC	Qseries	QJ71PB92V
Other equipment compatible with PROFIBUS-DP		

Note: System configuration of PROFIBUS components requires a configuration tool. Contact the master unit manufacturer for the applicable configuration tool.

- Fundamental structure of the system



1.3 Specifications

1) Communication specifications

Item	Specification
Communication Protocol	PROFIBUS-DP (V0)
Baud rate	Automatic baud rate detection (12M~9.6kbps)

With PROFIBUS, transmission distance varies depending on the baud rate.

Baud rate (bit/s)	9.6~93.75K	187.5K	500K	1.5M	3~12M
Transmission Distance (segment)	1200m	1000m	400m	200m	100m

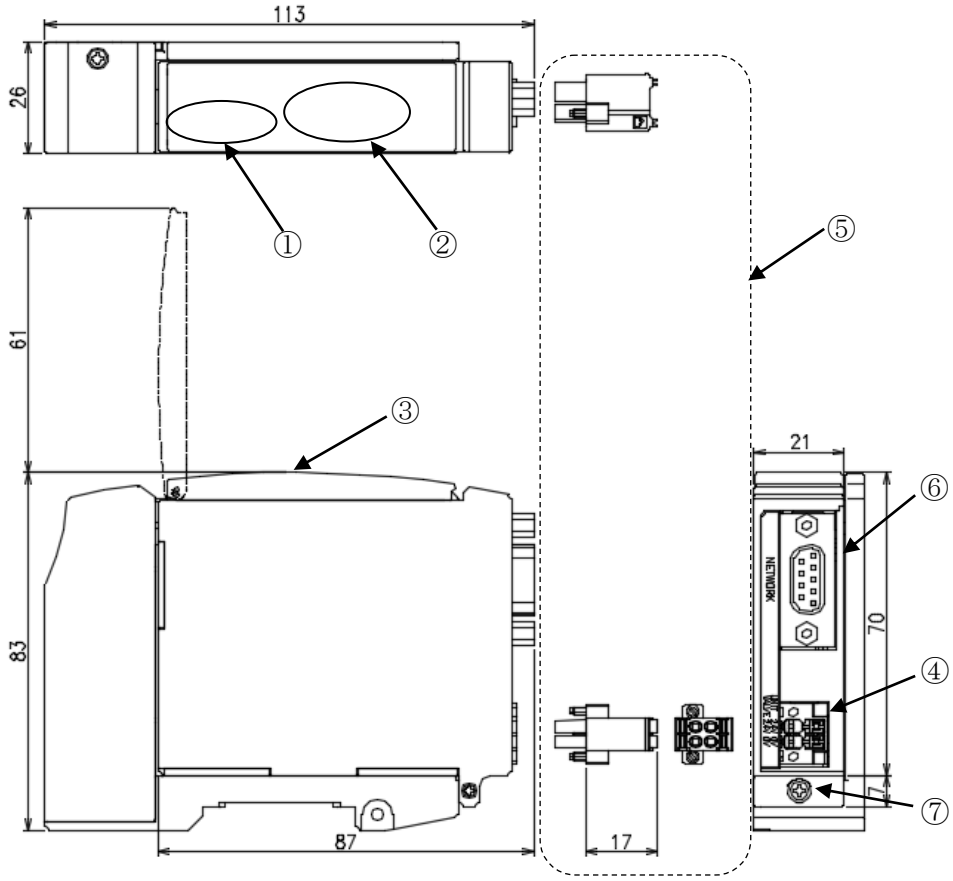
Note: Connect devices in a daisy chain. Especially in case of high-speed (3Mbit/s) communication, make sure to use cables of appropriate length (minimum of 1 m) between devices.

2) T8P(OPP7-□P) specificaions

Item		Specification			
Model number		T8P1 (OPP7-1P)	T8P2 (OPP7-2P)	T8PP1 (OPP7-1P-P)	T8PP2 (OPP7-2P-P)
Unit power supply voltage		21.6VDC to 26.4VDC (24VDC±10%)			
Unit power current consumption		60mA or less (@24.0VDC with all points ON)			
Valve power supply voltage		22.8VDC to 26.4VDC (24VDC+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 points	32 points	16 points	32 points
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)			
Ambient atmosphere		No corrosive gas			
Communications object		PROFIBUS-DP（V0）			
Baud rate (bit/s)		Automatic baud rate detection (12M~9.6kbps)			
Output insulation type		Photo coupler insulation			
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 (power and network status indicators)[*1]			
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]Status can be monitored when Unit power is supplied with specified voltage.

1.4 Parts of the Slave Unit



① Status monitoring lights
These lights indicate Slave Unit status and network status.

② Switches
These switches are used for setting the Slave Unit address.

③ Cover
This clear cover protects the status monitoring lights and the switches.

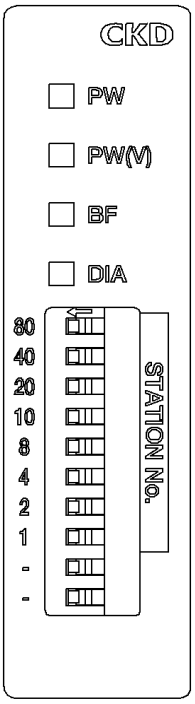
④ Unit/Valve power socket
This is the socket for connecting the Unit/Valve power plug.

⑤ Unit/Valve power plug (included)
This is the plug for connecting the Unit/Valve power cables (24V).

⑥ Network connector socket (D-Sub9)
This is the connector socket for connecting the network connector plug. (Network connector plug is not included.)

⑦ Mounting screw (M2.5 tapping screw)
This screw is used to secure the Slave Unit to the connecting block.

1.5 Switches and LED indicators



1) Switches for setting the station address

These switches are used to set the station address of the Slave Unit.
(Permissible addresses: 1 to 99)

Switches	STATION No. 80 40 20 10 8 4 2 1
Setting Method	Address switches are BCD-weighted.

With PROFIBUS, addresses 0, 1, and 2 are generally reserved for special devices. It is recommended to assign a station address between 3 and 99. Turning on the power will load the assigned station address.
(Duplicate station addresses cannot be assigned.)

Slave unit address	Switch No.							
	1(80)	2(40)	3(20)	4(10)	5(8)	6(4)	7(2)	8(1)
1	0	0	0	0	0	0	0	1
2	0	0	0	0	0	0	1	0
3	0	0	0	0	0	0	1	1
≀	≀							
96	1	0	0	1	0	1	1	0
97	1	0	0	1	0	1	1	1
98	1	0	0	1	1	0	0	0
99	1	0	0	1	1	0	0	1

0: OFF
1: ON
Value( ) is indicated on the sheet.

Example) To set the node address to “71”:

71 ＝ 80･(0)＋40･(1)＋20･(1)＋10･(1)＋8･(0)＋4･(0)+ 2･(0)+ 1･(1)
According to the above formula, turn on switches 2, 3, 4, and 8, and turn off other switches (1, 5, 6, and 7).

CAUTION :

- Setting the Slave Unit address to an improper value can cause a solenoid valve, a cylinder, or such to malfunction. Before using the Slave Unit, make sure the address is set correctly before use.
- Make sure the power is turned off when setting the switches.
- The cover on the Slave Unit can be easily opened by flipping it up with a finger. Keep the cover closed at all times except when setting the switches. Otherwise, foreign matter may enter into the internal circuit from the cover and cause unexpected failure, or the cover itself may get damaged. Be extremely careful not to allow any foreign matter to enter the Slave Unit when setting the switches.
- Switches are precisely built and can be damaged if mishandled. Make sure not to touch the internal circuit board when setting the switches.
- 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.

[SM-P29261-A/1]

2) Baud rate

The baud rate of the Slave Unit is automatically detected (from ten speeds between 12M and 9.6kbps). However, the baud rate may not be automatically detected if the baud rate of the master unit is changed during an operation. If this is the case, restart the Unit (turn its power off and back on).

3) PW、PW(V)、BF (Bus Fault Error)、DIA (Diagnosis Error) LED indicators

LED	Description		Remarks
PW Green PW(V) Off BF Red DIA Off	Unit: Powered Valve: Not powered	Communication not established (Valve power fuse inside Slave Unit has blown)	Valve power is not supplied. Check power supply/voltage of Valve power. Not communicating with master unit. Check PROFIBUS communication.
PW Green PW(V) Green BF Red DIA Off	Unit: Powered Valve: Powered	Communication not established/ Problem in communication	Not communicating with master unit. Check PROFIBUS communication.
PW Green PW(V) Green BF Off DIA Off	Unit: Powered Valve: Powered	Communication in progress	Normal communication in progress Note: If watchdog control is in OFF mode, Slave Unit does not detect problem in communication.
PW Green PW(V) Off BF Off DIA Red	Unit: Powered Valve: Not powered	Communication in progress Problem inside Slave Unit (Valve power fuse inside Slave Unit has blown)	Valve power is not supplied. Check power supply/voltage of Valve power. If power supply voltage is within specifications and yet this condition continues, replace Slave Unit.
PW Green PW(V) Green BF Off DIA Red	Unit: Powered Valve: Powered	Problem inside Slave Unit	If only a certain slave unit is in this condition, check network cable and master unit conditions, and then restart slave unit. If this condition continues, replace slave unit.
PW Off PW(V) Off BF Off DIA Off	Unit: Not powered	Not powered (Unit power fuse inside Slave Unit has blown)	Unit power is not supplied. Check power supply/voltage of Unit power. If power supply voltage is within specifications and yet this condition continues, replace Slave Unit.

Even if the LED indicators display one of the above conditions, that condition may change suddenly and the components in the system may move suddenly depending on the communication status; exercise care and ensure safety when performing maintenance.

If BF indicator lights up, check the following:

- Network cable connection

(Disconnection, incorrect connection, communication distance, noise, baud rate, network cable, network cable connector plug)

- PLC power
- Terminal switch
- Address setting
- Configuration setting

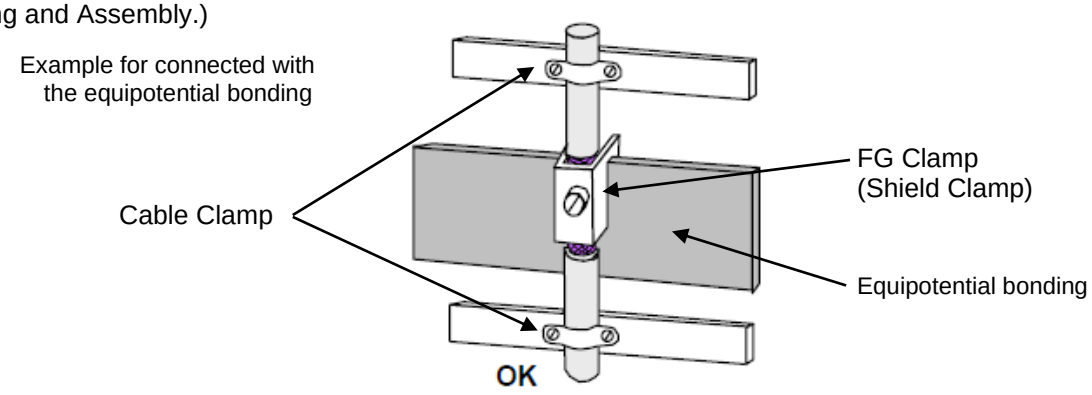
1.6 Wiring

In order for the T8P(OPP7-□P) to function, the network cable and the power cables must be connected to the Slave Unit. If these lines are not properly connected, the N4G*-T8P** may not only function improperly but may also cause serious problems to other devices being used at the same time. Read all manuals, including this manual and the user's manuals for the PLC and other units, before use and make sure all connections are secure and correct.

CAUTION :

- Contact with electric wiring connections (bare live parts) involves a risk of electric shock. Always disconnect power before wiring. Never touch live parts with wet hands.
- Do not subject the power cables and network cable to tension and impact. Long cables can exert unexpected power due to its weight and impact, and this can consequently damage the connectors and devices. Take preventative measures such as securing the cables to the equipment.
- To prevent problems caused by noise, keep the following in mind when wiring.
  - ①If noise is likely to have an influence, provide a power supply for each manifold solenoid valve when possible and wire them independently.
  - ②Do not use power cables that are longer than necessary and wire them in the shortest distance possible.
  - ③Do not share power with noise generating devices such as an inverter motor.
  - ④Do not lay the power cables, network cable, and other power lines in parallel.
  - ⑤The shielding of the PROFIBUS cable must be connected to the equipotential bonding as close as possible to the slave unit.
  - ⑥Refer to PROFIBUS Installation Guideline for Cabling and Assembly when wiring.
- Make sure the power cables and network cable are connected according to the specifications to avoid any incorrect wiring. Incorrect wiring can cause the Slave Unit to malfunction or to be damaged.
- Before turning on the power, make sure that all cables and connectors are connected firmly.
- Before handling PROFIBUS components, touch a grounded metal part. This allows your body to be discharged. Otherwise, static electricity may damage this product.

The protective earth is fundamentally provided to protect people from electrical shock. Grounding and bonding is thus primarily to ensure correct functioning of PROFIBUS, and not for safety reasons. Proper grounding of the cable shield ensures that electrostatic interference is reduced, so minimizing pickup. (For details, refer to "Grounding and equipotential bonding" in PROFIBUS Installation Guideline for Cabling and Assembly.)



Function of the terminals and their connection destination are described below.

1) Connecting and wiring to the Unit/Valve power socket
   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. After connecting the plug to the socket, secure the flanges on the plug using adequate torque (0.25N·m).

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.

Power plug included:

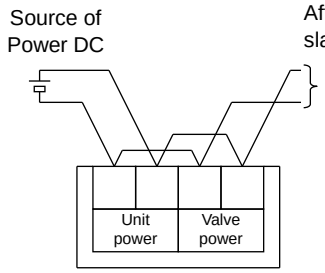
DFMC1,5/2-STF-3,5 (1790292)	4 contacts	Mfd by Phoenix Contact

Recommended ferrules and crimping plier:

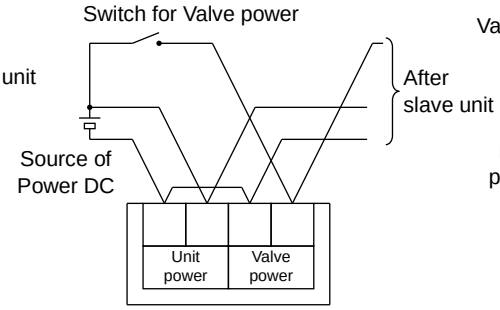
Ferrule (without sleeve): A0.5 to 1,5-10	Mfd by Phoenix Contact
Ferrule (with sleeve): AI0.25 to 0.75-10	Mfd by Phoenix Contact
Crimpling plier (common): CRIMPFOX6 (1212034)	Mfd by Phoenix Contact

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.

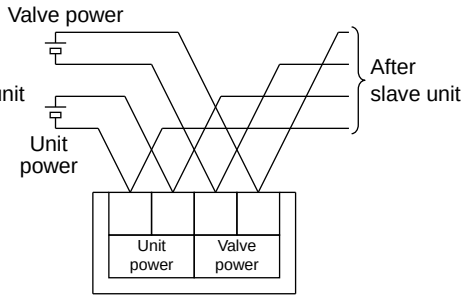
1. Common connection of Unit power and Valve power



2. Wiring to enable Valve power to be turned On・Off.



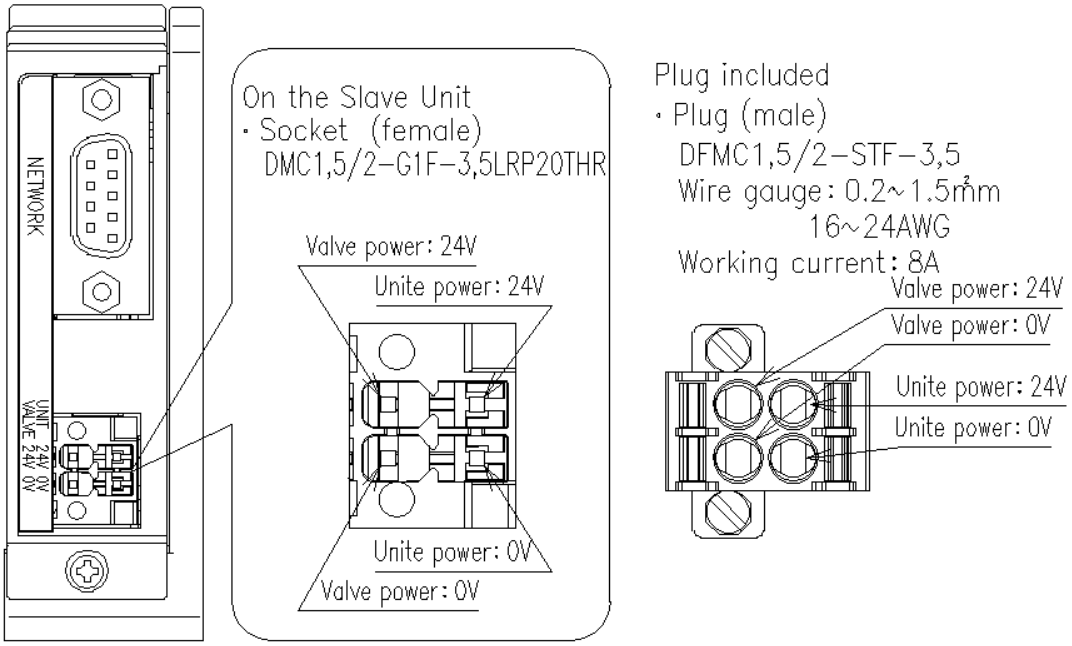
3. Seperate connection Unit power with Valve power



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

<Unit/Valve power cables>

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.



CAUTION :

- Always check the polarities and rated voltage carefully before making any connections.
- Calculate the current consumption before selecting an appropriate power cable.
- If power is to be supplied to more than one slave unit from one power supply, voltage drop due to cables should be considered when selecting and wiring the cables.
- If voltage drop cannot be avoided, take measures to secure the specified power supply voltage such as wiring the power cables in multiple systems or installing other power supplies.
- If branch wiring (double wiring or double lugging) of the power lines is necessary, install a terminal block just before the power plug, and wire at the terminal block.

2) Connecting and wiring to the network connector socket (D-Sub9)
Network connector plug is not included in the package with this product. A network connector plug that meets the specifications must be purchased separately. Network cable is wired by connecting it to the network connector plug and then connecting the plug to the network connector socket on the Slave Unit. After connecting the plug to the socket, secure the flanges on the plug using reference tightening torque (0.4N·m[*1]). ([*1]Torque depends on the network connector plug. Contact the plug manufacturer for appropriate torque.)

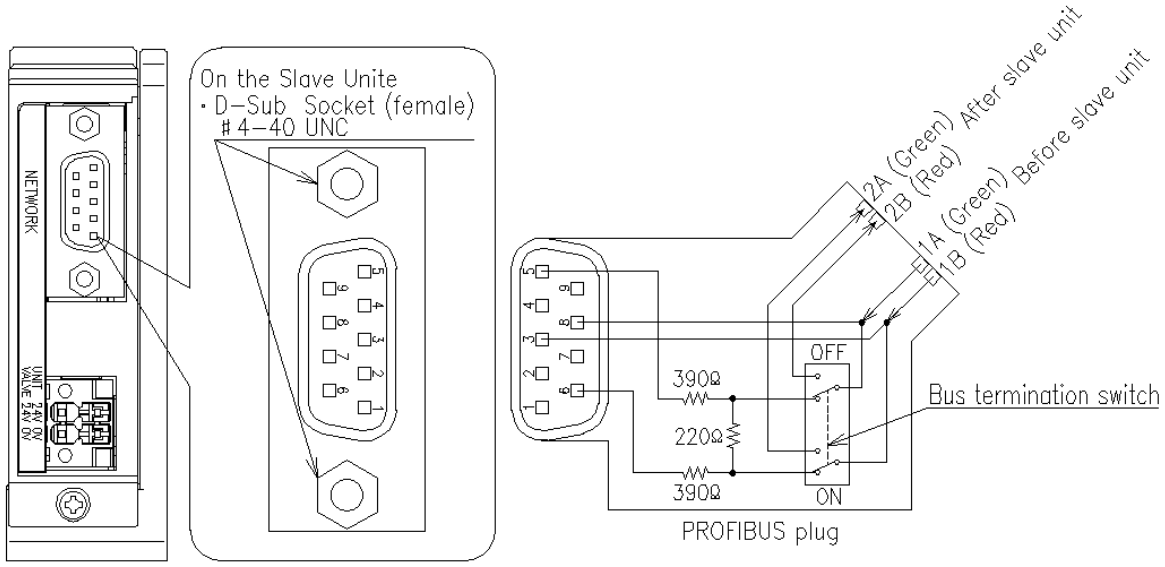
Recommended network connector plugs:

SUBCON-PLUS-PROFIBUS/SC2 (2708232)	D-SUB angle	Mfd by Phoenix Contact
SUBCON-PLUS-PROFIBUS/AX/SC (2744380)	D-SUB straight	Mfd by Phoenix Contact
6GK1500-0FC10	D-SUB straight	Mfd by Siemens Japan

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

<Network cable>

① After confirming safety, stop network communication and turn off all peripheral equipment.
② Connect the PROFIBUS-DP cable to PROFIBUS-DP plug according to the illustrations below.



Pin no	Signal	Significance	Connection
①	Shield	Shield/functional ground	—
②	M24	Vacant	—
③	RxD/TxD-P	Receive/Transmit data – plus	Connect B wire（Red）
④	CNTR-P	Vacant	—
⑤	DGND	Data ground	For terminating resistance (GND)
⑥	VP	Supply voltage - plus	For terminating resistance (+5V)
⑦	P24	Vacant	—
⑧	RxD/TxD-N	Receive/Transmit data – minus	Connect A wire（Green）
⑨	CNTR-N	Vacant	—

CAUTION :

- For the network cable, use a dedicated cable that complies with PROFIBUS-DP specifications.
- Make sure the network cable has sufficient bending radius, and do not bend it forcibly.

2. CAUTION

- The product is rated for DC24V CLASS2 only and shall only be used at its specified power supply voltage.
- Before turning on or off the power, take a good look around and make sure it is safe to do so as the components in the system, including the Valve (cylinder), may move unexpectedly.
- Refer to the user's manual provided for the master unit concerning the transmission delay time. The transmission delay within the entire system depends on the scan time achieved by the PLC and on other devices included in the system.
- Solenoid valve response time varies by model. Refer to the valve specification for the delay in response time.
- The time it takes for the solenoid valve to turn off is delayed by approximately 20ms since there is a surge absorbing circuit incorporated in the Slave Unit.
- Make sure the power cables and network cable are connected according to the specifications to avoid any incorrect wiring.
- Do not subject the power cables and network cable to tension and impact.
- Before turning on the power, make sure that all cables and connectors are connected firmly.
- Never attempt to disassemble, modify, and/or repair the Slave Unit. Doing so may result in failure or malfunction of the Slave Unit.
- Many precision devices are mounted inside the Slave Unit. Do not drop the Slave Unit nor apply vibration or impact to the Slave Unit.
- Do not connect or disconnect any connectors while the power is supplied. Doing so may result in failure or malfunction.
- Mold and rust can develop on the product if it is exposed to high humidity during transportation. Include moisture absorbers and tightly seal the package.
- Install the Slave Unit at least 200mm away from high-voltage cables and power lines, or lay the high-voltage cables and power lines in metal tubing and ground it.

3. OPERATION

3.1 GSD File

System configuration of PROFIBUS components require configuration using a configuration tool (registration in the system configuration definition).
(Contact the master unit manufacturer for applicable configuration tool.)
In order to perform system configuration easily and properly, contact our sales office for the latest GSD file.

GSD file for T8P(OPP7-□P): CKD_0EB0.GSD [*1]
[*1]GSD file and bitmap files (3 types) in a set (compressed): CKD_0EB0_GSD.zip

This Slave Unit is a module type slave. It is necessary to check the station address and specifications of the component to use beforehand and to register the compliant module to a slot in the GSD file.
Refer to the following table when setting the module to register.

	Model number	Module name	Discrete model	Output point	Input point	Remarks
1	T8P1 T8PP1	OPP7-1P*	OPP7-1P OPP7-1P-P	16 points (2-byte)	0 point (0-byte)	-
2	T8P2 T8PP2	OPP7-2P*	OPP7-2P OPP7-2P-P	32 points (4-byte)	0 point (0-byte)	-
3	T8P7 T8PP7	OPP7-7P*				Reserved

Note: The modules are dependent on the number of input/output points but are not dependent on output type. Moreover, do not use the module OPP7-7P-*. This module is reserved for future expansion.

3.2 Setting the Slave Unit with a configurator

The way the configuration tool (configurator) is operated depends on the make; refer to the user's manual provided by the manufacturer.
Take the following 3 steps for minimum system configuration.

1) Register the GSD file to the configurator (example)
First, download CKD_0EB0.GSD, the GSD file for T8P(OPP7-□P). Then, select and register the file CKD_0EB0 using the GSD Viewer tool or using a relevant add command (e.g., Add GSD File...) in the configurator.

2) Register the system configuration of T8P(OPP7-□P) (example)
To add the Slave Unit to PROFIBUS Network, use a relevant add command (e.g., Add Slave to Project) or drag and drop OPP7-*P* from the GSD database.
GSD file for T8P(OPP7-□P) can be found by selecting "CKD Corporation" for Vendor or by selecting "General" for Slave type.

3) Set the T8P(OPP7-□P) (example)
Set the following items by double clicking on the Slave Unit added or by selecting Slave Configuration/Slave Settings.
- Set the address
  Station address/FDL Address: Set to T8P(OPP7-□P) station address [Refer to part 1) in 1.5]
- Set the module
  Double click or select the module relevant to the model number and select 'Append Module/Add Module to Slave'.

Make sure you have good understanding before performing further configuration.

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

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

> Tables below explain the correspondence using PLC manufactured by Fuji Electric as a representative example. For this explanation, the node address of the Slave Unit is set to “1” and the machine number of the master unit is set to “1”.

T8P1、T8PP1

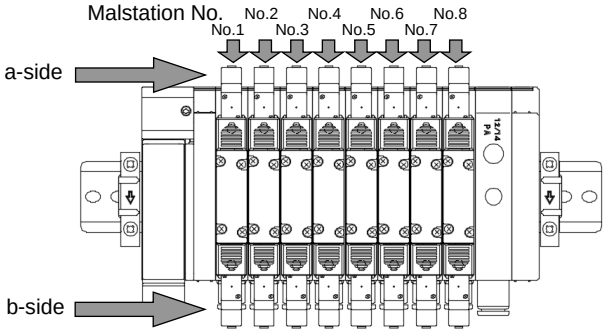
Occupied channel in the PLCinternal memory	QW1.2															
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
Slave Unit output No.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Solenoid Output No.	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11	s12	s13	s14	s15	s16

T8P2、T8PP2

Occupied channel in the PLCinternal memory	QD1.2																													
	QW1.2																QW1.3													
	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

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

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.



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

3.4 Programming

T8P occupies 1 station, where
T8P1、T8PP1 is regarded as a 2-byte (16 points) output station, and
T8P2、T8PP2 is regarded as a 4-byte (32 points) output station.
Refer to the manual provided by the PLC manufacturer when creating a program.
Note: Some PLCs manufactured by Siemens store memory in an Endian format different from that used by Japanese manufacturers. Use the tables below as a reference when programming.

Endian format used by Japanese manufacturers (in bytes)

●16-bit memory

Byte unit	Byte0								Byte 1							
Bit unit	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

●32-bit memory

Byte unit	Byte 0								Byte 1								Byte 2								Byte 3							
Bit unit	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

Endian format used by Siemens (in bytes)

●16-bit memory

Byte unit	Byte1								Byte 0							
Bit unit	8	9	10	11	12	13	14	15	0	1	2	3	4	5	6	7

●32-bit memory

Byte unit	Byte 3								Byte 2								Byte 1								Byte 0							
Bit unit	24	25	26	27	28	29	30	31	16	17	18	19	20	21	22	23	8	9	10	11	12	13	14	15	0	1	2	3	4	5	6	7

4. MAINTENANCE

4.1 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 the plugs.

⑤ Remove the network connector plug and the power plug.

4.2 Mounting the Slave Unit

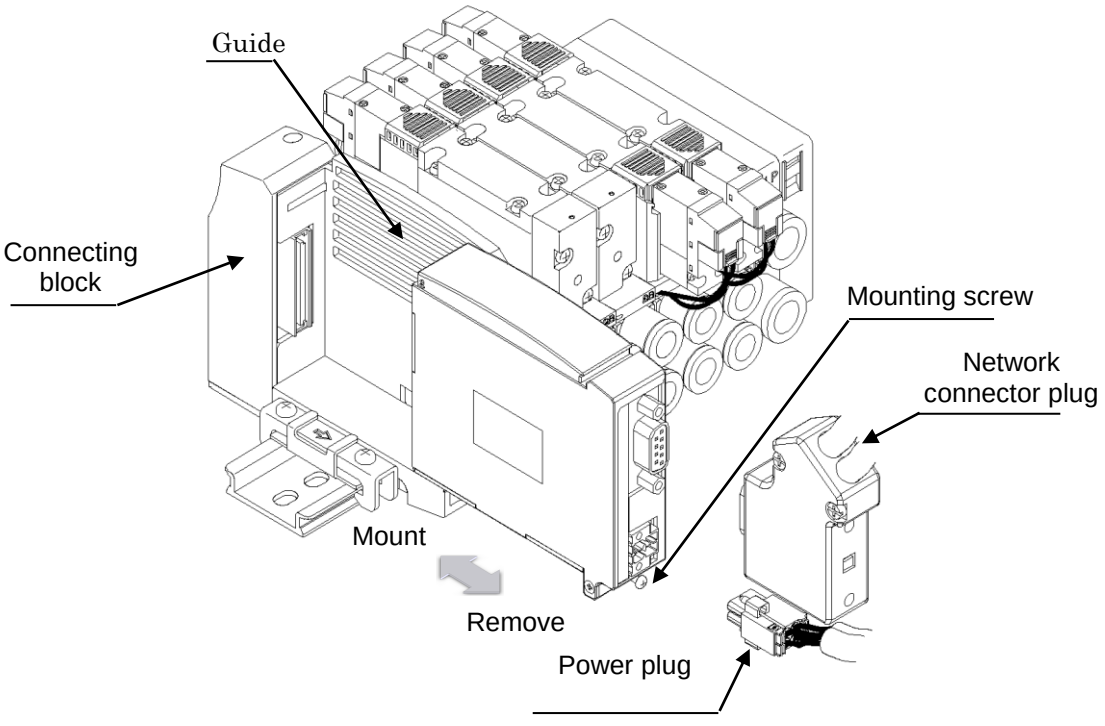
① Set the station address of the Slave Unit.

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 reference tightening torque: 0.4N·m; contact the plug manufacturer for appropriate torque)
(Power plug adequate tightening torque: 0.25N·m)

③ Holding the Slave Unit, insert it into the Slave Unit connecting block slowly from the front along the guide.

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)

⑥ After confirming safety, turn on the Unit power and Valve power.



CAUTION :

- Before turning on or off the power, take a good look around and make sure it is safe to do so as the components in the system, including the Valve (cylinder), may move unexpectedly.
- Before turning on the Unit power, check the Slave Unit address.
- Touching the electrical wiring connection part (bare live part) may cause an electric shock.
- Slave Unit is a delicate device. Do not drop the Slave Unit or apply vibration or impact to the Slave Unit.
- Do not connect or disconnect any connectors while the power is supplied. Doing so may result in failure or malfunction.

4.3 Maintenance of components

This section describes everyday maintenance of components, particularly the methods of cleaning, inspecting, and replacing the Slave Unit.

1) CLEANING

Regularly clean the physical components of the network as follows to ensure that the network is kept in the best condition possible.

① For daily cleaning, use a soft, dry cloth to wipe over the components.

② If dirt remains even after wiping with a soft, dry cloth, wipe with a cloth wrung out in a sufficiently diluted detergent (2%).

③ Slave Unit will become stained if items such as rubber or vinyl products and tape are left on the Slave Unit for long periods. Remove such items during regular cleaning.

2) INSPECTING

Always perform periodic inspections to ensure that the network is kept in the best possible condition. Periodic inspections should be carried out at least once every 6 to 12 months; however, for Slave Unit used in environments subject to high temperature and humidity or excessive dust, periodic inspections should be carried out more frequently.

■ Points of Inspection

Periodically inspect the following items to ensure that they do not deviate from the criteria.
If the items deviate from the criteria, adjust the environment so the criteria are met or adjust the Slave Unit itself.

Inspection item	Inspection details	Criteria	Inspection method
Environment	Are the ambient and in-panel temperatures appropriate?	Refer to the specifications of Slave Unit	Thermometer
	Is the ambient and in panel humidity appropriate?	Refer to the specifications of Slave Unit	Hygrometer
	Is there any dust accumulation?	No dust	Visual inspection
Installation	Is the Slave Unit securely mounted?	No looseness	Phillips screwdriver
	Is the network connector plug inserted properly?	No looseness	Flat blade screwdriver
	Are there any loose external wiring screw?	No looseness	Flat blade screwdriver
	Are there any damages to the connection cables?	No visible damage	Visual inspection

3) REPLACING

The network consists of a master unit and one or several slave units. Malfunctioning of any unit can affect the entire network, so such unit must be replaced immediately. To restore network functions as quickly as possible, it is recommended that spare units be kept on hand at all times to replace the malfunctioning unit.

■ Precaution

When replacing a unit after periodic inspection has revealed a problem, check that the new unit does not have errors after replacement.

■ Setting the new Slave Unit after replacement

After replacing the Slave Unit, make necessary changes to the switches and other settings so that they are the same as before the Slave Unit was replaced.

5. Appendix (GSD file)

```
;**************************************************************************
;***                                                                    ***
;***       Filename: CKD_0EB0.GSD                 (c) 2014              ***
;***       GSD file version 1.001 from   30.05.2014                     ***
;***       CKD Corporation                                              ***
;***       PROFIBUS-DP(V0) OPP7series                                   ***
;***       OPP7-1P* DO16          -T8P*1                                ***
;***       OPP7-2P* DO32          -T8P*2                                ***
;***       OPP7-7P* DI16 DO16     -T8P*7                                ***
;***                                                                    ***
;**************************************************************************
#Profibus_DP
; General DP keyword (4.2.1)
GSD_Revision           = 2                    ; GSD File Format Revision 2nd
Vendor_Name            = "CKD Corporation"    ;
Model_Name             = "OPP7-*P*"           ; Profibus-DP(V0)model, NPN/PNP type
Revision               = "Version 1.001"      ; Product revision 1st
Ident_Number           = 0x0EB0               ; PNO apply
Protocol_Ident         = 0                    ; 0 Profibus-DP
Station_Type           = 0                    ; 0 DP slave
Hardware_Release       = "Version 1.000"      ; Product hardware revision 1st
Software_Release       = "Version 1.000"      ; Product software revision 1st
;
9.6_supp               = 1                    ; 9.6 support True
19.2_supp              = 1                    ; 19.2 support True
45.45_supp             = 1                    ; 45.45 support True
93.75_supp             = 1                    ; 93.75 support True
187.5_supp             = 1                    ; 187.5 support True
500_supp               = 1                    ; 500 support True
1.5M_supp              = 1                    ; 1.5M support True
3M_supp                = 1                    ; 3M support True
6M_supp                = 1                    ; 6M support True
12M_supp               = 1                    ; 12M support True
;
MaxTsdr_9.6            = 60                   ; respond maxim time at 9.6
MaxTsdr_19.2           = 60                   ; respond maxim time at 19.2
MaxTsdr_45.45          = 250                  ; respond maxim time at 45.45
MaxTsdr_93.75          = 60                   ; respond maxim time at 93.75
MaxTsdr_187.5          = 60                   ; respond maxim time at 187.5
MaxTsdr_500            = 100                  ; respond maxim time at 500
MaxTsdr_1.5M           = 150                  ; respond maxim time at 1.5M
MaxTsdr_3M             = 250                  ; respond maxim time at 3M
MaxTsdr_6M             = 450                  ; respond maxim time at 6M
MaxTsdr_12M            = 800                  ; respond maxim time at 12M
;
Redundancy             = 0                    ; 0 redundancy not support
Repeater_Ctrl_Sig      = 0                    ; 0 redundancy not support
24V_Pins               = 0                    ; 0 no connected M24(2) and P24(7)
Bitmap_Device          = "opp7_n"             ; Standard device bitmap file name
Bitmap_Diag            = "opp7_d"             ; Diagnostic device bitmap file name
Bitmap_SF              = "opp7_s"             ; Special device bitmap file name
;
```

```
; Basic DP-Slave related keyword (4.4.1)
Freeze_Mode_supp       = 1                          ; 1 freeze mode support(only input modul)
Sync_Mode_supp         = 1                          ; 1 sync mode support
Auto_Baud_supp         = 1                          ; 1 auto baud support
Set_Slave_Add_supp     = 0                          ; 0 set slave address No support(EEPROM)

User_Prm_Data_Len      = 5                          ; 5 byte user parameter size
User_Prm_Data          = 0x00,0x00,0x00,0x00,0x00   ; user default parameter 1 , Bit 2,3
                                                    ; mask for Diagnostic port 1(port C)
                                                    ; mask for Diagnostic port 2(port D)
                                                    ; user default parameter 2
                                                    ; user default parameter 3
Min_Slave_Intervall = 1                             ; interval time 0.1ms
Modular_Station        = 1                          ; Input/Output size chenge
Max_Module             = 1                          ; 1 station inside module number
Max_Input_Len          = 2                          ; station input byte size (produced size)
Max_Output_Len         = 4                          ; station output byte size (consumed size)
Max_Data_Len           = 4                          ; station data byte size (sum of input and output)
Max_Diag_Data_Len      = 13                         ; 13byte diagnostic data
Unit_Diag_Bit(00)      ="Valve Power Off"           ; Diagnostic error messages
Slave_Family           = 0                          ; 0 General @Pneumatic valve
```

```
;
;*************************************************************************
;***        16bit(2byte) output model                                  ***
;***        NPN model     OPP7-1P       -T8P1                            ***
;***        PNP model     OPP7-1P-P     -T8PP1                           ***
;***        Mod_Name:     OPP7-1P*                                       ***
;***        Config1:0x21                                                 ***
;***        Config1(7):   0     None consist                             ***
;***        Config1(6):   0     Byte unit                                ***
;***        Config1(5,4):10   Output                                     ***
;***        Config1(3~0):1     2byte                                     ***
;***        Config2:0x00                                                 ***
;***        Config2(7,6):00   Special discernment(null)                  ***
;***        Config2(5,4):00   Rule                                       ***
;***        Config2(3~0):00    No vender specific data                   ***
;*************************************************************************
;
Module = "OPP7-1P*" 0x21, 0x00
EndModule
;*************************************************************************
;***        32bit(4byte) output model                                  ***
;***        NPN model     OPP7-2P       -T8P2                            ***
;***        PNP model     OPP7-2P-P     -T8PP2                           ***
;***        Mod_Name:     OPP7-2P*                                       ***
;***        Config1:0x23                                                 ***
;***        Config1(7):   0     None consist                             ***
;***        Config1(6):   0     Byte unit                                ***
;***        Config1(5,4):10   Output                                     ***
;***        Config1(3~0):3     4byte                                     ***
;***        Config2:0x00                                                 ***
;***        Config2(7,6):00   Special discernment(null)                  ***
;***        Config2(5,4):00   Rule                                       ***
;***        Config2(3~0):00    No vender specific data                   ***
;*************************************************************************
;
Module = "OPP7-2P*" 0x23, 0x00
EndModule
;*************************************************************************
;***        16bit(2byte) input   16bit(2byte) output model     OPP7-7P*    ***
;***        NPN model     OPP7-7P       -T8P7                            ***
;***        PNP model     OPP7-7P-P     -T8PP7                           ***
;***        Mod_Name:     OPP7-7P*                                       ***
;***        Config1:0x21                                                 ***
;***        Config1(7):   0     None consist                             ***
;***        Config1(6):   0     Byte unit                                ***
;***        Config1(5,4):10   Output                                     ***
;***        Config1(3~0):1     2byte                                     ***
;***        Config2:0x11                                                 ***
;***        Config2(7):   0     None consist                             ***
;***        Config2(6):   0     Byte unit                                ***
;***        Config2(5,4):01   Input                                      ***
;***        Config2(3~0):1     2byte                                     ***
;*************************************************************************
;
Module = "OPP7-7P*" 0x21, 0x11
EndModule
```