Fieldbus system

DeviceNet™ Compatible GW Unit

Operation Manual

EX500-GDN1

SMC Corporation URL http://www.smcworld.com

URL http://www.smcworld.com

Ver.B

Thank you for purchasing the SMC reduced wiring system EX500 series.
Please read this instruction manual carefully and understand the contents before use so that you can operate this unit safely and correctly.
Please keep this manual handy for future reference.

OPERATOR

- This instruction manual has been written for those who have knowledge of machines and equipments that use reduced wiring system as well as the sufficient knowledge to assemble, operate, and maintain such devices.
- Before performing assembly, operation and/or maintenance, please read this manual carefully and understand the contents.

Contents

SAFETY

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

IMPORTANT MESSAGES	
Read this manual and follow its instructions. Signal words such as WARNING, CAUTION and NOTE will be followed by important safety information that must be carefully reviewed.	
⚠WARNING	Indicates a potentially hazardous situation that could result in death or severe injury if you do not follow instructions.
⚠CAUTION	Indicates a potentially hazardous situation that, if not avoided, may result in minor injury or moderate injury.
NOTE	Gives you helpful information.

⚠WARNING

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

Otherwise injury or failure can result.

Do not operate beyond specification range.

Otherwise fire, malfunction or damage to the reduced wiring system can result.
Confirm the specifications before operation.

Do not operate in atmosphere of flammable/explosive/corrosive gas.

Otherwise fire, explosion or corrosion can result.
This reduced wiring system is not explosion-proof type.

For use in interlock circuit:
- **Provide double interlock system by adding different type of protection (such as mechanical protection).**
- **Check that the interlock circuit is working normally.**

Otherwise accident caused by malfunction can result.

⚠WARNING

Before performing maintenance:
- **Turn off power supply.**
- **Stop air supply, exhaust compressed air in piping, and confirm the release to atmosphere.**

Otherwise injury can result.

⚠CAUTION

Conduct proper functional inspection after completing maintenance.

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

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

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

●Handling precautions

The direct current power supply to combine should be UL 1310 class 2 power supply when conformity to UL is necessary.

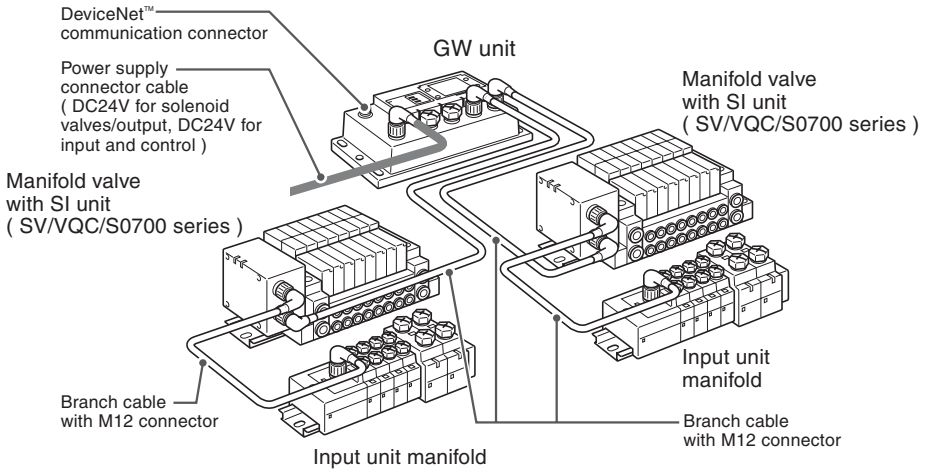
SAFETY (continued)

Follow the instructions given below when handling your reduced wiring system. Otherwise a damage or failure to cause a malfunction can result.

- Operate the reduced wiring system at the specified voltage.
- Reserve space for maintenance.
- Do not remove any name plate or label.
- Do not drop, hit or apply an excessive shock to the unit.
- Follow the specified tightening torque.
- Do not apply any excessive force to cables by repeated bending, tensioning or placing a heavy object on the cables.
- Connect wires and cables correctly.
- Do not perform any wiring work while the power is on.
- Do not use the reduced wiring system on the same wiring route as the power line or high voltage line.
- Confirm the insulation of wiring.
- Perform the power supply wiring by dividing into two lines — one is for power supply for output and the other is for power supply for input and control.
- Take sufficient measures against noise such as noise filter when incorporating the reduced wiring system into a machine or equipment.
- Mount a terminal plug or a waterproof cap on each unused M12 connector for input/output (communication connector, communication ports A - D, and power supply for input and control).
- Take sufficient shielding measures when operating the product in any of the following places.
  (1) A place where noise due to static electricity etc. is generated
  (2) A place of high electric field strength
  (3) A place where exposure to radioactivity is possible
  (4) A place near power cable
- Do not operate the product in a place where there is a source of surge.
- Use a surge absorbing element built-in type to directly drive the load that generates surge voltage such as solenoid valve.
- Prevent any foreign matter such as remnant of wires from getting inside the product when opening the station number switch protective cover.
- Install the reduced wiring system in a place free from vibration and impact.
- Operate the product in the specified ambient temperature range.
- Do not use in a place to be affected by the radiant heat from a surrounding heat source.
- Set the DIP switch and rotary switch by using a sharp-pointed watchmakers screwdriver etc.
- Perform the maintenance regularly.
- Conduct an appropriate functional inspection after completing the maintenance.
- Do not use chemicals such as benzin and thinner to clean the product.

Product Summary

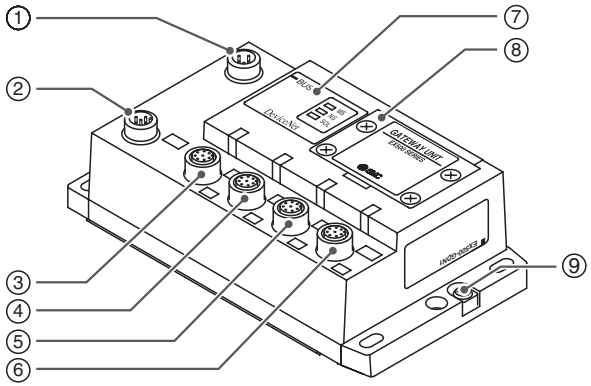
●System configuration



The reduced wiring system is connected to various kinds of fieldbus realizes the reduced wiring and decentralized installation of I/O devices . The signals to/from fieldbus are exchanged by GW unit, and the signals to/from decentralized I/O devices are collected and delivered by GW unit.
The maximum number of connections of manifold valve/Input unit manifold is 16/branch x 4 branches = 64 points each for output and input.

As the cables with connectors are used for all wirings among devices, the system complies with the IP65 environment.

EX500 Part Names



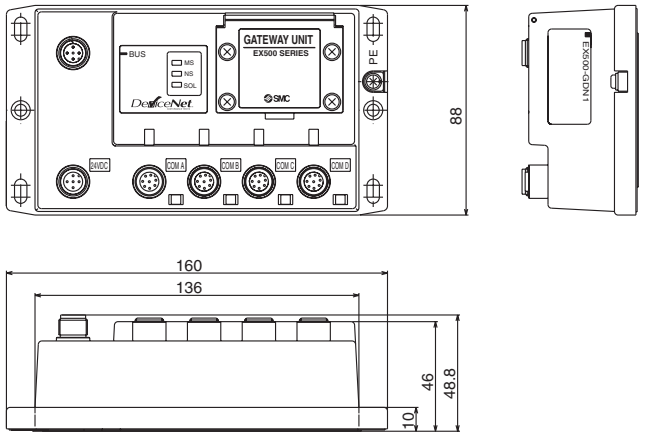
No.	Name	Application
1	Communication connector	Connect with DeviceNet™ line. (Note 1)
2	Power supply connector	Supply power for output devices such as solenoid valve, for input devices such as sensor, and for control by using power supply connector cable. (Note1)
3	Communication port A (COM A)	Connect SI unit (manifold valve) or Input unit by using branch cable with M12 connectors. (Note1)
4	Communication port B (COM B)	
5	Communication port C (COM C)	
6	Communication port D (COM D)	
7	Display	Display the power supply status and communication status with PLC. (Note2)
8	Station number switch protective cover	Set address and data rate by using the switches under this cover. (Note2)
9	Ground terminal	Used for grounding

Note1: For wiring method, refer to subsection "Wiring" (page 11) of section "EX500" in this manual.

Note2: For display and setting method, refer to subsection "Display/Switch Setting" (page 18) of section "EX500" in this manual.

Dimensions (unit: mm)

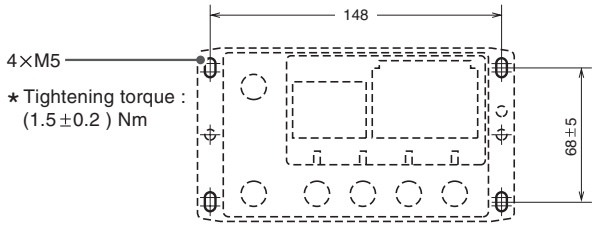
●EX500 body



Installation (unit: mm)

●Thread mounting

Secure at four positions with screws with head diameter of 5.2 or more and thread length of 15mm or more.



Cutout Dimensions for Mounting (Tolerance : ±0.2)

Specification

●Basic specifications

Rated voltage	DC24V
Range of power supply voltage	Power supply for input and control: DC24V ± 10% Power supply for output: DC24V+10%/-5% (Voltage drop warning at around 20V)
Rated current	Power supply for input and control: 3.0A (Inside GW unit: 0.2A Input device and SI control section: 2.8A) Power supply for solenoid valves and output: 3A
Number of input/ output points	Input point: max. 64/Output point: max 64

●Environmental specifications

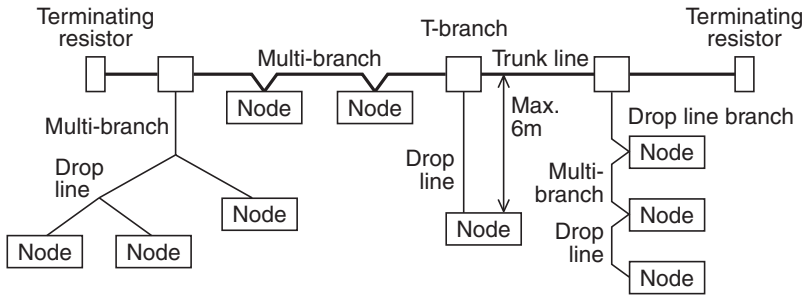
Pollution degree	Pollution degree 2
Operating ambient temp	5°C to 45°C
Storage ambient temp	-25°C to 70°C

●Higher-level bus

Protocol	DeviceNet™ Release 2.0
Slave (slave station) type	Group2 only server
MAC ID setting range	0 - 63
Device information	Vender code: 7 (SMC Corp.) Product type: 12 (communication adapter) Product code: 5001
Applicable message	Duplicate MAC ID check message Group2 only unconnected explicit message Explicit message Poll I/O message
I/O message size	Input: 8 bytes Output: 8 bytes
Date rate	125kbps, 250kbps, 500kbps
Transmission distance	Refer to the next page.
Insulation method	Photocoupler

Transmission distance

DeviceNet™ allows T-branch, multi-branch and drop line branch connections.
Total extended length of trunk line and drop lines depends on the date rate and the thickness of communication cable. The connection type for EX500 series is T-branch only.



Network length

Item		Date rate (kbps)		
		125	250	500
Maximum network length	Thick cable	500m or less	250m or less	100m or less
	Thin cable	100m or less		
Total drop line length		156m or less	78m or less	39m or less
		Note: Maximum length per drop line is 6m.		
Terminating resistor		121Ω, 1%, 1/4W		

Specification (continued)

Cable specification

Item	Thick cable		Thin cable	
	Signal	Power	Signal	Power
Conductor's cross-section area	0.82mm²	1.65mm²	0.20mm²	0.33mm²
Color	Blue, white	Red, black	Blue, white	Red, black
Impedance	120Ω ±10% (1MHz)	-	120Ω ±10% (1MHz)	-
Propagation delay (Max.)	1.36ns/ft	-	1.36ns/ft	-
Attenuation rate (Max.)	125kHz: 0.13dB/ft 500kHz: 0.25dB/ft 1.00MHz: 0.40dB/ft	-	125kHz: 0.29dB/ft 500kHz: 0.50dB/ft 1.00MHz: 0.70dB/ft	-
Conductor resistance (Max.)	6.9Ω /1000ft	3.6Ω /1000ft	28Ω /1000ft	17.5Ω /1000ft

1ft≒0.3048m

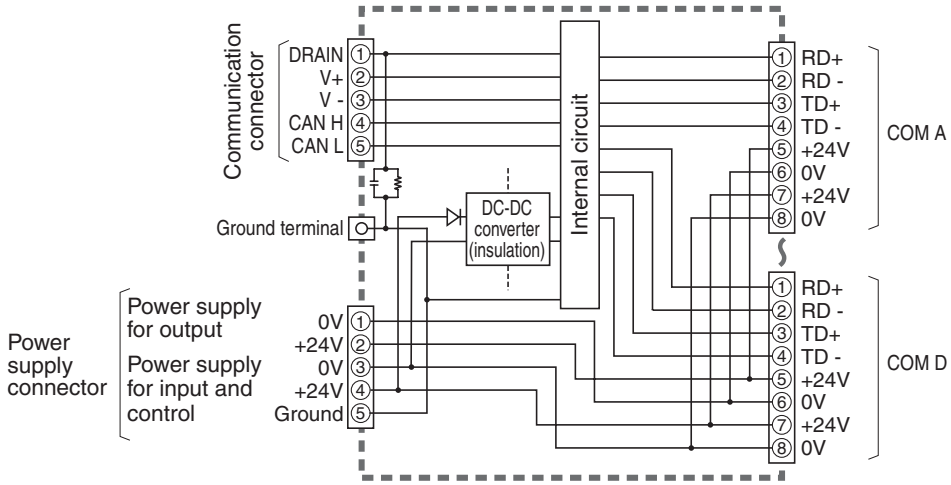
●Lower-level bus

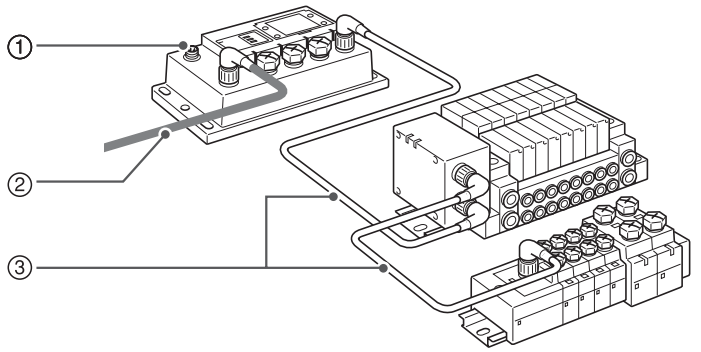
Number of branches for input/output	4 branches (16 points/branch) for input 4 branches (16 points/branch) for output
Communication method	Protocol: Dedicated for SMC Speed: 750kbps
Branch current for input (Note)	Max. 0.5 [A] per branch (when SI unit and input devices are connected)
Branch current for output	Max. 0.65 [A] per branch (when SI unit EX500-S□01 is connected) Max. 0.75 [A] per branch (when SI unit EX500-Q□O_2^1 is connected)
Branch cable length	5m or less per branch (total extended length: 10m or less)

Note: Total value of maximum current consumption and maximum load current of input devices to connect.

Wiring

●Internal circuit





The wirings are described in the following order.

① Communication wiring: Connection with DeviceNet™

▼

② Power supply wiring: Connections of power supplies for solenoid valves/output devices, and for input devices and control

▼

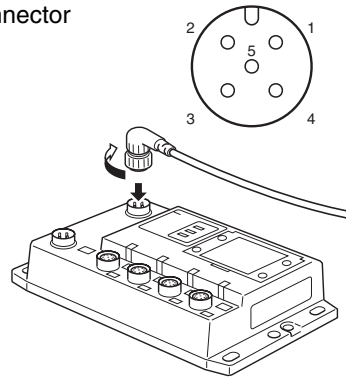
③ Branch wiring: Connection from GW unit to SI unit or Input unit

① Communication wiring

Connect the cable with DeviceNet™ communication connector to the communication connector of GW unit.

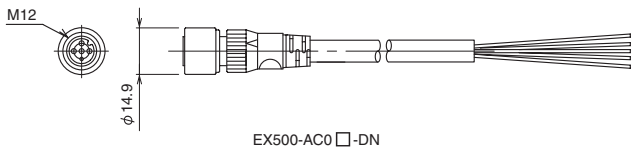
Cable connection

(1) Aligning the key groove with the communication connector (5-pin, plug) of GW unit, plug the DeviceNet™ communication cable (socket).
(2) Tighten the lock nut on cable side by turning it clockwise by hand.
(3) Confirm that the connector portion does not move.

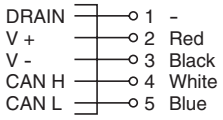


Pin layout and connection diagram of cable with DeviceNet™ communication connector

Connect the communication cable with socket-type M12 connector to the communication connector of GW unit.

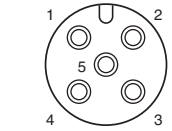


EX500-AC0☐-DN



Connection Diagram

Cable specification			
Core wire	Signal wire	AWG24 (41/0.08)	Blue, white
	Power wire	AWG22 (19/0.16)	Red, black
	Drain wire	AWG22 (19/0.16)	-
Outside diameter	ϕ 7		
Sheath color	Light blue		



Socket Connector Pin Layout

Note 1 This cable is DeviceNet™ thin cable.

Connection of terminating resistor

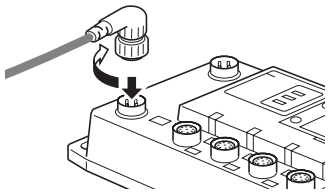
To both ends of DeviceNet™ trunk line, be sure to connect terminating resistors(PCA-1557675 etc).
For terminating resistor, refer to subsection "Specification" (page 8) of section "EX500" in this manual.

② Power supply wiring

Connect the power supply connector cable to the power supply connector of GW unit. There are two types of cables different in connector shape — straight type and angle type. With this cable, the power is supplied to the output devices such as solenoid valve, and the input devices such as sensor, and for control. Therefore, there is no need to supply the power to other units individually.
When selecting the power supply, refer to "Handling precautions" (page 3) in this manual.

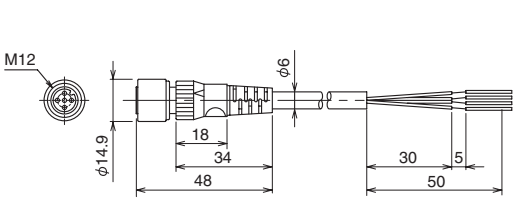
Cable connection

(1) Aligning the key groove with the power supply connector (plug) of GW unit, plug the power supply cable (socket).
(2) Tighten the lock nut on cable side by turning it clockwise by hand.
(3) Confirm that the connector portion does not move.

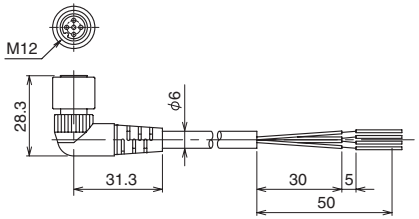


Pin layout and connection diagram of power supply connector cable for (unit: mm)

(Pin layout and connection diagram are common to all cables.)

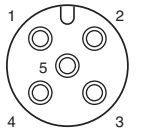


Straight connector Type
EX500-AP☐-S



Angle connector Type
EX500-AP☐-A

Pin No.	Cable color: Signal name
1	Brown: 0V (for solenoid valves/output)
2	White: DC24V+10%/-5% (for solenoid valves/output)
3	Blue: 0V (for input and control)
4	Black: DC24V±10% (power supply for input and control)
5	Gray: Ground



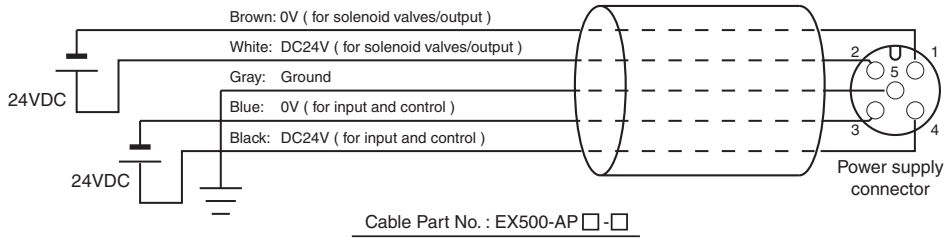
Socket Connector Pin Layout

NOTE
D type ground (Third-type-grounding) should be performed for ground terminal.

Separate wiring for power supply for solenoid valves/output and for input and control

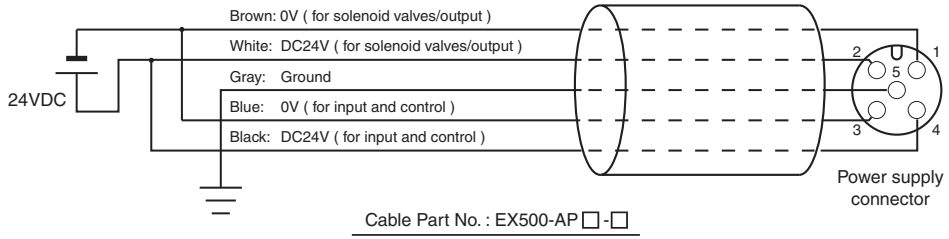
Both single power supply and two power supply systems can be adopted, however, the wiring shall be made separately (for solenoid valves/output and for input and control) for either system.

A. Two power supply system



Cable Part No. : EX500-AP□-□

B. Single power supply system



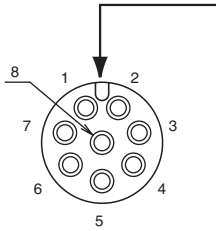
Cable Part No. : EX500-AP□-□

③ Branch wiring (wiring to communication ports)

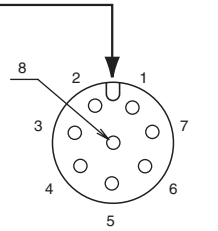
For wiring with solenoid valves or input devices, connect the branch cable with M12 connector to communication ports A - D.
There are two types of cables different in connector shape — straight type and angle type. As each cable contains power supply wire, there is no need to supply the power to solenoid valves or input devices individually.

Cable connection

(1) Aligning the key groove with the connector (socket) of GW unit, plug in the cable (plug).



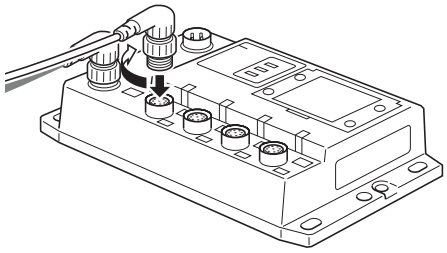
Socket Connector Pin Layout



Plug Connector Pin Layout

(2) Tighten the lock nut on cable side by turning it clockwise by hand.

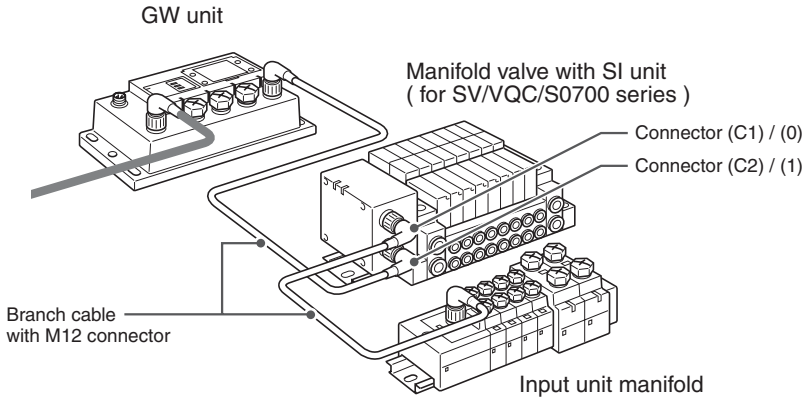
(3) Confirm that the connector portion does not move.



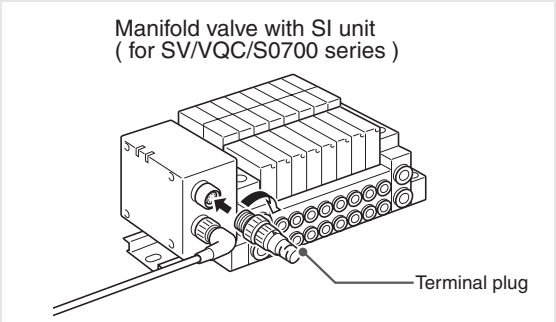
NOTE
Mount a waterproof cap on each unused connector of GW unit. The proper use of waterproof cap can achieve IP65 Enclosure. (Tightening torque: 0.1Nm for M12)

For GW unit – Manifold valve – Input unit manifold configuration

Two communication connectors in SI unit and one communication connector in Input unit are installed respectively.
To the communication connector (C2) or (1) of SI unit, connect the branch cable with M12 connector from GW. To the communication connector (C1) or (0), connect the branch cable with M12 connector from Input unit.
To the communication connector of Input unit, connect the branch cable with M12 connector from SI unit.

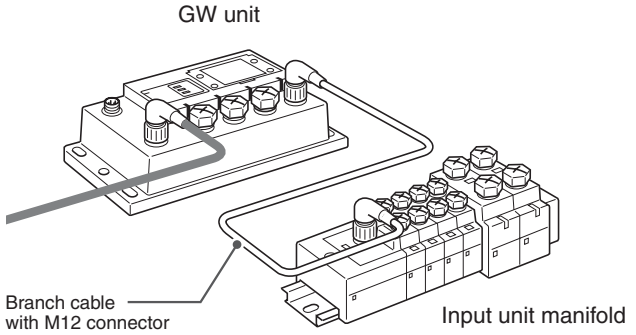


NOTE
When no Input unit is connected to the connector (C1) or (0) of SI unit, mount a terminal plug on the connector.

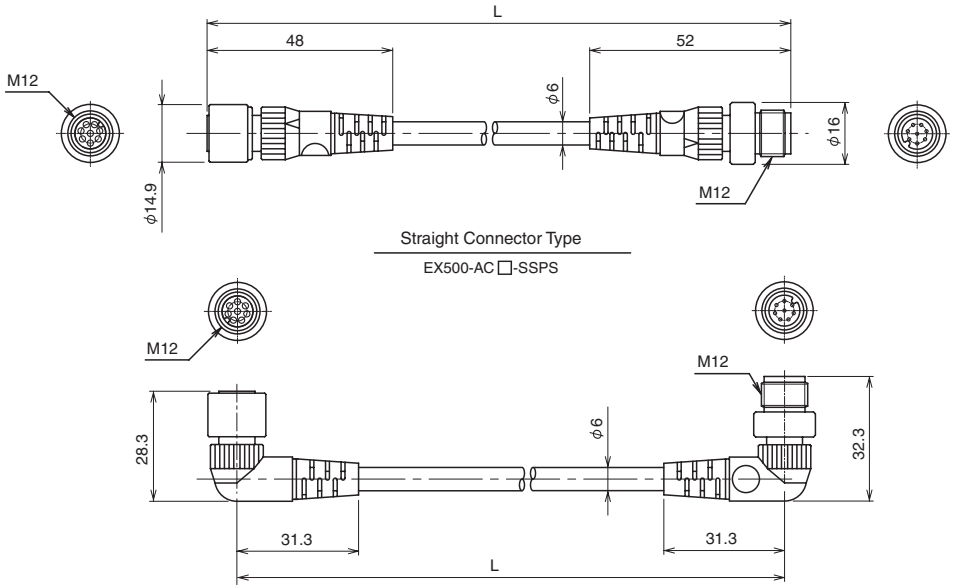


For GW unit – Input unit manifold configuration

To the communication connector of Input unit, connect the branch cable with M12 connector from GW unit.



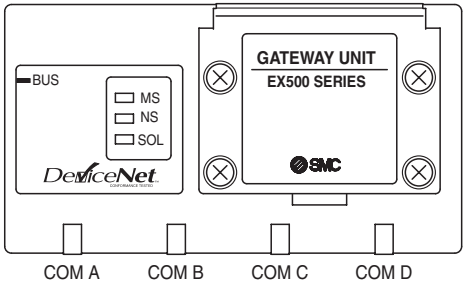
Type, pin layout and connection diagram of the branch cable with M12 connector (EX500-AC ☐ - ☐)



L=300, 500, 1000, 3000, 5000 (mm)

Display/Switch Setting

●Settings for display



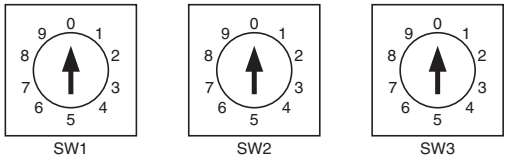
Display	Description
MS	Turns on in green: Normal status. Turns on in red: Fatal failure occurred.
NS	Turns off: Offline/Power is OFF. Blinks in green: Online/Communication is not established. Turns on in green: Online/Communication is established. Blinks in red: Minor communication error occurred. Turns on in red: Fatal communication error occurred.
SOL	Turns on: Power is supplied to solenoid valves/output at specified voltage. Turns off: Power is not supplied to solenoid valves/output at specified voltage. (Voltage dropped to lower than 20V.)
COM A	Turns on: COM A is receiving data. Turns off: COM A has no received data.
COM B	Turns on: COM B is receiving data. Turns off: COM B has no received data.
COM C	Turns on: COM C is receiving data. Turns off: COM C has no received data.
COM D	Turns on: COM D is receiving data. Turns off: COM D has no received data.

NOTE
When connecting manifold valve only without connecting Input unit manifold, LEDs of COM A - D do not light. To make them light, connect a terminal plug to the unused connector of SI unit ("C1" or "0").

●Switch setting

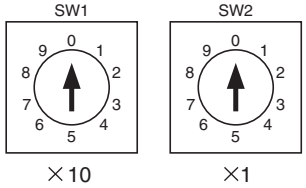
Open the station number switch protective cover and set the switches with a sharp-pointed watchmakers screwdriver etc.

NOTE
1. Be sure to turn off the power before setting the switches.
2. Be sure to set these switches before use.
3. After opening and closing the station number switch protective cover, tighten the screws by proper tightening torque. (Tightening torque: 0.6Nm)



Address setting switches 1 and 2 (SW1 and SW2)

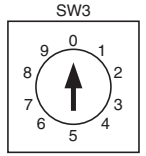
These switches can set the node address.



SW1: Sets the second digit.
SW2: Sets the first digit.

Data rate setting switch (SW3)

This switch can set the data rate.



The settings of each switch are as shown in the table below:
(The initial settings are: SW1; 6, SW2; 3 and SW3; 0.)

SW1	SW2	Node address
0	0	0
0	1	1
0	2	2
⋮	⋮	⋮
6	3	63
6	4	PGM (Note)
⋮	⋮	
9	9	

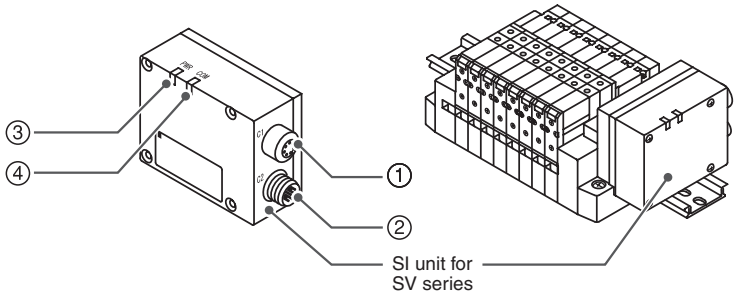
SW3	Data rate
0	125kbps
1	250kbps
2	500kbps
3···9	PGM (Note)

Note: When PGM is selected, the node address or data rate will be set via DeviceNet™ network.

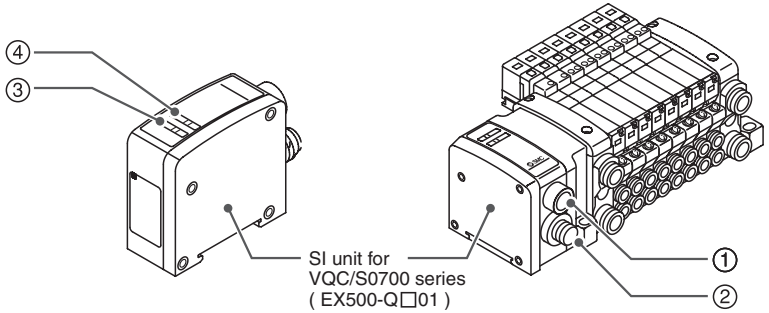
SI Unit Part Names

The SI unit is the unit to communicate with GW unit in combination with manifold valve. It can be used with SV series valves VQC series valves and S0700 series valves. In addition, this unit is able to operate solenoid valves, relays. etc. in combination with EX9 series general purpose output block. For how to use it, refer to section "EX9 Series General Purpose Output Block" (page 31) in this manual.

1. SI unit for SV series valves (EX500-S☐01)



2. SI unit for VQC/S0700 series valves (EX500-Q☐O_2^1)



Common to EX500-S☐01/EX500-Q☐O_2^1

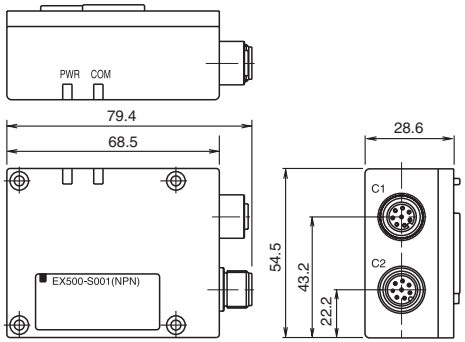
No.	Name	Application
1	Communication connector "C1" or "0"	Connects the branch cable to Input unit (branch cable with M12 connector). (Note1)
2	Communication connector "C2" or "1"	Connects the branch cable from GW unit (branch cable with M12 connector). (Note1)
3	Power LED	Indicates the power supply status. (Note2)
4	Communication LED	Indicates the communication status with GW unit: (Note2)

Note1: For wiring method, refer to subsection "Wiring" (page 11) of section "EX500" in this manual.

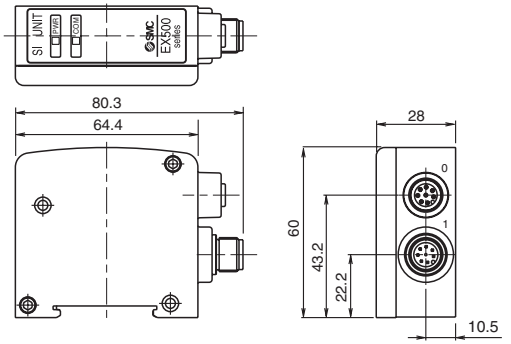
Note2: For display, refer to "Display" (page 24) in section "SI Unit" in this manual.

Dimensions (unit: mm)

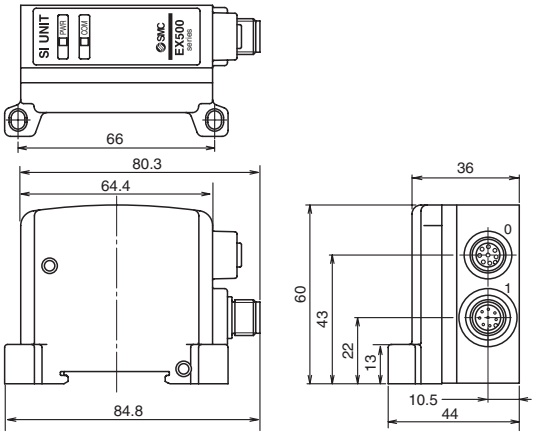
1. SI unit for SV series valves (EX500-S☐01)



2. SI unit for VQC/S0700 series valves (EX500-Q☐01)

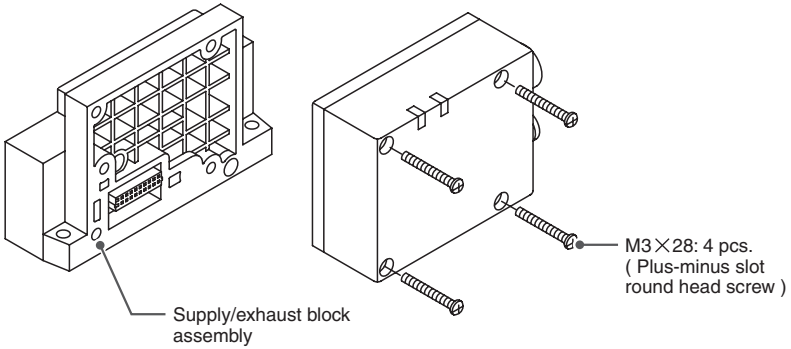


(EX500-Q☐02)

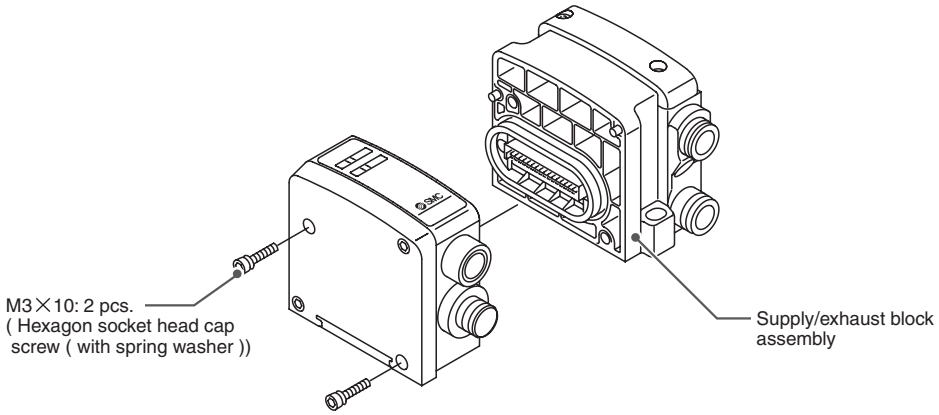


Mounting/Wiring

The mounting and removing methods of SI unit are as shown below.



SI Unit for SV Series Valves (EX500-S☐01)



SI Unit for VQC/S0700 Series Valves (EX500-Q☐01)

NOTE
Holding with hand so that there will be no gap between SI unit and Air supply/exhaust block assembly, tighten the bolts. Be sure to tighten each bolt by specified tightening torque. (Tightening torque: 0.6Nm)

Note 1 For branch wiring method, refer to subsection "Wiring" (page 11) of section "EX500" in this manual. As the power to output devices such as solenoid valve is supplied by branch wiring (branch cable with M12 connector), there is no need to supply power individually.

Note 2 For mounting/installation methods of solenoid valve, manifold, etc., refer to the catalogs, instruction manuals, technical data, etc. of each valve series.
When connecting general purpose output block only, refer to subsection "Mounting" (page 33) of section "EX9 Series General Purpose Output Block" in this manual.

Specification

1. SI unit for SV series valve (EX500-S☐01)

Item	Specification	
Connected block	Solenoid valve (single, double) Relay output module (1-point output, 2- point output)	
Connected block station	Double solenoid valve Relay output module (2-point output)	Max. 8 stations
	Single solenoid valve Relay output module (1-point output)	Max. 16 stations
Supply voltage for block	DC24V	
Supply current for block	0.65A Max.	
Current consumption	100mA or less (at rated voltage)	

2. SI unit for VQC/S0700 series valve (EX500-Q☐0$\frac{1}{2}$)

Item	Specification	
Connected block	Solenoid valve (single, double) General purpose output block (EX500-Q☐02 only)	
Connected block station	Double solenoid valve	Max. 8 stations
	Single solenoid valve	Max. 16 stations
	General purpose output block (EX500-Q☐02 only)	Max. 8 stations
Supply voltage for block	DC24V	
Supply current for block	0.75A Max.	
Current consumption	100mA or less (at rated voltage)	

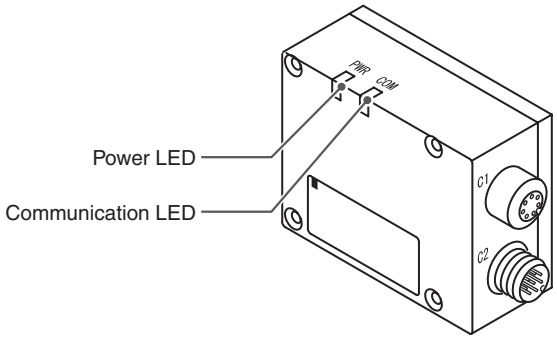
3. Applicable valve series

For detailed specifications of solenoid valve and manifold, refer to the catalogs, Operation manuals, technical data, etc. of each valve series.

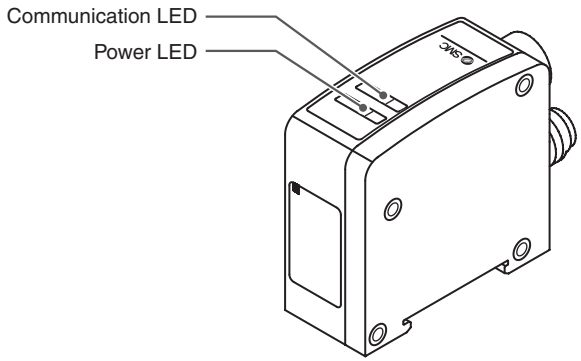
SV1000/2000/3000/4000
VQC1000/2000/4000
S0700

Display

●SI unit for SV series valves (EX500-S□01)



●SI unit for VQC/S0700 series valves (EX500-Q□O_2^1)



Common to EX500-S□01/EX500-Q□O_2^1

Display	Description
Power LED	Turns on: Power to solenoid valves/output is supplied at the specified voltage. Turns off: Power to solenoid valves/output is not supplied at the specified voltage. (Voltage dropped to lower than 20V.)
Communication LED	Turns on: Receiving data from GW Turns off: No received data

Input Unit Manifold Part Names

The Input unit manifold consists of Input unit, input block (s), end block and DIN rail.
The input block up to 8 can be connected (16 points).
Any combination of input blocks (for M8 connector, M12 connector and 8-point-integrated type) is acceptable.

Note Do not mix sensor input specifications (PNP and NPN) .

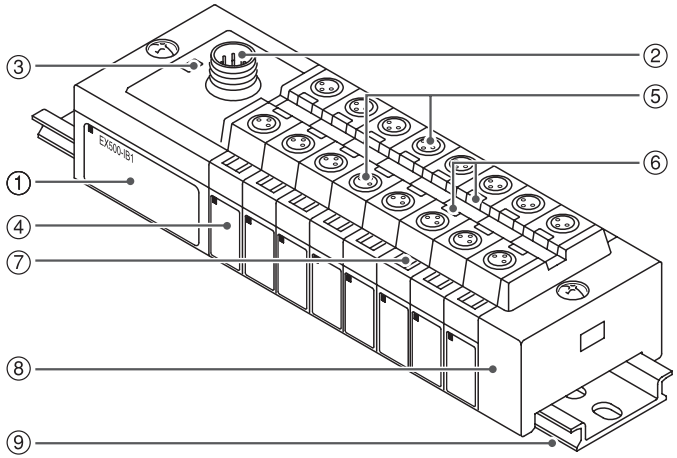


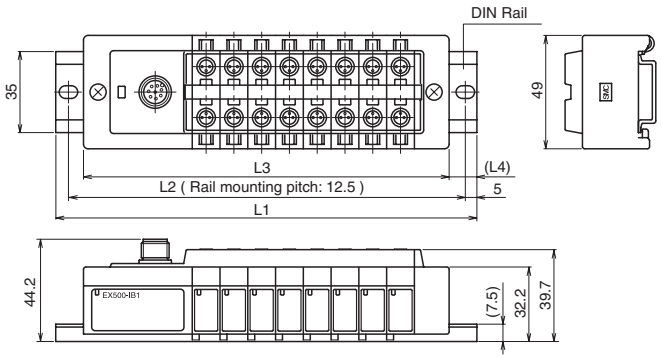
Figure shows the configuration when only input blocks for M8 connector are connected.

No.	Part name	Application
1	Input unit	Unit to communicate with GW unit or SI unit.
2	Communication connector	To be connected with branch cables from GW unit or SI unit (branch cable with M12 connector) (Note1)
3	Power LED	Indicates the power supply status. (Note2)
4	Input block	Unit for sensor signal input.
5	Sensor connector	Connects with sensor. (Note1)
6	Indicator LED	Indicates sensor signal status. (Note2)
7	Marker	To be used for writing input No. etc.
8	End block	Composes the end of Input unit manifold.
9	DIN rail	To be mounted with Input unit manifold.

Note1: For wiring method, refer to subsection "Wiring" (page 29) of section "Input Unit Manifold" in this manual.
Note2: For display, refer to "Display" (page 30) in section "Input Unit Manifold" in this manual.

Dimensions (unit: mm)

●When only input blocks for M8 connector are connected

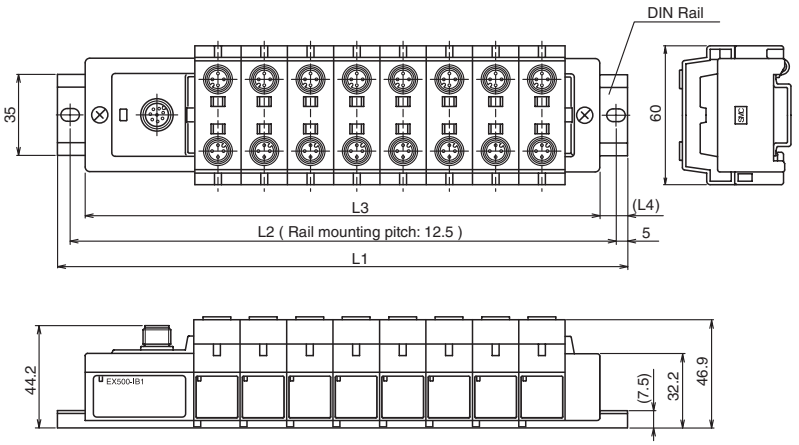


Stations	1	2	3	4	5	6	7	8
L1 [mm]: Rail length	98	110.5	123	135.5	148	160.5	173	185.5
L2 [mm]: Mounting pitch	87.5	100	112.5	125	137.5	150	162.5	175
L3 [mm]: Manifold length	74	86	98	110	122	134	146	158
L4 [mm]	12	12	12.5	12.5	13	13	13.5	13.5

●When only input blocks of 8-point-integrated type are connected

Stations	1	2
L1 [mm]: Rail length	135.5	185.5
L2 [mm]: Mounting pitch	125	175
L3 [mm]: Manifold length	110	158
L4 [mm]	12.5	13.5

●When only input blocks for M12 connector are connected



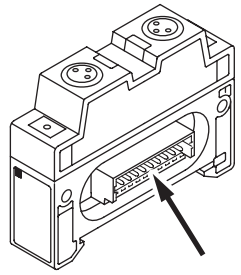
Stations	1	2	3	4	5	6	7	8
L1 [mm]: Rail length	110.5	123	148	173	185.5	210.5	223	248
L2 [mm]: Mounting pitch	100	112.5	137.5	162.5	175	200	212.5	237.5
L3 [mm]: Manifold length	82	102	122	142	162	182	202	222
L4 [mm]	12	12	12.5	12.5	13	13	13.5	13.5

Installation

① Connect each connector of Input unit, input blocks, and end block (portion indicated by arrow in the figure to the right).

② Holding with hands so that there will be no gap between blocks, place the jointed unit and blocks on DIN rail.

③ Tighten the bolts of Input unit and end block to secure the jointed unit and blocks to DIN rail. Be sure to tighten the bolts by proper tightening torque. (Tightening torque: 0.6Nm)



Specification

●Specifications for Input unit

Item	Specification
Connected block	Current source type input block (PNP input block) or Current sink type input block (NPN input block)
Connected block station	Max. 8 blocks
Supply voltage for block	DC24V
Supply current for block	0.65A Max.
Current consumption	100mA or less (at rated voltage)
Short circuit protection	Operates at 1A Typ. (Cuts power supply.) Can be reset by returning the power after cutting the power supply to input and control section of GW unit.

●Specifications for input block

Item	Specification	
Applicable sensor	Current source type (PNP output)	Current sink type (NPN output)
No. of input points	2 points/8 points (for M8 connector only)	
Rated voltage	DC24V	
Logical "1" input voltage	15V - 26.4V	0V - 8V
Logical "0" input voltage	0V - 5V	19V - 26.4V
Logical "1" input current	5mA Typ.	-5mA Typ.
Logical "0" input current	1.5mA	-1.5mA
Input delay time	1msec. or less	
Indicator LED	Green LED	
Insulation	N/A	
Supply current to sensor	Max. 480mA/Input unit manifold	

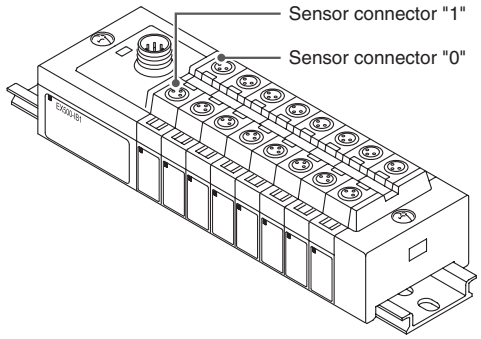
Wiring

●Branch wiring

For wiring method, refer to subsection "Wiring" (page 11) of section "EX500" in this manual. To input devices such as sensor, the power is supplied through the branch wiring (branch cable with M12 connector). Therefore, there is no need to supply the power to them individually.

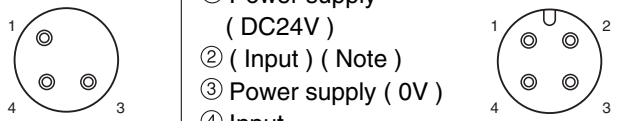
●Sensor wiring

Connect sensors to the sensor connectors of input block.



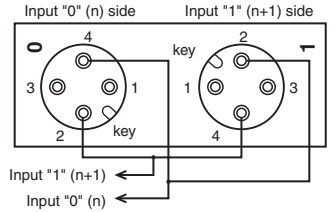
Pin layout of sensor connector

M8 connector (3-pin socket)	M12 connector (4-pin socket)
① Power supply (DC24V) ③ Power supply (0V) ④ Input	① Power supply (DC24V) ② (Input) (Note) ③ Power supply (0V) ④ Input



Note: Internal wiring of M12 input block and key position for mounting sensor connector

- No. 2 pins of M12 input block connectors are wired to each other's sensor signal input pins (No. 4 pins) internally.
- This wiring enables direct input of signals from two points combined into one cable through concentric connector etc.
- When connecting sensors, confirm the specification of output signal carefully. Otherwise malfunction can result.
- The key position for mounting sensor connector is as shown to the right. Consider this key position when selecting sensor.



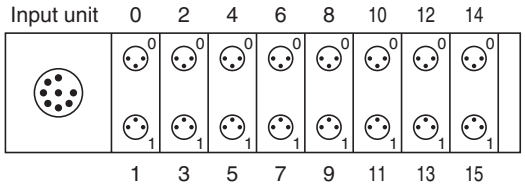
M12 Block

NOTE

Mount a waterproof cap on each unused connector of Input unit. The proper use of waterproof cap can achieve IP65 Enclosure. The waterproof caps are delivered together with each input block as accessories. (Tightening torque: 0.05Nm for M8 and 0.1Nm for M12)

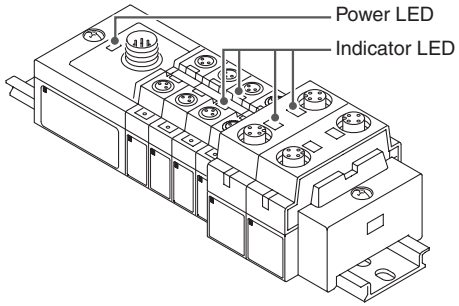
Correspondence between input number and input block

Input block up to 8 can be connected (16 points).
Input numbers are 0 - 15 from Input unit side.



Display

●Settings for display



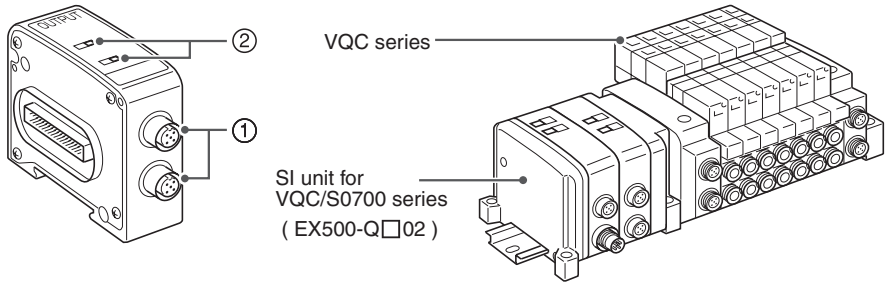
Display	Description
Power LED	Turns on: Power for input and control is supplied. Blinks: Under short circuit protection (abnormal status). As the short circuit protective function is operating, the power is not supplied. To cancel blinking, turn off and return the power to GW unit. Turns off: Power for input and control is not supplied.
Indicator LED	Turns on: Sensor signal input ON (logical "1") Turns off: Sensor signal input OFF (logical "0")

EX9 Series General Purpose Output Block Part Names

The EX9 series general purpose output block is the unit to operate solenoid valve, relay, etc. in combination with VQC series valve and applicable SI unit.
There are two types — one type is for low wattage load (EX9-OET1 or EX9-OET2) that outputs signals by receiving power supply from SI unit, and the other type is for high wattage load (EX9-OEP1 or EX9-OEP2) that outputs signals by receiving power supply from outside. The type for high wattage load is used in combination with the power block (EX9-PE1) connected with external power supply. As the low-wattage-load type is powered from SI unit, the wattage of load is limited to 1.0W (Note1). For a load up to 12W, use the power block and the high-wattage-load type.

Note1: When connected with EX500 series.

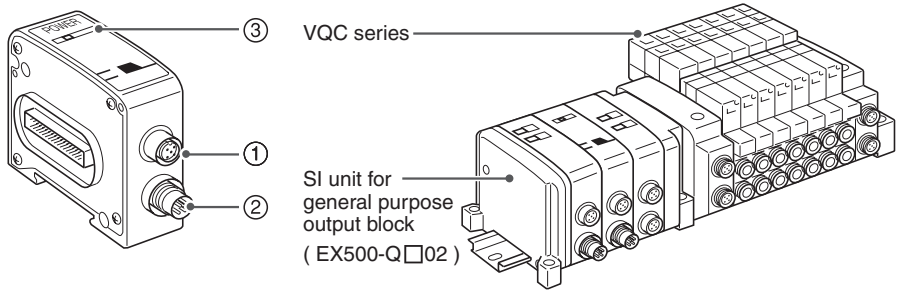
1. EX9-OET1/EX9-OET2/EX9-OEP1/EX9-OEP2



No.	Part name	Application
1	Output connector	Connects with output device. (Note1)
2	Indicator LED	Indicates the output status. (Note2)

Note1: For wiring method, refer to subsection "Wiring" (page 34) of section "EX9 Series General Purpose Output Block" in this manual.
Note2: For display, refer to subsection "Display" (page 37) of section "EX9 Series General Purpose Output Block" in this manual.

2. EX9-PE1



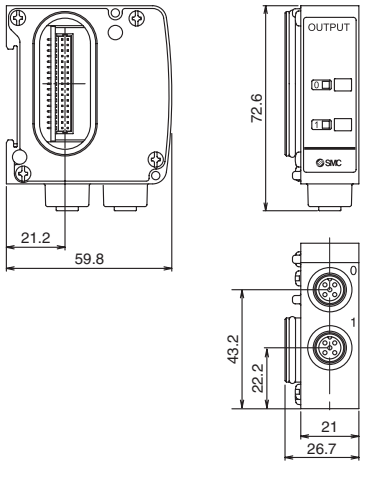
No.	Part name	Application
1	Power supply connector	Unused
2	Power input connector	Supplies power for output devices. (Note1)
3	Power LED	Indicates the power supply status. (Note2)

Note1: For wiring method, refer to subsection "Wiring" (page 34) of section "EX9 Series General Purpose Output Block" in this manual.

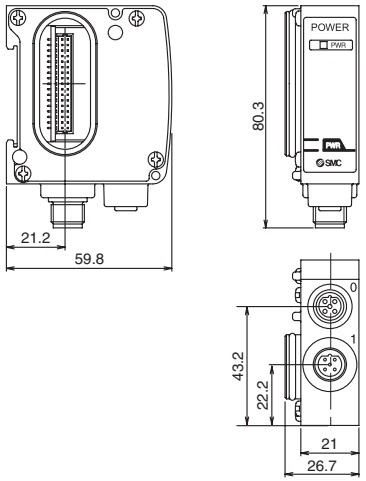
Note2: For display, refer to subsection "Display" (page 37) in section "EX9 Series General Purpose Output Block" in this manual.

Dimensions (unit: mm)

1. EX9-OET1/EX9-OET2/ EX9-OEP1/EX9-OEP2

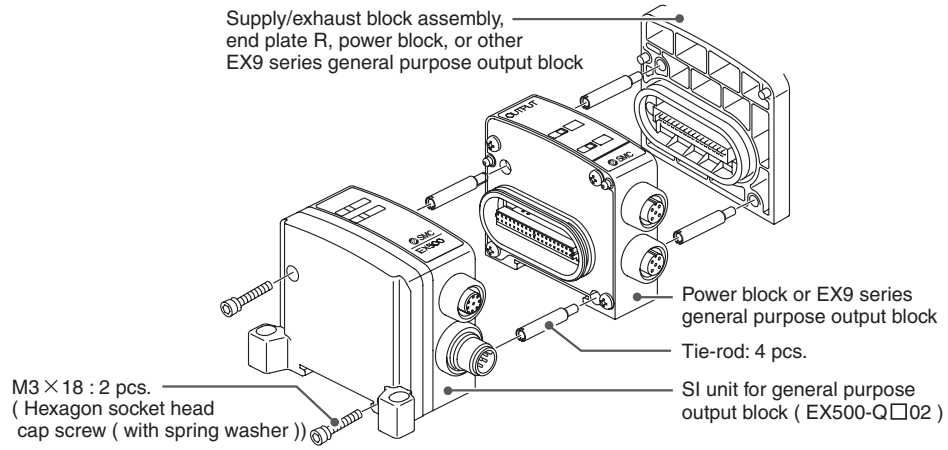


2. EX9-PE1



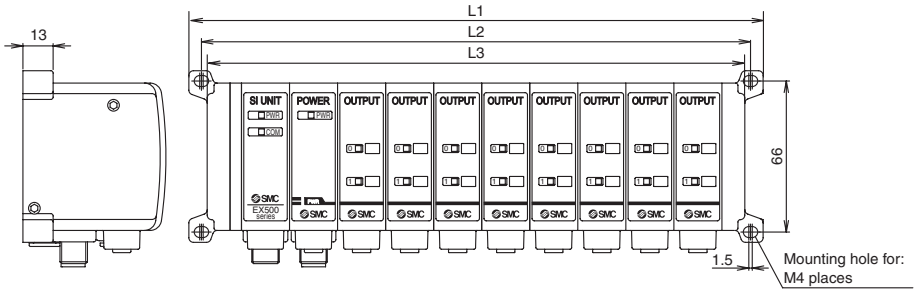
Mounting

The mounting and removing methods of each SI unit are as shown below.



NOTE
Holding with hand so that there will be no gap between units and tighten the bolts. Be sure to tighten each bolt by specified tightening torque. (Tightening torque: 0.6Nm)

●Dimensions when general purpose output block is connected



L dimensions

No. of output block stations	1	2	3	4	5	6	7	8
L1 [mm]	83	104	125	146	167	188	209	230
L2 [mm]	72	93	114	135	156	177	198	219
L3 [mm]	67	88	109	130	151	172	193	214

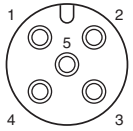
Note The above dimensions show those when one unit of power block (width: 21mm) is combined. For details, refer to the instruction manuals, technical data, etc. of EX9 series general purpose output block.

Output wiring

Connect output devices to the output connectors.

EX9-OET1/EX9-OET2/EX9-OEP1/EX9-OEP2 output connectors

M12, 5-pin, socket

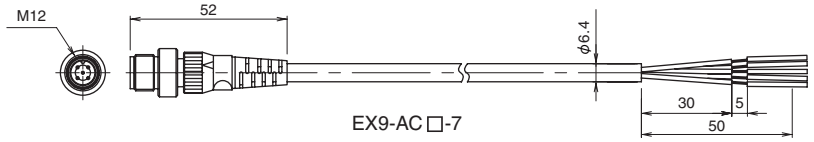


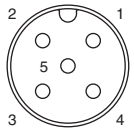
Model No.	EX9-OET2/EX9-OEP2		EX9-OET1/EX9-OEP1	
Pin No.	NPN output		PNP output	
	Output connector No.0	Output connector No.1	Output connector No.0	Output connector No.1
1	Power supply (DC24V)	Power supply (DC24V)	NC	NC
2	Output (OUT1)	NC	Output (OUT 1)	NC
3	NC	NC	Power supply (GND)	Power supply (GND)
4	Output (OUT 0)	Output (OUT 1)	Output (OUT 0)	Output (OUT 1)
5	NC	NC	NC	NC

NC: Not connected

Two outputs are available with only output connector No. 0.

Pin allgnment and connection drawing of the Output Cable





Plug connector pin layout

Pin No.	Cable color
1	Brown
2	White
3	Blue
4	Black
5	Grey

NOTE
Mount a waterproof cap to each unused connector. The proper use of waterproof cap can achieve IP65 Enclosure. (Tightening torque for M12: 0.1Nm)

●Power supply wiring

When combining EX9-OEP1 (or EX9-OEP2) and EX9-PE1 and using external power supply, connect the power supply to the power input connector of EX9-PE1.
When selecting power supply, refer to "Handling precautions" (page 3) in this manual.

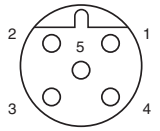
EX9-PE1 power supply connector No.0

M12, 5-pin, reverse key, socket

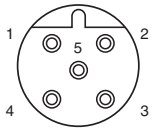
Note Keep the waterproof cap mounted on power supply connector No.0 while using EX9-PE1. This connector is prepared supplementarily and not used normally.

EX9-PE1 power input connector No.1

M12, 5-pin
reverse key, plug



Power input connector No.1

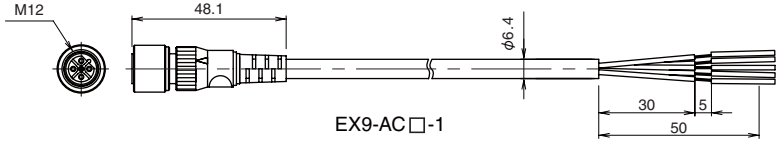


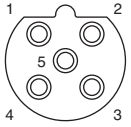
Power supply connector No.0

Pin No.	Power input connector No.1	Power supply connector No.0
1	Power supply for output devices (DC24V)	Power supply for output devices (DC24V)
2	Power supply for output devices (0V)	[Power supply for output devices (0V)]
3	[Power supply for sensor (DC24V)]	[Power supply for sensor (DC24V)]
4	[Power supply for sensor (0V)]	[Power supply for sensor (0V)]
5	Ground	[Ground]

Note: Each signal of connector No.0 is connected to corresponding signal of connector No.1. The pins whose applications are shown in brackets [ ], are prepared supplementarily and not used normally.

Pin allgnment and connection drawing of the Power Supply Cable





Socket connector pin layout(Reverse key)

Pin No.	Cable color: Signal name
1	Brown: Power supply for output (24VDC)
2	White: Power supply for output (0V)
3	Blue: [Power supply to sensor (24VDC)]
4	Black: [Power supply to sensor (0V)]
5	Grey: Ground

Specification

1. EX9-OET1/EX9-OET2/ EX9-OEP1/EX9-OEP2

Item	Specification			
Model No.	EX9-OET1	EX9-OET2	EX9-OEP1	EX9-OEP2
No. of output points	2 points/unit			
Output method	P-ch MOS-FET (open drain)	N-ch MOS-FET (open drain)	P-ch MOS-FET (open drain)	N-ch MOS-FET (open drain)
Insulation method	Optical isolation (with SI unit)		Optical isolation (with this unit) (Note)	

Note: To be used in combination with EX9-PE1.
For detailed specifications, refer to the instruction manuals, technical data, etc. of EX9 series general purpose output block.

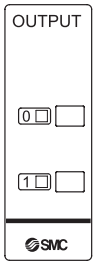
2. EX9-PE1

Item	Specification
Rated voltage	DC24V+10%, -5%
Supply current	3A Max.

Display

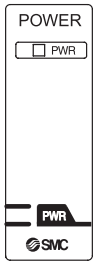
●Settings for display

1. EX9-OET1/EX9-OET2/EX9-OEP1/EX9-OEP2



Display	Description
0	Turns on: Output (OUT 0) is ON. Turns off: Output (OUT 0) is OFF.
1	Turns on: Output (OUT 1) is ON. Turns off: Output (OUT 1) is OFF.

2. EX9-PE1



Display	Description
PWR	Turns on: Power is supplied from external power supply. Turns off: Power is not supplied from external power supply.

Option

① Cable with DeviceNet communication connector

For details, refer to subsection "Wiring" (page 11) in section "EX500" in this manual.

How to order: EX500-AC[050]- DN

Cable length (L)

010	1 [m]
050	5 [m]

② Branch cable with M12 connector

For details, refer to subsection "Wiring" (page 11) in section "EX500" in this manual.

How to order: EX500-AC[030]-[SSPS]

Cable length (L)

003	0.3 [m]
005	0.5 [m]
010	1 [m]
030	3 [m]
050	5 [m]

Connector specification

SSPS	Socket side: Straight, Plug side: Straight
SAPA	Socket side: Angle, Plug side: Angle

③ Power supply connector cable

For details, refer to subsection "Wiring" (page 11) of section "EX500" in this manual.

How to order: EX500-AP[050]-[S]

Cable length (L)

010	1 [m]
050	5 [m]

Connector specification

S	Straight
A	Angle

④ Output cable

For details, refer to subsection "Wiring" (page 34) of section "EX9 series General Purpose Output Black " in this manual.

How to order: EX9-AP[010]- 7

Cable length(L)

010	1[m]
030	3[m]

⑤ Power supply cable(for power input connector of Power block)

For details, refer to subsection "Wiring" (page 34) of section "EX9 series General Purpose Output Black " in this manual.

How to order: EX9-AC[010]- 1

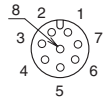
Cable length (L)

010	1 [m]
030	3 [m]
050	5 [m]

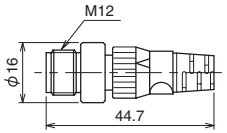
⑥ Terminal Plug

Connected to C1 (or 0) of SI unit when Input unit manifold is unused. (If this terminal plug is not used, COM LED of GW unit does not light on.)

How to order: EX500-AC000-S



Plug Connector Pin Layout



⑦ Waterproof cap

Mounted on unused ports of GW unit, input block, power block and output block.
The proper use of this waterproof cap can achieve IP65 Enclosure. (The waterproof caps are delivered together with each input block as accessories.)

How to order: EX500-AW□

Connector specification

ES	M8 connector (socket) /10 pcs.
TP	M12 connector (plug) /1 pc.
TS	M12 connector (socket) /10 pcs.

NOTE
Tighten the waterproof cap by the specified tightening torque. (0.05Nm for M8, 0.1Nm for M12)

Troubleshooting

●Overall system

No.	Item	Solution/Corrective action
1	Solenoid valve doesn't work	• Check the power for solenoid valves/output (DC24V) is supplied. • Check the connection of the branch cable with M12 connector to SI unit. • Check Power LED and Communication LEDs of SI unit turn on.
2	Solenoid valve doesn't work as programmed	• Check the wiring specification for manifold block assembly and modify the program.
3	Power LED of Input unit is blinking	• Short circuit of input sensor due to failure etc. is possibly caused. Check the sensor. • A current larger than specified value is flowing through the power line for input and control. Check the power supply section.
4	No signal is input even though connected with sensor(s)	• Check the power for input and control (DC24V) is supplied. • Check indicator LED of each block turn on.
5	COM A - D LED doesn't light on	• Check Input unit is connected to the branch of unlit COM port, and the branch cable with M12 connector is connected to the Input unit. • When connecting no Input unit, connect a terminal plug.

●DeviceNet™ compatible communication

No.	Item	Solution/Corrective action
1	MS LED status Normal status: Turn in green Fatal failure: Turn in red	• Check the signal line from PLC is connected. • Check the wiring and pin Nos. • Check the data rate and address settings.
2	NS LED status Offline/Power is OFF: Turn off Online/Communication is not established: Blinking in green Online/Communication is established: Turn in green Minor communication error occurred: Blinking in red Fatal communication error occurred: Turn in red	• Check the signal line from PLC is connected. • Check the wiring and pin Nos. • Check the data rate and address setting.
3	SOL LED is turned off	• Check the power for solenoid valves/output (DC24V) is supplied. • Check the power supply voltage for solenoid valves/output doesn't drop under 20V.

Appendix Table

●Cable with DeviceNet™ communication cable/connector/ terminal plug

Description	Part. No.
Communication cable (With one side connector)	PCA-1557633(Socket) PCA-1557646(Plug)
Field wireable connector	PCA-1557662(Socket) PCA-1557659(Plug)
Terminal plug	PCA-1557675(Plug, A-coded)