
TECHNICAL INSTRUCTION MANUAL

CompoBus/S SI Unit

EX120-SCS1

EX121-SCS1

EX122-SCS1

EX120-SCS2

EX121-SCS2

EX122-SCS2

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● Indication and meaning of directions



Caution : Operator error could result in injury or equipment damage.



Warning : Operator error could result in serious injury or loss of life.

(Reference) : Explanations of related matters

1.Directions



Warning

- This product is intended to be used to the general FA equipment. The use of this product should be avoided for the equipment and device that human life may be directly injured and malfunction or failure may cause enormous loss.
- This product should no be disassembled and remodeled.



Caution

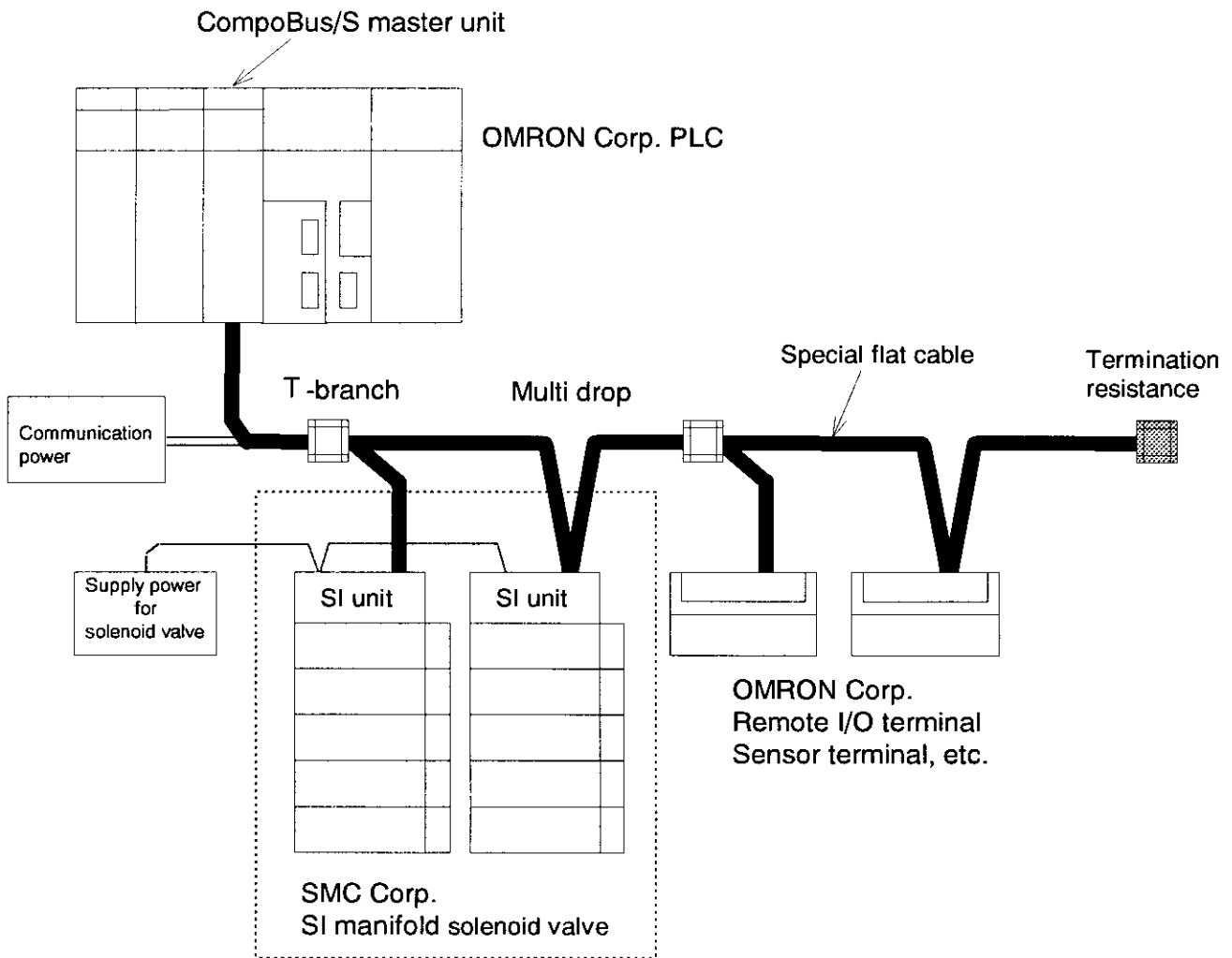
- Read this operation manual thoroughly and use the product within the range of specifications, observing the directions strictly.
- Make sure if this product and all the equipment connected with this product are turned off when wiring or inspecting.
- Don't touch the terminal and internal circuit boards while they are energized.
- Tighten wires securely with terminal screws.

2.Characteristics and System Structure

2-1.Characteristics

- CompoBus / S system
Serial transmission system in which master and slave etc. are connected together by one cable thanks to OMRON Corp. PLC
(programmable logic controller) SYSMAC Series and CompoBus / S master unit.
- SI manifold solenoid valve for CompoBus /S
Manifold solenoid valve with the remote Output unit (SI unit) connectable to CompoBus /S system. The occupying output point of SI unit is 16 or 8 points.
- Control many solenoid valves by one serial transmission cable
Since SMC's SI unit transmits directly from master unit, wiring manpower can be reduced.
- High-speed communication cycle time
The max. of 32 slaves , 256 (IN 128/OUT 128) IN/OUT put are connected in the high-speed communication cycle time of 1 ms or less.
- Highly free system is built by T branch style and multi-drop style.
Wiring can be composed freely by T branch style and multi-drop style.
The length of the trunk line can be extended to 100m maximum.
- Greatly reduced maintenance
The signal wiring will become one serial transmission cable, which will decrease much of the maintenance at the time of trouble like wrong, disconnection, etc. and increase credibility.

2-2. System structure



3.Applicable PLC

This SI unit is connected to the CompoBus/S system of OMRON Corp.

CompoBus/S has the following applicable PLC and master unit.

Applicable PLC	C200HX/HG/HE, C200HS	CQM1
Applicable master unit	C200HW - SRM21	CQM1 - SRM21
Max. IN/OUT put point per master	IN128/OUT128 point or IN64/OUT64 point	CQM1 - CPU11/21: IN32/OUT32 point or IN16/OUT16 point CQM1 - CPU41/42/43/44: IN64/OUT64 point or IN32/OUT32 point or IN16/OUT16 point
No. of the max. connection SI unit per master	when using EX12*-SCS1 (16 points output): 8 or 4 units when using EX12*-SCS2 (8 points output) : 16 or 8 units	EX12*-SCS1 (16 points output): 4, 2 or 1 unit EX12*-SCS2 (8 points output) : 8, 4 or 2 units

*: 0, 1 or 2

(Reference)

Number of max. IN/OUT put points and max. connection SI unit are decided by setting the dip switch for setting the no. of max. connection slave of master unit.

Please refer to OMRON Corp. CompoBus/ S user's manual, etc. for details about PLC and master unit.

4.Applicable solenoid valve

Solenoid valve Unit	VQ base piping type			VQ flip type		VQ cassette type	SX base piping type	SY base piping type
	plug-in	plug-lead		plug-in	plug-lead	plug-lead	plug-in	plug-in
	VQ1000 VQ2000	VQ0000	VQ1000	VQ1000	VQ0000 VQ1000 VQ2000	VQ1000	SX3000 SX5000	SY3000 SY5000
EX120-SCS1 EX120-SCS2	○							
EX121-SCS1 EX121-SCS2		●	○	●	●	○	○	○
EX122-SCS1 EX122-SCS2							○	○

○ applicable to standard products

● Please ask us about these.

Refer to catalogs of solenoid valve VQ, SX and SY for details.

Caution

Please understand that we can't take on responsibility for wrong operation, breakage or etc. resulting from connecting load other than the above-mentioned solenoid valves, other companies' solenoid valves or solenoid valves to SI unit.

5. Specifications

5-1. SI unit specifications

Items	Specifications	
Types of SI unit	EX120/121/122 - SCS1	EX120/121/122 - SCS2
Operating ambient temperature	0 ~ 55°C	
Operating ambient humidity	35 ~ 85% RH (without condensation)	
Storage ambient temperature	- 20 ~ + 65°C	
Vibration resistance	5 G (in accordance with JIS C0911)	
Impact resistance	10 G (in accordance with JIS C0912)	
Noise resistance	±1000 Vp - p pulse width 1 μs , leading 1 ns pulse	
Dielectric strength	between the full external terminal and case: AC1500 V for 1 minute	
Insulating resistance	between the full external terminal and case: DC500 V 2M Ω or more	
Operating atmosphere	without corrosive gas nor dust	
Occupied output point	16 points	8 points
Output style	transistor style (NPN open collector style)	
Connection load	DC 24 V, solenoid valve with lamp - surge voltage protection circuit of 2.1 W or less, SMC product	
Residual voltage	0.4 V or less	
Communication power voltage	DC14 ~ 26.4 V	
Supply power voltage for solenoid valve	DC24V - 5% ~ + 10%	
Current consumption	Communication power 0.1 A or less DC24 V	
Weight	140 g or less	

5-2.CompoBus / S system specifications

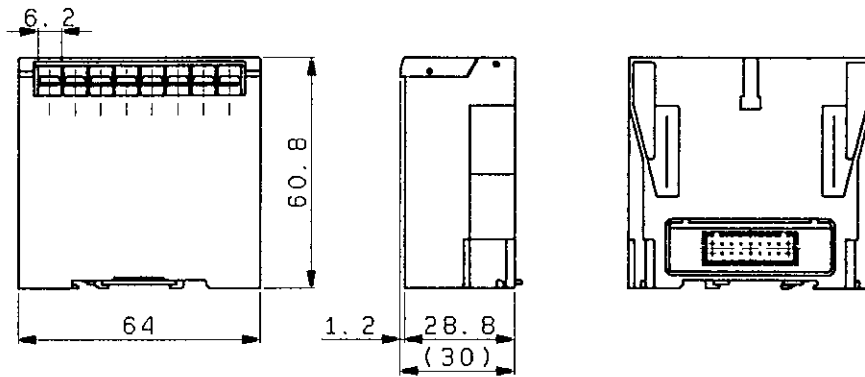
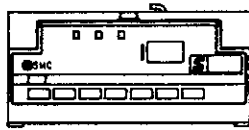
Items	Specifications															
Applicable PLC	OMRON Corp. C200HX/HG/HE, C200HS, CQM1															
Communication style	Protocol for CompoBus/S															
Communication speed	750 k bit/s															
Modulation style	base band style															
Symbol style	Manchester symbol style															
Error control	Manchester symbol check, frame length check, parity check															
Connection style	T branch style, multi drop style															
Distance	<table border="1" data-bbox="445 729 1376 1028"> <thead> <tr> <th data-bbox="451 738 686 825">Type of cable</th> <th data-bbox="693 738 915 825">trunk line length</th> <th data-bbox="921 738 1166 825">branch line length</th> <th data-bbox="1172 738 1370 825">full length of branch line</th> </tr> </thead> <tbody> <tr> <td data-bbox="451 834 686 921">when using VCTF cable</td> <td data-bbox="693 834 915 921">100 m or less</td> <td data-bbox="921 834 1166 921">3 m or less</td> <td data-bbox="1172 834 1370 921">50 m or less</td> </tr> <tr> <td data-bbox="451 930 686 1017">when using the special flat cable</td> <td data-bbox="693 930 915 1017">30 m or less</td> <td data-bbox="921 930 1166 1017">3 m or less</td> <td data-bbox="1172 930 1370 1017">30 m or less</td> </tr> </tbody> </table>				Type of cable	trunk line length	branch line length	full length of branch line	when using VCTF cable	100 m or less	3 m or less	50 m or less	when using the special flat cable	30 m or less	3 m or less	30 m or less
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when using the special flat cable	30 m or less	3 m or less	30 m or less													
<p>But if the no. of slave connection is 16 or less even when using the special flat cable, the length of trunk line can be 100 m or less and full length of branch line 50 m or less.</p>																
Max. IN/OUT put point	<table border="1" data-bbox="445 1190 1376 1524"> <thead> <tr> <th data-bbox="451 1199 978 1286">Type of master</th> <th data-bbox="984 1199 1370 1286">Max. IN/OUT put points</th> </tr> </thead> <tbody> <tr> <td data-bbox="451 1295 978 1382">when using the C200HW - SRM21</td> <td data-bbox="984 1295 1370 1382">IN128/OUT128 point or IN 64/OUT 64 point</td> </tr> <tr> <td data-bbox="451 1391 978 1524">when using the CQM1 - SRM21</td> <td data-bbox="984 1391 1370 1524">IN 64/OUT 64 point or IN 32/OUT 32 point or IN 16/OUT 16 point</td> </tr> </tbody> </table>				Type of master	Max. IN/OUT put points	when using the C200HW - SRM21	IN128/OUT128 point or IN 64/OUT 64 point	when using the CQM1 - SRM21	IN 64/OUT 64 point or IN 32/OUT 32 point or IN 16/OUT 16 point						
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(Reference)

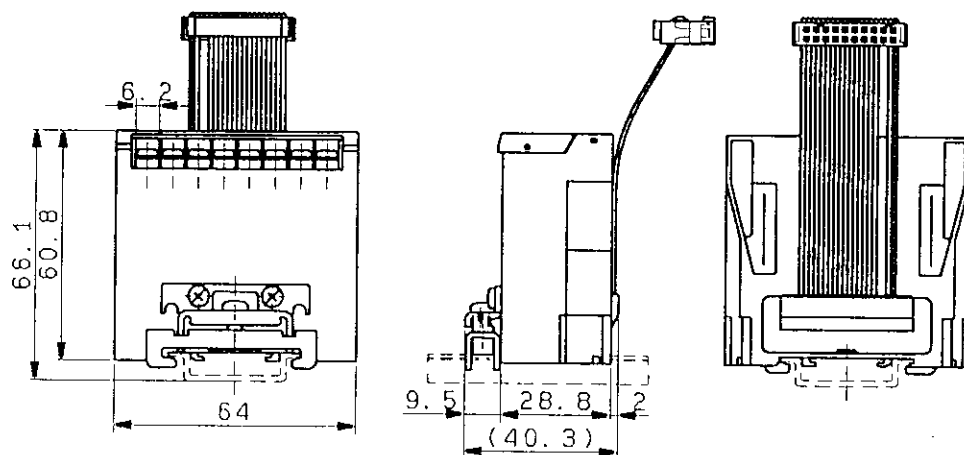
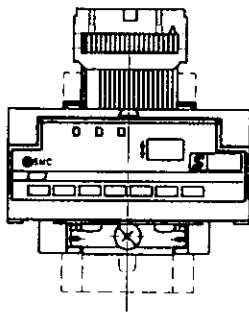
Please refer to OMRON Corp. CompoBus/ S user's manual, etc. for details.

5-3.External form of SI unit

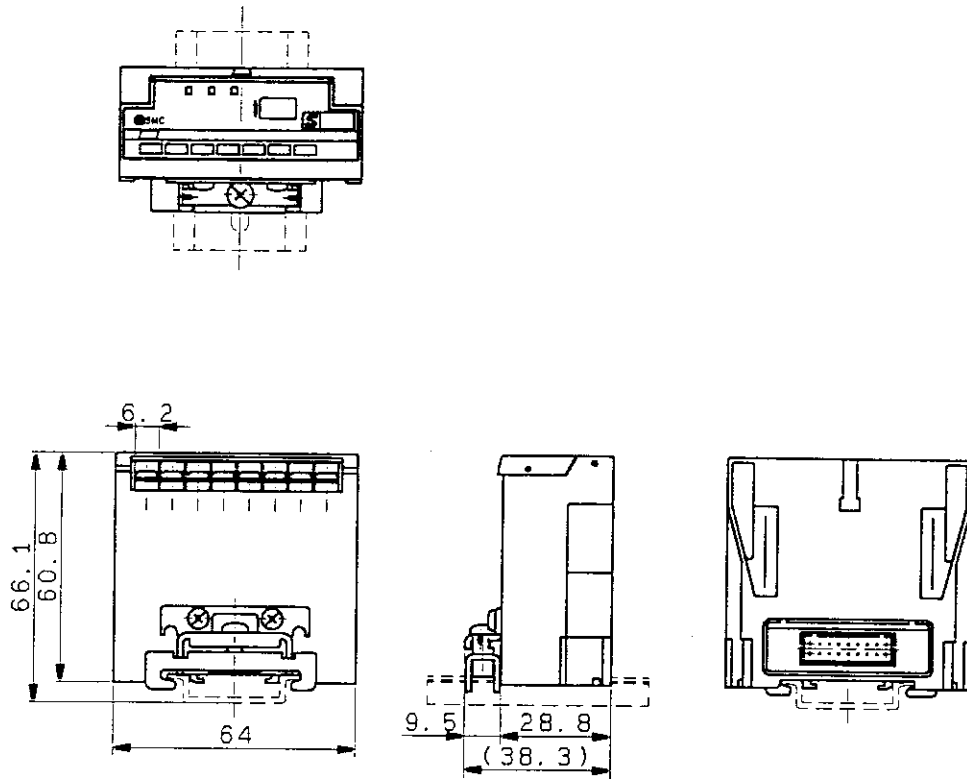
(1)External form of EX120 - SCS1 and 2



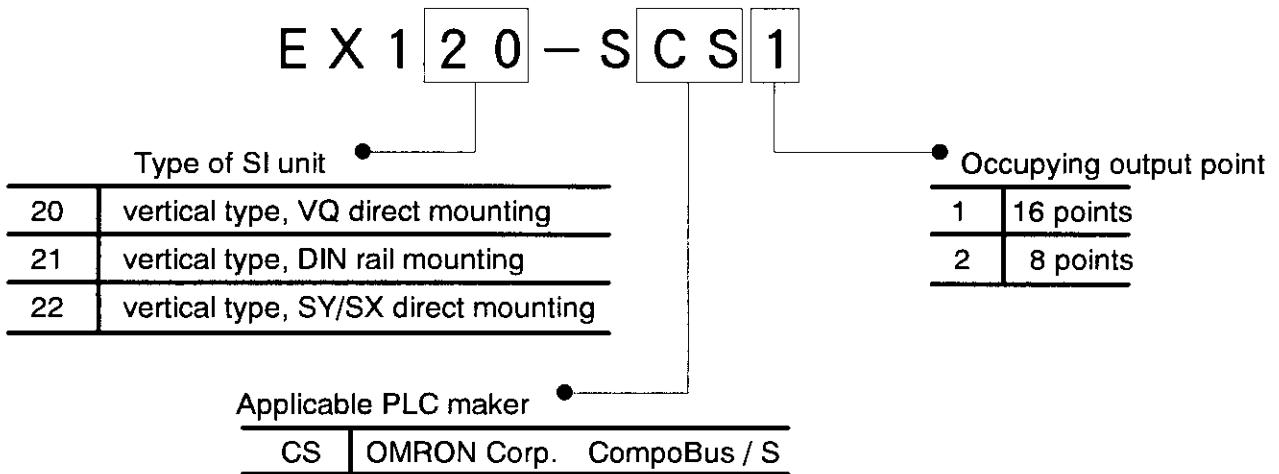
(2)External form of EX121 - SCS1 and 2



(3) External form of EX122 - SCS1 and 2

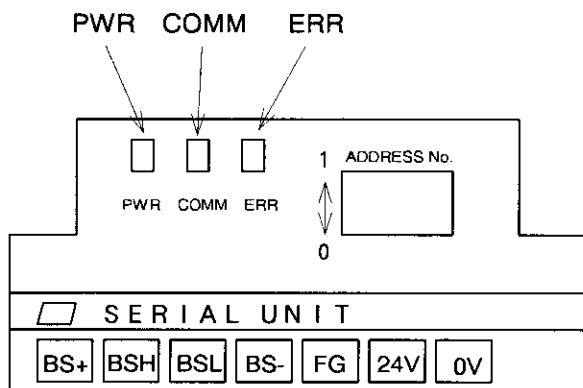


5-4. How to order SI unit



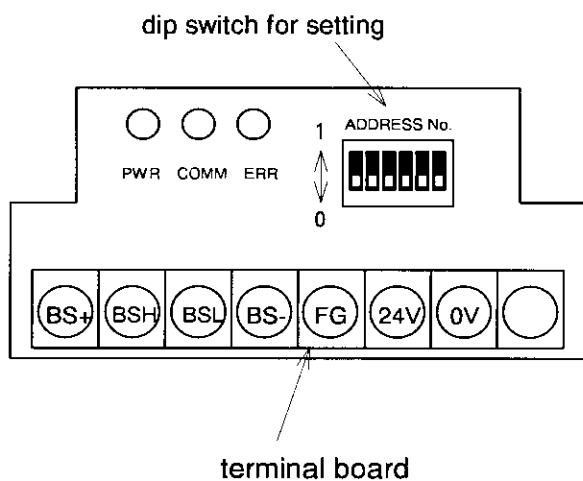
6.Name and effect of each part of unit

6-1.LED Indication



LED	Contents
PWR	ON: when supplying communication power OFF: when stopping its supply
COMM	ON: when communicating normally OFF: when communicating abnormally or waiting
ERR	ON: when communicating abnormally OFF: when communicating normally or waiting

6-2.Name of the terminal board



Terminal	Where to connect
BS+	connect communication power line BS+
BDH	connect communication line BDH
BDL	connect communication line BDL
BS -	connect communication power line BS -
FG	connect the ground line
24V	connect supply power line 24V for solenoid valve
0V	connect supply power line 0V for solenoid valve

Terminal thread is M3 thread.

7.Switch Setting

The switch of SI unit should be set while the power is off.

7-1.Address setting

(1) ADDRESS NO. (node address)

The setting range of node address will be as follows according to the type or setting of the master unit.

- For master unit C200HX/HG/HE, C200HS
 max. no. of connected slave: 16 units (IN 8/OUT 8) ——— node address: 0~7
 max. no. of connected slave: 32 units (IN 16/OUT 16) ——— node address: 0~15
- For master unit CQM1
 The setting range will be as follows according to the PLC occupying CH no. of master unit and the setting of the occupying points per node address.

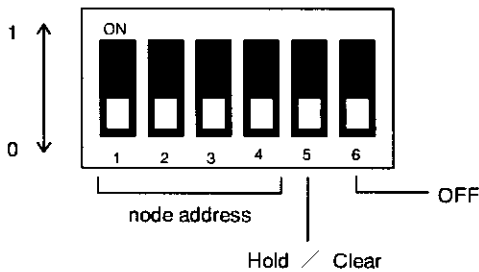
PLC Occupying CH no.	Occupying Points per node address	Setting range of node address	Max. no. of node address
IN1/OUT1CH	8 Points	IN :0~1 OUT:0~1	IN2 units OUT2 units
IN2/OUT2CH	8 Points	IN :0~3 OUT:0~3	IN4 units OUT4 units
IN4/OUT4CH	8 Points	IN :0~7 OUT:0~7	IN8 units OUT8 units
IN1/OUT1CH	4 Points	IN :0~3 OUT:0~3	IN4 units OUT4 units
IN2/OUT2CH	4 Points	IN :0~7 OUT:0~7	IN8 units OUT8 units
IN4/OUT4CH	4 Points	IN :0~15 OUT:0~15	IN16 units OUT16 units

(Reference)

- When node address is set, it should not overlaps with other node address. If it does, communication will not be done normally.
- Sixteen points slaves occupy 2 units of 8 points slave and are laid out to go in the same channel. Therefore, the node address that is not set is also used as follows:
 If the set node address is an odd number, one node address just before that is also used.
 If the set node address is an even number, one node address next to it is also used.
 For example, when the node address 5 is set for the SI unit of the 16 occupying output points, node address 4 will be used by this SI unit.
- When the master unit is CQM1 and when 8 points slaves are connected in the mode of 4 points, it will be considered equal to 2 units and the node address next to it will also be used. If this part overlaps with other slave, area overlapping occurs and communication of CompoBus/S cannot be started.
- In the mode of 4 points, the slave of 16 points cannot be used.

(2) Switch setting

Open the terminal board cover on the upper section of SI unit and set the dip switch.



• Setting of node address

Set the node address with SW 1 ~ 4 as follows: 0: OFF, 1: ON

node address	SW1	SW2	SW3	SW4	node address	SW1	SW2	SW3	SW4
0	0	0	0	0	8	0	0	0	1
1	1	0	0	0	9	1	0	0	1
2	0	1	0	0	10	0	1	0	1
3	1	1	0	0	11	1	1	0	1
4	0	0	1	0	12	0	0	1	1
5	1	0	1	0	13	1	0	1	1
6	0	1	1	0	14	0	1	1	1
7	1	1	1	0	15	1	1	1	1

7-2.Hold/Clear setting

When communication trouble occurs, SI unit output is set to be kept or to be turned off.

The following will be set by SW 5. 0: OFF, 1: ON

Hold/Clear setting	SW5
Clear	0
Hold	1

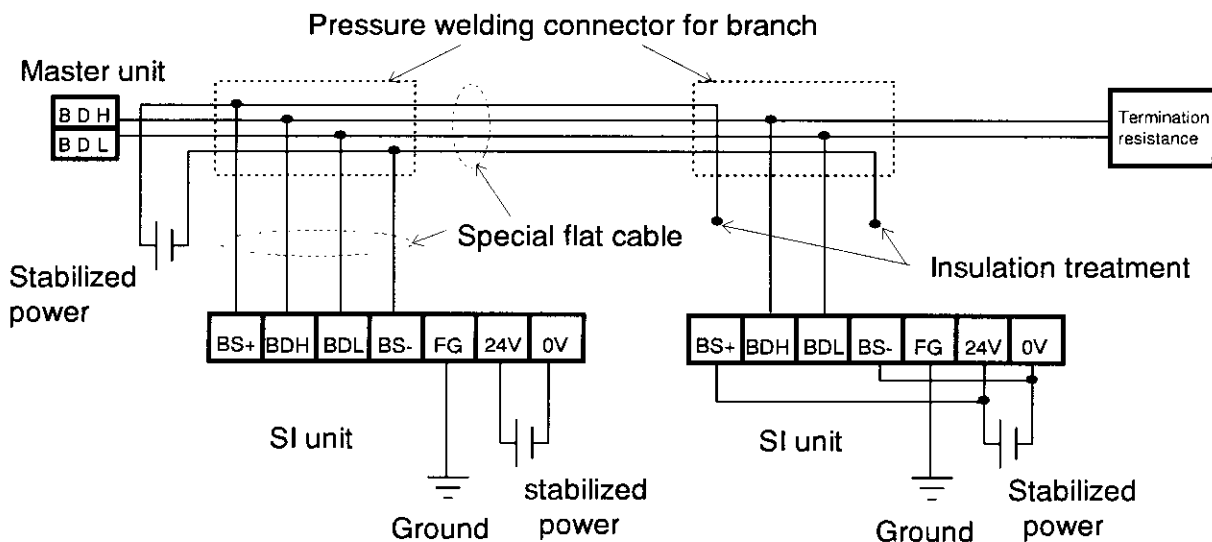
(Reference)

SW 6 is turned off.

8.Wiring

8-1.Wiring of communication line

Connecting style of the CompoBus/S slave has 2 types: T branch style and multi-drop style. In the T branch style, slave is connected with branch line that branched off from the trunk line. In the multi-drop style, slave is connected directly with the trunk line. But branch line cannot be branched off from the branch line. When branch line is branched off from the trunk line, special pressure welding connector for branch or terminal board is used. When communication cable is connected with SI unit, BDH and BDL communication lines are connected with BDH and BDL terminals respectively. Communication power BS+ and BS- lines are also connected to BS+ and BS- terminals respectively.



This SI unit is multi power supply type slave. It has 2 supplying sections for communication and solenoid valve. It's possible to supply power to the supplying section for communication by the special flat cable. But another power is needed at the supplying section for solenoid valve. Also, the power can be supplied from the supply power for solenoid valve to communication power supplying section.

The communication line of special flat cable is as follows:



Caution

The communication cable should be wired away from the power cable and high voltage cable in order not to be affected by noise, etc.

Cable should be connected without mistake. If it is wired wrongly, SI unit and other devices may be damaged.

8-2.Termination resistance

The termination resistance should be mounted at the end of trunk line on the opposite side of the master in order to stabilize the communication. The following OMRON Corp. 's products should be used for the termination resistance.

- SRS1-T terminal with the termination resistance usable for VCTF and special flat cable
- SCN1-TH4T pressure welding connector with the termination resistance
usable only for the special cable

When the communication cable is connected to the terminal with termination resistance, BDH and BDL communication lines will be connected with each terminal. If the slave at the end of the trunk line is connected by the T- branch style, the termination resistance should be connected by the longer cable than the branch line so that the position of the termination resistance will be the farthest from the master.

8-3.Communication cable

Type	Specifications
VCTF Cable	vinyl cable VCTF JIS C 3306 2-core nominal sectional area: 0.75 mm^2 (signal line $\times 2$) conductor resistance (20°C): $25.1 \text{ } \Omega/\text{km}$
Special flat cable SCA1-4F10 (length 100m)	nominal sectional area: $0.75 \text{ mm}^2 \times 4$ (signal line $\times 2$, power line $\times 2$) operating ambient temperature: 60°C or less

8-4.Wiring of power

This SI unit is multi-power supply type slave. There are 2 supplying sections: for communication and for solenoid valve.

(1) Communication power

- When VCTF cable is used for communication line
Power will be supplied to SI unit by different cable from the VCTF cable for communication.
- When the special flat cable is used for communication line
Communication power of SI unit is supplied from the special flat cable.

(2) Supply power for solenoid valve

Power of DC24V - 5%, +10% should be connected. Power and connecting cable should be considered from the solenoid valve and SI unit current consumption.

It is possible to supply power form from the supply power for solenoid valve to communication power supplying section of SI unit.

(Reference)

Please prepare the power with enough power capacity, considering the rush current at starting, etc.

Caution

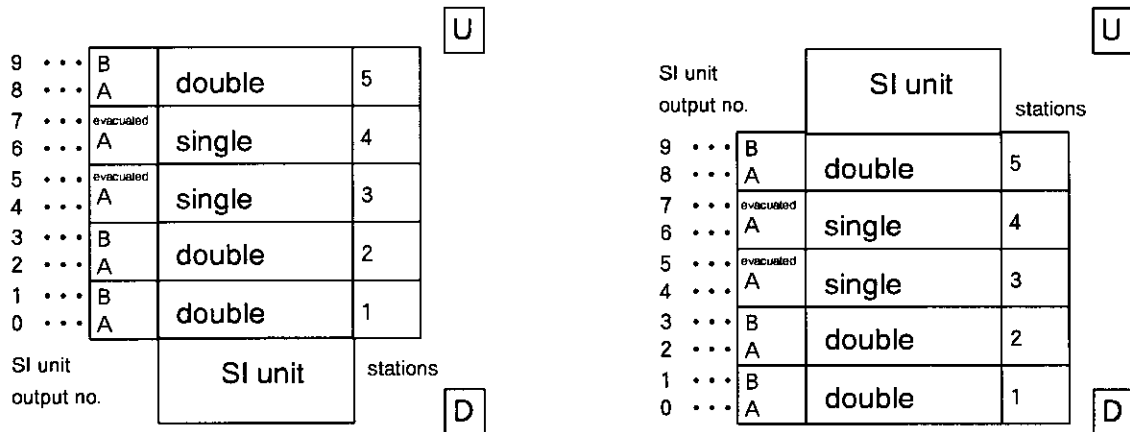
The remaining power supplying line end of the special flat cable should be insulating-treated.

9.SI unit output no. and solenoid valve coil

9-1.Standard wiring

The output of SI unit is allotted in order from the D-side solenoid valve. In the case of VQ manifold solenoid valve, SI unit will be attached at the D-side, and so output will be 0, 1, 2 ... from the side of SI unit. In the case of SX, SY manifold solenoid valve, the mounting direction of SI unit is on the side of D and U. Therefore, if SI unit is mounted on the U-side, the output number will be allotted in order from the solenoid valve on the opposite side of SI unit. When the number of station of VQ, SX manifold solenoid valve is 8 or less, the wiring inside the manifold will all be double wiring. SY manifold solenoid valve will be all single wiring.

[e.g. of wiring 1: VQ manifold solenoid valve] [e.g. of wiring 2: SX manifold solenoid valve (U-side)]

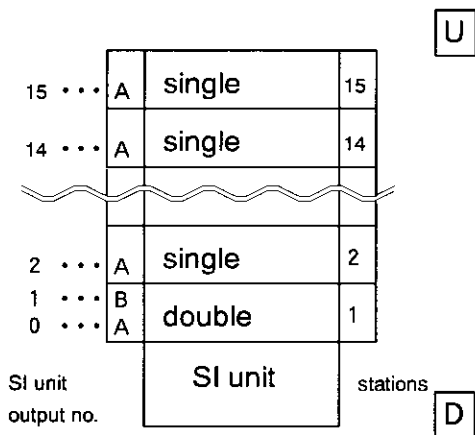


In the e.g. of wiring shown above, the 3rd, 4th single can be changed to double. In this case, the output no. of the 3rd solenoid valve on the B side will be 5, the output no. of 4th solenoid valve on the B side will be 7.

9-2.Made-to order wiring (mixed wiring)

The mixed wiring can be done as the made-to-order wiring. Specify the wiring specifications by the manifold specifications, when the solenoid valve stations are 9~16 or when continuous output will be allotted to the single solenoid valve with VQ, SX manifold solenoid valve stations of 8 or less.

[e.g. of wiring: VQ manifold solenoid valve]



It is fixed depending on whether the solenoid valve carrying the manifold inside wiring is single or double. In this case, please note that it's impossible to output since the inside wiring is not done to the B side of solenoid even if the solenoid valve is changed from single to double. The max. station of the single solenoid valve is 8 and 16 respectively when SI unit output point is 8 and 16.

(Reference)

For mixed wiring, the wiring specifications should be written clearly in the manifold specifications.

10. Troubleshooting

The following flow chart shows directions to solve the malfunction when SI unit doesn't operate normally. Refer to OMRON Corp. CompoBus/S user manual, etc. for the entire troubleshooting.

