

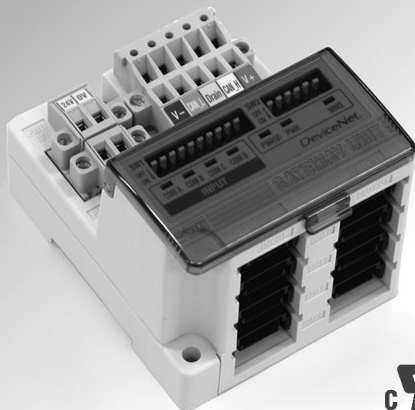
Reduced wiring system

DeviceNet Compatible GW unit



Operation Manual

EX510-GDN1



SMC Corporation

URL <http://www.smcworld.com>

Table of Contents

Thank you for purchasing the SMC reduced wiring system EX510 series.

Please read this manual carefully before operating the digital pressure switch and make sure you understand the digital pressure switch, its capabilities and limitations.

Please keep this manual handy for future reference.

OPERATOR

- This operation manual has been written for those who have knowledge of machinery and apparatuses that use reduced wiring units and have full knowledge of assembly, operation and maintenance of such equipment.
- Please read this operation manual carefully and understand it before assembling, operating or providing maintenance service to the actuator.

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SAFETY

This manual contains essential information for the protection of users and others from possible injury and property damage. To ensure correct handling, please follow the instructions.

Please check that you fully understand the meaning of the following messages (signs) before going on to read the text, and always follow the instructions.

Please read the operation manuals of related apparatus and understand it before operating the unit.

IMPORTANT MESSAGES

Read this manual and follow its instructions. Titles such as WARNING, CAUTION and NOTE, will be followed by important safety information which must be carefully followed.

WARNING

Indicates a potentially hazardous situation which could result in death or serious injury if you do not follow instructions.

CAUTION

Indicates a potentially hazardous situation which 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 specification range.

Fire, malfunction or damage can result.

Only use the unit after confirming the specification.

Do not use the product in the environment with possible presence of flammable, explosive or corrosive gas with the product.

Fire, explosion or corrosion can result. This unit does not have an explosion proof construction.

These instructions must be followed when using the product in an interlocking circuit:

- **Provide double interlocking by another system such as mechanical protection**
 - **Check the product regularly to ensure proper operation**
- Otherwise a malfunction can cause an accident.

These instructions must be followed while carrying out maintenance work:

- **Turn off the power supply**
 - **Stop the supplied air, exhaust the residual pressure and verify the release of air before performing maintenance**
- Otherwise it can cause injury.

⚠ CAUTION**Execute a performance inspection after completing the maintenance check.**

Please do not use if there is any error.

There is a possibility that safety cannot be secured due to the malfunction not intended.

Provide grounding for correct operation and improved noise resistance of the unit.

The unit should be individually grounded with a short cable.

Note

The direct-current power supply should be a UL approved power supply.

1. Limited voltage current circuit in accordance with UL508.

A circuit 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
Above 20 to 30 [V]	100/peak voltage

2. A circuit using max. 30 Vrms or less (Class-2 circuit), which power is supplied by Class-2 power supply unit in accordance with UL1310 or Class-2 power supply unit in accordance with UL1585.

Follow the instructions given below when handling your unit. Failure to follow instructions may damage the unit.

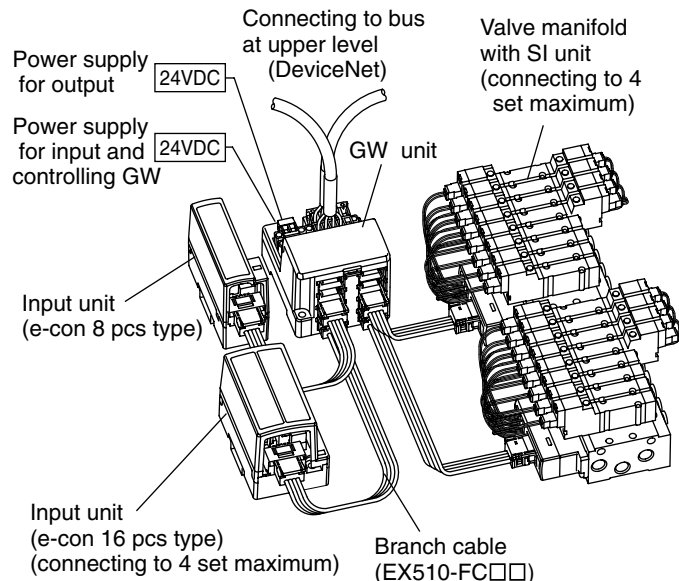
- Operate the unit within the specified voltage range.
- Leave space around the unit for maintenance.
- Do not remove labels.
- Do not drop, hit or apply excessive shock to the unit.
- Follow the specified tightening torque.
- Do not bend or apply tensile force to cables, or apply force by placing heavy load on them.
- Connect wires and cables correctly.
- Do not connect wires while the power is on.

SAFETY (continue)

- Do not lay wires or cables with power cable or high-voltage cable in the same wiring route.
- Verify the insulation of wiring.
- Take proper measurements against noise such as noise filter when the unit 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 a 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 close to a place where electric surges are generated.
- Use a unit 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 unit to vibration and impact.
- Keep the specified ambient temperature range.
- Do not expose the unit 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 clean the product with chemicals such as benzene and thinner.

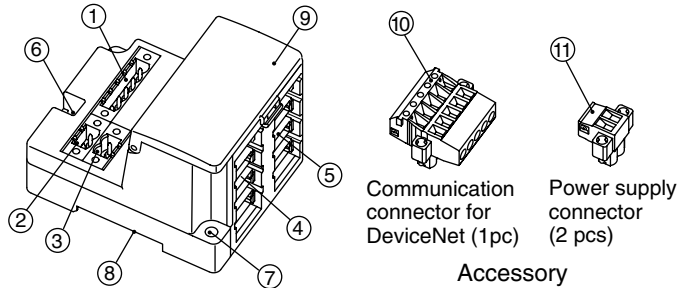
Product Summary

System structure



The GW unit connects to the installation using the DeviceNet fieldbus standard. The input/output modules are addressed from DeviceNet via the GW unit.

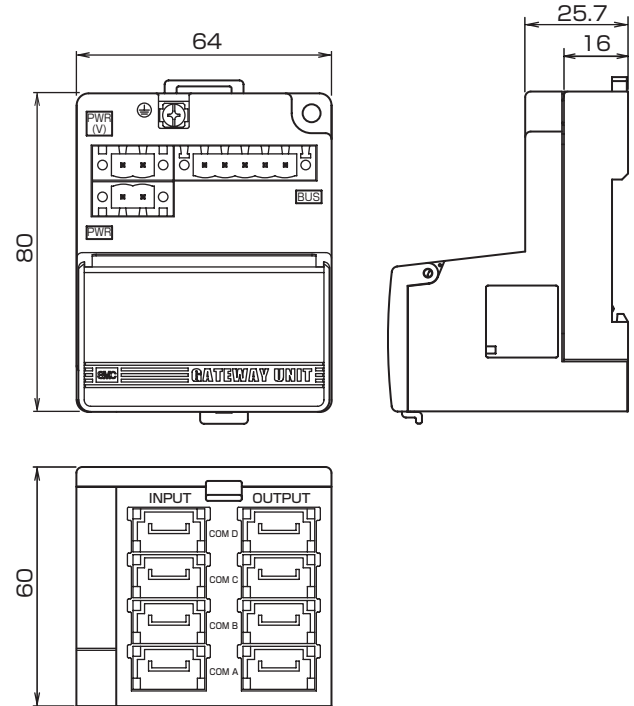
Name of Parts / Accessories



No.	Parts	Purpose
1	Communication socket (BUS)	Connect to DeviceNet line with an accessory connector for DeviceNet (10). *
2	Power supply socket (PWR(V))	Supplying power for output instruments such as a solenoid valve with an accessory connector (11). *
3	Power supply socket (PWR)	Supplying power for controlling GW and for input instruments such as a sensor with an accessory 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 2 M4 screws.
8	DIN rail mounting slot	Used when a unit is mounted to DIN rail.
9	Display/ setting switch area	Setting switch such as LED display of unit state, MAC ID, Baud rate and I/O point.

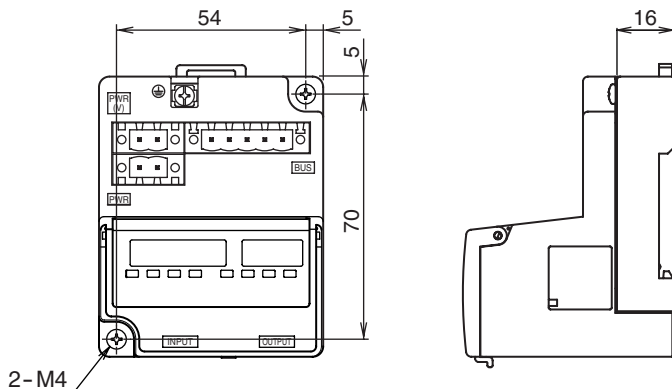
*Note: For wiring method, see "Wiring" in the "Technical Specifications".

Dimension (in mm)



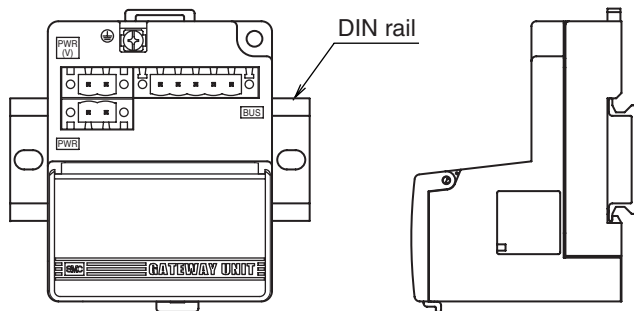
Settings

Screw installation



* Tightening torque : 0.8N·m
Perspective drawing (tolerance ± 0.2)

DIN rail installation

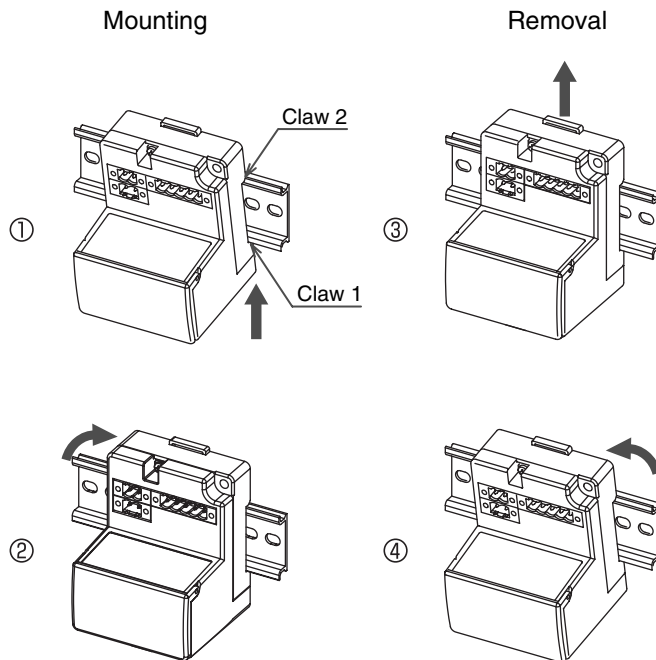


Put Claw 1 of the body under DIN rail and push it upward. Push down Claw 2 to the opposite rail until the claw clicks securely on to rail.

(Mounting procedure ① and ②)

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

(Removal procedure ③ and ④)



Specifications

Basic specifications

Rated voltage	24VDC
Range of power supply voltage	Power supply for input and controlling GW : 24VDC \pm 10% Power supply for output: 24VDC+10%/-5% (Warning for voltage drop is given at approx. 20V) Power supply for DeviceNet : 11 to 25VDC
Rated current	Power supply for input and controlling GW : 4.1A (Inside GW unit: 0.1A, input unit: 4A) Current for output: 6A Power supply for DeviceNet : 50mA
Input/ output point	Input point: Max. 64 / Output point: max. 64 (Changeable by switch settings)

Bus for upper level

Compatible system	DeviceNet Release 2.0
Slave type	Group2 Only Server
MAC ID setting	0 to 63
Device information	Vender code : 7 (SMC Corp.) Product type : 12 Product code : 100
Applicable message	Duplicate MAC ID Check Message Group2 Only Unconnected Explicit Message Explicit Message, Poll/ I/O Message
I/O message size	Input: Max. 8byte, Output: Max. 8byte (Changeable by switch settings)

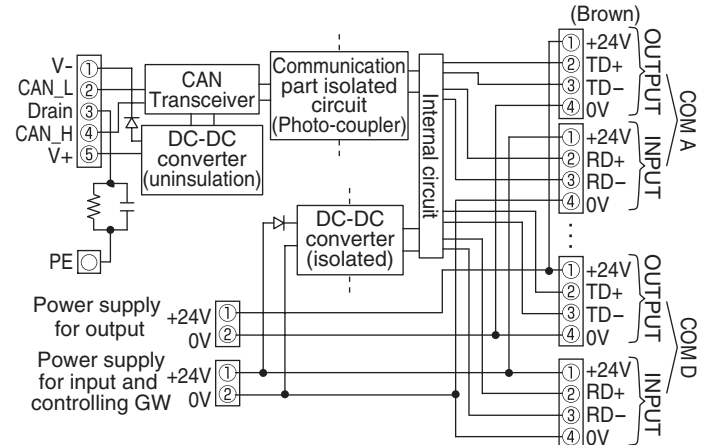
Baud rate		125kbps	250kbps	500kbps
Max. length of Network	Thick cable	500m or less	250m or less	100m or less
	Thin cable	100m or less		
Total extended cable length		156m or less	78m or less	39m or less
		Note: Max. extended cable length is 6m.		

Lower level bus

Number of branches for input/ output	4 branches for input 4 branches for output
Communication type	Communication protocol: dedicated for SMC Baud rate : 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

Wiring

Internal circuit



Branch cable 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 each.

Pressure welding for branch connector

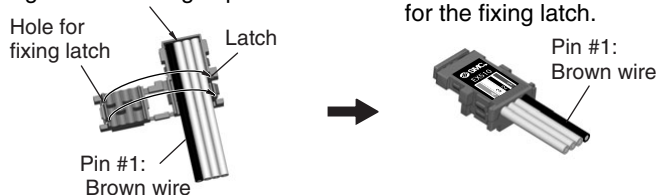
The method of pressure assembly of the branch connector is explained.

(1) Components



(2) Working procedure

- 1) Set a branch cable in the cover.
- 1) Set the brown wire of the branch cable so that it matches to pin #1.
- 2) Push the 4 cable ends securely against insulating cap in cover.
- 3) Fold the cover so that the branch cable is trapped between the cover.
- 4) Fix the latch tip by inserting through the hole for the fixing latch.



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

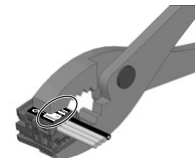
2 Tentative fixing to the body

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.

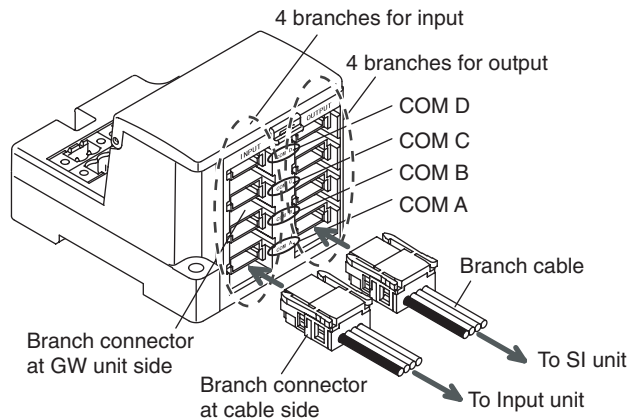


4 Confirmation

Check that all of the 4 latches are fully engaged.



Wiring of branch cables

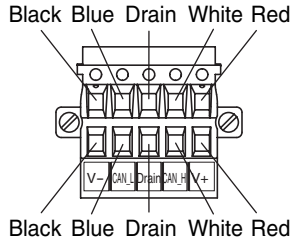


Insert branch connector on the table side from the bottom (COM A, B, C, D of branch connector of GW unit side).

Communication wiring

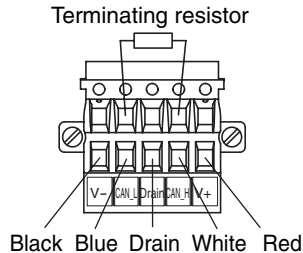
Connect DeviceNet dedicated cables to the communication connector for DeviceNet.

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



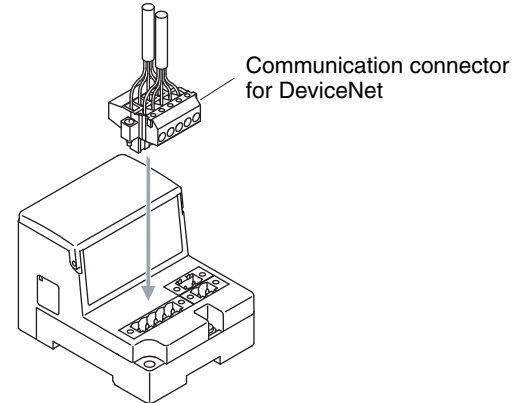
Drawing1

- (2) Make sure to connect a "terminating resistor" between "CAN_H"- "CAN_L" to the units at both ends of the system. (Refer to Drawing 2).



Drawing2

- (3) Refer to Drawing 3 about how to connect to the unit.



Drawing3

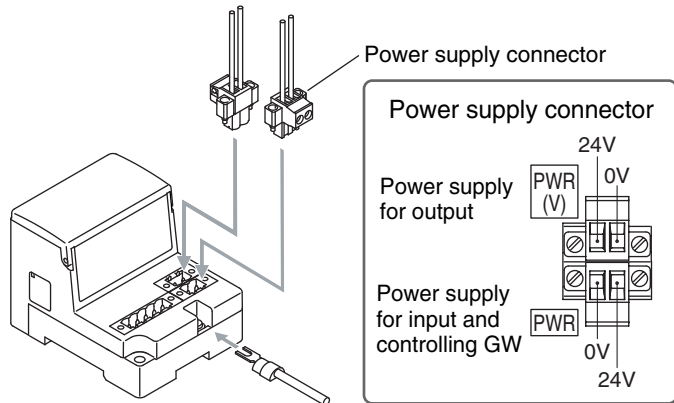
Terminating resistor :
 $121\Omega \pm 1\%$, 1/4W

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 dual power supply.

Individual power supply for other units is not necessary. Make sure to connect the designated pin.

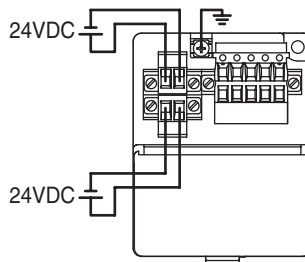
Tighten the connector securely to 0.5 to 0.6Nm tightening torque.



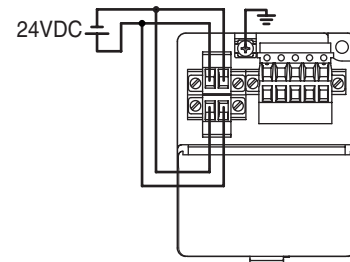
Note

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

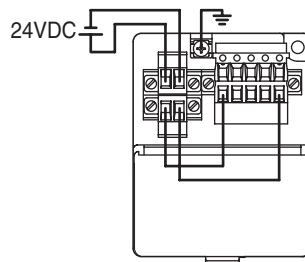
A. For dual power supply use



B. For single power supply use



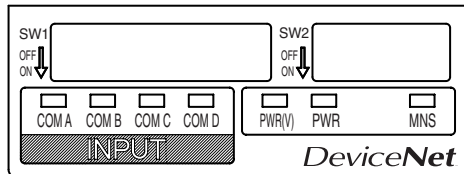
C. When used as power supply for DeviceNet
(Power supply for output is another one.)



- When input unit is used
It is necessary to make power supply for DeviceNet 24VDC ± 10%.
- When input unit is not used
Power supply for DeviceNet can be operated by 11 to 25VDC.

Display / Switch Setting

Setting for Display



Display	Meaning
PWR (V)	The power for output is supplied with specified voltage :Lights The power for output is not supplied with specified voltage:Lights off
PWR	Power supply for DeviceNet is supplied : Lights Power supply for DeviceNet is not supplied : Lights off
MNS	Power off, off line, or duplicate check MAC ID : Lights off Waiting for I/O connection (online) : Green flashing I/O connection completed (online) : Green lights I/O connection • time out : Red flashing (Light degree of communication error) MAC ID duplicate error, or BUS OFF error : Red lights (Heavy degree of communication error)
COM A	COM A is receiving data : Lights. * COM A is having no data to receive : Lights off
COM B	COM B is receiving data : Lights. * COM B is having no data to receive : Lights off
COM C	COM C is receiving data : Lights. * COM C is having no data to receive : Lights off
COM D	COM D is receiving data : Lights. * COM D is having no data to receive : Lights off

*Note:It is lit when input unit is connected and communicating normally.

Switch setting

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

Setting of MAC ID, Baud rate, HOLD/CLR, HW/SW mode (SW1)

These setting are done with SW1.



MAC ID setting (switch No.1 to 6)

All of the settings when shipped from plant are turned ON and the station number is set 63. Make sure to set the station number in the range of 0 to 63.

MAC ID	1(No.1)	2(No.2)	4(No.3)	8(No.4)	16(No.5)	32(No.6)
0	OFF	OFF	OFF	OFF	OFF	OFF
1	ON	OFF	OFF	OFF	OFF	OFF
2	OFF	ON	OFF	OFF	OFF	OFF
3	ON	ON	OFF	OFF	OFF	OFF
:	:	:	:	:	:	:
10	OFF	ON	OFF	ON	OFF	OFF
11	ON	ON	OFF	ON	OFF	OFF
:	:	:	:	:	:	:
62	OFF	ON	ON	ON	ON	ON
63	ON	ON	ON	ON	ON	ON

Baud rate setting (switch No. 7 to 8)

Make sure to set the baud rate in the range as follows. All of the settings when shipped from plant are turned OFF, set to 125kbps.

Baud rate	No.7	No.8
125kbps	OFF	OFF
250kbps	ON	OFF
500kbps	OFF	ON
—	ON	ON

HOLD/CLR setting (switch No. 9)

The setting is as follows.

The setting when shipped from plant is turned OFF, set to CLR.

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

HW/SW mode setting (switch No. 10)

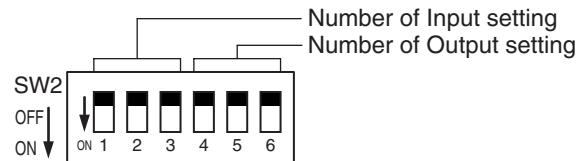
The setting is as follows.

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

Mode	No.10	Function
HW	OFF	Set MAC ID and baud rate with SW1 to 8.
SW	ON	MAC ID and baud rate are set by network. Note: SW1 to 8 are ignored.

Input/Output Setting (SW2)

Input/output Setting is done with SW2.



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

The setting is as follows. All of the settings when shipped from plant are turned OFF, 64 I/O 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	16	16	—	—	—	
ON	OFF	OFF	32	8	8	8	8	
ON	OFF	ON	32	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	16	16	—	—	—	
ON	OFF	OFF	32	8	8	8	8	
ON	OFF	ON	32	16	16	—	—	
ON	ON	OFF	Reserve					
ON	ON	ON	Reserve					

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	COM A-D is not LIT	<ul style="list-style-type: none"> • Check the connection of UNLIT COM port branch to input unit.

DeviceNet compatible communication

No.	Item	Remedy / Disposal
1	PWR LED is UNLIT	<ul style="list-style-type: none"> • Check the power supply for DeviceNet is supplied.
2	PWR(V) LED is UNLIT	<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 (24V DC) is supplied.
3	<p>The status of MNS LED</p> <p>Not online : Light off</p> <p>Online, not allocated : Green flashing</p> <p>Online, allocated : Green light</p> <p>Light degree of communication error : Red flashing</p> <p>Heavy degree of communication error : Red light</p>	<ul style="list-style-type: none"> • Check the signal line from PLC is correctly connected. • Check the wiring and pin numbers. • Check the baud rate and MAC ID setting is correct.