

EX510 Series Serial System Technical Specifications

GW Unit

Applicable to CC-Link	: EX510-GMJ1
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Input Unit

1 connector 2 inputs type (2 wire)	: EX510-DXB1
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1 connector 2 inputs type (NPN)	: EX510-DXN1
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1 connector 2 inputs type (PNP)	: EX510-DXP1
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1 connector 1 input type (NPN)	: EX510-DXN2
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1 connector 1 input type (PNP)	: EX510-DXP2
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SI Unit

NPN output	: EX510-S001(^A / _B)
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PNP output	: EX510-S101(^A / _B)
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Contents

1. Safety	P 2
2. Product Summary	P 7
2-1 Features	P 7
2-2 System structure	P 7
3. Specifications / How to Order	P 8
3-1 EX510 series general specifications	P 8
3-2 GW unit	P 8
3-3 Input unit	P 10
3-4 SI unit	P 11
3-5 Option	P 12
4. Valve Manifold	P 14
5. Name of parts / Accessory	P 15
5-1 GW unit (EX510-GMJ1)	P 15
5-2 Input unit (EX510-DX□□)	P 16
5-3 SI unit (EX510-S□01□)	P 17
6. Wiring	P 18
6-1 GW unit	P 18
6-1-1 Internal circuit	P 18
6-1-2 Branch wiring	P 18
6-1-3 Communication wiring	P 20
6-1-4 Power supply wiring	P 21
6-2 Input unit	P 22
6-2-1 Typical internal circuit and wiring	P 22
6-2-2 Wiring of branch cables and e-con	P 24
6-2-3 Sensor connection	P 24
6-3 SI unit	P 26
6-3-1 Typical internal circuit and wiring	P 26
6-3-2 Wiring of branch cables and load mounting connector	P 26
6-3-3 How to use extra output	P 27
7. Display / Switch Setting (GW unit)	P 28
7-1 LED display	P 28
7-2 Switch setting	P 28
7-2-1 Setting of station number / transmission speed (SW1)	P 28
7-2-2 HOLD/CLR setting / Setting of the number of stations occupied/ Mode setting (SW2)	P 29
7-3 I/O memory map and setting of number of I/O point	P 31
7-3-1 How to set	P 31
7-3-2 Memory map	P 31
8. Dimension	P 35
8-1 GW unit	P 35
8-2 Input unit	P 35
8-3 SI unit	P 36
8-4 Valve manifold	P 36
9. Troubleshooting	P 37

1. Safety

This manual contains essential information to prevent possible injury and damage to (users and other people, and property) and to ensure correct handling.

Please confirm understanding the definition of the following messages (signs) before going on to read the text, and always follow the instructions.

Also read carefully the instruction manual of relevant equipment or apparatus before use.

◆ Indications

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 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.

◆ Operator

- ◆ This operation manual has been written for those who have knowledge of machinery and apparatus that use pneumatic equipment 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 to the SI Unit.

◆ Usage Restrictions

- ◆ This product is designed for use in general equipment for factory automation. Never use this product with equipment or apparatus that directly concerns human lives*¹, or which malfunction or failure can cause a huge loss.
 - *1: Equipment or apparatus that directly matters human lives means the following:
 - Medical equipment such as life support systems or equipment used in operating rooms
 - Compulsory equipment required by law such as the Fire Prevention Law, Construction Law and etc.
 - Equipment or apparatus that conforms with those mentioned above.
- ◆ Contact our sales department when plans are made for the product to be used for the system*² including equipment that concerns itself with the safety of persons or that seriously affects the public. This usage needs special consideration*³.
 - *2: The system including equipment that concerns itself with the safety of persons or that seriously affects the public means the following:
 - Nuclear reactor control systems in nuclear power plants, safety protection systems or other systems important for safety in nuclear power facilities
 - Driving control systems of mass transportation systems, and flight control systems
 - Equipment or apparatus that comes into contact with foods or beverages
 - *3: Special consideration means discussing usage with our engineers to establish a safe system designed as fool-proof, fail-safe, redundant and etc.
- ◆ Special consideration of safety or maintainability should be taken to prevent hazard or loss caused by a failure or malfunction that is likely to occur in certain probability due to environmental stress (deterioration). The special consideration means to fully review the equipment or apparatus in design stage and to establish a backup system in advance such as a redundant system or fail-safe system.

⚠WARNING

- ◆ The compatibility of pneumatic equipment is the responsibility of the person who designs the pneumatic system or decides its specifications.
Since the products specified here are used in various operating conditions, their compatibility with the specific pneumatic system must be based on specifications or after analysis and / or tests to meet your specific requirements.
- ◆ Only trained personnel should operate pneumatically operated machinery and equipment.
Compressed air can be dangerous if an operator is unfamiliar with it. Assembly, handling or repair of pneumatic systems should be performed by trained and experienced operators.
- ◆ Do not service machinery / equipment or attempt to remove components until safety is confirmed.
 1. Inspection and maintenance of machinery /equipment should only be performed after confirmation of safe locked-out control positions.
 2. When equipment is to be removed, confirm the safety process as mentioned above. Cut the supply pressure for the equipment and exhaust all residual compressed air in the system.
 3. Before machinery / equipment is re-started, take measures to prevent quick extensions of the cylinder piston rod etc. (Bleed air into the system gradually to create back-pressure.)
- ◆ Contact SMC if the product is to be used in any of the following conditions:
 1. Conditions and environments beyond the given specifications, or if product is used outdoors.
 2. Installation on equipment in conjunction with atomic energy, railway, air navigation, vehicles, medical equipment, food and beverage, recreation equipment, emergency stop circuits, press applications, or safety equipment.
 3. An application which has the possibility of having negative effects on people, property, or animals, requiring special safety analysis.

⚠WARNING

- ◆ Do not disassemble, modify (including change of printed circuit board) or repair.
An injury or failure can result.
- ◆ Do not operate the product beyond specification range.
Operation at a range that exceeds the specifications can cause a fire, malfunction, or damage to the unit.
Verify the specifications before use.
- ◆ Do not use the product in an atmosphere containing combustible, explosive or corrosive gas.
It can cause a fire, explosion or corrosion.
The unit is not designed to be explosion-proof.
- ◆ The following instructions must be kept 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 operationOtherwise malfunction can cause an accident.
- ◆ The following instructions must be kept while in maintenance:
 - Turn off the power supply
 - Stop the supplied air, exhaust the residual pressure and verify the release to atmosphere before performing maintenanceOtherwise the injury could be caused.

⚠CAUTION

- ◆ Perform proper functional checks after maintenance.
Stop operation when an abnormality is observed such that the unit does not work properly.
Safety is not be assured due to unexpected malfunction.
- ◆ Provide grounding for securing safety and noise resistance of reduced-wiring system.
Individual grounding is provided to the unit closely with short distance.

NOTE

- ◆ Follow the instructions given below when handling reduced-wiring system :
Or it will have a risk of being damaged and operating failure.
- ◆ The instructions on selection (installation, wiring, environment of use, adjustment, operation and maintenance) described below must also be followed.

*Product specifications

- Use the following UL recognized direct-current power supply to combine.

(1) Limited voltage current circuit in accordance with UL508

A circuit whose power is supplied by secondary coil of a insulating transformer that meets the following conditions

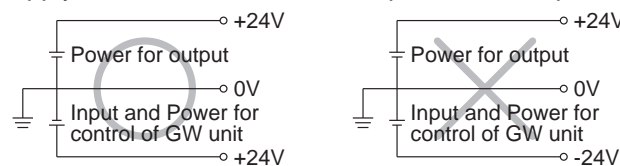
- Maximum voltage (with no load) : less than 30Vrms (42.4V peak)
- Maximum current : (1) less than 8A(including when short circuited)

(2) limited by circuit protector (such as fuse) with the following ratings

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

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

- The reference of power supply for GW unit is 0V for both powers for output and control of GW unit.



- Operate reduced-wiring system with the specified voltage.
Operation with a voltage beyond specifications could cause malfunction or damage of the unit.
- Reserve a space for maintenance
Be sure to keep a space for maintenance when designing layout of the unit.
- Do not remove nameplate.
Otherwise maintenance error and misreading of an operation manual could cause damage or malfunction.
It may also result in nonconformity to safety standards.

◆Precautions on handling

*Installation

- Do not drop, hit or apply excessive shock to the unit.
Otherwise the unit could be damaged so much as to result in.
- Follow the specified tightening torque.
Excessive tightening torque can break screws.

*Wiring (including plugging in/out of connector)

- Do not bend the cables or apply excessive force to them by pulling or placing heavy load.
Wiring subject to bending or tensile stress could cause the cables to break.
- Connect wires and cables correctly.
Incorrect could wiring break the reduced-wiring system to its extent.
- Do not connect wires while the power is supplied.
Otherwise it can break the reduced-wiring system or I/O devices could be damaged or malfunction.
- Do not connect power cable or high-voltage cable in the same wiring route as the unit.
Otherwise the wires to the reduced-wiring system can be interrupted with noise or induced surge voltage from power lines or high-voltage lines and malfunction could be caused.
Separate wiring of the unit and each I/O device from that of power line and high voltage line.

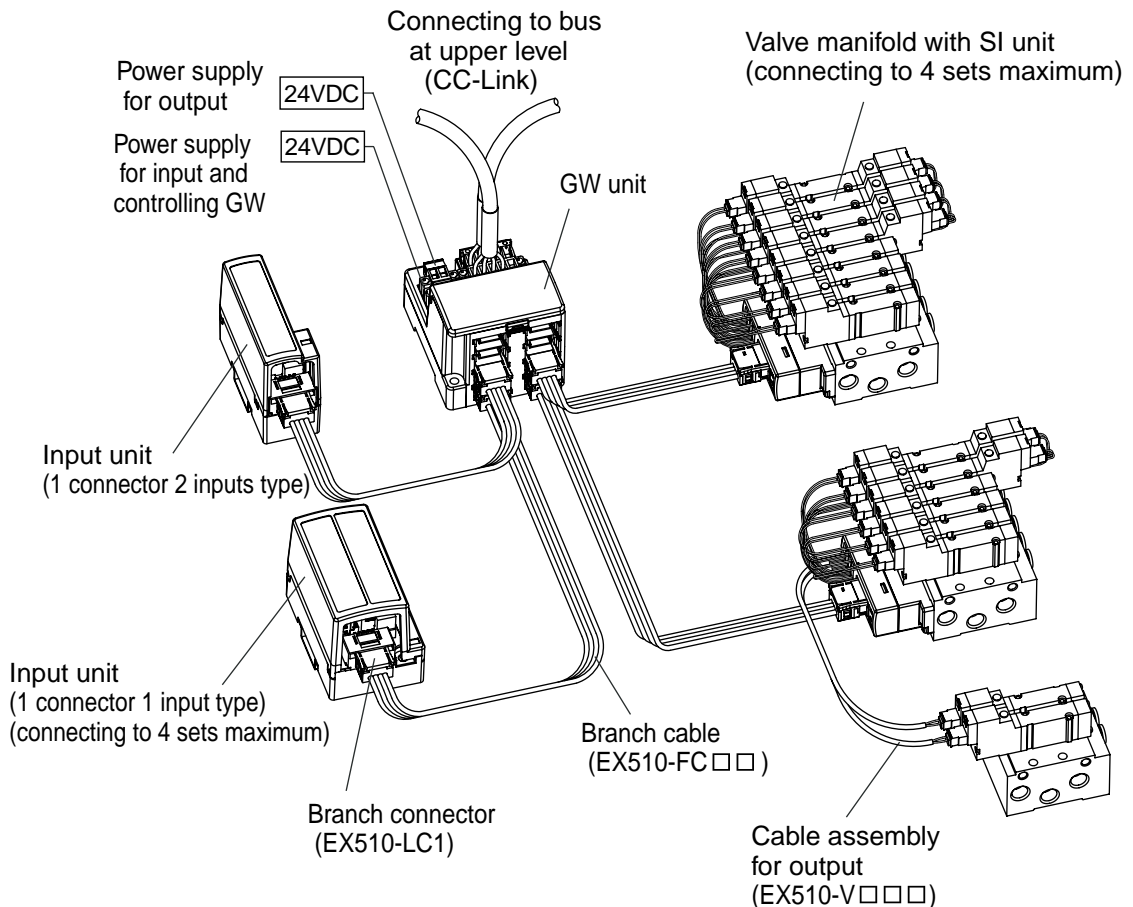
- Verify the insulation of wiring.
Insulation failure (interference with other circuit, poor insulation between terminals and etc.) could introduce excessive voltage or current to the reduced-wiring system or each I/O device and damage them.
- Separate power line for solenoid valves from power line for input and control unit.
Otherwise wires can be interrupted with noise or induced surge voltage causing malfunction.
- Take proper measurements such as noise filter against noise when the reduced-wiring system is incorporated in equipment or devices.
Otherwise contamination with noise can cause malfunction.
- *Environment
 - Consider operating environment suitable for protection class.
In case of IP20 protection class, avoid use in the place where water and oil scatter.
 - Take sufficient shielding measures when the unit is installed.
Insufficient measures could cause malfunction or failure.
Verify the effect of the measures after incorporation of the unit in equipment or devices:
 - (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 unit near by a place where electric surge is generated.
Internal circuit elements of the reduced-wiring system can deteriorate or break when equipment generating a large surge (electromagnetic lifter, high frequency induction furnace, motor, etc.) is located near the reduced-wiring system. Provide surge preventives, and avoid interference with line for the equipment.
 - Use the reduced-wiring system equipped with surge absorber when a surge-generating load such as solenoid valve is driven directly.
Direct drive of a load generating surge voltage can damage reduced wiring system.
 - Prevent foreign matter such as remnant of wires from entering the unit.
Take proper measures for the remnant not to enter the reduced-wiring system in order to prevent failure or malfunction.
 - Do not expose the reduced-wiring system to vibration and impact.
Otherwise failure or malfunction could be caused.
 - Keep the specified ambient temperature range.
Otherwise malfunction could be caused.
Do not use reduced-wiring system in a place where temperature suddenly changes even within the specified range.
 - Do not expose the reduced-wiring system to heat radiation from a heat source located nearby.
Malfunction could be caused.
- *Adjustment and Operation
 - Use precision screwdriver with for small flat blade for setting DIP switch.
- *Maintenance
 - Perform maintenance and check regularly.
Otherwise an unexpected malfunction of components could of the unit occur due to a malfunction of the whole unit.
 - Perform a proper functional check.
Stop operation when an abnormality is observed such that the device doesn't work properly.
Otherwise an unexpected malfunction of the unit component can occur.
 - Do not use solvents such as benzene, thinner or other to clean the reduced-wiring system.
They could damage the surface of the body and erase the indication on the body.
Use a soft cloth to remove stains. For heavy stains, use a cloth soaked with diluted neutral detergent and fully squeezed, then wipe up the stains again with a dry cloth.

2. Product Summary

2-1 Features

- (1) Capable of decentralized control of input points of 64 / output points of 64
Decentralized control of input 4 branches (max. points of 16×4 branches) and output 4 branches (16×4 branches) per one GW unit is possible.
- (2) Easy setting and wiring
Slave side doesn't need switch settings, but GW unit needs them such as address setting.
It is possible to adjust length of branch cable and crimp branch cable without dedicated tool.
Each slave doesn't need individual power supply because the branch cable is 4-core flat cable including a power supply line.
- (3) Small and compact
Small and compact design is applied for all of GW unit which realizes decentralized control, Input unit which connects input equipments such as sensor, and SI unit which connects output equipment such as solenoid valve.
- (4) Flexible setting of number of occupied station
Utilize I/O point effectively by setting number of occupied station of GW unit.
- (5) Applicable to each type of solenoid valves
SMC's solenoid valves can be easily wired for serial communication.
(See 4. Manifold Valve for applicable valve.)
The extra output of SI unit can be used to actuate 2-port valve etc, with a cable assembly for output.

2-2 System structure



3. Specifications/How to Order

3-1 EX510 series general specifications

Item	Specification
Rated voltage	24VDC
Allowable instantaneous electrical stop	1msec. or less
Protection class	IP20
Applicable standard	UL / CSA , CE Marking *
Withstand voltage	500VAC 1min. (between PE and external terminal block)
Insulation resistance	10MΩ or more (500VDC Mega is given between PE and external terminal block)
Ambient temperature	Operation : -10~50 °C Storage : -20~60 °C
Ambient humidity	35~85%RH (No dew condensation)
Vibration resistance	10~57Hz (constant amplitude) 0.035mm 57~150Hz (constant acceleration) 4.9m/s ² 2 hours for each direction, X, Y and Z (comply with JIS B 3502 and IEC61131-2)
Impact resistance	147m/s ² is given 3 times for each direction, X, Y and Z (comply with JIS B 3502 and IEC61131-2)
Operating environment	No corrosive gas

*Note : EMC directive (89/336/EEC)

EN50081-2/1993, EN55011/1998+A1, EN50082-2/1995, EN61000-6-2/1999

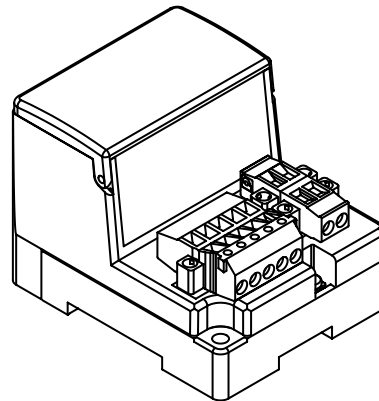
3-2 GW unit

How to order

EX510-G M:J 1

Applicable net work

MJ | CC-Link



Basic specifications

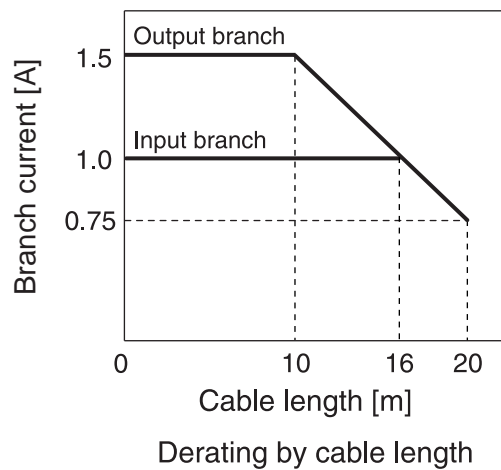
Item	Specification
Rated voltage	24VDC
Power supply voltage	Power supply for input and control : 24VDC ±10% Power supply for output : 24VDC +10% / -5% (Low power alarm occurs at approx. 20V.)
Rated current	Power supply for input and control : 4.1A Inside of GW unit : 0.1A Input unit : 4A Power supply for output : 6A
Weight	160g (including accessories)

Bus at upper level (Specifications of bus at upper level)

Compatible system	CC-Link Ver. 1.10				
Number of station occupied	3 stations (for setting with input point 64 / output point 64) 2 stations (for setting with input point 32 / output point 32)				
Station type	Remote device station				
Communication speed	156Kbps	625Kbps	2.5Mbps	5Mbps	10Mbps
Cable length between stations	20cm and over				
Maximum extended cable length	1200m	900m	400m	160m	100m

Bus at lower level (Specifications of bus at lower level)

Number of branches for input / output	4 branches for input (16 points for each) 4 branches for output (16 points for each)
Communication type	Communication protocol : dedicated for SMC Communication speed : 750kbps
Current for input branch	Maximum 1[A] per branch
Current for output branch	Maximum 1.5[A] per branch
Branch cable length	Within 20m (See diagram below for details.)



3-3 Input unit

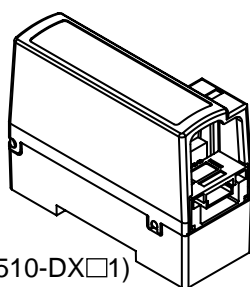
How to order

EX510-DX N 1

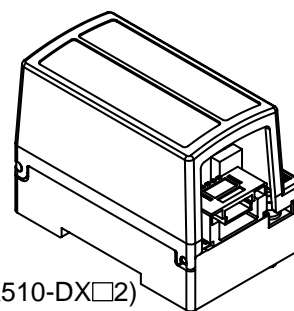
Applicable sensor → Unit type

N	NPN output	1	1 connector 2 inputs type
P	PNP output	2	1 connector 1 input type
B	2 wire type		

Note) B (2 wire type) is available only with unit type 1.



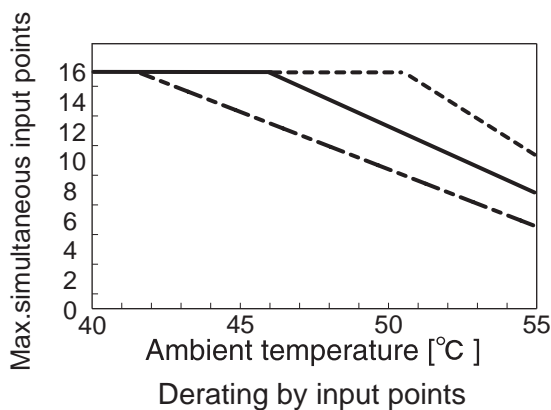
(EX510-DX□1)



(EX510-DX□2)

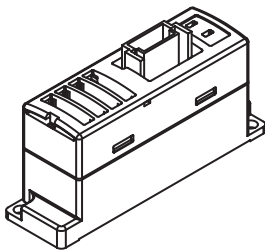
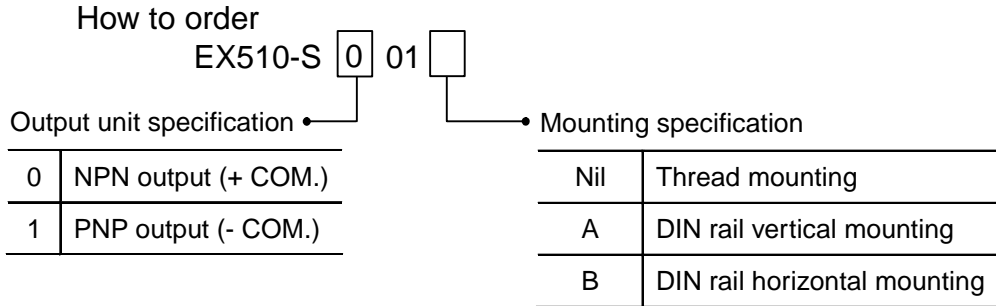
Input unit specification

Item	EX510-DXN□	EX510-DXP□, DXB1
Input form	NPN input	PNP input
Number of input points	16 points (See diagram below for details.)	
Supply voltage for sensor	24VDC	
Max. supply current for sensor	0.2A / 1 point, 0.9A / 1unit	
Current consumption	100mA or less (inside of input unit)	
Input resistance	5.6kΩ	
Rated input current	Approx. 4mA	
ON voltage / ON current	17V or more / 2.5mA or more (Between input terminal and +24V for sensor)	17V or more / 2.5mA or more (Between input terminal and 0V for sensor)
OFF voltage / OFF current	7V or less / 1mA or less (Between input terminal and +24V for sensor)	7V or less / 1mA or less (Between input terminal and 0V for sensor)
LED display	Green LED (lights up during ON time)	
Weight	EX510-DX□ 1 : 90g (including accessories) EX510-DX□ 2 : 110g	

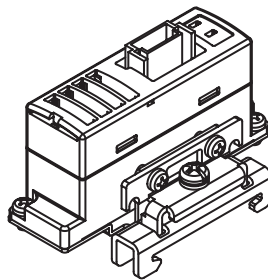


	Voltage for input and controlling part [V]
----	21.6
—	24.0
- · -	26.4

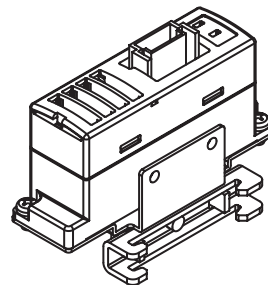
3-4. SI unit



(EX510-S□01)



(EX510-S□01A)



(EX510-S□01B)

SI unit specification

Item	Specification	
Model	EX510-S001□	EX510-S101□
Output type	NPN output (sink type)	PNP output (source type)
Number of output points	16 points	
Rated load current	24VDC	
Maximum load current	Meet the three following conditions, 1. 0.25A / 1 point 2. 1.4A / 1 unit 3. Total current of OUT0 to OUT7 : 1A or less Total current of OUT8 to OUT15 : 1A or less	
Protection	Built-in protection circuit for short circuit	
Current consumption	50mA or less (inside of SI unit)	
Weight	EX510-S□01	40g (including accessories)
	EX510-S□01A,B	80g

3-5. Option

(1) Branch cable

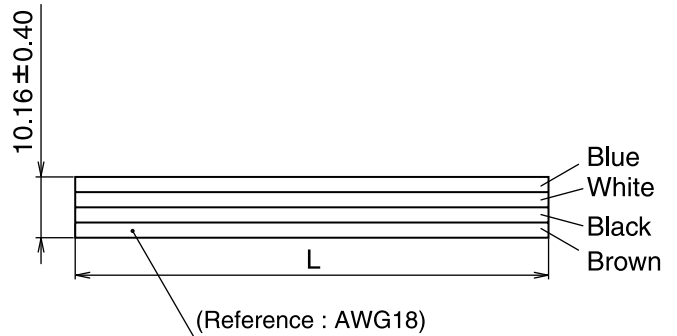
It is a 4-core flat cable used for connecting each unit.

How to order

EX510-FC 1:0

Cable length [L]

01	1[m]
02	2[m]
05	5[m]
10	10[m]
20	20[m]
60	60[m]



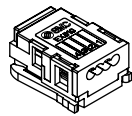
(2) Branch connector (packaged individually)

It is a connector used for connecting a branch cable to each unit.

Two branch connectors are attached to each of SI unit and Input unit.

How to order

EX510-LC1



(After crimping)

Electrical specifications	
Rated voltage	160VAC / DC or less
Rated current	Max. 5.0A
Contact resistance	20mΩ or less
Withstand voltage	1000VAC 1min. (Current leakage 1mA or less)

(3) Cable assembly for output

It is a cable assembly to transmit the extra output of SI unit to outside.

How to order

EX510-V S 1:0 S

Output point

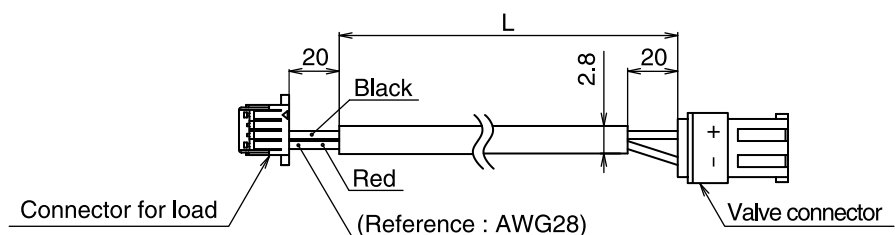
S	1
W	2

Valve connector

Nil	For SY/ SYJ
S	For SY/ SYJ
Q	For VQ/ VQZ

Cable length [L]

10	1.0[m]
30	3.0[m]



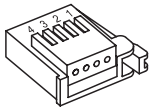
(4) e-con

It is a connector used for connecting a sensor to the Input unit (EX510-DX□□).

See “6-2-3 Sensor connection” for connector model no. and applicable electric wire size.

How to order

ZS-28-C□-□

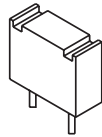


(5) Fuse for replacement

It is a fuse for replacement used for Input unit (EX510-DX□□).

How to order

EX9-FU10



Electrical specifications	
Rated current	1A
Rated breaking capacity	AC / DC 48V 50A
Fuse resistance	0.145Ω

4. Valve Manifold

EX510 series can use the following manifold valve.

Contact SMC salesperson for its compatibility with other valves.

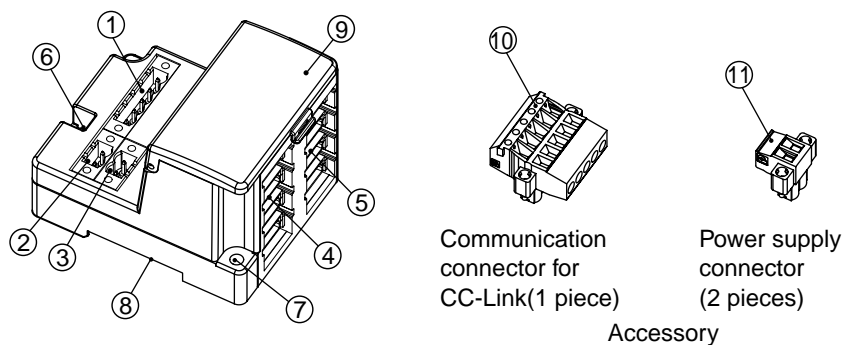
Applicable manifold

- SY3000 / 5000 / 7000 / 9000 series
- SYJ3000 / 5000 / 7000 series
- VQZ1000 / 2000 / 3000 series

See catalog of each valve series and technical operation manual for details of solenoid valves, manifolds, etc.

5.Name of Parts / Accessory

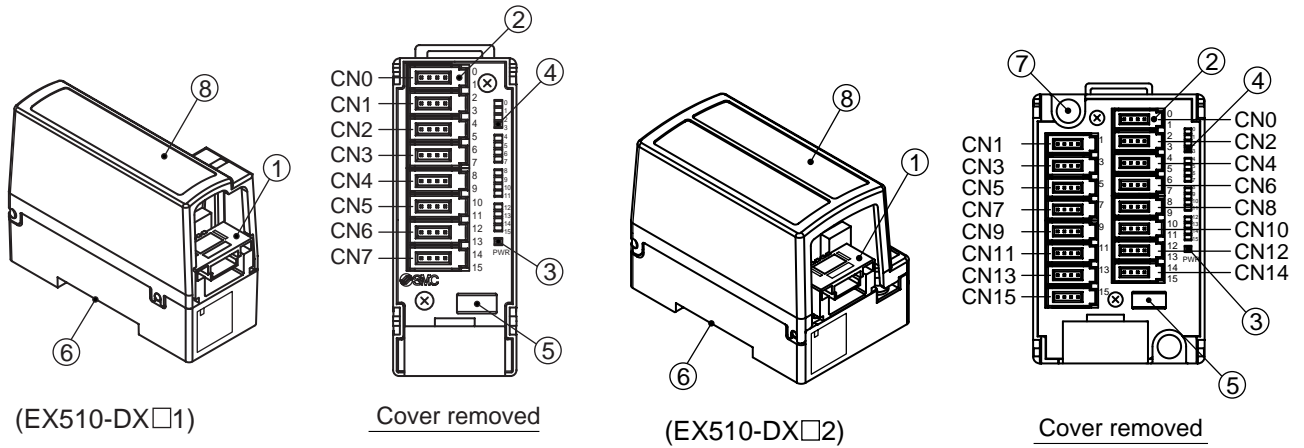
5-1 GW unit (EX510-GMJ1)



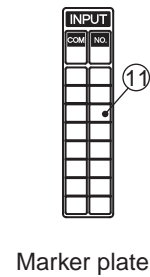
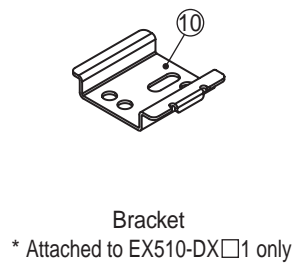
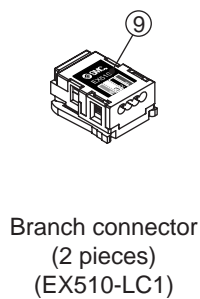
No.	Parts	Purpose
1	Communication socket (BUS)	Connect to CC-Link line with an accessory connector for CC-Link (⑩).*
2	Power supply socket (PWR(V))	Supplying power for output instruments such as a solenoid valve with an accessory connector (⑪).*
3	Power supply socket (PWR)	Supplying power for controlling 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 an unit is mounted with two M4 screws.
8	DIN rail mounting slot	Used when an unit is mounted to DIN rail.
9	Display / switch setting part	Switch setting such as LED display in unit state, transmission speed, and occupied station number.

*Note : For wiring method, see "6. Wiring" in this "technical specifications".

5-2 Input unit (EX510-DX□□)

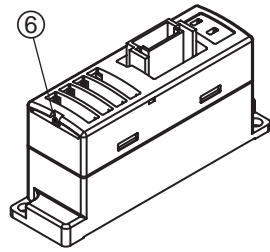


Accessory

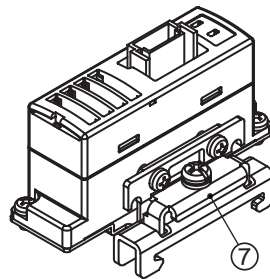
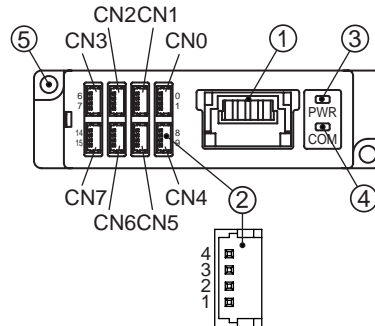


No.	Parts	Purpose
1	Branch connector at Input unit	Used to crimp branch connector (⑨) into branch cable (EX510-FC□□) and connected them to GW unit.
2	e-con socket	The sensor is connected.
3	Power supply LED	Lights up : Power ON (normal) Goes off : Power OFF
4	Display LED	Lights up : Sensor signal input ON Goes off : Sensor signal input OFF
5	Fuse	Fuse is replaceable.
6	Mounting slot	Used for mounting the unit on DIN rail and with attached bracket (⑩) (thread mounting).
7	Mounting hole	Used to mount the unit with two M4 screws.
8	Cover	Used to protect sensor cable and provided with marker plate (⑪) on the top.

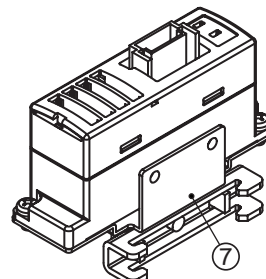
5-3 SI unit (EX510-S□01□)



(EX510-S□01)

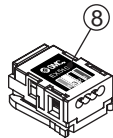


(EX510-S□01A)

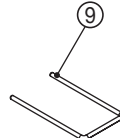


(EX510-S□01B)

Accessory



Branch connector
(2 pieces)
(EX510-LC1)



Connector lock pin
(1 piece)

No.	Parts	Purpose
1	SI unit side, Branch connector	Crimping branch cable (EX510-FC □□) to branch connector (⑧) and connecting them to GW unit.
2	Load mounting connector	Connecting output equipment such as solenoid valve.
3	Power supply LED	Lights up : Power ON (normal) Goes off : Power OFF
4	Communication LED	Lights up : Data received Goes off : No data received
5	Mounting hole	Used to mount the unit with two M3 screws.
6	Connector locking pin inserted hole	Receiving connector locking pin (⑨).
7	Mounting bracket	Possible to mount on DIN rail.

6. Wiring

Note

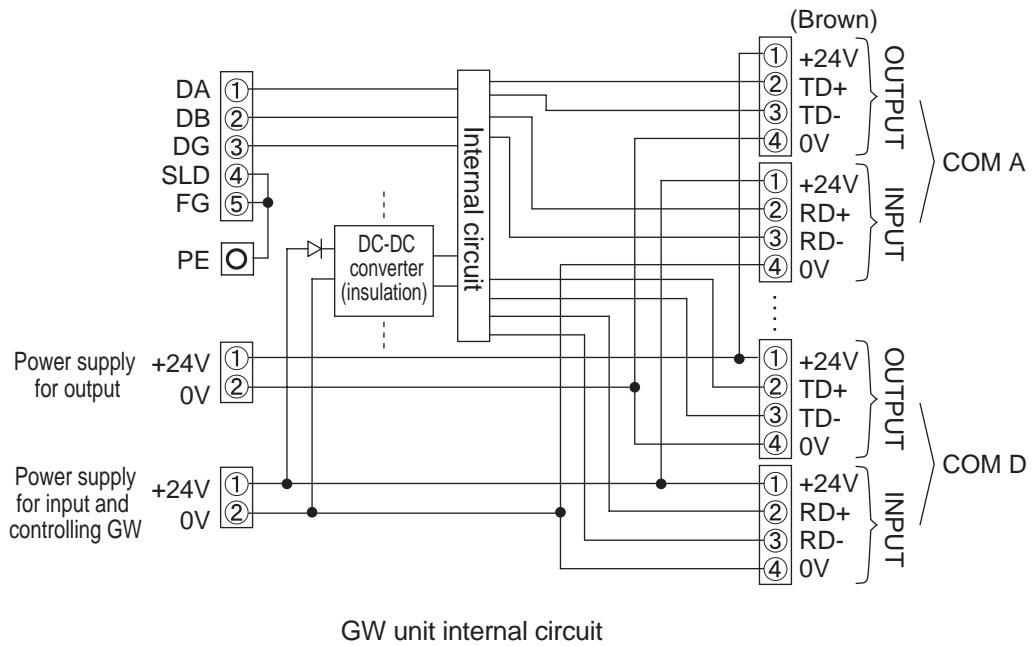
Be sure to turn off the power before wiring.

6-1 GW unit

Wiring for GW unit is as follows.

6-1-1 Internal circuit

Internal circuit is shown below.



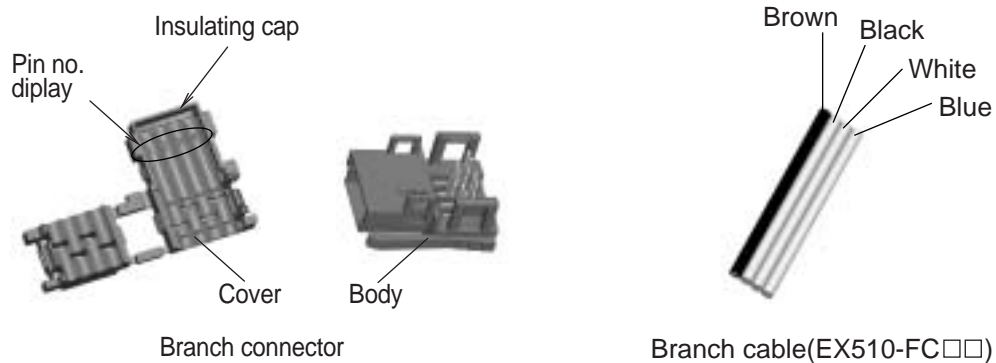
6-1-2 Branch wiring

Each unit is wired with a branch cable, and connected with a branch connector. Two branch connectors are attached to each of SI unit and Input unit.

(1) Pressure welding for branch connector

The method of pressure welding for branch connector is explained.

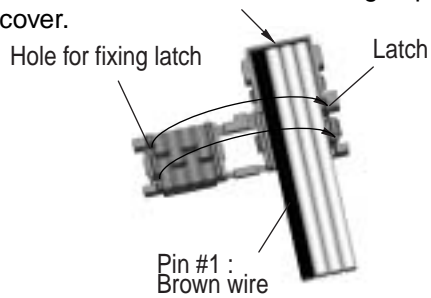
Components



Working procedure

1. Set a branch cable to the cover.

- 1) Set the brown wire of the branch cable so that it comes to the pin #1.
- 2) Meet the cable end to the insulating cap at the cover.



- 3) Fold the cover so that the branch cable can be put between the cover.
- 4) Fix the latch tip by inserting to a hole for fixing latch.



Note) Check the color of wire written on a branch connector and the color of branch cable are same.

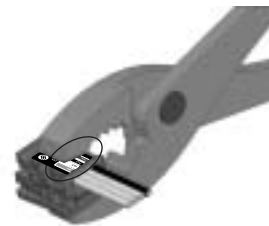
2. Fix to a body tentatively

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



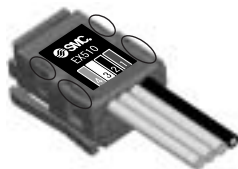
3. Press fitting

Press the cover to the body with plier etc.



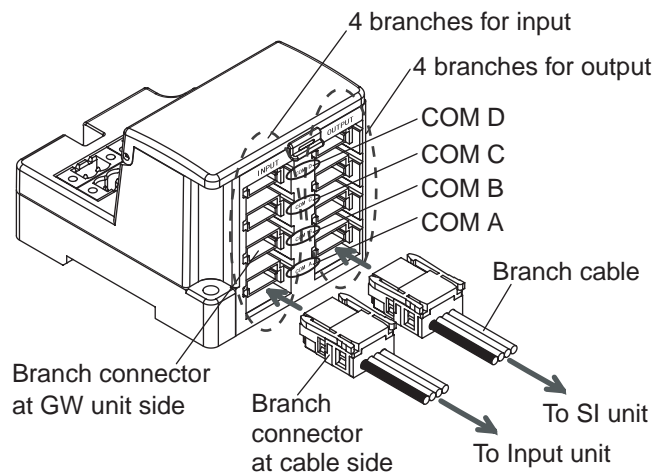
4. Confirmation

It is completed with a check on 4 latches engaging.



(2) Wiring of branch cables

How to connect branch cable is shown below.



Connect the branch connectors for GW unit in order from the bottom one (COM A, B, C, and D).

6-1-3 Communication wiring

How to connect the CC-Link dedicated cable and the CC-Link communication connector for GW unit is as follows.

- (1) Make sure to connect the signal cables to designated pins (Refer to Fig.1).
- (2) Make sure to connect "terminal resistor" to the units at the both ends of the CC-Link system.
And, connected the terminal resistor between "DA"-"DB" (Refer to Fig.2,3).
- (3) The connected terminal resistor differs depending on used cable in CC-Link system.
See the table below.

Cable type	Terminal resistor
CC-Link dedicated cable	110Ω 1/2W
CC-Link dedicated cable compatible with Ver.1.10	(brown, brown, brown)
CC-Link dedicated high performance cable	130Ω1/2W
	(brown, orange, brown)

- (4) Refer to Fig.4 about how to connect.

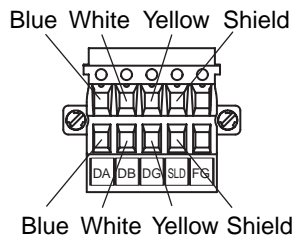


Fig.1

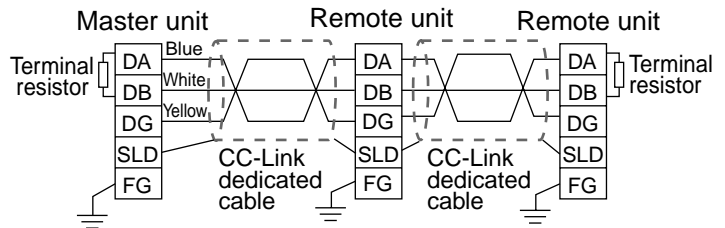


Fig.2

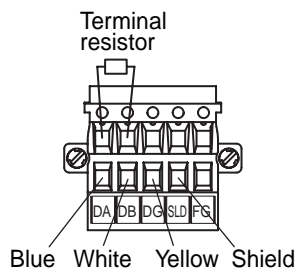


Fig.3

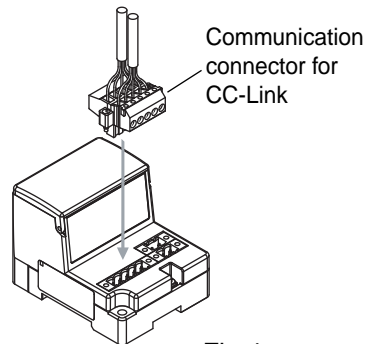


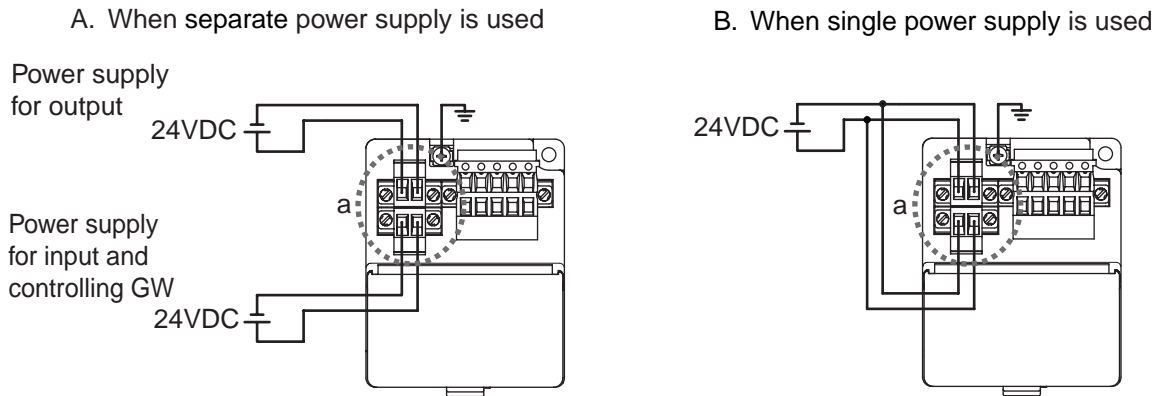
Fig.4

Note

1. CC-Link dedicated high performance cable cannot be mixed with other cables (CC-Link dedicated cable, CC-Link dedicated cable compatible with Ver.1.10).
If mixed, normal transmission of data cannot be assured.
2. Connect the shield line of CC-Link dedicated cable to "SLD" of each unit.

6-1-4 Power supply wiring

Connect power supply wiring to the two power supply connectors which have 2 pins. Power supply consists of 2 systems, but they can be used with both of single power supply and separate power supply. Also, other units don't need individual power supply. Make sure of connection with the designated pin. Refer to Fig.5 about how to connecting.



Detail for part a

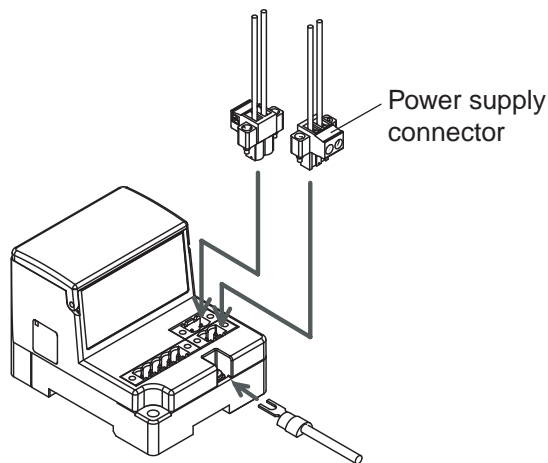
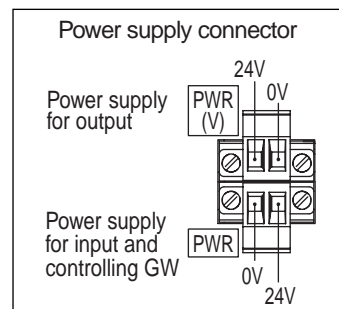


Fig.5

Note

D type grounding (Third-type grounding) should be performed for PE terminal. (SLD, FG, and PE terminal in CC-Link are connected inside of GW unit.)

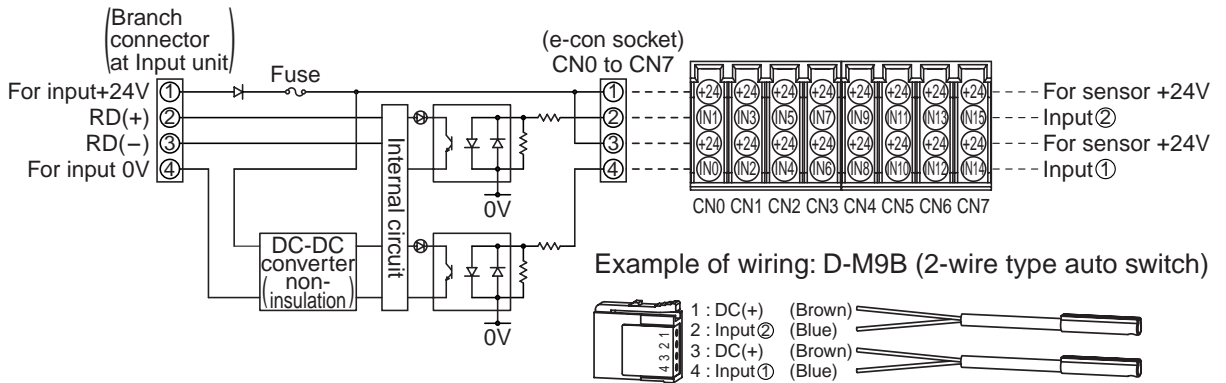
6-2 Input unit

The wiring of Input unit is explained.

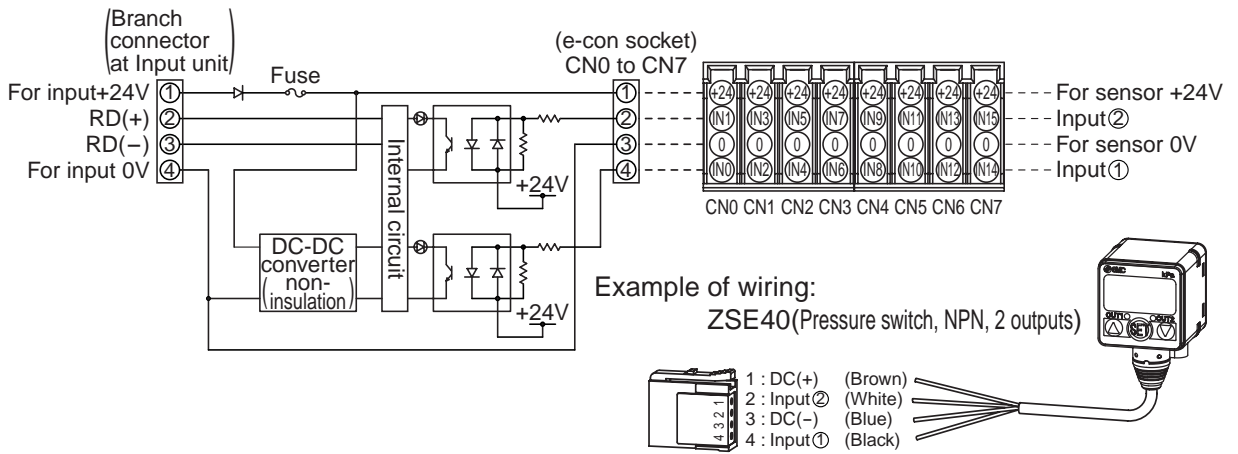
6-2-1 Typical internal circuit and wiring

Example of internal circuit and wiring are shown below.

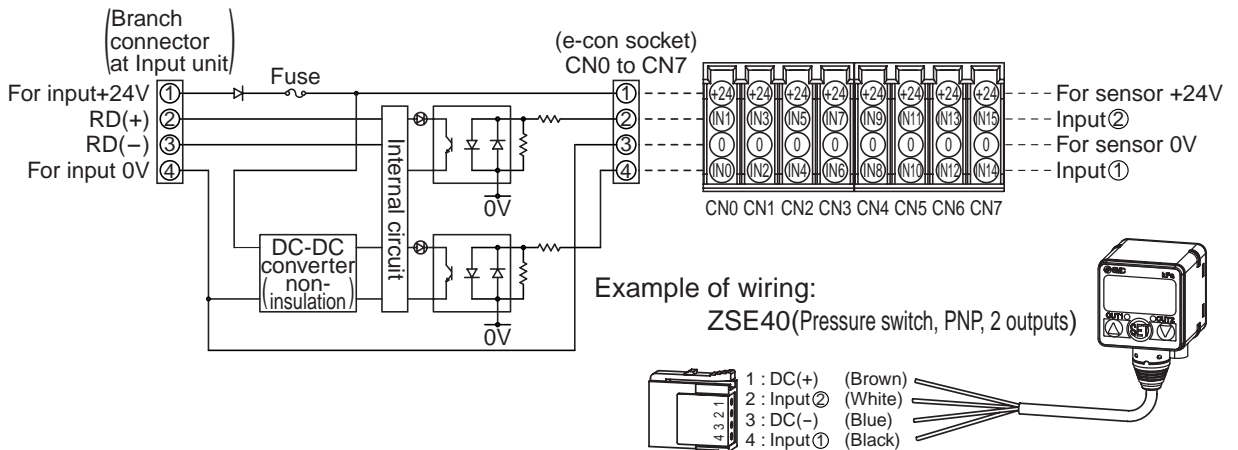
EX510-DXB1: Input unit for 2-wire type (1 connector 2 inputs type)



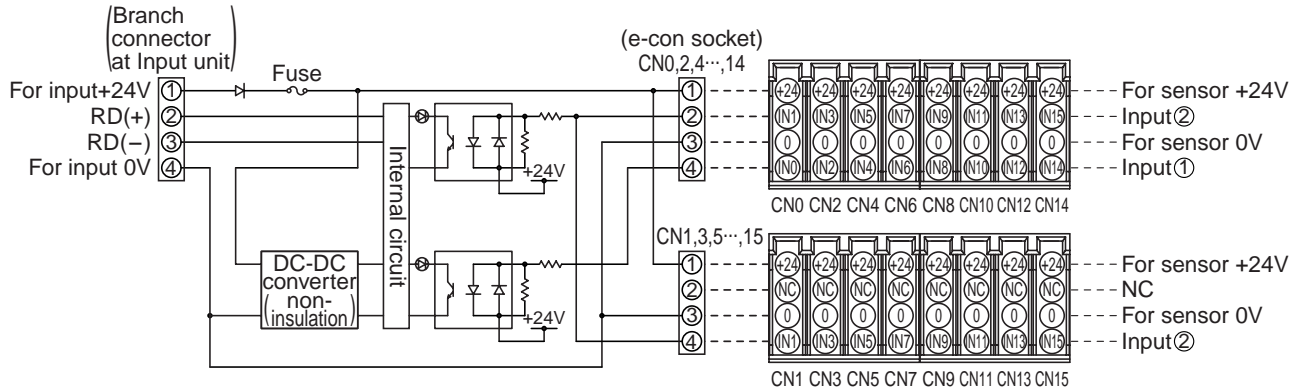
EX510-DXN1: Input unit for NPN (1 connector 2 inputs type)



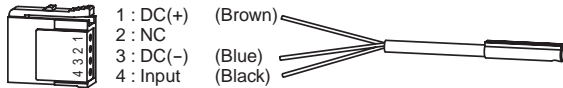
EX510-DXP1: Input unit for PNP (1 connector 2 inputs type)



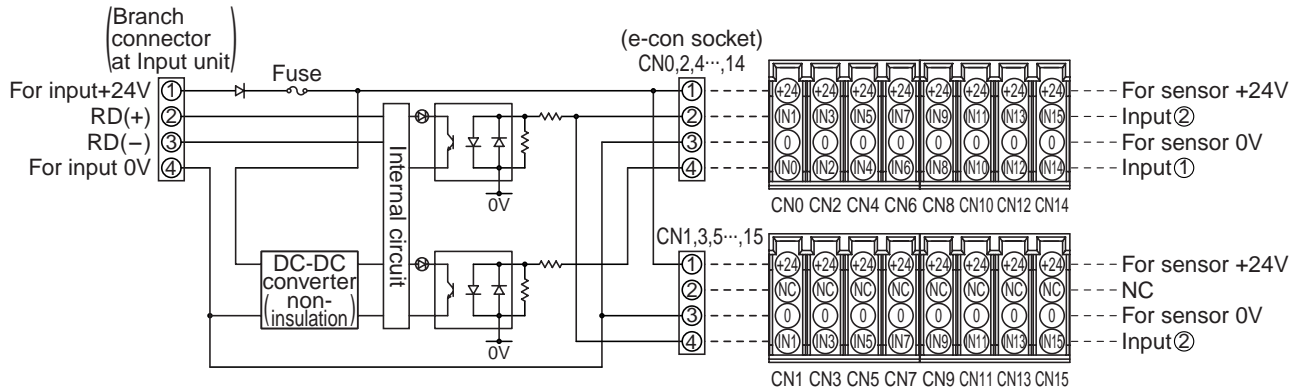
EX510-DXN2: Input unit for NPN (1 connector 1 input type)



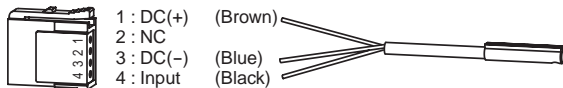
Example of wiring: D-M9N (3-wire type auto switch NPN output)



EX510-DXP2: Input unit for PNP (1 connector 1 input type)

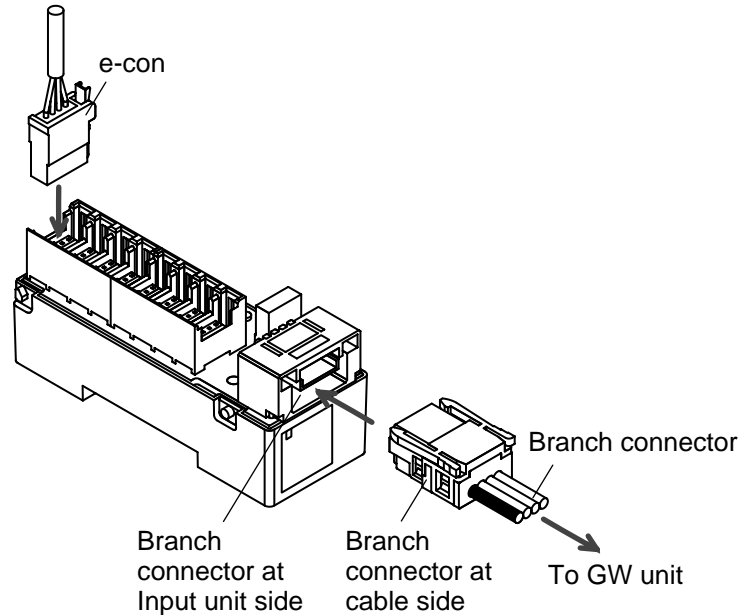


Example of wiring: D-M9P (3-wire type auto switch PNP output)



6-2-2 Wiring of branch cables and e-con

- Insert the branch connector at cable side into mating connector at Input unit side.
- Connect e-con after removal of cover.

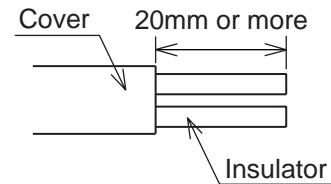


6-2-3 Sensor connection

Utilize e-con to connect the sensor to the Input unit.

Attaching the e-con to the lead wire for sensor

- Strip the sensor wire as shown in the right figure.
(Refer to the table below for correspondence between connector and electrical wire gauge.)



Lead Wire Table

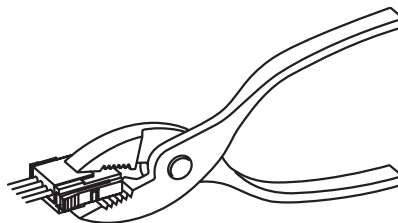
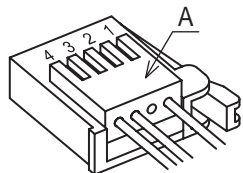
SMC Product No. (1 piece)	Color of cover	Applicable gauge of cable (ϕ)	Nominal sectional area (mm ²)	AMP Product No.
ZS-28-CA-1	Orange	0.6 to 0.9	0.1 to 0.5 (AWG26 to 20)	3-1473562-4
ZS-28-CA-2	Red	0.9 to 1.0		1-1473562-4
ZS-28-CA-3	Yellow	1.0 to 1.15		1473562-4
ZS-28-CA-4	Blue	1.15 to 1.35		2-1473562-4
ZS-28-CA-5	Green	1.35 to 1.60		4-1473562-4

SMC Product No. (1 piece)	Color of cover	Applicable gauge of cable (ϕ)	Nominal sectional area (mm ²)	Sumitomo 3M Product No.
ZS-28-C	Red	0.8 to 1.0	0.14 to 0.3 (AWG26 to 24)	37104-3101-000FL
ZS-28-C-1	Yellow	1.0 to 1.2		37104-3122-000FL

SMC Product No. (1 piece)	Color of cover	Applicable gauge of cable (ϕ)	Nominal sectional area (mm ²)	OMRON Product No.
–	Transparency	to 1.5	0.08 to 0.5 (AWG28 to 20)	XN2A-1430 *

*Note: If given tensile force more than 12N, cable may separate from connector.

- Insert the cable to the end with checking correspondence between color of cable and number stamped on e-con. (Refer to “6-2-1 Typical internal circuit and wiring”)



- It checks that the above-mentioned preparation work has been performed correctly, and A part shown in right figure is pushed by hand and makes temporary connection.
- A part center is straightly pushed in by tools, such as pliers.
- e-con is not allowable to be reused once crimped for connection. For the connection failure such as incorrect order of wire and incomplete insertion, please use the new e-con for sensor.

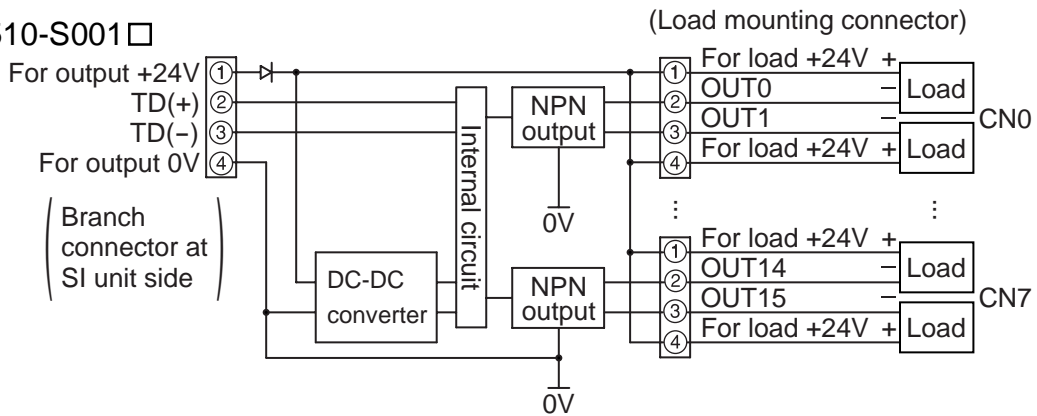
6-3 SI unit

The wiring of SI unit is explained.

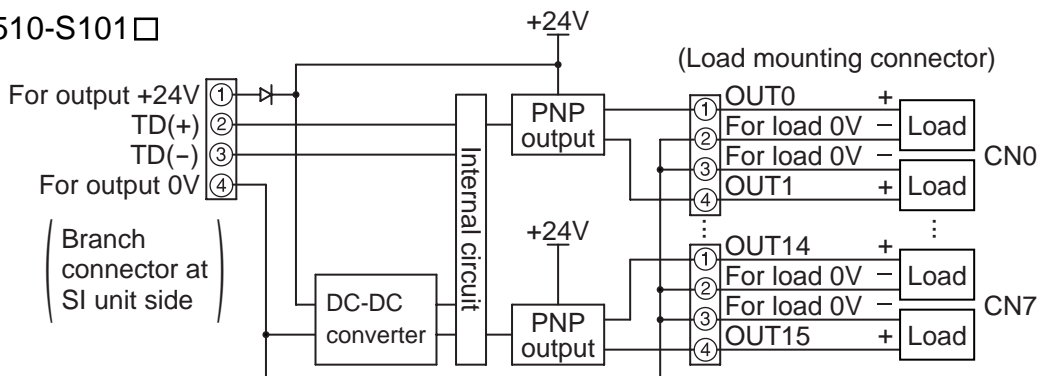
6-3-1 Typical internal circuit and wiring

Example of internal circuit and wiring are shown below.

• EX510-S001 □



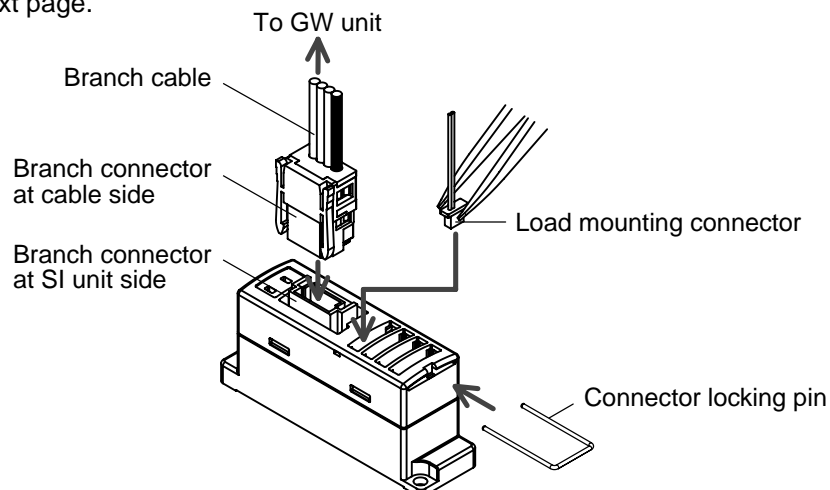
• EX510-S101 □

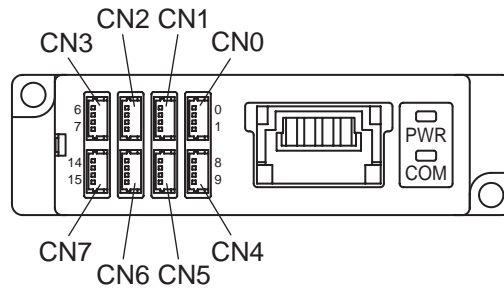


NPN and PNP outputs use the transistor with built - in protective function for short circuit.

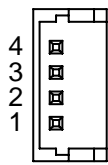
6-3-2 Wiring of branch cables and load mounting connector

- Wiring of branch cables and load mounting connector are shown below.
- Insert load mounting connector with pinsette. After insertion at all load mounting connectors is completed, insert connector locking pin. The output no. of each load mounting connector can be found on the next page.



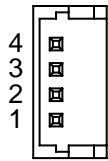


• EX510-S001□



No.	Name	Function							
		CN0	CN1	CN2	CN3	CN4	CN5	CN6	CN7
4	COM	Load actuating common (+)							
3	Output (n)	OUT0	OUT2	OUT4	OUT6	OUT8	OUT10	OUT12	OUT14
2	Output (n+1)	OUT1	OUT3	OUT5	OUT7	OUT9	OUT11	OUT13	OUT15
1	COM	Load actuating common (+)							

• EX510-S101□



No.	Name	Function							
		CN0	CN1	CN2	CN3	CN4	CN5	CN6	CN7
4	Output (n)	OUT0	OUT2	OUT4	OUT6	OUT8	OUT10	OUT12	OUT14
3	COM	Load actuating common (-)							
2	COM	Load actuating common (-)							
1	Output (n+1)	OUT1	OUT3	OUT5	OUT7	OUT9	OUT11	OUT13	OUT15

6-3-3 How to use extra output

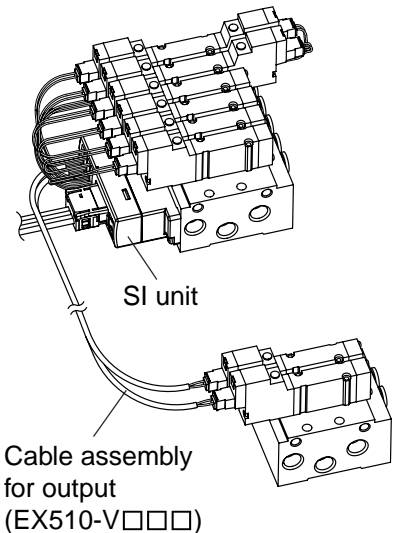
The extra output of SI unit can be used through cable assembly for output (EX510-V□□□).
(Refer below.)

For load current limit of SI unit, refer to “3-4 Specifications of SI unit”.

The current consumption of each valve series can be checked on table below.

For further information, refer to catalog of the valve.

Valve series	Current consumption
SY3000 / 5000 / 7000 / 9000	Standard : 0.4W (Approx.17mA) Power saving circuit : 0.1W (Approx.4mA)
SYJ3000 / 5000 / 7000	Standard : 0.4W (Approx.17mA) Power saving circuit : 0.1W (Approx.4mA)
VQZ1000 / 2000 / 3000	Standard : 1.0W (Approx.42mA) Low wattage : 0.5W (Approx.21mA)

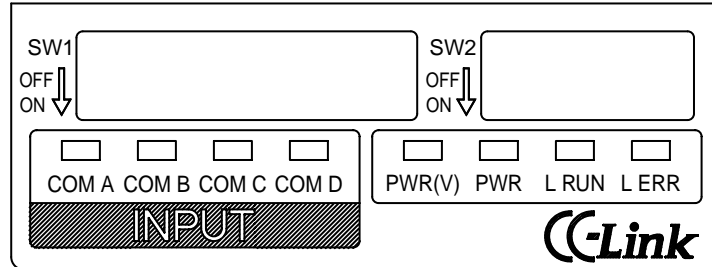


For how to connect cable assembly for output, refer to “6-3-2 Wiring of branch cables and load mounting connector”.

Caution : Do not apply strong tensile force on the cable assembly for output. The cable could have contact failure and breakage.

7. Display/ Switch Setting (GW unit)

7-1 LED display



Display	Meaning
PWR(V)	The power for output is supplied at specified voltage : Lights up The power for output is not supplied at specified voltage : Goes off
PWR	The power for input and controlling GW is supplied : Lights up The power for input and controlling GW is not supplied: Goes off
L RUN	Normally communicating :Lights up Communication interrupted :Goes off
L ERR	Communication error :Lights up Setting of station number and of transmitting speed setting switch is changed during powered :Lights (Blink with 0.4s interval) up Normally communicating :Goes off
COM A	COM A is receiving data : Lights up * COM A is having no data to receive : Goes off
COM B	COM B is receiving data : Lights up * COM B is having no data to receive : Goes off
COM C	COM C is receiving data : Lights up * COM C is having no data to receive : Goes off
COM D	COM D is receiving data : Lights up * COM D is having no data to receive : Goes off

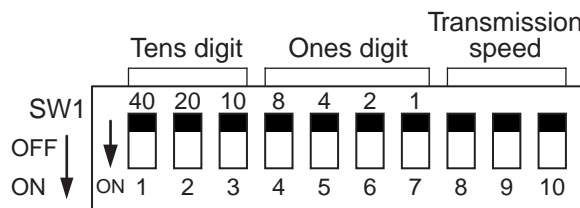
*Note: Only when Input unit (equipment) is connected and communicated normally.

7-2 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 driver etc.

7-2-1 Setting of station number/ transmission speed (SW1)

Setting of station number and transmission speed is performed with SW1.



(1) Station number setting (switch No.1 to 7)

Set tens digit of station number 10, 20 and 40, and set ones digit of station number 1,2,4 and 8. All setting are turned OFF at shipment and no station number is set.

Make sure to set the station number in the range of 1 to 62 (with 3 stations occupied).

Station number	Tens digit (switch No.)			Ones digit (switch No.)			
	40 (No.1)	20 (No.2)	10 (No.3)	8 (No.4)	4 (No.5)	2 (No.6)	1 (No.7)
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
:	:	:	:	:	:	:	:
10	OFF	OFF	ON	OFF	OFF	OFF	OFF
11	OFF	OFF	ON	OFF	OFF	OFF	ON
:	:	:	:	:	:	:	:
62	ON	ON	OFF	OFF	OFF	ON	OFF
63*	ON	ON	OFF	OFF	OFF	ON	ON

*Note : Station number 63 can be set for 2 stations occupied type.

(2) Transmission speed setting (switch No.8 to 10)

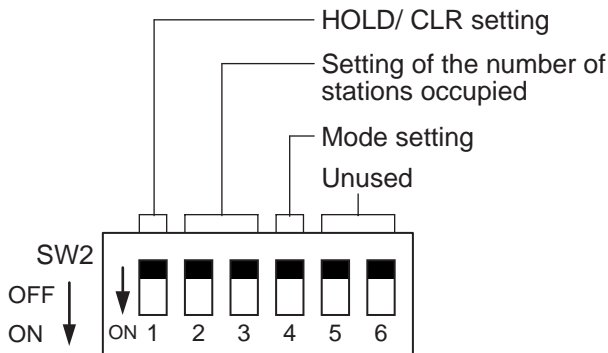
Make sure to set the transmission speed in the range as follows.

All setting are turned OFF at shipment, which means transmission speed is 156kbps.

Transmission speed	No.8	No.9	No.10
156kbps	OFF	OFF	OFF
625kbps	OFF	OFF	ON
2.5Mbps	OFF	ON	OFF
5Mbps	OFF	ON	ON
10Mbps	ON	OFF	OFF

7-2-2 HOLD/ CLR setting/ Setting of the number of stations occupied/ Mode setting (SW2)

HOLD/ CLR setting/ Setting of the number of stations occupied/ Mode setting are performed with SW2.



*Switch No.5 and 6 are unused. (Turn them off.)

(1) HOLD/ CLR setting (switch No.1)

The setting is as follows.

The setting at shipment is OFF, and this means CLR is selected.

HOLD/ CLR	No.1	Function
CLR	OFF	Output is cleared when an error occurs.
HOLD	ON	Output is held when an error occurs.

(2) Setting of the number of stations occupied (switch No.2 to 3)

The setting of the number of stations occupied is performed with switch No.2 to 3.

3 stations are occupied at shipment.

For further information, refer to "7-3 I/O memory map and flexible setting of number of I/O point".

Station setting	No.2	No.3	The max. available number of I/O point
2 station-occupied	OFF	ON	Input 32/ Output 32
3 station-occupied	ON	OFF	Input 64/ Output 64

(3) Mode setting (switch No.4)

Mode setting of each port is available only when 2 stations are occupied.

No.4 is used for mode setting.

For further information, refer to "7-3 I/O memory map and flexible setting of number of I/O point".

Mode	No.4	Number of branch	Valid port
A	OFF	16 points per port	COM.A and B
B	ON	8 points per port	COM.A to D

7-3 I/O memory map and setting of number of I/O point

In GW unit, the number of controlled I/O point can be changed with DIP switch (SW2 No. 2 to 4).
At shipment, setting to occupy 3 stations are provided.

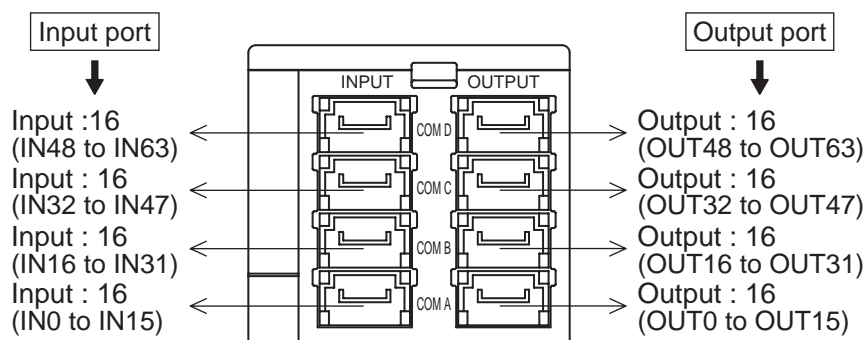
7-3-1 How to set

Number of occupied station	Mode	The max. available number of I/O point	SW2			Number of point controlled by COM port	
			NO.2	NO.3	NO.4	INPUT	OUTPUT
3 occupied stations	-	Input : 64 / Output : 64	ON	OFF	OFF	16 points for each of A to D	16 points for each of A to D
2 occupied stations	A mode	Input : 32 / Output : 32	OFF	ON	OFF	16 points for each of A and B	16 points for each of A and B
2 occupied stations	B mode	Input : 32 / Output : 32	OFF	ON	ON	8 points for each of A to D	8 points for each of A to D

7-3-2 Memory map

(1) I/O data

- 3 stations occupied (Input : 64, Output : 64)

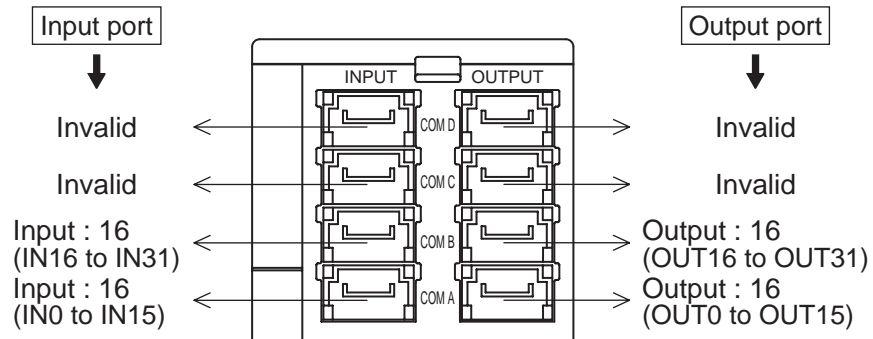


I/O memory map (in case of station number 1)

Buffer memory address	Remote input (RX)	Buffer memory address	Remote output (RY)
E0H	RX F to RX 0	160H	RY F to RY 0
	COM A (IN15 to IN0)		COM A (OUT15 to OUT 0)
E1H	RX1F to RX10	161H	RY1F to RY10
	COM B (IN31 to IN16)		COM B (OUT31 to OUT16)
E2H	RX2F to RX20	162H	RY2F to RY20
	COM C (IN47 to IN32)		COM C (OUT47 to OUT32)
E3H	RX3F to RX30	163H	RY3F to RY30
	COM D (IN63 to IN48)		COM D (OUT63 to OUT48)
E4H	RX4F to RX40	164H	RY4F to RY40
	Profile area *		It is not possible to use it.
E5H	RX5F to RX50	165H	RY5F to RY50
	Profile area *		It is not possible to use it.

Note : For detail of profile area, refer to "7-3-2 (2) Profile area".

- 2 stations occupied A mode (Input : 32, Output : 32)

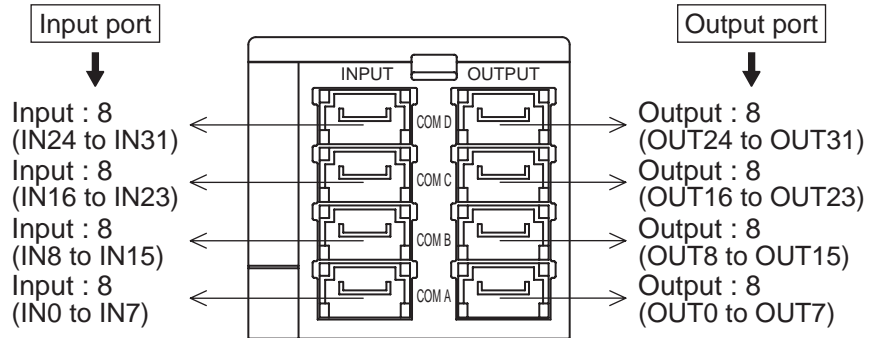


I/O memory map (in case of station No. 1)

Buffer memory address	Remote input (RX)	Buffer memory address	Remote output (RY)
E0H	RX F to RX 0	160H	RY F to RY 0
	COM A (IN15 to IN0)		COM A (OUT15 to OUT 0)
E1H	RX1F to RX10	161H	RY1F to RY10
	COM B (IN31 to IN16)		COM B (OUT31 to OUT16)
E2H	RX2F to RX20	162H	RY2F to RY20
	Profile area *		Not available
E3H	RX3F to RX30	163H	RY3F to RY30
	Profile area *		Not available

Note : For detail of profile area, refer to "7-3-2 (2) Profile area".

- 2 stations occupied B mode (Input : 32, Output : 32)



I/O memory map (in case of station No. 1)

Buffer memory address	Remote input (RX)		Buffer memory address	Remote output (RY)	
E0H	RX F to RX 8	RX 7 to RX 0	160H	RY F to RY 8	RY 7 to RY 0
	COM B (IN15 to IN 8)	COM A (IN 7 to IN 0)		COM B (OUT15 to OUT 8)	COM A (OUT7 to OUT 0)
E1H	RX1F to RX18	RX17 to RX10	161H	RY1F to RY18	RY1F to RY10
	COM D (IN31 to IN24)	COM C (IN23 to IN16)		COM D (OUT31 to OUT24)	COM C (OUT23 to OUT16)
E2H	RX2F to RX20		162H	RY2F to RY20	
	Profile area *			Not available	
E3H	RX3F to RX30		163H	RY3F to RY30	
	Profile area *			Not available	

Note : For detail of profile area, refer to "7-3-2 (2) Profile area".

(2) Profile area

GW unit has the function to detect lowering of power supply for output and to diagnose the condition of input port monitor etc., and sends the detected result by using profile area shown below.

- Low output power supply detecting function ... Detecting the condition where power supply for output decreases less than 20V and then informing it to CC-Link profile area.
This function doesn't influence error state flag and remote READY shown on the table below.
(Signal name on the table : Voltage decrease)
- Input port monitoring function ... Monitoring COM port of input and informing it to CC-Link profile area.
(Signal name on the table: COM A, COM B, COM C, COM D)
- Error state flag ... 0 : Normal
1 : GW unit is in start or stop condition
- Remote READY ... 1 : GW unit is in start condition

• 3 station occupied

I/O memory map (in case of station No. 1)

Buffer memory address	Remote input (RX)									
E4H	RX4F	...	RX4B	RX4A	RX49	RX48	...	RX42	RX41	RX40
	-	...	COM D	COM C	COM B	COM A	...	Voltage decrease	-	-
E5H	RX5F	...	RX5B	RX5A	RX59	RX58	...	RX52	RX51	RX50
	-	...	Remote READY	Error state flag	-	-	...	-	-	-

• 2 station occupied A • B mode

I/O memory map (in case of station No. 1)

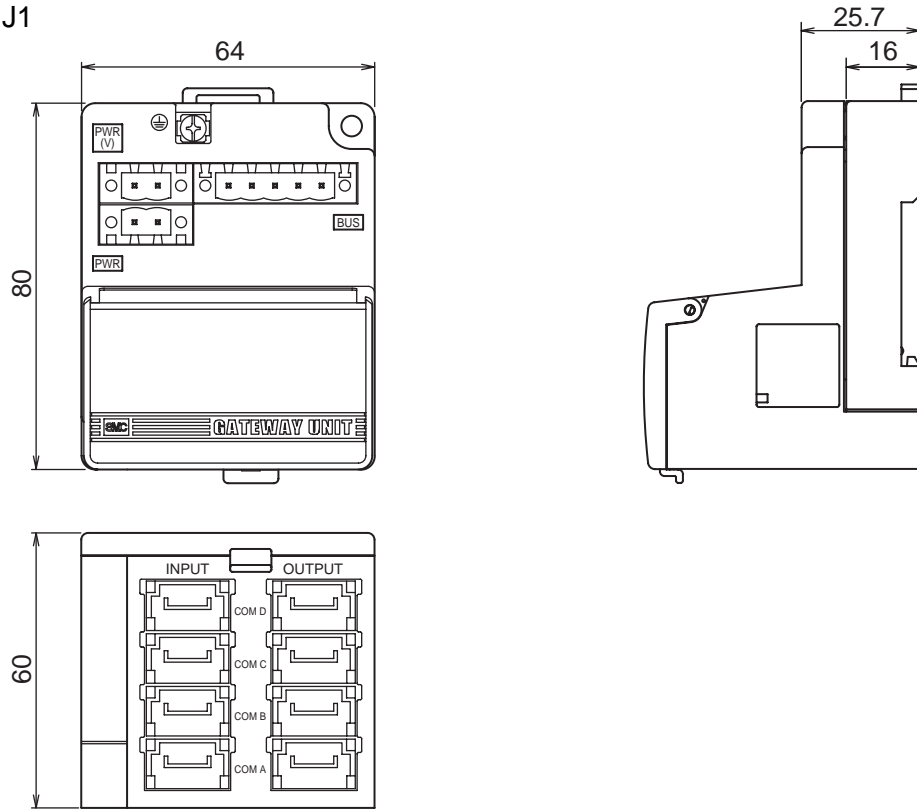
Buffer memory address	Remote input (RX)									
E2H	RX2F	...	RX2B	RX2A	RX29	RX28	...	RX22	RX21	RX20
	-	...	(COM D)	(COM C)	COM B	COM A	...	Voltage decrease	-	-
E3H	RX3F	...	RX3B	RX3A	RX39	RX38	...	RX32	RX31	RX30
	-	...	Remote READY	Error state flag	-	-	...	-	-	-

() is valid only in mode B.

8. Dimension

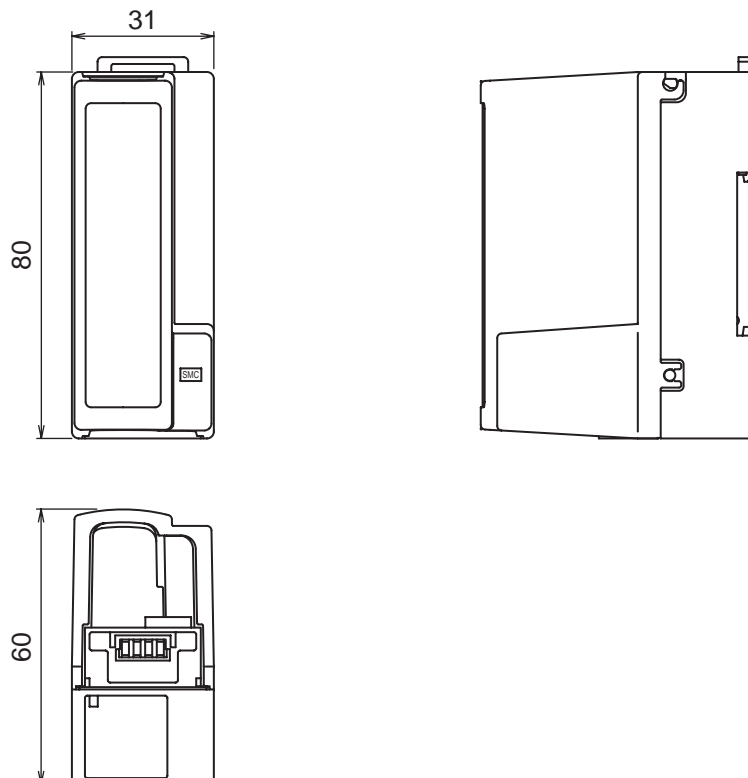
8-1 GW unit

- EX510-GMJ1

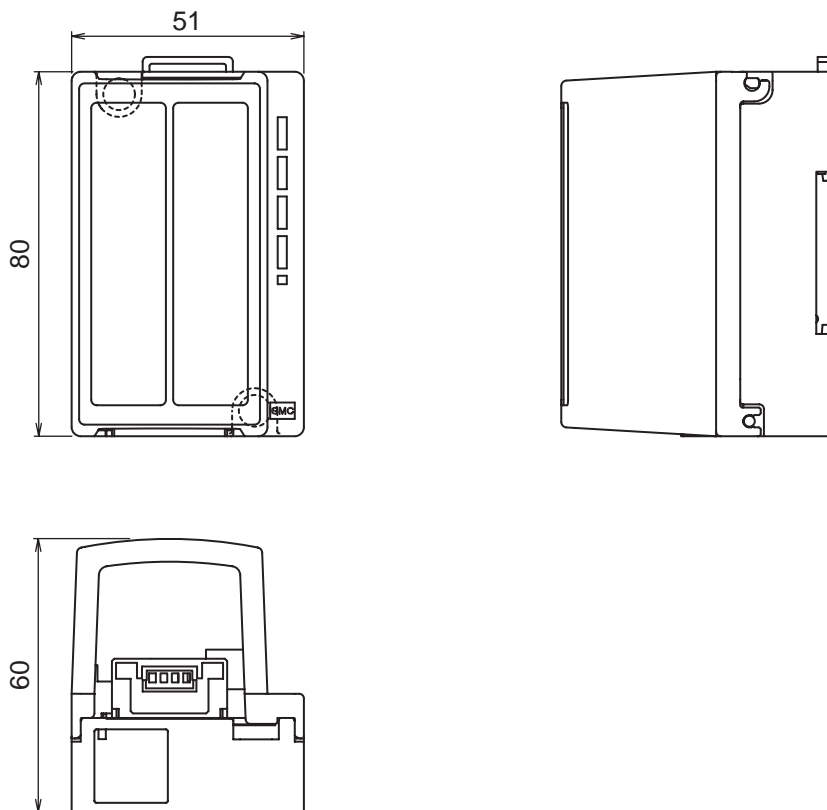


8-2 Input unit

- EX510-DX□1

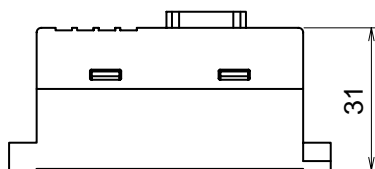
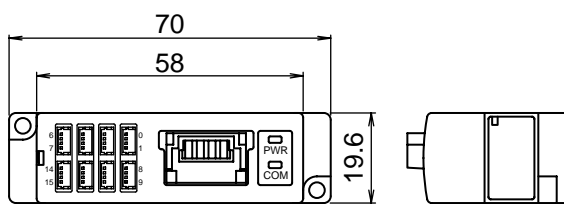


• EX510-DX□2

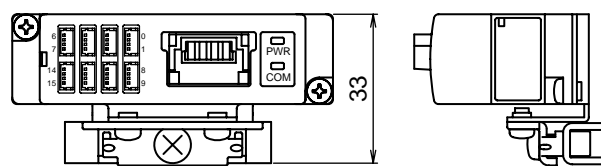


8-3 SI unit

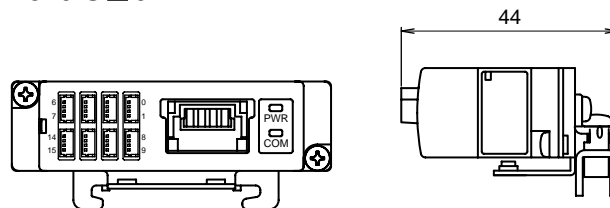
• EX510-S□01



• EX510-S□01A



• EX510-S□01B



8-4 Valve manifold

For valve manifold, refer to technical material including catalog and operation manual of each valve series.

9. Troubleshooting

Overall system

No.	Item	Remedy / Disposal
1	Solenoid valve is not operated	<ul style="list-style-type: none"> • Check the power for output (24V DC) 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 light up. • Ensure output branch current doesn't exceed the specification range.
2	Valve is not operated as programmed	<ul style="list-style-type: none"> • Re - 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 (24V DC) is supplied. • Check the LED for indication lights up. • Ensure input branch current doesn't exceed the specification range.
4	COM A-D doesn't light up	<ul style="list-style-type: none"> • Check the connection of branch of COM port, which doesn't light up, to Input unit.

CC-Link compatible communication

No.	Item	Remedy / Disposal
1	PWR LED goes off	<ul style="list-style-type: none"> • Check the power for input and controlling GW (24V DC) is supplied.
2	PWR (V) goes off	<ul style="list-style-type: none"> • Check the power for output (24V DC) is supplied. • Check the power supply voltage for output doesn't decrease under 20V.
3	RUN LED goes off/ ERR LED lights up	<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.
4	ERR LED is flashing	<ul style="list-style-type: none"> • Check the setting of transmission speed or station number doesn't change halfway.