



Installation & Maintenance Manual

Gateway unit for Profibus DP

Type EX510-GPR1



Safety Instructions

The body of unit and this manual contain the essential information for the protection of users and others from possible injury and property damage and to ensure correct handling. Please check that you fully understand the definitions of the following messages (symbols) before going on to read the body of this manual, and always follow the instructions. Please also read the instruction manuals etc. of related machines and understand the contents before use.

IMPORTANT MESSAGES

Read this manual and follow its instructions. Signal words such as WARNING, CAUTION and NOTE will be followed by important safety information that must be carefully reviewed.

⚠ WARNING	Indicates a potentially hazardous situation that could result in death or severe injury if you do not follow instructions.
⚠ CAUTION	Indicates a potentially hazardous situation that, if not avoided, may result in minor injury or moderate injury.
NOTE	Gives you helpful information.

⚠ WARNING

Do not disassemble, modify (including change of printed circuit board) or repair.

An injury or failure can result.

Do not operate beyond the specification range.

Fire, malfunction or damage can result.

Only use the unit after confirming the specification.

Do not use the product in an environment of flammable, explosive or corrosive gas.

Otherwise fire, explosion or corrosion can result.

This product is not explosion-proof type.

For use in interlock circuit:

•Provide double interlock system by adding different type of protection (such as mechanical protection).

•Check the product regularly to ensure proper operation.

Otherwise accident caused by malfunction can result.

Before performing maintenance:

•Turn off the power supply.

•Stop air supply, exhaust compressed air in piping, and confirm the release to atmosphere.

Otherwise injury can result.

⚠ CAUTION

Conduct proper functional inspection after completing maintenance.

In the case of abnormality such as unit does not work normally, stop the operation. Otherwise safety cannot be assured due to unintended malfunction.

Safety Instructions (continued)

⚠ CAUTION

Provide grounding to improve safety and noise resistance of reduced wiring system.

Provide grounding as close to the unit as possible to shorten distance for grounding.

NOTE

The direct-current power supply to combine should be UL authorization power supply.

1.A limited voltage/current circuit which conforms to UL508.

A circuit to which power is supplied by the secondary coil of a transformer that meets the following conditions.

- Maximum voltage (with no load) : less than 30Vrms (42.4V peak)
- Maximum current : (1)less than 8A (including when short circuited)
(2)limited by circuit protector (such as fuse)
with the following ratings

No load voltage (V peak)	Max. current rating (A)
0 to 20 [V]	5.0
20 to 30 [V]	100/peak voltage

2.UL1310 Class 2 power supply unit or circuit of max.30Vrms (42.4Vpeak) or less using a UL1585 Class 2 transformer as power source.

Follow the instructions given below when handling the reduced wiring system.

Failure to follow instructions may damage the unit.

- Operate the unit within the specified voltage range.
- Reserve a space for maintenance.
- Do not remove labels.
- Do not drop, hit or apply excessive shock to the product.
- Follow the specified tightening torque.
- Do not bend or apply tensile force to cables, or apply force by placing heavy load on them.

- Connect wires and cables correctly.
- Do not connect wires while the power is on.
- Do not lay wires or cables with power cable or high-voltage cable in the same wiring route.
- Verify the insulation of wiring.
- Separate power cables for solenoid valves from power cables for Input and control unit.
- Take proper measurements against noise such as noise filter when the reduced wiring system is incorporated in equipment or devices.
- Select the proper type of protection according to the environment of operation.
- Take sufficient shielding measures when installing at the following place.
 - (1) A place where noise due to static electricity is generated
 - (2) A place where electric field strength is high
 - (3) A place where there is radioactive irradiation
 - (4) A place near power line

- Do not use the product nearby a place where electric surges are generated.
- Use reduced wiring system equipped with surge absorber when a surge-generating load such as a solenoid valve is driven directly.
- Prevent foreign matter such as remnant of wires from entering this product.
- Do not expose the reduced wiring system to vibration and impact.
- Keep the specified ambient temperature range.
- Do not expose reduced wiring system to heat radiation from a heat source located nearby.
- Use a precision screwdriver with small flat blade when setting DIP switch.
- Perform maintenance and check regularly.
- Perform a proper functional check.
- Do not use the product with chemicals such as benzene and thinner.

Specifications

Basic specifications

Rated voltage	24VDC
Range of power supply voltage	Power supply for input and controlling GW : 24VDC ±10% Power supply for output : 24VDC+10%/-5% (Warning for voltage drop is given at approx. 20V)
Rated current	Power supply for input and controlling GW : Max.4.1A (Inside GW unit : 0.1A, Input unit : 4A) Power supply for output : Max.6A
Input/Output point	Input point : Max. 64, Output point : Max. 64 (Changeable by switch settings)
Weight	160g (Including accessories)

Upper level bus

Compatible system	PROFIBUS-DP V0
Bus Interface	EIA RS-485
Freeze function	Available
Synchronous function	Available
Address setting range	0 to 125
ID no.	140d HEX
Device data file	GSD file *

*This file is necessary for automatic device setting.

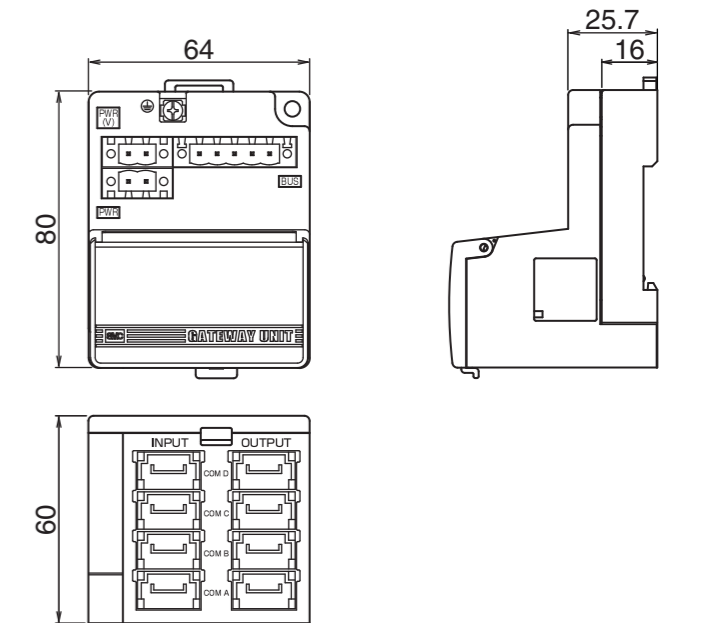
Communication speed [kbps]	9.6	19.2	45.45	93.75	187.5
Max. wiring length [m] *	1200				1000
Communication speed [kbps]	500	1500	3000	6000	12000
Max. wiring length [m] *	400	200	100		

*Max. wiring length differs depending on the specification of a cable.
The specification of wiring length is based on type A cable.

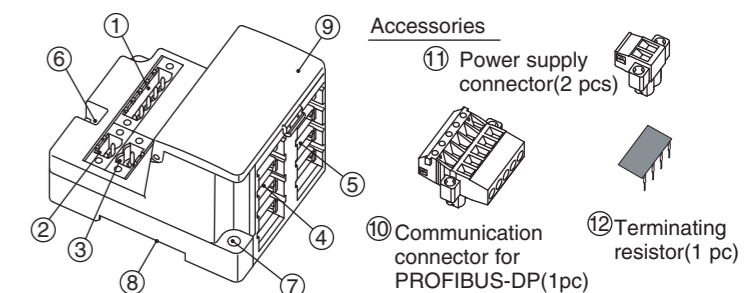
Lower level bus

Number of branches for input/ output	4 branches for input 4 branches for output
Communication type	Communication protocol : Dedicated for SMC Communication speed : 750kbps
Branch current for input	Max. 1A per branch
Branch current for output	Max. 1.5A per branch
Branch cable length	At 0.75A per branch : 20m or less At 1.0A per branch : 16m or less At 1.5A per branch : 10m or less

Outline with Dimensions (in mm)



Name of Parts/ Accessories

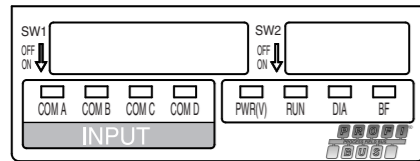


No.	Parts	Purpose
1	Communication socket (BUS)	Connect to PROFIBUS-DP line with a communication connector for PROFIBUS-DP (10). Connect a terminating resistor (12) to both end units of a transmission route.*
2	Power supply socket (PWR(V))	Supplying power for output instruments such as a solenoid valve with a power supply connector (11).*
3	Power supply socket (PWR)	Supplying power for controlling GW and input instruments such as a sensor with a power supply connector (11).*
4	GW unit side branch connector (for input)	Connecting an input unit etc. by using branch cables (EX510-FC□□).
5	GW unit side branch connector (for output)	Connecting SI unit (manifold valve) etc. by using branch cables (EX510-FC□□).
6	PE terminal	Used for grounding.
7	Mounting hole	Used when a unit is mounted with two M4 screws.
8	DIN rail mounting slot	Used when a unit is mounted to DIN rail.
9	Display/ setting switch area	Switch setting such as LED display in unit state, Address and I/O point.

*For wiring method, see "Wiring" section.

Name of Parts/ Accessories (continued)

Setting for Display



Display	Meaning
PWR (V)	Light ON : The power for output is supplied with specified voltage Light OFF : The power for output is not supplied with specified voltage
RUN	Light ON : Power supply for input and controlling GW is supplied Light OFF : Power supply for input and controlling GW is not supplied
DIA	Light ON : With extension diagnosis information*1 Light OFF : Without extension diagnosis information
BF	Light ON : PROFIBUS-DP communication is abnormal Light OFF : PROFIBUS-DP communication is normal
COM A	Light ON : COM A is receiving data*2 Light OFF : COM A has no data to receive
COM B	Light ON : COM B is receiving data*2 Light OFF : COM B has no data to receive
COM C	Light ON : COM C is receiving data*2 Light OFF : COM C has no data to receive
COM D	Light ON : COM D is receiving data*2 Light OFF : COM D has no data to receive

*1:Refer to "Technical Specification" for the extension diagnosis information.

*2:Lights up when Input unit is connected and communicating normally. LED of COM A-D does not light up if the port is not set to be "used" by input point setting.

Installation (continued)

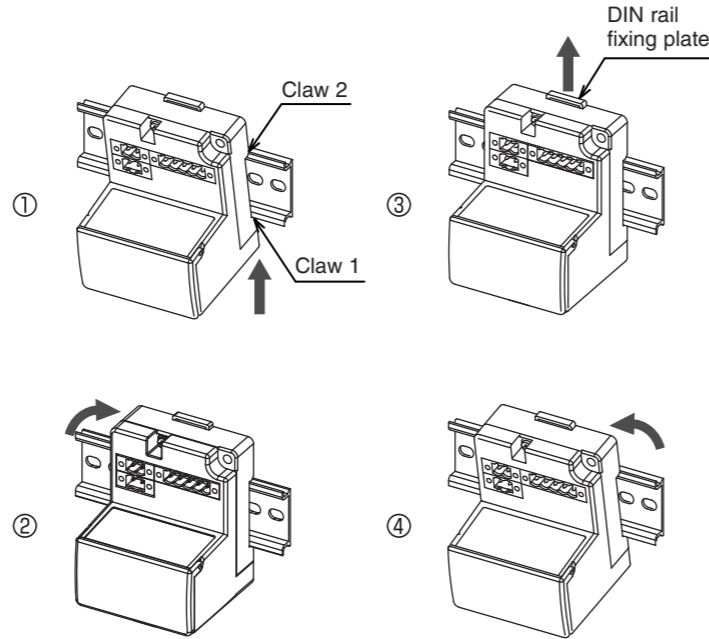
DIN rail installation

Put claw 1 of the body under DIN rail and push it upward. Push down claw 2 to the opposite rail until the claw clicks securely on to rail.

(Mounting procedure ① and ②)

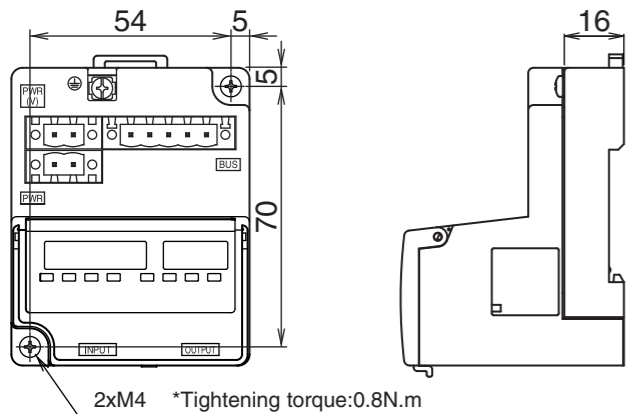
For removing, lever up the DIN rail fixing plate at the body with a flat screwdriver, and remove it by tilting claw 2 side forward.

(Removal procedure ③ and ④)



Installation

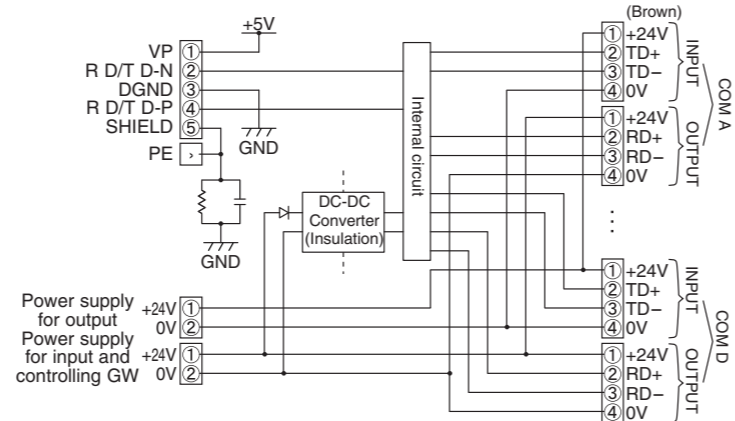
Screw installation



Perspective drawing (tolerance ±0.2)

Wiring

Internal circuit



Branch wiring

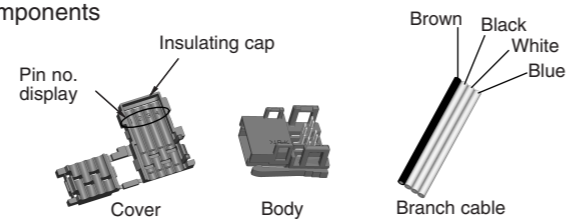
The wiring between each unit should use branch cables, and be connected with branch connectors.

The SI unit and Input unit have 2 branch connectors for each.

Pressure welding for branch connector

The method of pressure assembly of the branch connector is explained.

(1)Components



Wiring (continued)

(2)Working procedure

- Set a branch cable in the cover.
 - Set the brown wire of the branch cable so that it matches to pin #1.
 - Push the cable ends securely against insulating cap in cover.
 - Fold the cover so that the branch cable is trapped between the cover.
 - Fix the latch tip by inserting through the hole for the fixing latch.

Note)Check the color of wires printed on the branch connector and the color of the cables are the same.

② Tentative fixing to the body.

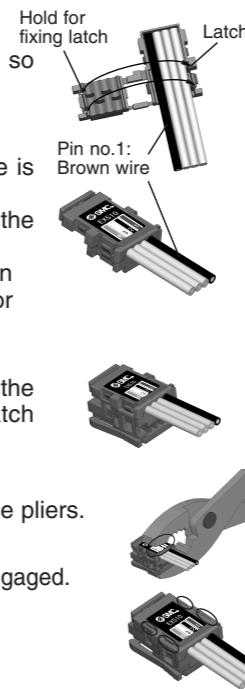
Fit 4 latches on the body to 4 ditches on the cover, and press them until the latch engages to the level 1.

③ Press fitting

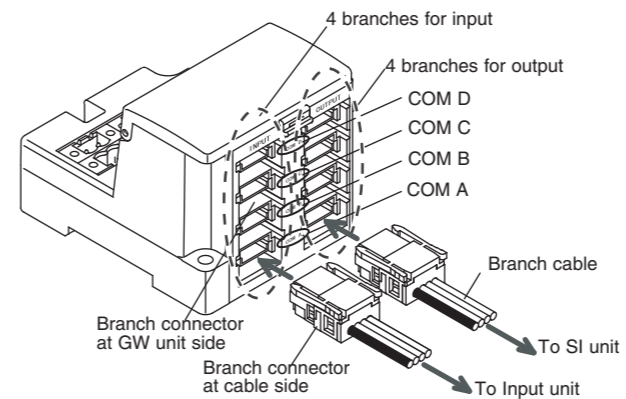
Press the cover to the body with suitable pliers.

④ Confirmation

Check that all of the 4 latches are fully engaged.



Wiring of branch cables



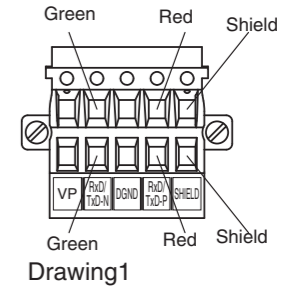
Insert branch cable connectors from the bottom (COM A, B, C, D at the side GW unit).

Wiring (continued)

Communication wiring

Connect PROFIBUS-DP dedicated cables to the communication connector for PROFIBUS-DP.

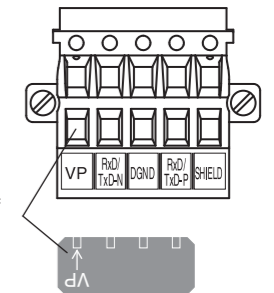
- Make sure to connect the signal cables to designated pins (Refer to Drawing 1). And tighten the connector surely to 0.5 to 0.6 N·m tightening torque.



Drawing1

- Make sure to connect a "terminating resistor" to the units at the both ends of the system (Refer to Drawing 2). For firmly tightening, apply a torque of 0.5 to 0.6 N·m.

*The terminating resistor attached to this unit as an accessory is recommended.

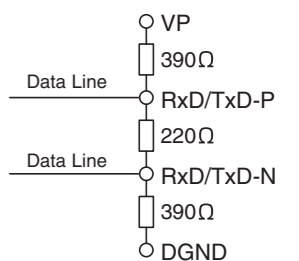


Drawing2

The value of the terminating resistor changes with the cable specification. The value given is based on type A cable (Refer to Drawing 3).

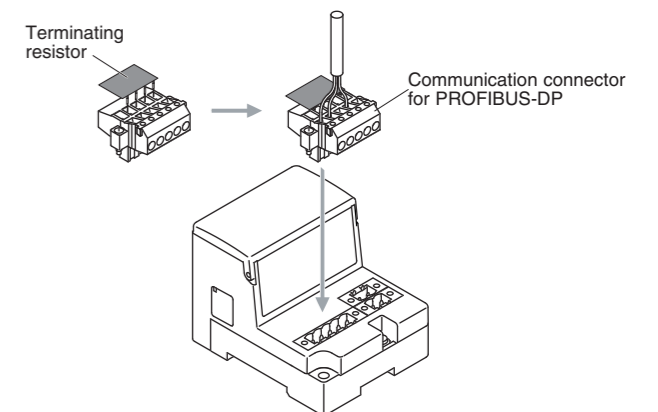
Specification of type A cable

Impedance	135 to 165 Ω
Capacitance between conductors	30 pF/m or less
Conductor resistance	110 Ω /km or less
Cable diameter	0.64 mm or more
Conductor area	0.34 mm ² or more



Drawing3

- Refer to Drawing 4 about how to connect to the unit.



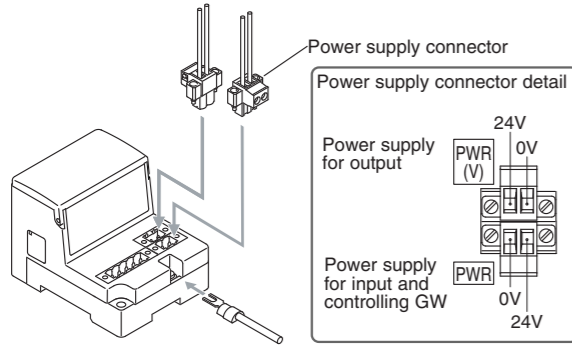
Drawing4

Wiring (continued)

Power supply wiring

Connect power supply wiring to the two power supply 2pin connectors. Power supply structure consists of 2 systems, but it can be used with both single power supply and separate power supply.

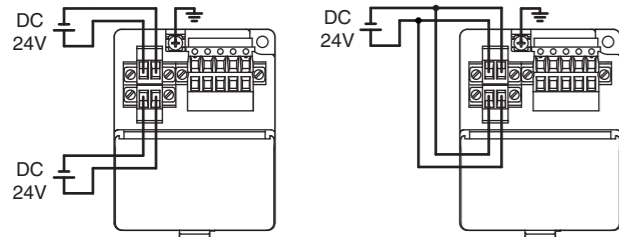
Individual power supply for other units is not necessary. Make sure of connection with the designated pin. Tighten the connector securely to 0.5 to 0.6N·m tightening torque.



Note

A secure earth connection (Protection class 3) should be made for PE terminal.

A. For dual power supply use B. For single power supply use



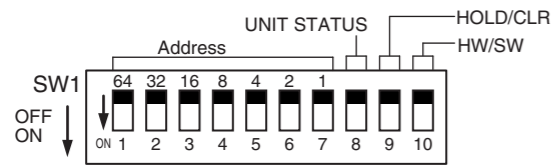
SW Setting

Switch setting

Make sure that switch setting is performed with power supply turned off. Open the cover, and set DIP switch with a flat blade screwdriver ect.

Setting of Address, UNIT STATUS, HOLD/CLR, HW/SW mode (SW1)

These setting are done with SW1.



Address setting (switch No.1 to 7)

At the time of shipment from the plant, all settings are turned off and the address is set to 0. Make sure to set the address in the range of 0 to 125.

Address	64(No.1)	32(No.2)	16(No.3)	8(No.4)	4(No.5)	2(No.6)	1(No.7)
0	OFF	OFF	OFF	OFF	OFF	OFF	OFF
1	OFF	OFF	OFF	OFF	OFF	OFF	ON
2	OFF	OFF	OFF	OFF	OFF	ON	OFF
3	OFF	OFF	OFF	OFF	OFF	ON	ON
4	OFF	OFF	OFF	OFF	ON	OFF	OFF
:	:	:	:	:	:	:	:
24	OFF	OFF	ON	ON	OFF	OFF	OFF
25	OFF	OFF	ON	ON	OFF	OFF	ON
:	:	:	:	:	:	:	:
125	ON	ON	ON	ON	ON	OFF	ON
126	ON	ON	ON	ON	ON	ON	OFF
127	ON	ON	ON	ON	ON	ON	ON

*Setting of the address 126 and 127 are invalid.

SW Setting (continued)

UNIT STATUS setting (switch No. 8)

The setting is as follows.

The settings when shipped from plant are turned OFF, GW status information is not sent to master side as an input data.

UNIT STATUS	No.8	Function
OFF	OFF	GW status information isn't sent to master side as an input data.
ON	ON	GW status information is sent to master side as an input data.

*If the address setting is turned on, an input setting for PLC is required. Refer to "Technical Specification" for detail.

HOLD/CLR setting (switch No. 9)

The setting is as follows.

The settings when shipped from plant are turned OFF, set to CLR.

HOLD/CLR	No.9	Function
CLR	OFF	Output is cleared when a communication error occurs.
HOLD	ON	Output is held when a communication error occurs.

*HOLD/CLR setting is made available per one point by parameter setting. Refer to "Technical Specification" for detail.

HW/SW mode setting (switch No. 10)

The setting is as follows.

The setting when shipped from plant are turned OFF, set to HW mode.

Mode	No.10	Function
HW	OFF	Set Address with SW1 to 7.
SW	ON	Address are set by network. The setting when shipped from plant is 126. Note : SW1 to 7 are ignored.

Input/Output Setting (SW2)

Input/Output Setting is performed with SW2.



Input setting (switch No.1 to 3), Output setting (switch No.4 to 6)

The setting is as follows. At the time of shipment from the plant, all settings are turned OFF, set to 64 Input/Output points.

No.1	No.2	No.3	Input point	COM A	COM B	COM C	COM D	
OFF	OFF	OFF	64	16	16	16	16	
OFF	OFF	ON	0	-	-	-	-	
OFF	ON	OFF	16	8	8	-	-	
OFF	ON	ON	24	8	8	8	-	
ON	OFF	OFF	32	8	8	8	8	
ON	OFF	ON	48	16	16	16	-	
ON	ON	OFF	Reserve					
ON	ON	ON	Reserve					

No.4	No.5	No.6	Output point	COM A	COM B	COM C	COM D	
OFF	OFF	OFF	64	16	16	16	16	
OFF	OFF	ON	0	-	-	-	-	
OFF	ON	OFF	16	8	8	-	-	
OFF	ON	ON	24	8	8	8	-	
ON	OFF	OFF	32	8	8	8	8	
ON	OFF	ON	48	16	16	16	-	
ON	ON	OFF	Reserve					
ON	ON	ON	Reserve					

*Input/Output points set at PLC must be consistent with the Input/Output points set at the GW unit.

Troubleshooting

Overall system

No.	Item	Remedy / Disposal
1	Solenoid valve is not working	<ul style="list-style-type: none"> •Check the power for output (24VDC) is supplied. •Check the branch cable is connected to SI unit. •Check the LED for power supply (PWR) and the LED for communication (COM) at SI unit are ON. •Ensure output branch current does not exceed the specification range.
2	Valve is not working as program directs	<ul style="list-style-type: none"> •Program it after checking the wiring specification of manifold block assembly.
3	Signals cannot be received even with a sensor	<ul style="list-style-type: none"> •Check the power for input and controlling GW (24VDC) is supplied. •Check the input unit indication LED is ON. •Ensure input branch current does not exceed the specification range.
4	LED of COM A-D Light OFF	<ul style="list-style-type: none"> •Check the connection of UNLIT COM port branch to input unit. •LED of unused COM port does not light up when an input unit is connected. Check the port is set to be "unused" by input point setting.
5	RUN LED Light OFF	<ul style="list-style-type: none"> •Check the power for input and controlling GW is supplied.
6	PWR(V) LED Light OFF	<ul style="list-style-type: none"> •Check the power for output (24VDC) is supplied. •Check the power supply voltage for output is above 20V. •Check the power for input and controlling GW (24VDC) is supplied.

PROFIBUS-DP compatible communication

No.	Item	Remedy / Disposal
1	BF LED Light ON	<ul style="list-style-type: none"> •Check the signal line from PLC is correctly connected. •Check the wiring and pin numbers. •Check the address setting is correct. •Check the connecting condition of the terminating resistor. •Check the number of input/output is set correctly.
2	DIA LED Light ON	<ul style="list-style-type: none"> •Check the power for output (24VDC) is powered at a specified voltage. •Check the power supply voltage for output is above 20V. •Check the input unit is connected after the input port.

*Refer to "Technical Specification" for detail of troubleshooting.

Contact

AUSTRIA	(43) 2262 62280	NETHERLANDS	(31) 20 531 8888
BELGIUM	(32) 3 355 1464	NORWAY	(47) 67 12 90 20
CZECH REP.	(420) 541 424 611	POLAND	(48) 22 211 9600
DENMARK	(45) 7025 2900	PORTUGAL	(351) 21 471 1880
FINLAND	(358) 207 513513	SLOVAKIA	(421) 2 444 56725
FRANCE	(33) 1 6476 1000	SLOVENIA	(386) 73 885 412
GERMANY	(49) 6103 4020	SPAIN	(34) 945 184 100
GREECE	(30) 210 271 7265	SWEDEN	(46) 8 603 1200
HUNGARY	(36) 23 511 390	SWITZERLAND	(41) 52 396 3131
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