CKD

SM－P00095－A

INSTRUCTION MANUAL

SERIAL TRANSMISSION TYPE

MN$\frac{3}{4}$GA$\frac{1}{2}$R－T6G1

MN4GB$\frac{1}{2}$R－T6G1

MN$\frac{3}{4}$GD$\frac{1}{2}$R－T6G1

MN4GE$\frac{1}{2}$R－T6G1

- 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.

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Serial Transmission Type

Instruction Manual No. SM-P00095-A

1. PRODUCT

1.1 General outline of the system

1) MN3/4G**R-T6G1

This solenoid valve system is equipped with a remote I/O station (slave station unit OPP3-1G), the CC-Link open field network system. (This is specified by CC-Link Partner Association. : hereafter referred to as CLPA) The following features are provided.

(1) It helps to curtail wiring man-hours as it requires twist pair cables only to connect it with PLC.

(2) Up to 64 units of the slave station OPP3-1G having 16 output points, are able to be connected to one master unit, made by Mitsubishi Electric Corporation.

(3) The source of power for unit and valve can be installed individually and each unit has a monitor LED indicator.

(4) The charging of power for valve is verified on the side of sequencer by means of communication. The location of electric trouble such as abnormal condition of power or burnt out fuse is detected easily.

(5) HLD/CLR switch helps choosing either holding output signal or All points OFF.

2) CC-Link System

The CC-Link is Open field network system for FA including remote I/O devices (Sensor and valve, etc.) and intelligent devices (high-speed counters, inverters, etc.), can be configured with reduced wire connections. Moreover, the user can create programs that control these devices installed away from the master station without being aware of the communication protocols. The CC-Link system has following features :

(1) 10Mbps network, the fastest network in the industry, is applicable to a sensor and large capacity data communication requiring the high-speed response.

(2) Remote control handling the bit data and data communication handling word data (analog) can be performed at the same time. The communication is also stable at a high speed.

(3) “n : n” cyclic transmission can be performed between the controllers, ensuring easy distributed control.

Note : Read this User’s Manual and the CKD’s Solenoid Valve Instruction Manual without fail before using the solenoid valve system.
This manual chiefly describes the solenoid valve system and the slave station (OPP3-1G) installed to it. Another units (master, slave station) which allows connection with the CC-Link, refer to the corresponding user’s manuals. Before using the solenoid valve system, you are requested to study its functions and performance by reading both this manual and the Solenoid Valve Instruction Manual without fail.

If the customer has any question about the CC-Link, contact the following home page.

CC-Link Association

Home page address : **http://www.cc-link.org**

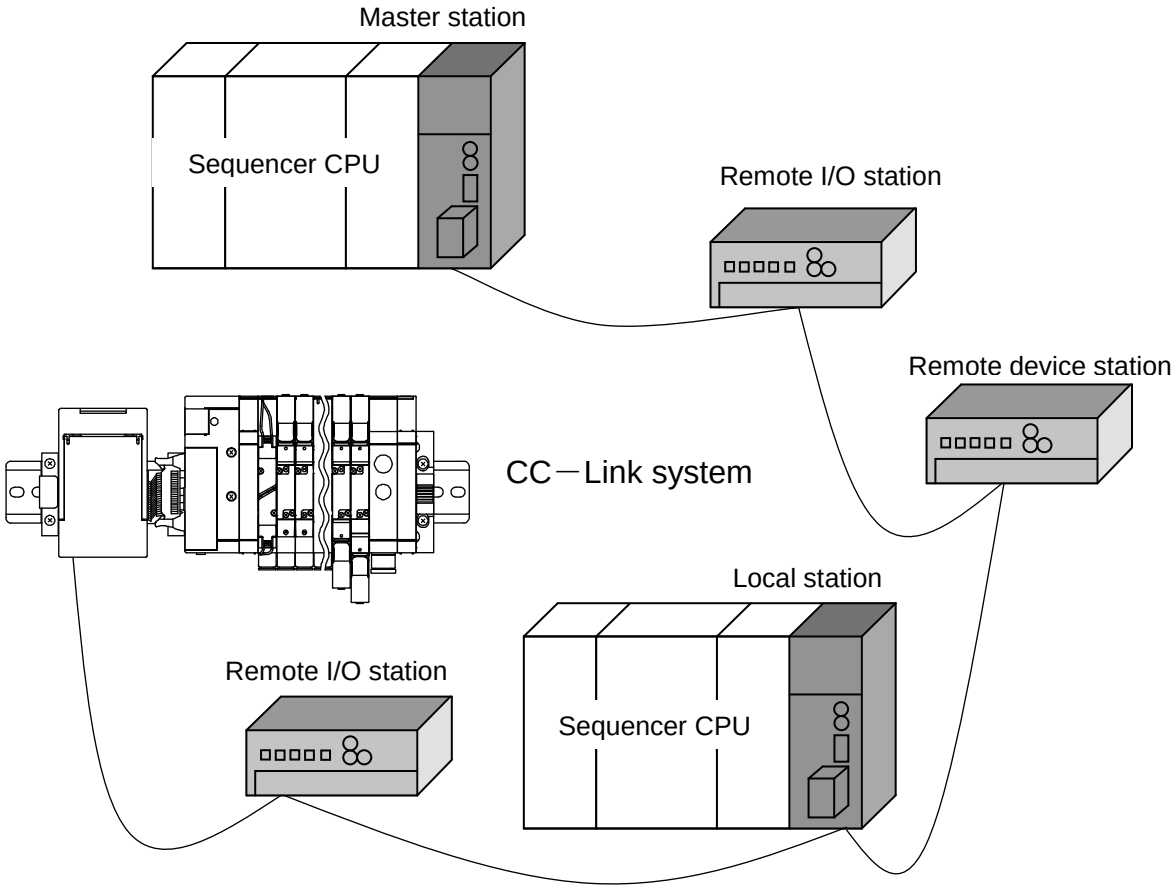
1.2 Network structure

This system chiefly consists of PLC body, Master station Solenoid valve MN3/4G**R-T6G1 and peripheral equipment.

1) Examples of PLC and master unit (master station) combination.

Manufacturer	Compatible PLC	Master unit model
MITSUBISHI ELECTRIC	AnN / AnA / AnU series	AJ61BT11
	AnS / A2US series	A1SJ61BT11
	QnA series	AJ61QBT11
	Q2AS series	A1SJ61QBT11
	Q series	QJ61BT11
Others CC-Link Type of Master unit		

2) Fundamental structure of system



Master station ····· Station controlling remote I/O stations, remote device stations, and local stations.
Remote I/O station ····· Remote station that handles ON/OFF data only.
Remote device station····· Remote station that handles ON/OFF data and numerical data.
Local station ····· Station that has its own CPU and can communicate with the master station and other local stations.
Intelligent device station ····· Station informed by the transient transmission (including the local station)

1.3 Specifications

1) Specification of solenoid valve

(1) Specification of Manifold

Item		Specification	
		MN4G*1 Series	MN4G*2 Series
Mounting method		DIN rail mount type	
Station no.		1 to 8(16 stations Max.for single valve)	
Supply and exhaust method		Common supply/common exhaust(check valve integrated)	
Ambient temperature °C		-5 to 55 (no freezing)	
Atmosphere		Containing corrosive gas is not permissible	
Fluid temperature °C		5 to 55	
Port size	supply port (P)	Push-in fitting φ6, φ8, φ1/4″, φ5/16″	Push-in fitting φ8, φ10, φ5/16″, φ3/8″
	exhaust port (R)		
	Cylinder port(A・B)	Push-in fitting φ1.8, φ4, φ6 φ1/8″, φ5/32″ M5 (A type)	Push-in fitting φ4, φ6, φ8 φ1/4″, φ5/16″ Rc1/8 (A type)
	External pilot port (PA・Option)	Push-in fitting φ6	

※refer to catalog for details

(2) Specification of solenoid valve

Item \ Model			MN3/4G*1 Series							
			4 port valve					3 port valve		Dual 3 port valve integrated type
			2-position		3-position			2-position		2-position
			Single	Double	All ports closed	ABR connection	PAB connection	Normally closed	Normally open	NC-NC NO-NC NC-NO NO-NO
			N4G* 110R	N4G* 120R	N4G* 130R	N4G* 140R	N4G* 150R	N3GA 110R	N3GA 1110R	N3G* 1(*1)0R
Working fluid			Compressed air							
Valve type and operation method			Pilot-operated soft spool valve							
Min. working pressure MPa			0.2							
Max. working pressure MPa			0.7							
Proof pressure MPa			1.05							
Flow Characteristics *2 *3 C:Sonic conductance dm³/(s・bar) b:Critical pressure ratio	MN4GA1 MN4GD1	P→A/B	C:0.98 b:0.33		C:0.92 b:0.34	C:0.92 b:0.29	C:1.1 b:0.35	C:0.98 b:0.33		C:0.87 b:0.37
		A/B→R	C:1.2(0.71) b:0.11(0.27)		C:1.0 b:0.16	C:1.1 (0.69) b:0.13 (0.22)	C:1.1 b:0.17	C:1.2(0.71) b:0.11(0.27)		C:1.0(0.68) b:0.14(0.22)
	MN4GB1 MN4GE1	P→A/B	C:1.0 b:0.30		C:0.96 b:0.32	C:0.96 b:0.29	C:1.1 b:0.31	C:1.0 b:0.30		C:0.86 b:0.35
		A/B→R	C:1.1(0.72) b:0.11(0.26)		C:1.0 b:0.14	C:1.2 (0.71) b:0.11 (0.30)	C:1.0 b:0.15	C:1.1(0.72) b:0.11(0.26)		C:1.0 (0.66) b:0.15 (0.25)
Response time *4 ms	MN4GA1 MN4GB1		12	9	15			12		12
	MN4GD1 MN4GE1		25	15	30			25		15
Lubrication			Not required (Use the turbine oil Class 1 ISO VG32 if lubricated. Excessive or intermittent lubrication results in unstable operation.)							
Degree of protection			Dust proof							
Manual operating device			Non-locking/locking common type							

*1: 66(A side valve: Normally closed B side valve: Normally closed)
67(A side valve: Normally closed B side valve: Normally open)
76(A side valve: Normally open B side valve: Normally closed)
77(A side valve: Normally open B side valve: Normally open)

*2: Effective sectional area S and sonic conductance C are converted as S≒5.0 × C

*3: Values in ( ) apply when a check valve is integrated.

*4: The response time is the value at an air supply of 0.5MPa,20℃,and oil-free. It varies depending on the pressure and the lubricant quality .

Item \ Model			MN3/4G*2 Series							
			4 port valve					3 port valve		Dual 3 port valve integrated type
			2-position		3-position			2-position		2-position
			Single	Double	All ports closed	ABR connection	PAB connection	Normally closed	Normally open	NC-NC NO-NC NC-NO NO-NO
			N4G* 210R	N4G* 220R	N4G* 230R	N4G* 240R	N4G* 250R	N3GA 210R	N3GA 2110R	N3G* 2(*1)0R
Working fluid			Compressed air							
Valve type and operation method			Pilot-operated soft spool valve							
Min. working pressure MPa			0.2							
Max. working pressure MPa			0.7							
Proof pressure MPa			1.05							
Flow Characteristics *2 *3 C:Sonic conductance dm³/(s・bar) b:Critical pressure ratio	MN4GA2 MN4GD2	P→A/B	C:2.2 b:0.21		C:2.0 b:0.25	C:2.0 b:0.27	C:2.3 b:0.31	C:2.2 b:0.21		C:1.7 b:0.37
		A/B→R	C:2.5(1.7) b:0.19(0.10)		C:2.3 b:0.10	C:2.5 (1.7) b:0.18 (0.12)	C:2.3 b:0.16	C:2.5(1.7) b:0.19(0.10)		C:2.2(1.6) b:0.13(0.21)
	MN4GB2 MN4GE2	P→A/B	C:2.4 b:0.35		C:2.2 b:0.38	C:2.2 b:0.38	C:2.3 b:0.29	C:2.4 b:0.35		C:1.7 b:0.42
		A/B→R	C:2.5(1.7) b:0.19(0.19)		C:2.3 b:0.17	C:2.5 (1.7) b:0.18 (0.20)	C:2.3 b:0.15	C:2.5(1.7) b:0.19(0.19)		C:2.2(1.6) b:0.15(0.19)
Response time *4 ms	MN4GA2 MN4GB2		19	18	30			19		29
	MN4GD2 MN4GE2		30	20	35			30		30
Lubrication			Not required (Use the turbine oil Class 1 ISO VG32 if lubricated. Excessive or intermittent lubrication results in unstable operation.)							
Degree of protection			Dust proof							
Manual operating device			Non-locking/locking common type							

*1: 66(A side valve: Normally closed B side valve: Normally closed)
67(A side valve: Normally closed B side valve: Normally open)
76(A side valve: Normally open B side valve: Normally closed)
77(A side valve: Normally open B side valve: Normally open)

*2: Effective sectional area S and sonic conductance C are converted as S≒5.0 × C

*3: Values in ( ) apply when a check valve is integrated.

*4: The response time is the value at an air supply of 0.5MPa,20℃,and oil-free. It varies depending on the pressure and the lubricant quality .

(3) Electrical specifications

Descriptions	Specification
Rated voltage (V)	24
Holding current (A)	0.017
Power consumption (W)	0.40
Voltage fluctuation range	+10%, -5%
Thermal class	B
Surge suppressor	Zener diode
Indicator	LED

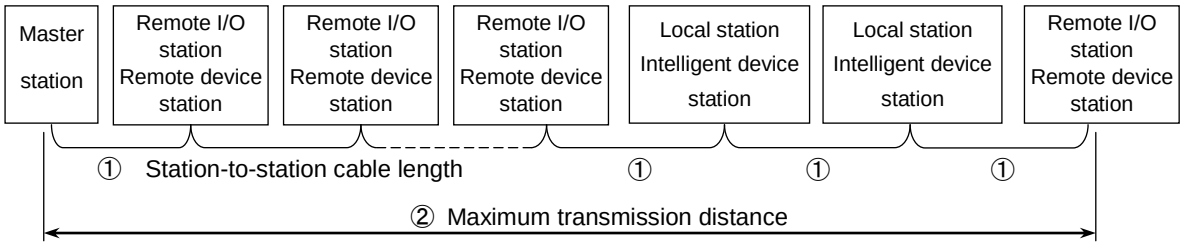
2) Transmission specifications

Item	Specification
Communication protcol	CC-Link (Ver1.10) conformance
Communication speed (B RATE)	10M / 5M / 2.5M / 625k / 156k bps (selectable)
Max. transmission distance (overall cable length)	Depends on communication speed (See " 3) ")
Communication system	Polling system
Synchronization system	Frame synchronization system
Encoding system	NRZI
Transmission path format	Bus format (EIA RS485 conformance)
Transmission format	HDLC conformance
Error control system	CRC (X16 + X12 + X5 + 1)
Conection cable	Shielded twist pair cable (See " 4.1 ")

3) Communication speed and cable length

The following explains the selationships between the communication speed and the maximum transfer distance.

◆ Multi-dropped connection (CC-Link Ver.1.10 system)



B RATE	Communication speed	① Station-to-Station cable length	② Maximum transmission distance
4	10Mbps	0.2m or more	100m or less
3	5Mbps		160m or less
2	2.5Mbps		400m or less
1	625kbps		900m or less
0	156kbps		1200m or less

Since the transmission distance varies, depending on the communication speed and network cables used or the like, refer to the CC-Link User's Manual issued by MITSUBISHI ELECTRIC CO. LTD. or check it through the cable manufacturer, etc.

Since the number of stations (remote stations) connected differs, depending on the number of occupied stations and conditions of trancemission distance or the like, refer to the CC-Link User's Manual is sued by MITSUBISHI ELECTRIC CO, LTD. Check it through the cable manufacturer, etc.

CAUTION :

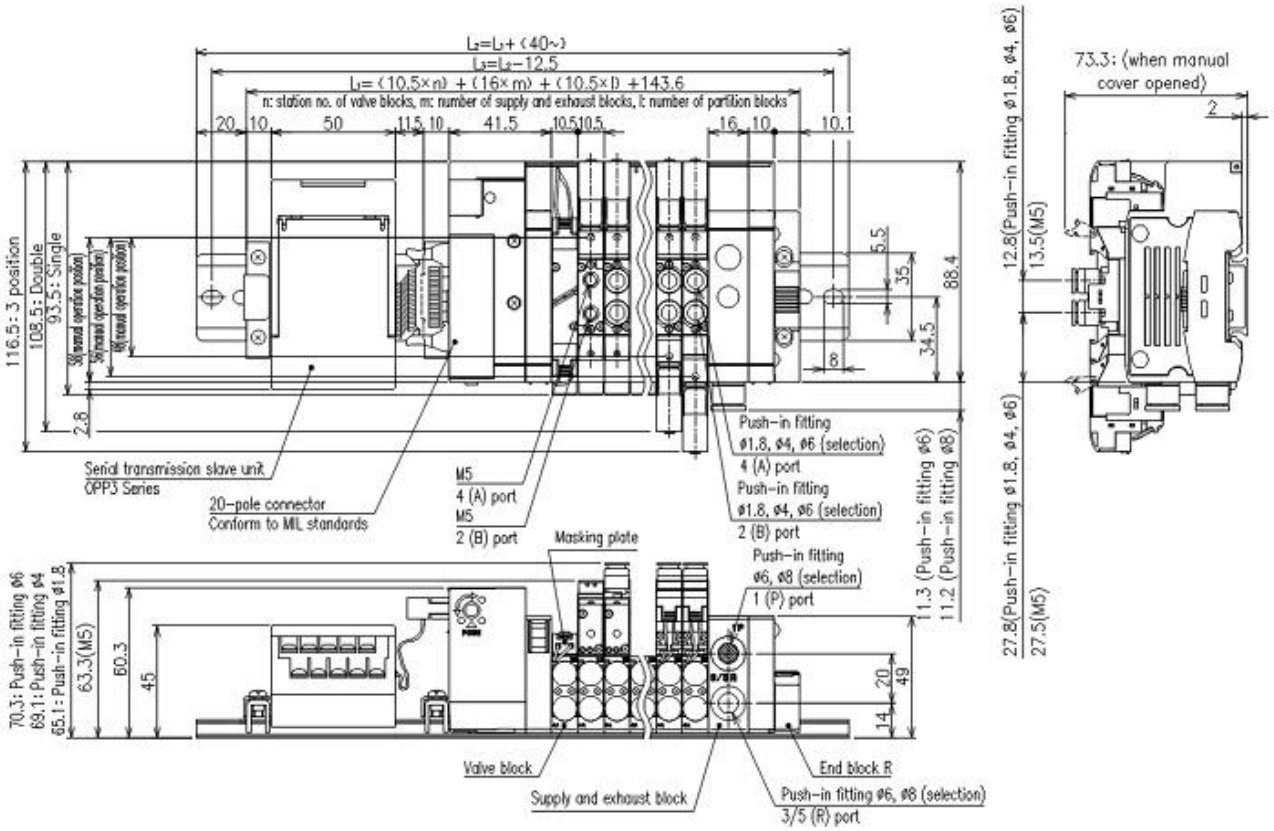
- Condition of transmission distance: All devices and CC-Link cable should be Ver.1.10 compatible products. If any of products is in Ver.1.00, follow the specification for Ver.1.00. Refer to the CC-Link User's Manual issued by MITSUBISHI ELECTRIC CO. LTD., etc.
- Network cables of different vendors can be used together if they are Ver.1.10 compatible. But, in case of Ver.1.00 network cable is used only single vendor.
- About T-brunch connections, there are various restrictions including the usable cable, the number of stations and etc.
  With reference to the instruction manuals (User's manual,etc.) of the master station, please wire it by all means after having confirmed contents.

4) Slave station specifications

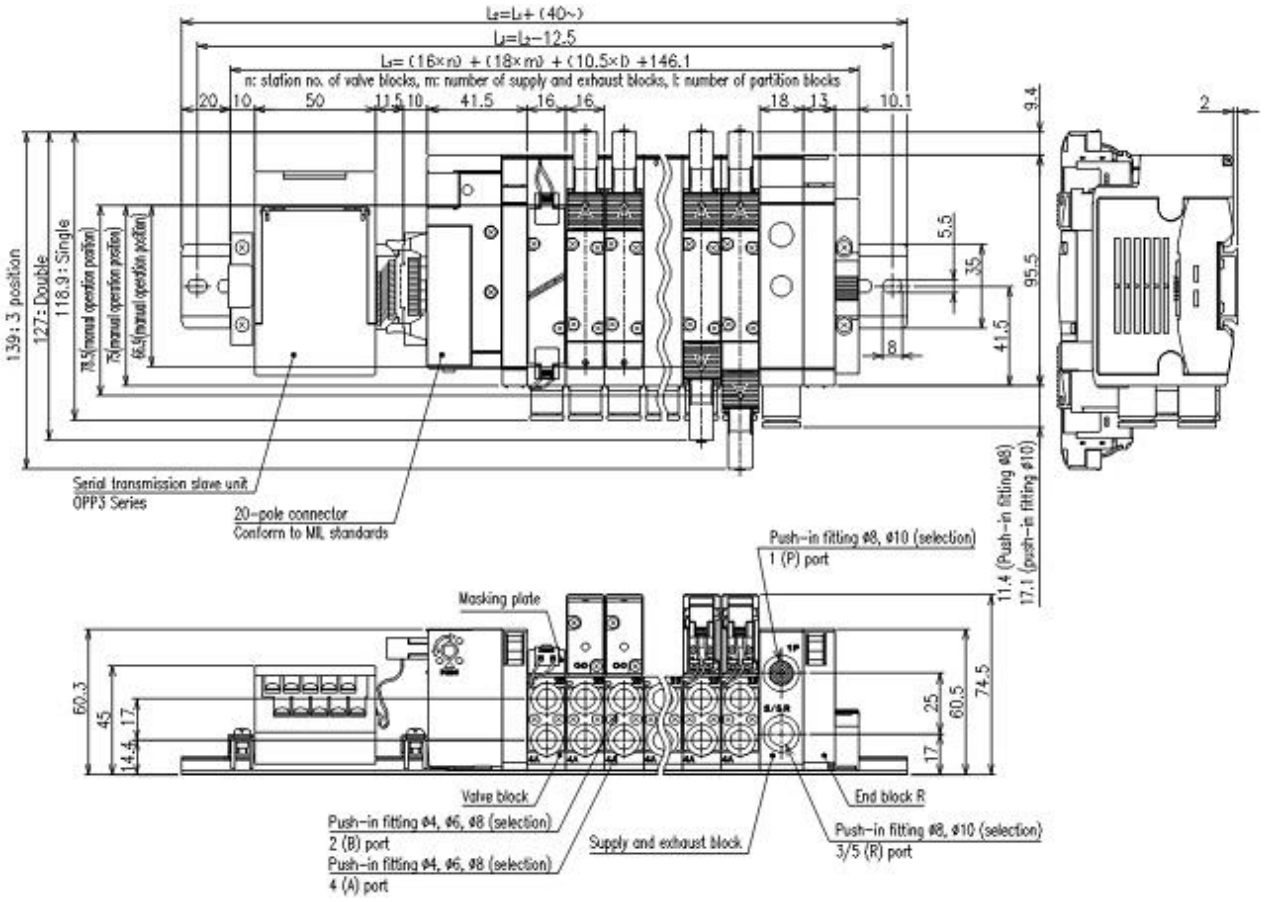
Item		Specification
Unit power supply voltage		21.6VDC to 26.4VDC (DC24V ±10%)
Unit power current consumption		100mA or less (@24.0VDC with all points ON)
Valve power supply voltage		22.8VDC to 26.4VDC (24VDC+10%, -5%)
Valve power current consumption		15mA or less (@24.0VDC with all points OFF)
Output type(polarity)		NPN (+common output)
Number of output points		16 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.
Noise resistance		500Vp-p Pulse width 1μm/s
Shock resistance		294.0m/s^2 for 3 times in each direction of X, Y, Z
Ambient temperature		-5 to 55°C(no freezing)
Sotrage humidity		30 to 85%RH (no dew condensation)
Ambient atmosphere		No corrosive gas
Communications object		CC-Link Ver.1.10
Output insulation type		Photo coupler insulation
Max, load current		100mA / output
Leakage current		0.1mA or less
Residual voltage		0.5V or less
Display		LED (power supply status, communication status)
Occupation station		1 station
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^2whichever smaller.

1.4 Dimensions

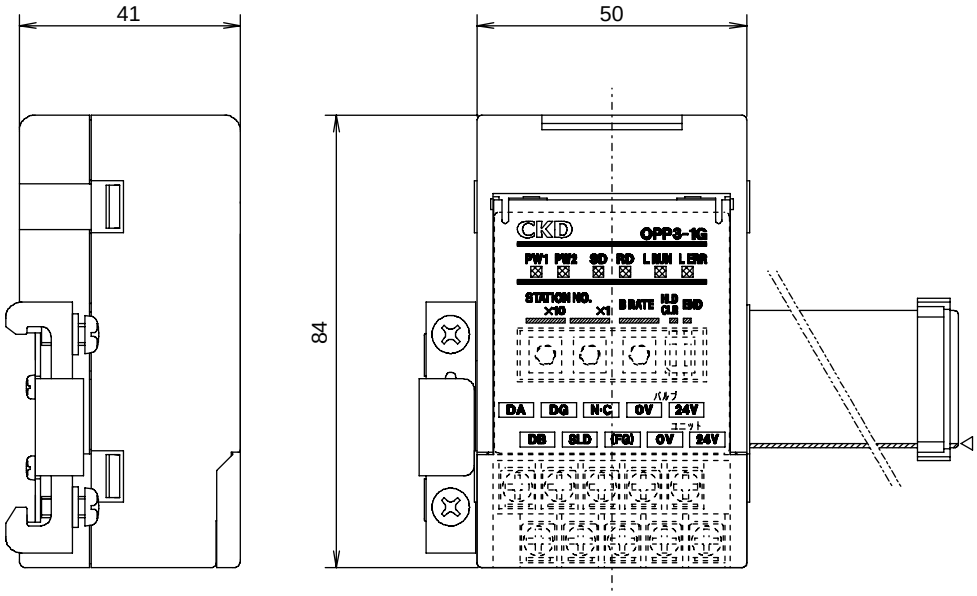
・MN4GA1*0R-*-*T6G1-*

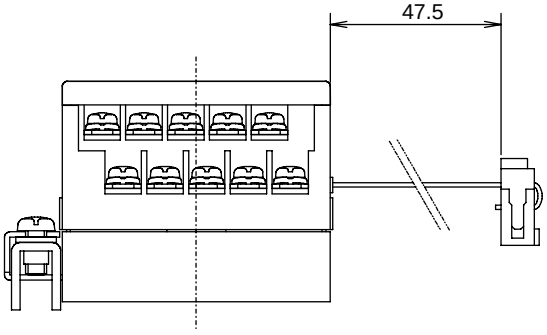


・MN4GB2*0R-*-*T6G1-*



・Slave station unit OPP3-1G



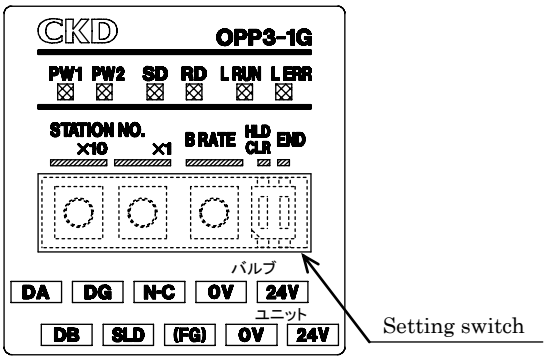


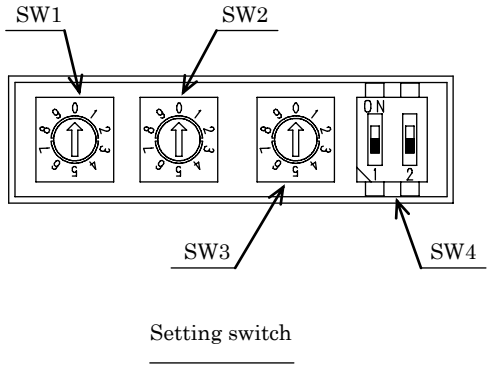
1.5 Switches and LED indicators

CAUTION :

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

(1) Various LED lamps are installed in front of station to aid visual varification of operational conditions. Each function is printed on the sheet made of resin. The content of each function is posted in the table below. Make use of them during maintenance works or for varification of operation.





Name ofLED	Content of indication
PW1	Lit when unit power is ON.
PW2	Lit when valve power is ON.
SD	Blinks while Data being output.
RD	Blinks while Data being input.
L RUN	At the time of red lighting, refresh date of CC-Link come by the normal reception.
	At the time of timeout error, lights out. (It turns on by receiving normal data.)
L ERR	When is receiving abnormal data of CC-Link, red lighting.
	When is operating normally, lights out. (L RUN turns on)
	When is transmission error (CRC error), red lighting.
	When is a different station number setting or communication speed setting, red lighting.
	When station number setting or communication speed setting changes during movement, red fashes. (L RUN turns on, and this product works under conditions of station number setting and communication setting at the time of Unit power ON)
	When is a timeover, lights out. (L RUN lights out, too.)

Name of Switches	Content of Setting
Station number setting switch (SW1・SW2)	Set station number of slave unit in the range of 64 from 1. SW1 takes care of the second digit (10) while SW2 takes care of the first digit (l).
Transfer rate setting switch (SW3)	Set communication speed in the range of 4 from 0.
Switch used for specifying the state of output after error (SW4 : HLD / CLR)	Specify whether to hold (HDL) or clear (CLR) the output when an error occurs.
End station setting switch (SW4 : END)	When is terminal station, END is ON. ∗1

∗1. Turn this switch “OFF” when the high-performance cable exclusively for CC-Link is used, and connect a terminal resistor externally. (See 3.1 “Switch setting”.)

(2) Setting switch sets the valve slave station number and transmission speed. (Refer to “Chapter 3. Operation”.) Be sure to set it before turning power to valve slave station ON.

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 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 cables 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.

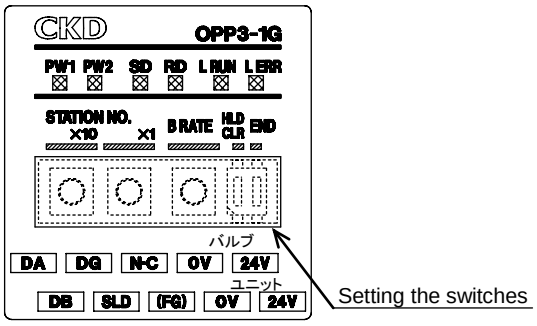
3. OPERATION

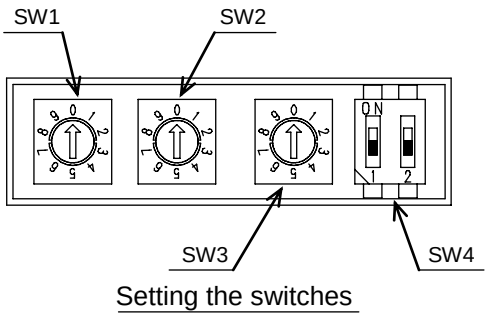
3.1 Switches setting

The switches are used for four different kinds of setup: setting the station number, setting the transfer rate, specifying whether to hold or clear the output during an error, and specifying the end station. Since different switches are used for different kinds of setup, you must correctly identify the switch to be used. Before changing the switch positions, be sure to cut the power.

CAUTION :

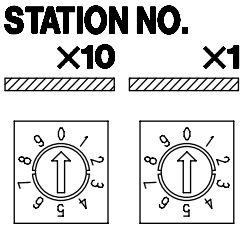
- Setting the Slave Unit address to an improper value can cause a solenoid valve, a cylinder, or such to malfunction. Before using the Slave Unit, make sure the address is set correctly before use.
- Make sure the power is turned off when setting the switches.
- The cover on the Slave Unit can be easily 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.





1) Station number setting (SW1 and SW2)

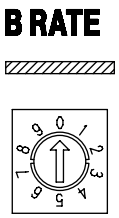
Assign a station number to the slave station using a number between 01 and 64.



- Use the “×10” switch to specify the 10 column digit in the station number.
- Use the “×1” switch to specify the 1 column digit in the station number.
  (Can’t use the same station No.)

2) Transfer rate setting (SW3)

Set the transfer rate for communication between the master and slave stations.



Position	Transfer rate
0	156kbps
1	625kbps
2	2.5Mbps
3	5Mbps
4	10Mbps

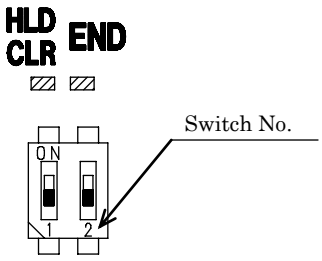
Be sure to set the switch to a position between 0 to 4.

CAUTION :

- Set the same communication speed in all the stations in the CC-Link system. Data link cannot be performed with a slave station where the different communication speed from the master station is set.

3) Other setups (SW4)

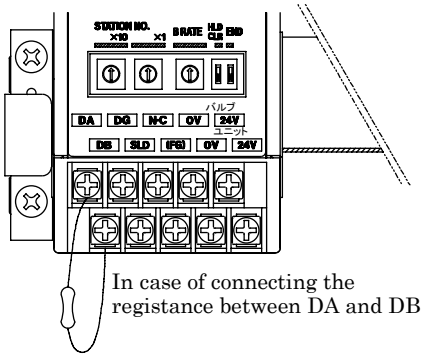
Using this switch, specify whether to hold or clear the output when an error occurs and whether this slave station is the end station (station furthermost from the master station) or not.



Switch No.	Function	Position	
		OFF	ON
No.1	Specifies whether to hold or clear the output when an error (bus line error, time-over, etc.) occurs.	Clear	Hold
No.2	Sets the end station. (110Ω-terminating resistor is built-in.) *Turn OFF this switch if the CC-Link special high-performance cable is used. (See also the Fig. below.)	In setting the middle station	In setting the end station

* End station settings when using the CC-Link special high-performance cable

If the CC-Link special high-performance cable (FANC-SBH made by Kuramo Electric co. Ltd.) is used for the communication cable and this slave station is the end station, always turn OFF the end station setting (SW4 No. 2). Additionally, 130Ω-terminating resistor (1/2W), which is purchased on the general market or supplied with the master station, is connected to a position between the terminal blocks DA and DB of this slave station to set the station to the end station.
When connecting a resistor purchased on the general market, perform the insulation process so that the lead wires of the resistor are not in contact with each other (short-circuit).



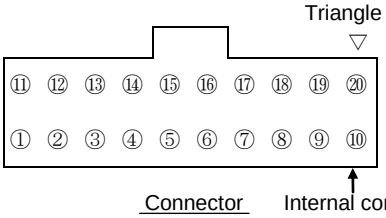
In case of connecting the registance between DA and DB

CAUTION :

- Set collect with end-resister, referring user's manual of master unit. Wrong resister, or wiring lead to transmission-err.
- If a terminal resistor is connected externally (on a terminal block), be sure to set this switch to OFF.
- When connecting end-resister outside the unit, make insulate to percent (short) touching electric wires each other.

3.2 Correspondence between Output Nos. and internal connector Nos.

Those Numbers correspond as per table, posted below.

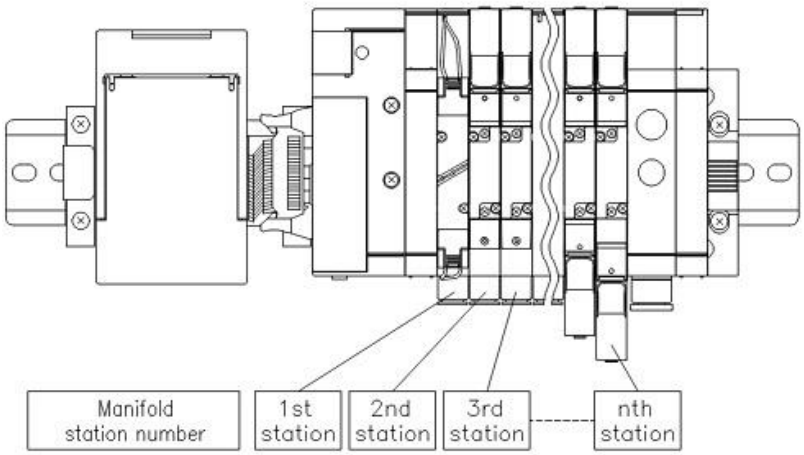


Correspondence between Output Nos.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Internal connector pin No.	1	2	3	4	5	6	7	8	11	12	13	14	15	16	17	18

3.3 Correspondence between Output Nos. and Valve solenoid Nos.

(1) Connector pin Nos. and manifold solenoid correspond with each other as per tables posted below.

(2) Manifold block number is allocated from leftmost block toward right while holding piping port facing to you.



Manifold wiring example

- For Single solenoid valve

	Connector pin No.															
	0(1)	1(2)	2(3)	3(4)	4(5)	5(6)	6(7)	7(8)	8(11)	9(12)	A(13)	B(14)	C(15)	D(16)	E(17)	F(18)
1st station	○															
2nd station		○														
3rd station			○													
4th station				○												
5th station					○											
6th station						○										
7th station							○									
8th station								○								
9th station									○							
10th station										○						
11th station											○					
12th station												○				
13th station													○			
14th station														○		
15th station															○	
16th station																○
Symbol	○ SOL.(a)side															

(Corresponds with up the 16th solenoid valve.)

• For Double solenoid valve

	Connector pin No.															
	0(1)	1(2)	2(3)	3(4)	4(5)	5(6)	6(7)	7(8)	8(11)	9(12)	A(13)	B(14)	C(15)	D(16)	E(17)	F(18)
1st station	○	●														
2nd station			○	●												
3rd station					○	●										
4th station							○	●								
5th station									○	●						
6th station											○	●				
7th station													○	●		
8th station															○	●
9th station																
10th station																
11th station																
12th station																
13th station																
14th station																
15th station																
16th station																
Symbol	○ SOL.(a)side / ● SOL.(b)side															

(Corresponds with up the 8th solenoid valve.)

• For mixed (Single and Double) solenoid valve

	Connector pin No.															
	0(1)	1(2)	2(3)	3(4)	4(5)	5(6)	6(7)	7(8)	8(11)	9(12)	A(13)	B(14)	C(15)	D(16)	E(17)	F(18)
1st station	○															
2nd station		○														
3rd station			○	●												
4th station					○	●										
5th station							○									
6th station								○								
7th station									○	●						
8th station											○					
9th station												○				
10th station													○	●		
11th station															○	●
12th station																
13th station																
14th station																
15th station																
16th station																
Symbol	○ SOL.(a)side / ● SOL.(b)side															

(Corresponds with up the 16th solenoid valve.)

(3) Output pin No. sometime become vacant depending upon manifold valve block number due to the sequential wiring. Such vacant pin is not available to be used for driving any other equipment.

3.4 Programming

This slave station unit is seen as a 16-point output unit constituting a remote I/O station. (The unit monopolizes the position of a single station.) When creating programs, refer to the Mitsubishi Electric Corporation User's Manual (CC-Link system master/local units).

Functions particular to this slave station unit are the specification of the state of output during an error and the declaration of the end station. These functions, however, need not be taken into consideration when you create a program. This slave station unit has a function for informing the master station of the breaking of fuse in the power source for the solenoid valve system. The program can detect a breaking of the fuse or the availability (ON/OFF) of the power source for the solenoid valve system by referring to the state of a bit in the registers listed below. (The position of the bit to be referred to depends on the station number.)

<table>
<tr><th>Link special registers</th><th>Name</th><th>Contents</th></tr>
<tr><td>SW0088 (688H)

SW0089 (689H)

SW008A (68AH)

SW008B (68BH)</td><td>Fuse blown status of other station</td><td>Whether a fuse blown error has occurred is stored.

0 : Normal (Correct)
1 : Error (Fuse blow-up occurs)

<table>
<tr><th></th><th>b15</th><th>b14</th><th>b13</th><th>b12</th><th>～</th><th>b3</th><th>b2</th><th>b1</th><th>b0</th></tr>
<tr><td>SW0088</td><td>16</td><td>15</td><td>14</td><td>13</td><td>～</td><td>4</td><td>3</td><td>2</td><td>1</td></tr>
<tr><td>SW0089</td><td>32</td><td>31</td><td>30</td><td>29</td><td>～</td><td>20</td><td>19</td><td>18</td><td>17</td></tr>
<tr><td>SW008A</td><td>48</td><td>47</td><td>46</td><td>45</td><td>～</td><td>36</td><td>35</td><td>34</td><td>33</td></tr>
<tr><td>SW008B</td><td>64</td><td>63</td><td>62</td><td>61</td><td>～</td><td>52</td><td>51</td><td>50</td><td>49</td></tr>
</table>
1 to 64 in the table shows station No.</td></tr>
</table>

Note: When the master station is QJ61BT11N model.

4. INSTALLATION

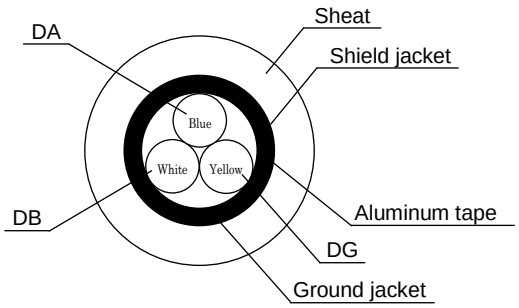
It is required to connect signal circuit with power line to make this model MN3/4G**R-T6G1 function. Erroneous connection causes not only malfunction but in some cases, vital transmission damage to this station including other related devices. Read and understand the content of each User's manual for Sequencer and CC-Link system, product of MITSUBISHI ELECTRIC CO. LTD., as well as reading this manual to accomplish correct wiring.

CAUTION :

- Before handling the CC-Link device, touch a grounded metal object to discharge the static electricity from the human body. Failure to do so may cause the module to fail or malfunction.
- 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.
- Pay special attention so that any tensile force or impact is not applied to the power cable and communication cable. Additionally, if the wiring distance is long, unexpected force due to own weight or shock may be applied, causing the unit to break. Therefore, to prevent such troubles take appropriate measures, such as securing of the wires and cables to the machine.
- To prevent problems caused by noise, keep the following in mind when wiring.
  - ① If noise is likely to have an influence, provide a power supply for each manifold solenoid valve when possible and wire them independently.
  - ② Do not use power cables that are longer than necessary and wire them in the shortest distance possible.
  - ③ Do not share power with noise generating devices such as an inverter motor.
  - ④ Do not lay the power cables, network cable, and other power lines in parallel.
  - ⑤ The shielding of the network cable must be connected to the equipotential bonding as close as possible to the slave unit.
  - ⑥ Refer to CC-Link Cable Wiring Manual 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 are connected firmly.

4.1 Specifications of network cable (Shielded twisted cable)

The table below illustrates the twist pair cable recommended for use in the CC-Link system. The quality of data transfer in the CC-Link system is guaranteed only if you use the recommended cable. Note the name and specifications of the recommended cable in the table below.

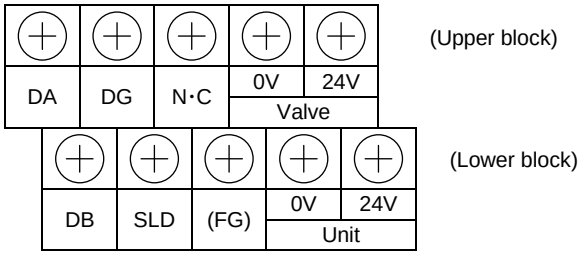
Item	Specifications	
	Cable exclusively for CC-Link	High-performance cable exclusively for CC-Link
Name	FANC-SB	FANC-SBH
Manufacturer	Kuramo Electric Co., Ltd.	
Kind of cable	Twist pair cable with shield	
Conduit sectional area	0.5mm^2	
Conduit resistance (20℃)	37.8Ω / km or less	
Insulation resistance	10000MΩ-km or more	
Withstanding voltage	DC500V 1 minute	
Capacity of Static electricity (1kHz)	60nF / km or less	40nF / km or less
Impedance characteristic (1MHz)	100±15Ω	130±15Ω
Sectional view		
External dimension	7mm	8mm
Approximate weight	65kg/km	60kg/km

Note : A CC-Link special cable other than that described in the above table can also be used. However, the transfer distance may vary depending on the type of cable. To use such cable, refer to the User's Manual for CC-Link or contact the cable manufacturer.

4.2 Connecting and wiring to the network connector plug

There are terminal blocks provided on the mounting device. Wiring connection to station is accomplished through these terminal blocks. Function of each terminal is printed on the face of station mounting device.

- Choose 6.6mm wide or less of M3 crimp type terminal metal piece and tighten it with torque of 0.3 to 0.5N･m.



Terminal symbols and functions

Symbol		Function	Major objects to be connected
DA		Data terminal	Connect them with the data terminals (DA, DB, and DG) of the master station or of a remote I/O or remote device station.
DB			
DG			
SLD		Shield terminal	Connect with the shielding in the shielded twist pair cable. (*1)
N･C		Not used	Do not use this terminal.
(FG)		Ground terminal	Ground this terminal without fail (independent grounding for the PLC system only; grounding resistance 100 ohms or less). (*1)
Power for Unit	0V	Power for Units	Apply source of power with less noise, such as DC24V±10%.
	24V		
Power for Valves	0V	Power for Valves	Apply source of power with less noise, such as DC24V+10%,-5%.
	24V		

*1 :SLD and FG terminals are connected inside the slave station unit.

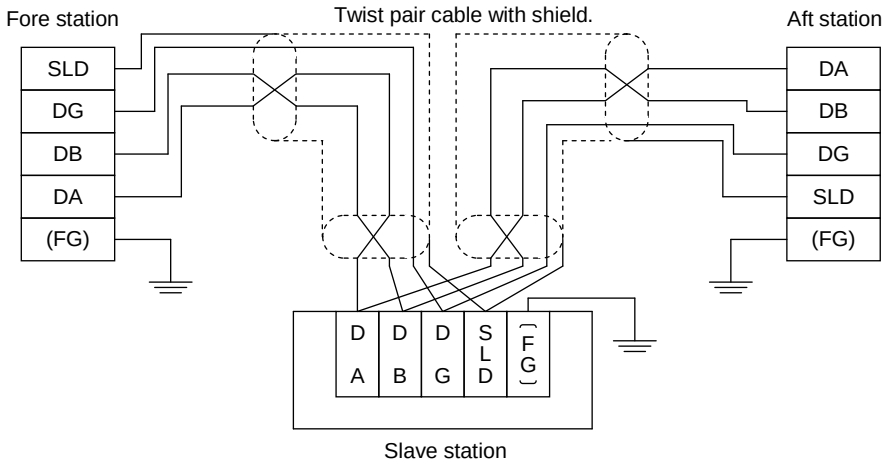
CAUTION :

- 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.

2) Wiring of network cable

When connecting a twist pair cable to this slave station unit, connect the DA (blue), DB (white), and DG (yellow) wires in the cable to the DA, DB, and DG terminals respectively, and connect the shield jacket to the SLD terminal. Ground the FG terminal without fail (grounding resistance 100 ohms or less).

An example of cable connections is given below.



Note : This slave station unit (OPP3-1G) does not use two-piece type terminal blocks. The data links, therefore, have to be shut down when you replace the slave station unit.

If you wish to replace a slave station unit that constitutes the end station and a terminal resistor is connected with it, you will have to connect the terminal resistor to the station positioned before the end station before you disconnect the end station for replacement.

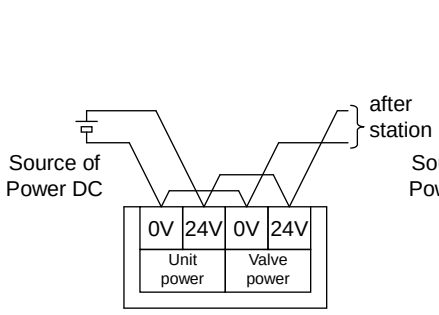
CAUTION :

- For the network cable, use a dedicated cable that complies with CC-Link specifications.
- Make sure the network cable has sufficient bending radius, and do not bend it forcibly.
- Separate the network cable from the power cable and high-voltage cables.

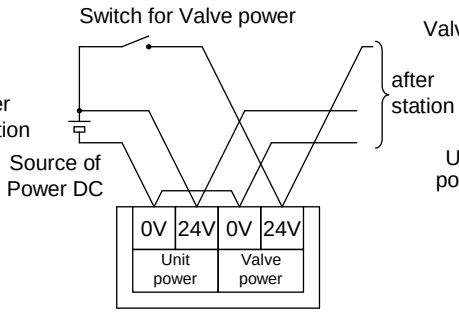
3) Wiring of power cable

The power circuit for the slave station unit (OPP3-1G) can be isolated from the power circuit for the solenoid valve system. Moreover, two separate power sources can be used to supply power independently to the slave station unit and the solenoid valve system. The illustrations below are examples of power supply to two or more slave stations (remote I/O units) from power source(s) at a single location. You may try other variations as required.

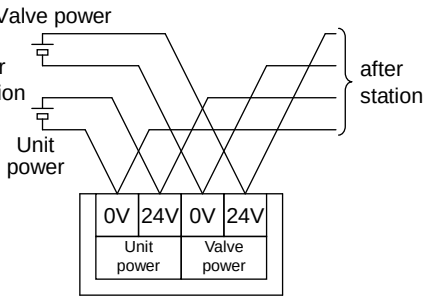
① Common connection of Unit power and Valve power



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



③ Seperate connection Unit power with Valve power



NOTE : When designing the system to supply power to duplex number of slave stations and remote I/O stations, choose and wire the source of power cord with a consideration of voltage drop. Secure ample voltage within rating by providing dual wiring, if necessary, to keep as small voltage loss of single system as possible or installing source of power near-by solenoid.

4) Cautions for wiring

To avoid any troubles caused by noise, strictly observe the following cautions when performing the wiring.

(1) If the noise may affect adversely, prepare the power supply for each manifold solenoid valve where possible and perform the wiring individually.

(2) Do not use a long power cable if it is not necessary. Make the wiring distance as short as possible.

(3) Do not connect devices producing noise, such as inverter or motor to the same power supply for the manifold solenoid valve.

(4) Do not connect the power supply and signal cables in parallel to other power cables.

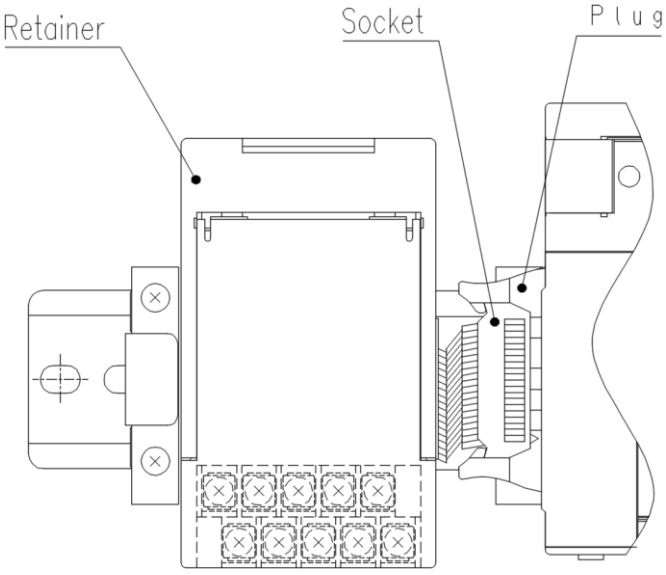
⚠ CAUTION :

- Since connecting the electric wires that were only twisted direct to the terminal strip may cause firing, be sure to use a crimp terminal.
- 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.

5. MAINTENANCE

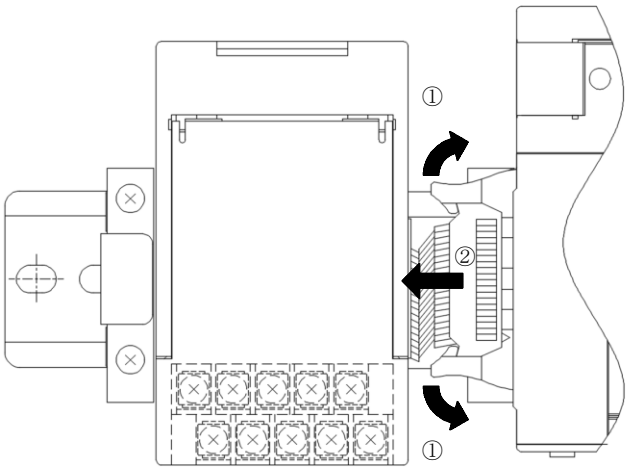
5.1 Removing/Mounting of Slave station for valve

The slave station unit OPP3-1G is normally secured by a retainer to the DIN rail (next to the solenoid valve manifold) and connected with the solenoid valve manifold by a connector (plug and socket).
If you have to dismount the slave station unit from the DIN rail when you connect signal and power cables, for example, follow the procedure below:



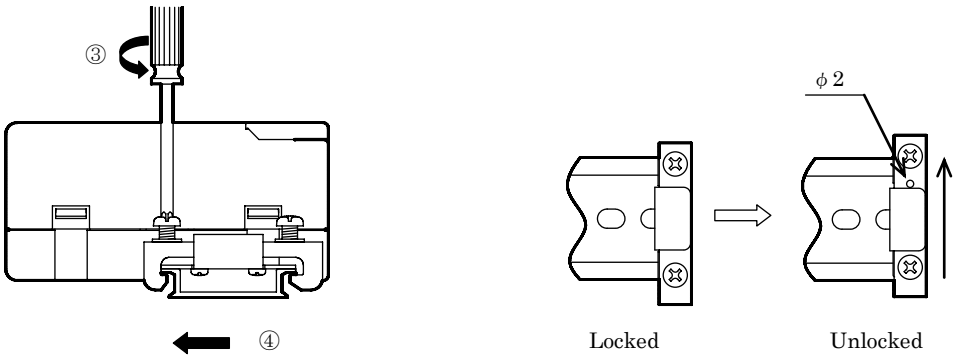
Slave station unit (OPP3-1G) Solenoid valve manifold

1) Spread the plug ends to remove the socket.
   * Spread the plug ends evenly.



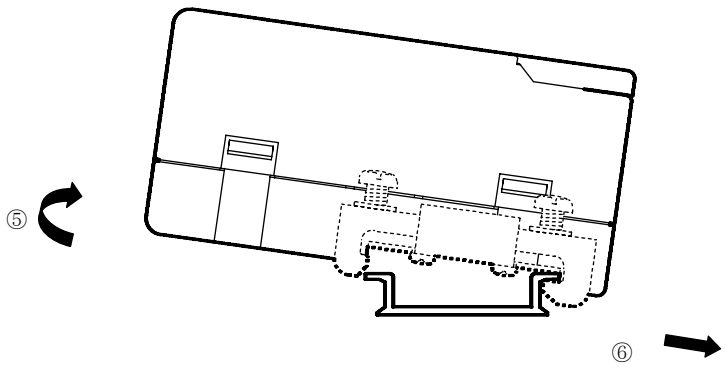
2) Slacken the two mounting screws and then slide the retainer until you can see a perfect hole (ϕ 2 mm) in the retainer surface.

* The retainer is unlocked when you can see the hole (ϕ 2 mm); locked when you cannot.



3) To disengage the slave station unit from the DIN rail, lift it at the rear end and pull toward the terminal block.

* At this time, keep the retainer at the unlocked position by using your finger to hold the retainer at the end closer to you.

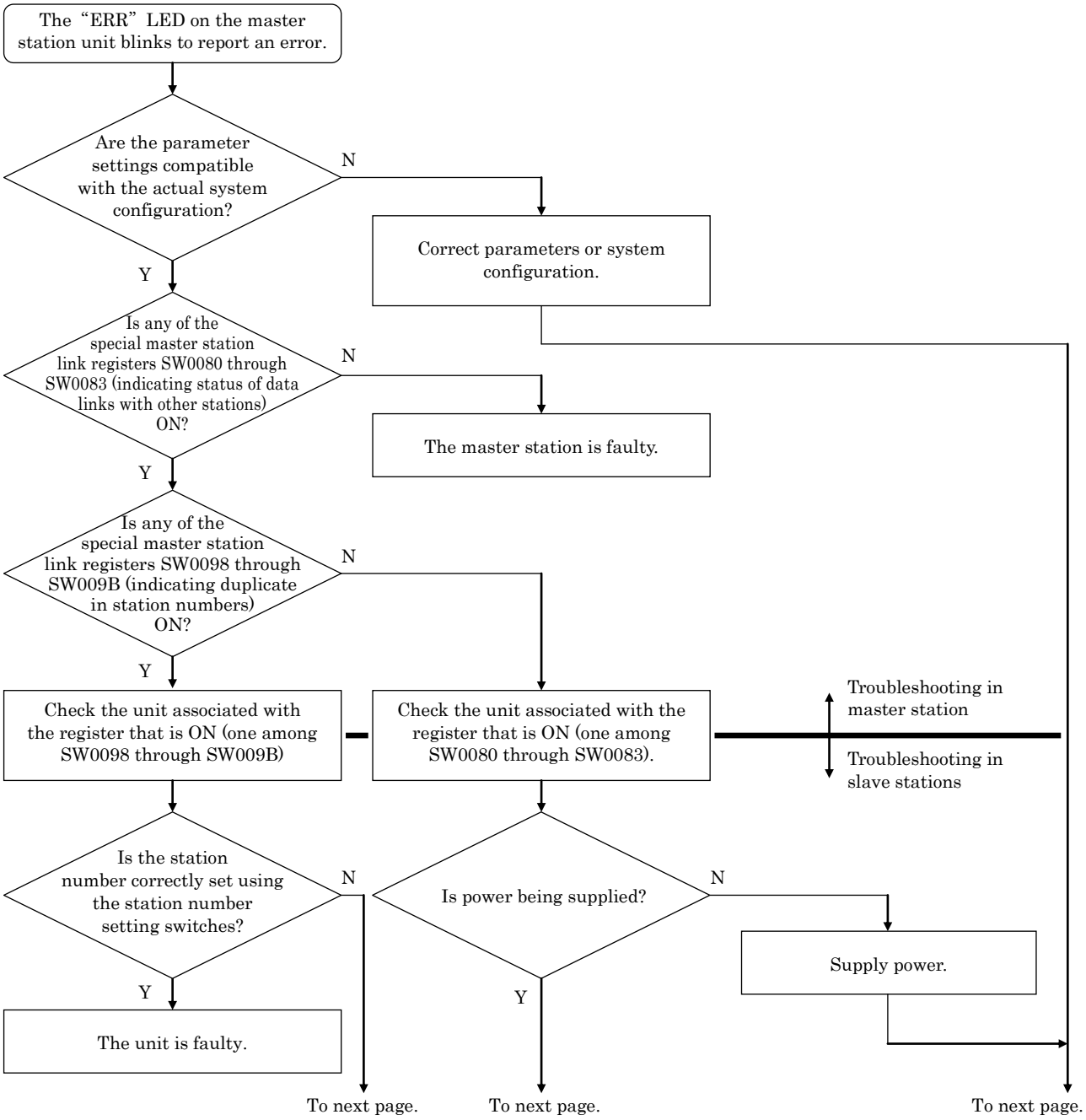


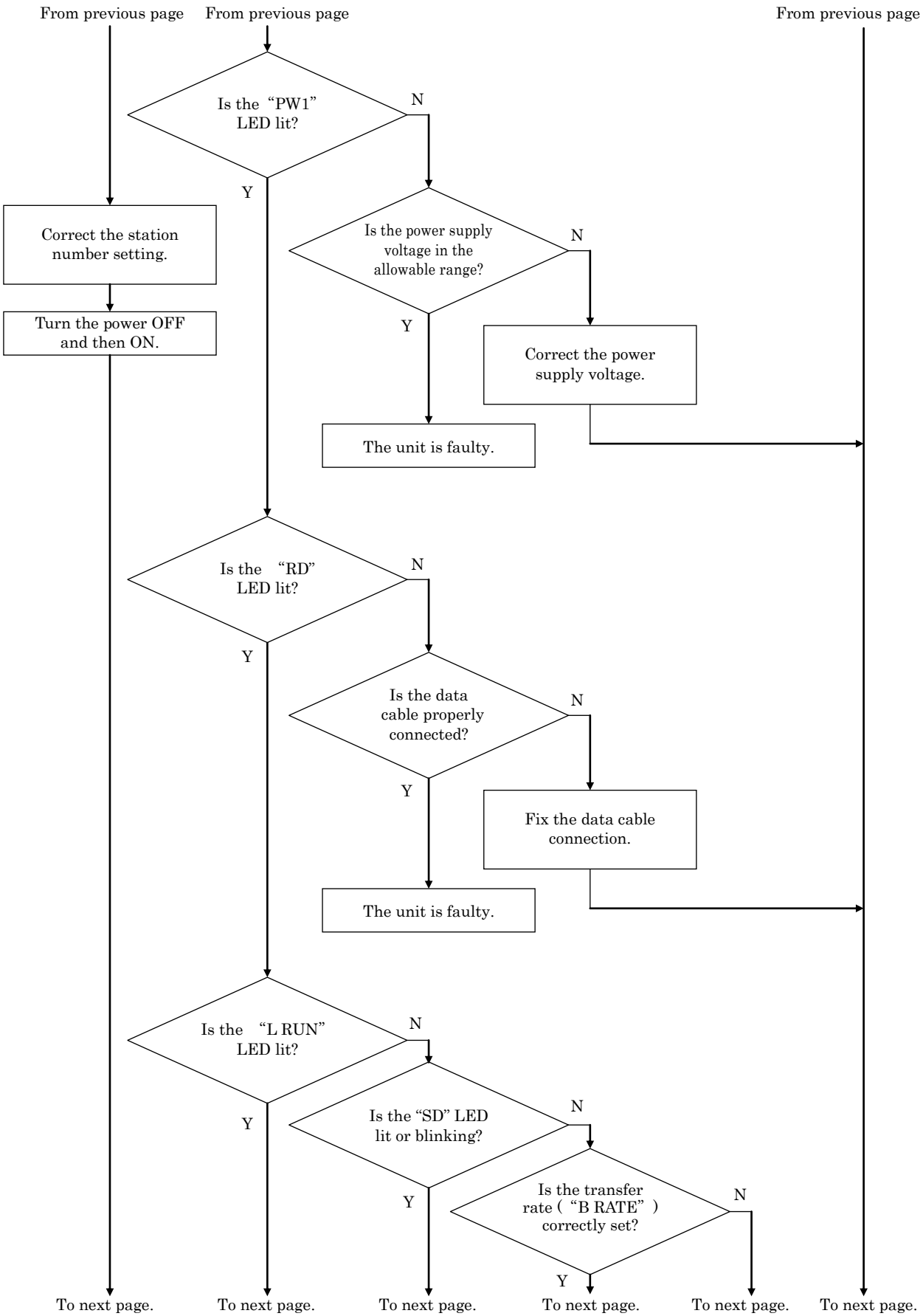
4) To reinstall the slave station unit, reverse the procedure; start with ⑥ and end with ①. Reverse the directions of arrows in the illustrations.

* The distance between the slave station unit and the solenoid valve manifold depends on whether the connector is oriented vertically or horizontally. Be careful of this when reinstalling the slave station unit.

5.2 Troubleshooting

Troubleshooting should address the entire system rather than a particular slave station.
This slave station unit has its LED indicators similar to those provided on a Mitsubishi remote I/O station. Looking at these indicators and the indicators on the master station unit, you can determine the cause and take corrective action. During such troubleshooting operations, refer to Chapter 13 “Troubleshooting” of the Mitsubishi User’s Manual (CC-Link system master/local units). The “PW2” LED is particular to this slave station unit. If only this LED has gone off, check the voltage of the power supplied to the solenoid valve system.




From previous page
From previous page
From previous page
Is the "PW1" LED lit?
N
Y
Correct the station number setting.
Turn the power OFF and then ON.
Is the power supply voltage in the allowable range?
N
Y
Correct the power supply voltage.
The unit is faulty.
Is the "RD" LED lit?
N
Y
Is the data cable properly connected?
N
Y
Fix the data cable connection.
The unit is faulty.
Is the "L RUN" LED lit?
N
Y
Is the "SD" LED lit or blinking?
N
Y
Is the transfer rate ("B RATE") correctly set?
N
Y
To next page.
To next page.
To next page.
To next page.
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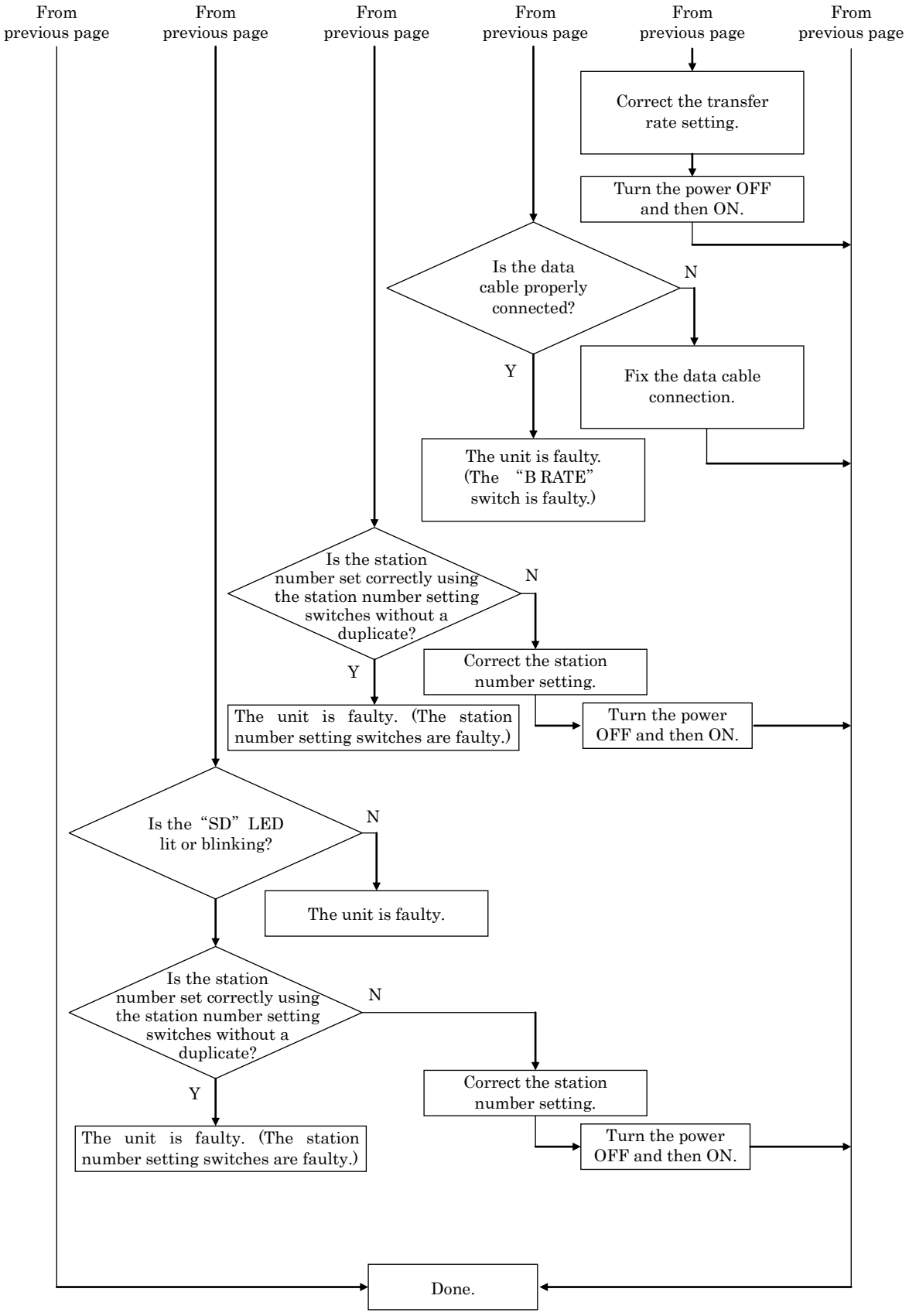
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Correct the transfer rate setting.
Turn the power OFF and then ON.
Is the data cable properly connected?
N
Y
Fix the data cable connection.
The unit is faulty. (The "B RATE" switch is faulty.)
Is the station number set correctly using the station number setting switches without a duplicate?
N
Y
Correct the station number setting.
The unit is faulty. (The station number setting switches are faulty.)
Turn the power OFF and then ON.
Is the "SD" LED lit or blinking?
N
The unit is faulty.
Is the station number set correctly using the station number setting switches without a duplicate?
N
Y
Correct the station number setting.
The unit is faulty. (The station number setting switches are faulty.)
Turn the power OFF and then ON.
Done.

5.3 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
	Are there any loose external wiring screw?	No looseness	Phillips 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.