
TECHNICAL INSTRUCTION MANUAL

For EX500 SERIAL SYSTEM

Gateway (GW) Unit

Rockwell Automation Remote I/O (RIO)	: EX500 - GAB1 - X1
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DeviceNet	: EX500 - GDN1
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PROFIBUS-DP	: EX500 - GPR1
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Input Unit Manifold

Input Manifold	: EEX500 - IB1 - □□ (-X1)
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Input Unit	: EX500 - IB1 (-X1)
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M8 Input Block (PNP)	: EX500 - IE1 (-X1)
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M8 Input Block (NPN)	: EX500 - IE2 (-X1)
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M12 Input Block (PNP)	: EX500 - IE3 (-X1)
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M12 Input Block (NPN)	: EX500 - IE4 (-X1)
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8 point unit Input Block (PNP, M8)	: EX500 - IE5 (-X1)
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8 point unit Input Block (NPN, M8)	: EX500 - IE6 (-X1)
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SI Unit

SV series	: EX500 - S001 (-X1)
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VQC series (NPN output (+ COM.))	: EX500 - Q001 (-X1)
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VQC series (PNP output (- COM.))	: EX500 - Q101 (-X1)
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● Safety Instructions ●

(Read carefully before handling.)

Thoroughly read this handling manual and related manuals mentioned here to ensure the safety and proper operation of the product.

These safety instructions are intended to prevent hazardous situations and / or equipment damage. These instructions indicate the level of potential hazard by labeling “ **CAUTION** ” or “ **WARNING** ” .

•Level of potential hazard

-  **CAUTION** : Operator error could result in injury or equipment damage.
-  **WARNING** : Operator error could result in serious injury or loss of life .

•Safety instructions for pneumatic equipment



1. 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 post analysis, and / or tests to meet your specific requirements.

2. 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.

3. 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.)

4. 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, requires special safety analysis.

•Safety instructions for electric equipment



1. The product specified here is designed to be used in ordinary factory automation equipment.

Prevent the use in machinery and / or equipment where human life may be directly injured and malfunction or failure may cause enormous loss.

2. Do not use in the explosive atmosphere, the atmosphere of flammable gas, the corrosive atmosphere.

In these atmospheres, it may cause injury or fire.

3. Only The person who has professional knowledge should implement work of the carriage, the establishment, the piping, the wiring, the operation, the handling, the maintenance, the check.

If not, it will cause in being shocked, the injury, the fire and so on.

4. Install a direct stop circuit outside that to stop operation immediately and then to shut the power supply.

5. Do not disassemble the product for modifications.

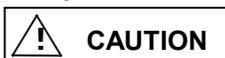
It may injure the person or damage the property.

6. Do not wipe this product with any chemical solvent.



1. Read this manual thoroughly, and operate this product within the range of the specification after observing notes strictly.
2. Do not drop nor apply force to the product.
It may damage the unit, and may cause failure or malfunction.
3. Take appropriate measures to ensure that the specified power is supplied regardless of the condition of power supply.
Use within specified voltage range. To use outside of specified voltage will cause malfunction, damage to unit, electric shock, and fire.
4. Do not touch the terminal or internal circuit board while they are energized. It may cause malfunction, damage to unit, and electric shock.
Turn the power supply OFF when increasing / decreasing the number of Input Block or the Manifold Valve, and disconnecting the power supply.
5. Use within operating ambient temperature. Do not use where temperatures can rapidly change even though it is within the specifications.
6. Foreign objects should be prevented from entering the product. Contamination by foreign objects, such as wire chips will cause fire, breakage, and malfunction.
7. Use within the operating environment of the protection structure.
IP65 is achieved by proper mounting of Input Unit / Input Block and Manifold Valve with SI Unit and by processing properly a cable with the M12 connector which is wiring each unit, and a cable which is wiring for power supply, and a connector which is setting for communication, and by processing properly with the water - proof cap when there is an unused port.
Take measures such as the covers to be used in the environment in which water splashes always.
8. Operate within the specified tightening torque.
It will be possible to damage the screw when the screw is tightening exceeds the range of the tightening torque.
9. Take appropriate and sufficient countermeasures when installing systems in the following locations.
 - Locations subject to static electricity or other forms of noise.
 - Locations subject to strong electromagnetic fields.
 - Locations subject to possible exposure to radioactivities.
 - Locations close to power supplies.
10. Take appropriate measures to noise such as the noise filter and so on, when installing this product in equipment.
11. This product is a component, which is installed in the final equipment and used.
Please confirm the adaptability of EMC instruction when being installed in equipment by the customer.
12. Do not detach the nameplate.
13. Carry out periodical checks to confirm correct operation.
Safety may not be maintained by unintentional malfunction or incorrect operation.

•Safety instructions for cables



1. Pay attention to wrong wiring.
It will cause malfunction, fire and damage to the unit.
2. Do not wire the power line with the high-voltage wire to prevent the signal line from the noise surge.
It will cause the malfunction.
3. Confirm the non-conductivity of wiring. It will cause the unit to be damaged by the excessive electric current flowing and voltage's being impressed, when there is an insufficient insulation resistance.
4. Do not bend cable repeatedly, or pull the cable, or put a heavy object on the cable.

•Safety instructions for power supply

1. Whether you use a single power supply or a dual power supply, two power lines have to be supplied at all times (for solenoid valve and for input and control).
2. Choose UL recognized product for direct current power source to be mounted.
 - (1) Limited voltage / current circuit complying with UL508
 The power supply circuit made with the secondary winding of an isolating type transformer which satisfies the following condition.
 - Max. voltage (No load applied) : 30Vrms (42.4V peak) or less, and
 - Max. current : 8A or less (Including a short circuit), and restricted by the circuit protective device or a fuse with rating in the table below

Open circuit volts (V peak)	Amperes
0 to 20 [V]	5.0
Over 20 [V] to 30 [V]	$\frac{100}{V^*}$

* " V " is defined as the peak open circuit voltage.

- (2) Max. 30Vrms (42.4V peak) or less circuit (Class 2 circuit) which is supplied by an isolating source that complies with the requirements in the Standard for Class 2 Power Units, UL1310 or for Class 2 Transformers, UL1585.

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1. Outline

A. Gateway (GW) Unit

- (1) The Gateway (GW) Unit can be connected with a PLC.
 At present, Gateway (GW) Unit with the following communication protocols are available:
 - Remote I/O (RIO) System slaves to Rockwell Automation PLC and SLC series unit.
 - DeviceNet
 - PROFIBUS-DP
- (2) The Gateway (GW) Unit can be connected with Manifold Valve / Relay Output Module with the SI Unit, and Input Unit / Input Block can be controlled in a decentralized fashion.
 It is not necessary to supply power to I/O unit individually because power supply line is built in the communication port.
- (3) Transmission delay time problem will not occur because the communication with each branch is running by separate asynchronized transmission form from upper transmission form.
- (4) 16 input points per input manifold and 16 output points per output manifold can be controlled in a decentralized fashion per one branch (1CH) of GW Unit. GW Unit communication ports and in / output can control 128 decentralized I/O points.

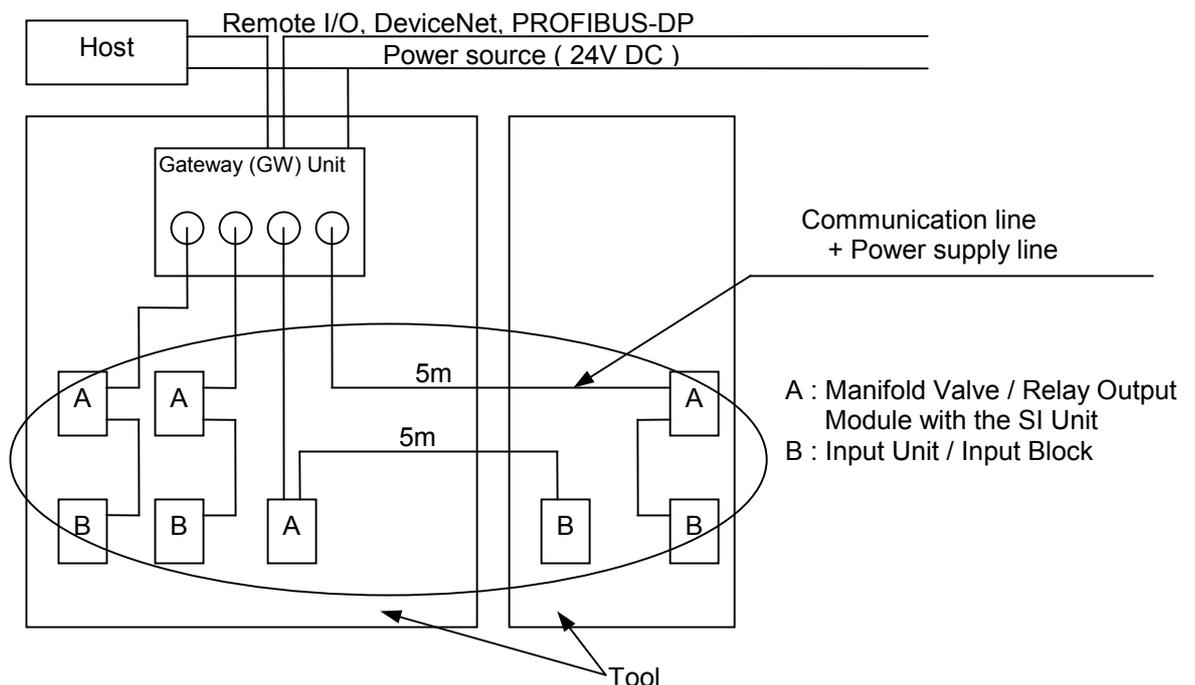


Maximum number of I/O points depends on the communication protocol and the host PLC.

B. Input / Output Unit

- (1) Input Unit Manifold (Input Unit / Input Block)
 The Input Block can be increased or decreased by two points. A maximum of 8 blocks can be used on a single input manifold.
- (2) Output Manifold Valve / Relay Output Module with the SI Unit (SV series , VQC series)
 The SV series and the VQC series Manifold Valve can be used with the EX500 series SI Unit.
 The number of Solenoid Valve and Relay Output Module can be increased / decreased by the block alone.
 A maximum of 8 Double Solenoid Valve and / or 2 point Relay Output Module can be connected.
 And a maximum of 16 Single Solenoid Valve and / or 1 point Relay Output Module can be connected with each channel.

2. System Structure



3. Specification and Product numbers

3-1. General specification of EX500 series

Item	Specification
Enclosure	IP65
Standard	UL, CSA, CE
Withstand voltage	1500V AC 1min. (between PE - external terminal package)
Insulation resistance	2M Ω or more (500VDC meg. between PE - external terminal package)
Momentary power failure	1m sec. or less
Ambient temperature	+5°C to +45°C
Ambient humidity	35% to 85%RH (without condensation)
Preservation temperature	- 25°C to 70°C
Vibration proof	10Hz to 57Hz 0.35mm (constant amplitude) 57Hz to 150Hz 5G (constant speed) 2 hours per each direction of \pm X, Y and Z
Shock resistance	Peak value : 15G 3 times per each direction of \pm X, Y and Z
Applicable altitude	Less than 1000m above sea

•EMC Directive (89 / 336 / EEC)

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

Electromagnetic Emission

Item	Test Procedure	Specification	Criterion
Radiated Electric Field Strength	EN55011 : 1998 +A1 : 1999	30MHz to 230MHz, 230MHz to 1GHz (Distance : 10m)	Group 1 Class A

Electromagnetic Susceptibility (Immunity)

Item	Test Procedure	Specification	Criterion
ESD	EN61000-4-2 : 1995 / A1 : 1998	\pm 4kV contact \pm 8kV air discharge	B
RS : Radiated Susceptibility (amplitude modulated)	EN61000-4-3 : 1996 / A1 : 1998	80MHz to 1000MHz 10V / m (1kHz AM 80%)	A
RS : Radiated Susceptibility (pulse modulated)	ENV50204 : 1995	900 \pm 5MHz 10V / m (200Hz Pulse Mod. Duty 50%)	A
CS : Conductive Susceptibility (amplitude modulated)	EN61000-4-6 : 1996	0.15MHz to 80 MHz 10V (1kHz AM 80%)	A
EFT / Burst, DC power lines	EN61000-4-4 : 1995	\pm 2kV (5 / 50ns, 5kHz)	B
EFT / Burst, control lines	EN61000-4-4 : 1995	\pm 2kV (5 / 50ns, 5kHz)	B
Surge, interface lines	EN61000-4-5 : 1995	\pm 1kV (Common)	B

3 -2. Gateway (GW) Unit

How to Order

EX500 - GDN1

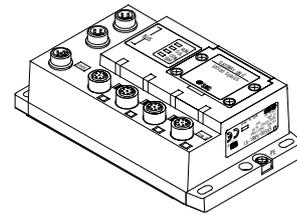
Network communication protocol

DN	DeviceNet
PR	PROFIBUS-DP
AB	Remote I/O (RIO)



GW Unit compatible

Nil	DeviceNet
	PROFIBUS-DP
-X1	Remote I/O (RIO)



Gateway (GW) Unit

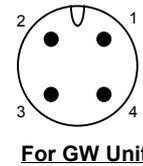
Gateway (GW) Unit specification

Item	Specification		
Models	EX500 - GAB1 - X1	EX500 - GDN1	EX500 - GPR1
Rated voltage	24V DC		
Power supply voltage	Input and control power supply : 24V DC \pm 10% Solenoid valve power supply : 24V DC +10% / -5% (Warning of voltage drop given lower than approx. 20V)		
	-	Communication power supply for DeviceNet : 11V DC to 25V DC	-
Current consumption	200mA or less (only GW Unit)		
	-	Communication power supply for DeviceNet : 50mA or less	-
Input / Output points	Maximum 64 inputs / Maximum 64 outputs		
Input / Output branches	4 branches (one branch 16 inputs / 16 outputs)		
Branch connector	M12 connector (8 pin, socket)		
	Pin NO. 1. RD + 2. RD - 3. TD + 4. TD - 5. 24V DC (for solenoid valve) 6. 0V DC (for solenoid valve) 7. 24V DC (for power source) 8. 0V DC (for power source)		
	<p style="text-align: center;">For GW Unit</p>		
Length of branch cable	Less than 5m (Less than 10m Max. Length)		
Communication form	Communication protocol : SMC original protocol Communication speed : 750 k bit / sec. (DeviceNet, PROFIBUS-DP) : 500 k bit / sec. (Remote I/O (RIO))		
Power Supply connector	M12 connector (5 pin, plug)		
	Pin NO. 1. 0V (for solenoid valve) 2. 24V DC + 10% / - 5% 3A Max. (for solenoid valve) 3. 0V (for power source (input and control)) 4. 24V DC \pm 10% 3A Max. (for power source (input and control)) 5. PE (Protective earth)		
	<p style="text-align: center;">For GW Unit</p>		
Weight	470g		

-Communication specification for each PLC

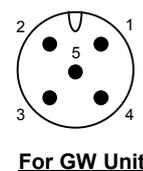
Rockwell Automation Remote I/O communication specification (RIO) (EX500 - GAB1 - X1)

Item	Specification
Applicable PLC	Rockwell Automation Remote I/O PLC
Communication speed	57.6 k bit / sec. , 115.2 k bit / sec. , 230.4 k bit / sec.
Cable distance (Terminating resistor size)	57.6 k bit / sec. : 3048 m [10000 feet] (150 Ω) 115.2 k bit / sec. : 1524 m [5000 feet] (150 Ω) 230.4 k bit / sec. : 762 m [2500 feet] (82 Ω)
Communication connector	M12 connector (4 pin, plug) Pin NO. 1. Line1 (Blue) 2. N. C. 3. Line2 (Clear) 4. Shield (Shield)

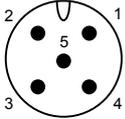
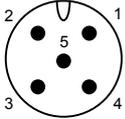
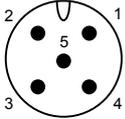


DeviceNet communication specification (EX500 - GDN1)

Item	Specification
Communication protocol	DeviceNet Release 2.0
Slave (branch) type	Group2 Only Server
MAC ID setting range	0 to 63
Device information	Vender code : 7 (SMC corp.) Product type : 12 (Communication Adapter) Product code : 5001
Corresponding message	Duplicate MAC ID Check Message Group2 Only Unconnected Explicit Message Explicit Message Poll I/O Message
I/O message size	Input : 8 byte , Output : 8 byte
Communication speed	125 k bit / sec. , 250 k bit / sec. , 500 k bit / sec.
Cable distance	Refer to section 5 -1
Isolation	Photo coupler (between CAN transceiver - main circuit)
Communication connector	M12 connector (5 pin, plug) Pin NO. 1. DRAIN 2. V+ 3. V- 4. CAN_H 5. CAN_L



PROFIBUS-DP communication specification (EX500 - GPR1)

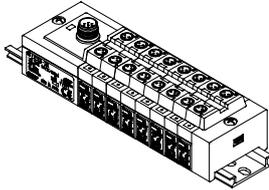
Item	Specification															
Protocol	PROFIBUS-DP (EN50170)															
Bus interface	EIA RS - 485															
Communication speed	9.6 / 19.2 / 93.75 / 187.5 / 500 k bit / sec. 1.5 / 3 / 6 / 12 M bit / sec.															
Cable distance	Refer to section 6 -1															
Freeze function	Available															
Synchronous function	Available															
ID number	1405 hex															
Communication connector	M12 connector (5 pin, plug) <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none;">IN</td> <td style="width: 50%; border: none;">OUT</td> <td rowspan="6" style="text-align: center; border: none;">  <p data-bbox="1241 768 1366 790">For GW Unit</p> </td> </tr> <tr> <td style="border: none;"><u>Pin NO.</u></td> <td style="border: none;"><u>Pin NO.</u></td> </tr> <tr> <td style="border: none;">1. VP</td> <td style="border: none;">1. N.C.</td> </tr> <tr> <td style="border: none;">2. RxD / TxD (N)</td> <td style="border: none;">2. RxD / TxD (N)</td> </tr> <tr> <td style="border: none;">3. DGND</td> <td style="border: none;">3. N.C.</td> </tr> <tr> <td style="border: none;">4. RxD / TxD (P)</td> <td style="border: none;">4. RxD / TxD (P)</td> </tr> <tr> <td style="border: none;">5. Shield</td> <td style="border: none;">5. Shield</td> </tr> </table>	IN	OUT	 <p data-bbox="1241 768 1366 790">For GW Unit</p>	<u>Pin NO.</u>	<u>Pin NO.</u>	1. VP	1. N.C.	2. RxD / TxD (N)	2. RxD / TxD (N)	3. DGND	3. N.C.	4. RxD / TxD (P)	4. RxD / TxD (P)	5. Shield	5. Shield
IN	OUT	 <p data-bbox="1241 768 1366 790">For GW Unit</p>														
<u>Pin NO.</u>	<u>Pin NO.</u>															
1. VP	1. N.C.															
2. RxD / TxD (N)	2. RxD / TxD (N)															
3. DGND	3. N.C.															
4. RxD / TxD (P)	4. RxD / TxD (P)															
5. Shield	5. Shield															

3 -3. Input Unit Manifold

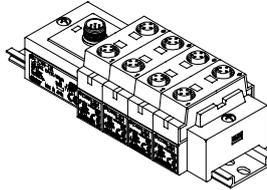
The Input Unit Manifold can have various combinations depending on the number of stations and type of the sensor connector.

When placing an order, the input manifold part number and the input block part number are entered together.

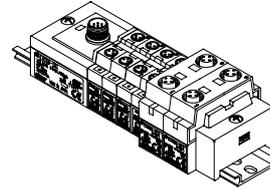
But only one sensor type has to be specified per manifold (either NPN or PNP).



M8 Input Block



M12 Input Block

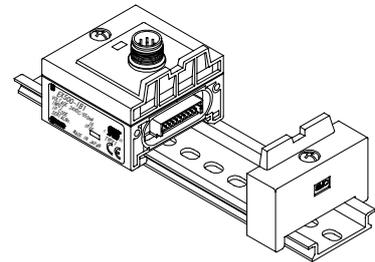
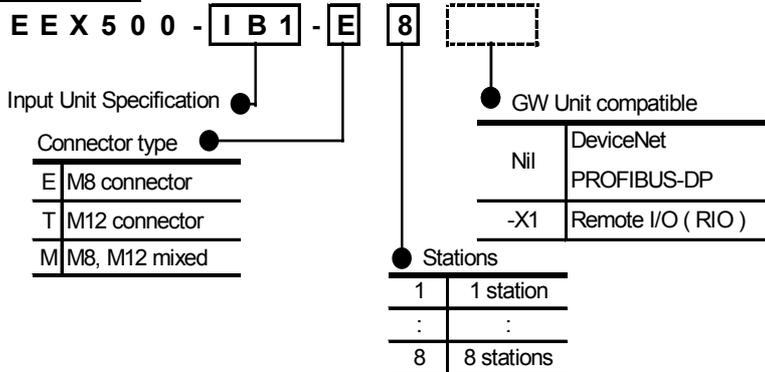


M8 and M12 mixed

3 -3 -1. Input Manifold

The Input Manifold includes Input Unit (EX500 - IB1 (-X1)), End Block and DIN rail.

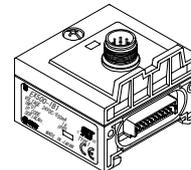
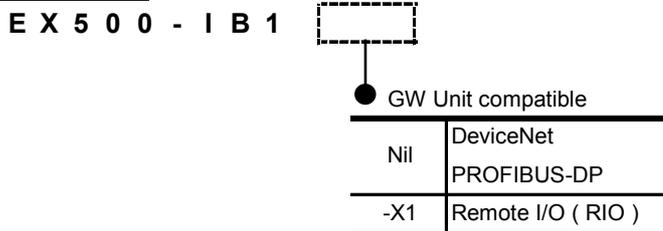
How to Order



Input Manifold

3 -3 -2. Input Unit

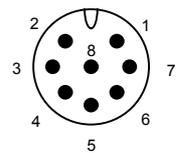
How to Order



Input Unit

Input Unit specification

Item	Specification
Connecting block	Current source type Input Block (PNP) or Current sink type input Block (NPN)
Number of connecting block	8 blocks Max.
Power supply for block	24V DC
Current supply for block	0.65A Max.
Current consumption	100mA or less (in case of rated voltage)
Short circuit protection	1A Typ. for each unit (supply power cut) Cut the power for power source once and then supply it again for return.
Communication connector	M12 connector (8 pin, plug) Pin NO. 1. RD + 2. RD - 3. N. C. 4. N. C. 5. N. C. 6. N. C. 7. 24V DC (for power source) 8. 0V DC (for power source)
Weight	100g (Input Unit + End Block)



For Input Unit

3 -3 -3. Input Block

How to Order

EX500 - I E 1

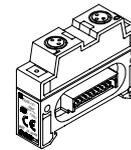
Connector type

Input specification

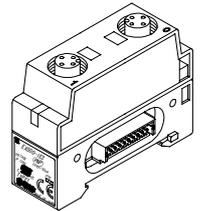
1	M8 connector, PNP
2	M8 connector, NPN
3	M12 connector, PNP
4	M12 connector, NPN
5	8 point unit, M8 connector, PNP
6	8 point unit, M8 connector, NPN

GW Unit compatible

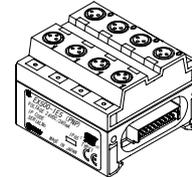
Nil	DeviceNet PROFIBUS-DP
-X1	Remote I/O (RIO)



M8 Input Block

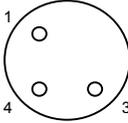
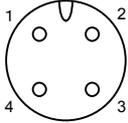


M12 Input Block



8 point unit Input Block (M8)

Input Block specification

Item	Specification	
Corresponding sensor	Current source type (PNP output)	Current sink type (NPN output)
Sensor connector	M8 connector (3 pin, socket) Pin NO. 1. power supply (24V DC) 3. power supply (0V) 4. input  For Input Block	M12 connector (4 pin, socket) Pin NO. 1. power supply (24V DC) 2. (input) *Note 3. power supply (0V) 4. input  For Input Block
	Input points	2 points / 8 points (M8 only)
Rated voltage	24V DC	
Logical " 1 " input voltage	15V to 26.4V	0V to 8V
Logical " 0 " input voltage	0V to 5V	19V to 26.4V
Logical " 1 " input current	5mA Typ.	- 5mA Typ.
Logical " 0 " allowable current	1.5mA	- 1.5mA
Input delay	1m sec. or less	
Display	LED (green - colored) light up	
Insulation	Nothing	
Sensor supply current	30mA Max. / sensor	
Weight	[M8 : 20g] [M12 : 40g] [8 points (M8) : 55g]	

Note) Internal circuit of the M12 Input Block and the position of the key for installing the sensor connector of the M12 Input Block.

Each No.2 pin of each sensor connector of the M12 Input Block is connected to the next No.4 pin which is the sensor signal input pin of the connector.

Therefore, it is possible to incorporate the two input signals of the sensor into one cable. (just like a Y connection)

Confirm the specification of the output signal when connecting the sensor. It will cause the malfunction.

The position of the key for installing the sensor connector of the M12 Input Block refers to the right figure.

Confirm the type of the sensor connector when selecting a sensor.

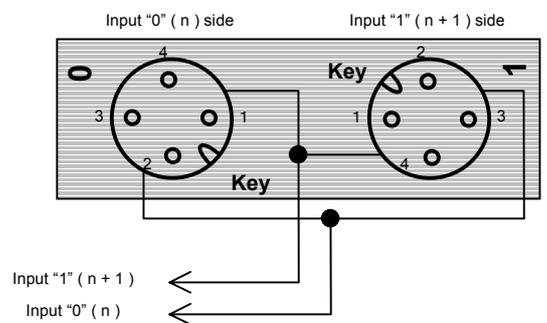


Figure of M12 Input Block (the top of view)

3 -4. SI Unit

SI Unit for SV series Manifold Valve

How to Order

EX500 - S001



● GW Unit compatible

Nil	DeviceNet
	PROFIBUS-DP
-X1	Remote I/O (RIO)

SI Unit for VQC series Manifold Valve

How to Order

EX500 - Q101



● GW Unit compatible

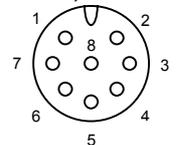
Output specification ●

0	NPN output (+ COM.)
1	PNP output (- COM.)

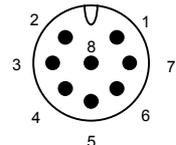
Nil	DeviceNet
	PROFIBUS-DP
-X1	Remote I/O (RIO)

SI Unit specification

Item	Specification	
Models	EX500 - S001 (-X1)	EX500 - Q□01 (-X1)
Connecting block	Solenoid valve (Single , Double) Relay Output Module (1 output , 2 output)	Solenoid valve (Single , Double)
Number of connecting block	Double solenoid valve , : 8 blocks Max. Relay Output Module (2 output) Single solenoid valve , : 16 blocks Max. Relay Output Module (1 output)	Double solenoid valve : 8 blocks Max. Single solenoid valve : 16 blocks Max.
Power supply for block	24V DC	
Current supply for block	0.65A Max.	0.75A Max.
Current consumption	100mA or less (in case of rated voltage)	
Short circuit protection	Use current limit driver Once the driver circuit is shorted, current is limited in order to de-energize the load. Once the short circuit is fixed, the unit will self recover.	
Communication connector	C1 or " 0 "	Connecting with Input Unit. M12 connector (8 pin, socket) Pin NO. 1. RD + 2. RD - 3. N. C. 4. N. C. 5. N. C. 6. N. C. 7. 24V DC (for power source) 8. 0V DC (for power source)
	C2 or " 1 "	Connecting with GW Unit. M12 connector (8 pin, plug) Pin NO. 1. RD + 2. RD - 3. TD + 4. TD - 5. 24V DC (for solenoid valve) 6. 0V DC (for solenoid valve) 7. 24V DC (for power source) 8. 0V DC (for power source)
Weight	115g	105g



For SI Unit



For SI Unit

3 -5. Applicable Manifold Valve series

Series	Manifold		Applicable cylinder size (mm)					
	Cassette type	Tie-rod type	40	50	63	80	100	125
SV1000	○	○						
SV2000	○	○						
SV3000	-	○						
SV4000	-	○						
VQC1000	-	○						
VQC2000	-	○						
VQC4000	-	○						

Refer to the Catalogues or Technical Instruction Manual of SV and VQC series Manifold Valve for more details.

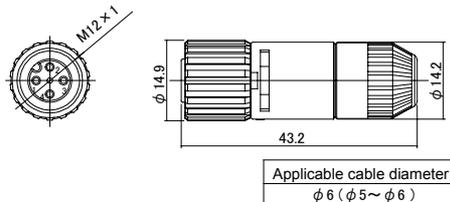
3 -6. Option

3 -6 -1. Communication Connector / Cable

1. Communication Connector for Remote I/O (RIO) (EX500 - GAB1 -X1)

How to Order

E X 5 0 0 - A C 0 0 0 - A B



Electric specification	
Rated voltage	125V DC
Rated current	3A
Contact resistance (connector part)	40m ohms or less (At 20mV DC or less, 100mA or less)
Insulation resistance	1000M ohms or more (At 500V DC)
Withstand voltage (connector part)	1500V AC 1min. (Leak current 1mA or less)

2. Communication Connector Cable for DeviceNet (EX500 - GDN1)

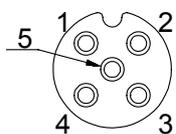
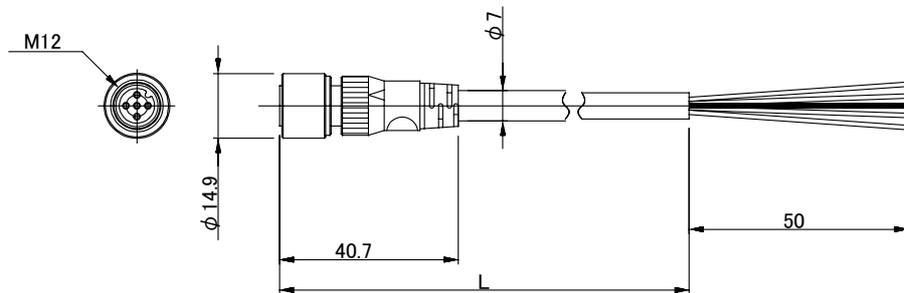
How to Order

E X 5 0 0 - A C 0 5 0 - D N

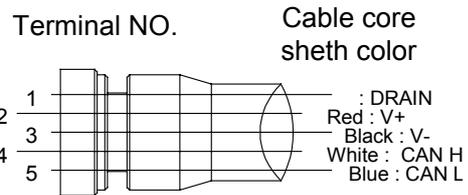
L : Cable length

010	1m
050	5m

Electric specification	
Rated voltage	125V DC
Rated current	3A
Contact resistance (connector part)	40m ohms or less (At 20mV DC or less, 100mA or less)
Insulation resistance	1000M ohms or more (At 500V DC)
Withstand voltage (connector part)	1500V AC 1min. (Leak current 1mA or less)



Socket connector
Pin assignment



Wiring

Cable specification			
	Signal	AWG24 (41 / 0.08)	Blue / White
	Power supply	AWG22 (19 / 0.16)	Red / Black
	Drain	AWG22 (19 / 0.16)	-
Outside diameter	Φ7		
Sheath color	Light blue		

Terminal NO.	Cable color / Signal name	
1	Bare	DRAIN
2	Red	V+
3	Black	V-
4	White	CAN H
5	Blue	CAN L

3 -6 -2. Branch Cable with M12 Connector

How to Order

EX500 - AC **030** - **SSPS**

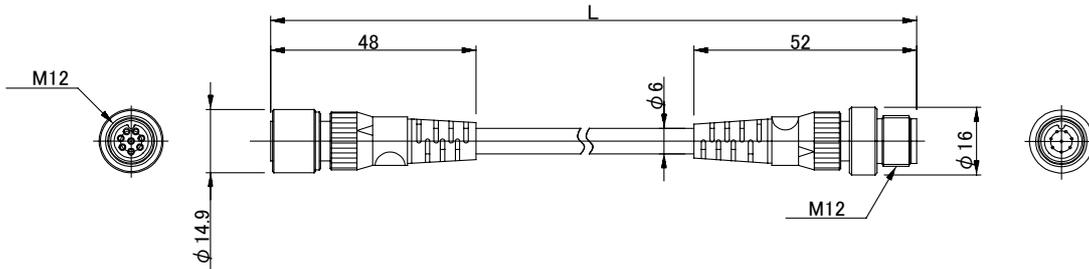
L : Cable length

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

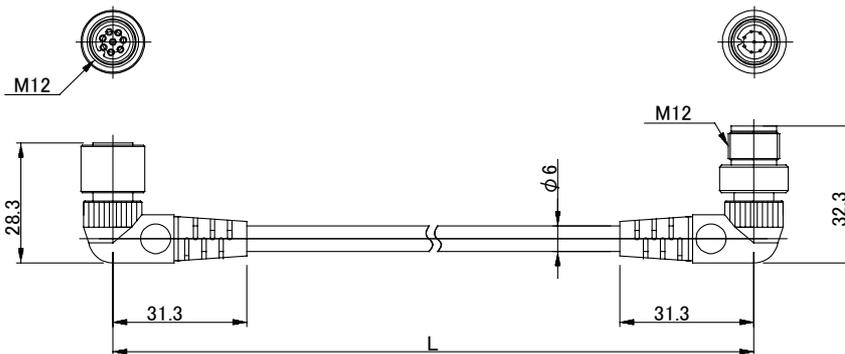
Connector specification

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

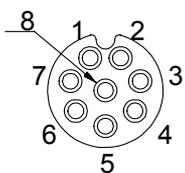
Electric specification	
Rated voltage	36V DC
Rated current	1.5A
Contact resistance (connector part)	40m ohms or less (At 20mV DC or less, 100mA or less)
Insulation resistance	1000M ohms or more (At 500V DC)
Withstand voltage (connector part)	1000V AC 1min. (Leak current 1mA or less)



Straight connector type



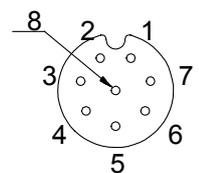
Angled connector type



Socket connector
Pin assignment

Terminal NO.	Cable core sheath color
1	White
2	Brown
3	Green
4	Yellow
5	Gray
6	Pink
7	Blue
8	Shield

Wiring



Plug connector
Pin assignment

3-6-3. Power Supply Connector Cable

How to Order

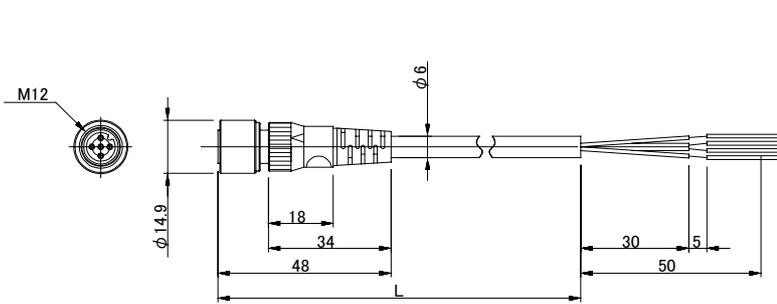
EX500 - AP **050** - **S**

L : Cable length	
010	1m
050	5m

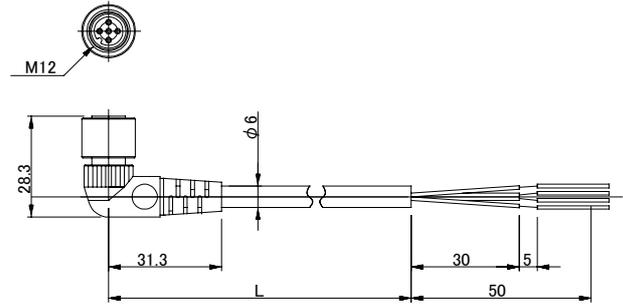
Connector specification

S	Straight
A	Angled

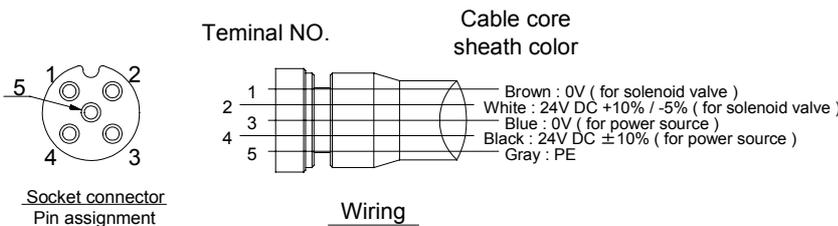
Electric specification	
Rated voltage	125V DC
Rated current	3A
Contact resistance (connector part)	40m ohms or less (At 20mV DC or less, 100mA or less)
Insulation resistance	1000M ohms or more (At 500V DC)
Withstand voltage (connector part)	1500V AC 1min. (Leak current 1mA or less)



Straight connector type



Angled connector type



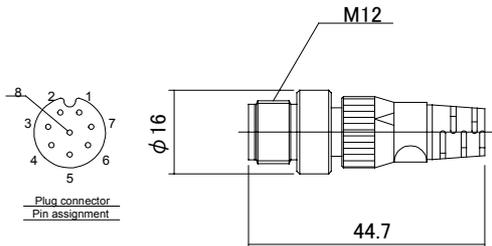
Terminal NO.	Cable color / Signal name
1	Brown 0V (for solenoid valve)
2	White 24V DC +10% / -5% (for solenoid valve)
3	Blue 0V (for power source)
4	Black 24V DC \pm 10% (for power source)
5	Gray PE

3-6-4. Terminal Plug

When Input Unit Manifold is not required, a Terminal Plug should be hooked up with port C1 (for SV Valve Manifold) or port 0 (for VQC Valve Manifold). Without this plug, the communication LED of GW Unit will not light up.

How to Order

EX500 - AC000 - S



Electric specification	
Rated voltage	36V DC
Rated current	1.5A
Contact resistance (connector part)	40m ohms or less (At 20mV DC or less, 100mA or less)
Insulation resistance	1000M ohms or more (At 500V DC)
Withstand voltage (connector part)	1000V AC 1min. (Leak current 1mA or less)

3-6-5. Water Proof Cap

To accommodate the product's water proof feature, a Water Proof Cap is used for an open port in the GW Unit and the Input Block. The Cap is supplied with the product when ordered.

Tighten the Water Proof Cap with the specified tightening torque. (M8 : 0.05 N·m, M12 : 0.1 N·m)

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.



4. How to operate EX500 - GAB1 - X1 (Rockwell Automation Remote I/O (RIO))

4 -1. Applicable PLC

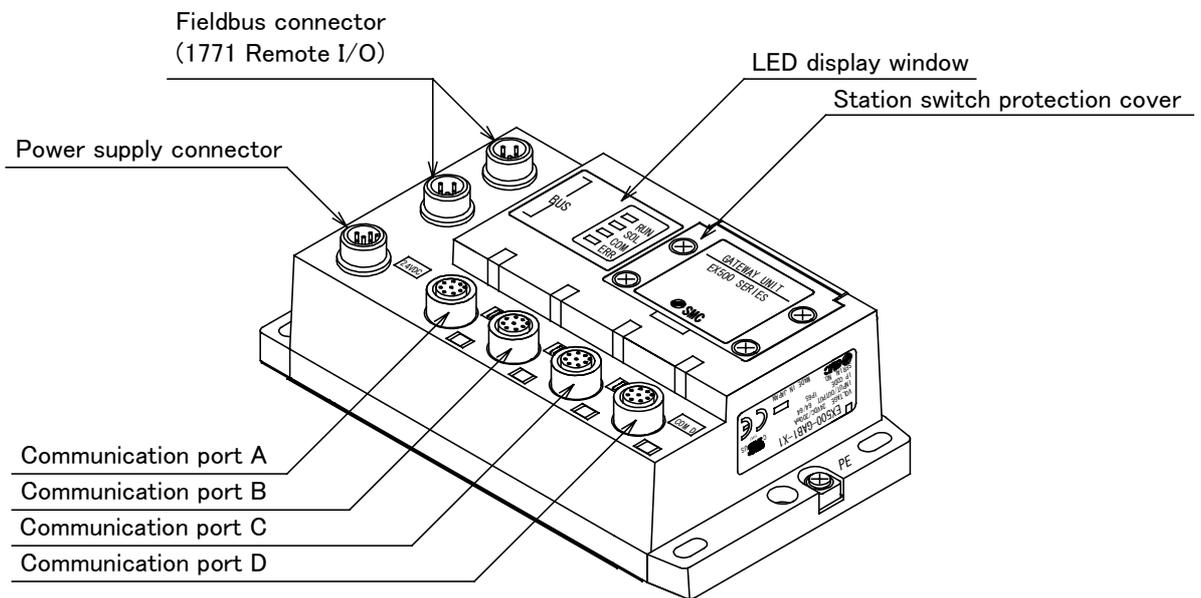
Applicable PLCs in which Rockwell Automation Remote I/O (RIO) system is installed.
Please contact Rockwell Automation for more details.

•Representative PLC

SLC500

PLC - 2 / 20	PLC - 2 / 30	PLC - 3 / 10	
PLC - 5 / 11	PLC - 5 / 15	PLC - 5 / 20	PLC - 5 / 25
PLC - 5 / 30	PLC - 5 / 40	PLC - 5 / 40L	PLC - 5 / 60
PLC - 5 / 60L	PLC - 5 / 80		
PLC - 5 / 250	PLC - 5 / VME	PLC - 5 / V40B	

4 -2. Parts description

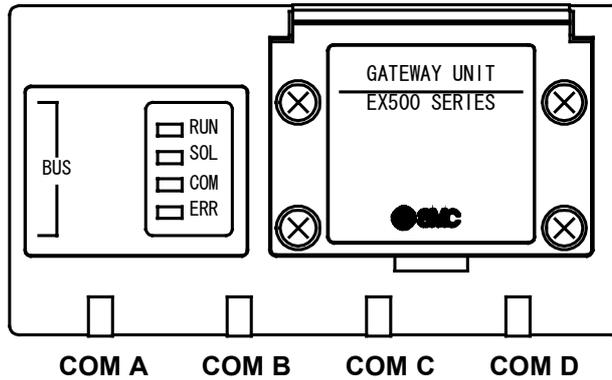


- | | | |
|------------------------------------|---|------------------------------------------------------------------------------------------------------------------|
| a. Fieldbus connector | : | Port for PLC connection. |
| b. Power supply connector | : | The power source for Input Unit, SI Unit, and control and for the solenoid valve is connected through this port. |
| c. Communication port | : | Input Unit Manifold or the Manifold Valve with the SI Unit is connected through this port. |
| d. LED display window | : | The state of the power source supply and the PLC communication is displayed. (Refer to section 4 -3) |
| e. Station switch protection cover | : | Switches for the operation setting are inside. (Refer to section 4 -4) |



The station switch protection cover should be tightened with specified tightening torque after it is opened. (Tightening torque : 0.6 N·m)

4 -3. LED display



Display	Content
RUN	Source ON : Lights Source OFF : Lights off
SOL	Solenoid valve source voltage is normal :Lights Voltage lowered to 20V or less :Lights off
COM	RIO communication is normal : Lights RIO communication is abnormal : Lights off
ERR	RIO communication is abnormal : Lights RIO communication is normal : Lights off
COM A	Communication port A is receiving data : Lights Communication port A has no data : Lights off
COM B	Communication port B is receiving data : Lights Communication port B has no data : Lights off
COM C	Communication port C is receiving data : Lights Communication port C has no data : Lights off
COM D	Communication port D is receiving data : Lights Communication port D has no data : Lights off

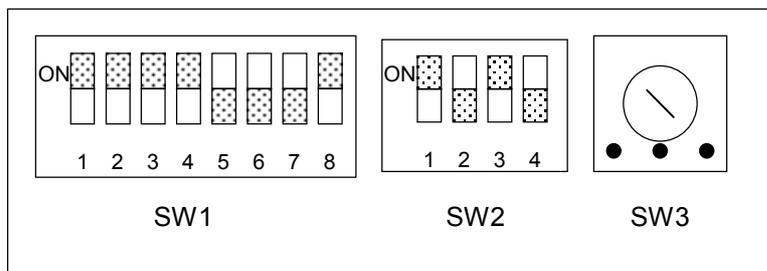
CAUTION

When the Input Unit Manifold is not connected, the respective COM LED of the GW Unit will not light up. To monitor the status of COM port, it is necessary to use a Terminal Plug. The COM LED will light up when a Terminal Plug is used. (Refer to section 3 -6 -4)

4 -4. Operation setting

Turn the power supply OFF when setting switches.

Open the station switch protection cover and set the dip switch with a flat blade screw driver.

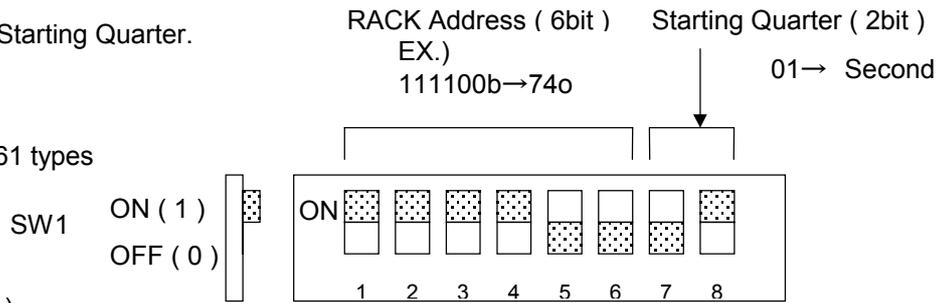


4 -4 -1. Operation setting switch (SW1)

This switch sets RACK Address / Starting Quarter.

- (1) RACK Address (6 bit setting)
0 to 74 (OCT : octal number) 61 types of setting are available.

- (2) Starting Quarter (2 bit setting)
Three types of setting (First, Second, Third) are available.



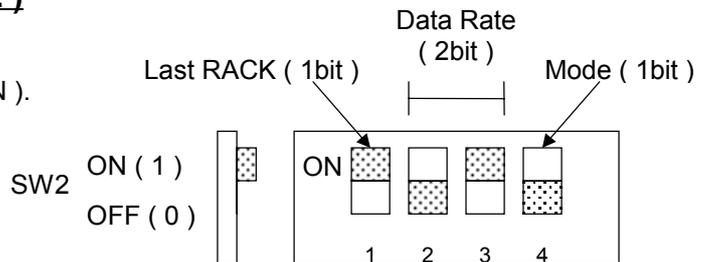
SW1 NO.	1	2	3	4	5	6	7	8
	32	16	8	4	2	1		
RACK Address	0	0	0	0	0	0		
	1	0	0	0	0	0	1	
	2	0	0	0	0	1	0	
	73	1	1	1	0	1	1	
	74	1	1	1	1	0	0	
Starting Quarter	First						0	0
	Second						0	1
	Third						1	0
	Fourth						-	-

4 -4 -2. Operation setting switch (SW2)

- (1) Last RACK (1 bit setting)
With Last RACK, the switch is set as " 1 " (ON).

- (2) Data Rate (2 bit setting)
Set data communication rate.
57.6 k bit / sec. : 00
115.2 k bit / sec. : 01
230.4 k bit / sec. : 1X

- (3) Mode (1 bit setting)



SW2 NO.	1	2	3	4
Last RACK	NO	0		
	YES	1		
Data Rate	57.6 k bit / sec.	0	0	
	115.2 k bit / sec.	0	1	
	230.4 k bit / sec.	1	X	
Mode	Clear	0		
	Hold	1		

Setting	Operation
0 Clear	If " 0 " (OFF) set , output status is cleared and held temporarily when Remote I/O (RIO) has communication error. When returned to normal signal, the communication will automatically be recovered.
1 Hold	If " 1 " (ON) set , operation held temporarily holding the last normal output signal when Remote I/O (RIO) has communication error. When returned to normal signal, the communication will automatically be recovered.

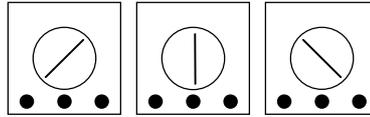
4 -4 -3. Terminating resistance setting switch (SW3)

Set termination resistance.

Data Rate

- 57.6 k bit / sec. : 150 Ω
- 115.2 k bit / sec. : 150 Ω
- 230.4 k bit / sec. : 82 Ω

- ① 150 Ω
- ② 82 Ω
- ③ No resistance



State of SW3

4 -5. Layout of scanner I/O

I/O mapping image at the Gateway (GW) Unit communication port is shown in examples 1 and 2. In this product, regardless of the quantity of the I/O equipment, continuous 4 Groups are automatically occupied. (1/2 RACK occupation). Each communication port occupies all of 16 points in corresponding Group.

Ex.1) RACK Address = 0
Starting Quarter = First

Bit Number(decimal)		15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0		
	RACK0 Group0																		COM A occupied
RIO	RACK0 Group1																		COM B occupied
LOGICAL	RACK0 Group2																		COM C occupied
RACK0	RACK0 Group3																		COM D occupied
	RACK0 Group4																		
	RACK0 Group5																		
	RACK0 Group6																		
	RACK0 Group7																		
	RACK1 Group0																		
RIO	RACK1 Group1																		
LOGICAL	RACK1 Group2																		
RACK1	RACK1 Group3																		
	RACK1 Group4																		
	RACK1 Group5																		
	RACK1 Group6																		
	RACK1 Group7																		

Ex.2) RACK Address = 1
Starting Quarter = Third

Bit Number(decimal)		15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0		
	RACK0 Group0																		
RIO	RACK0 Group1																		
LOGICAL	RACK0 Group2																		
RACK0	RACK0 Group3																		
	RACK0 Group4																		
	RACK0 Group5																		
	RACK0 Group6																		
	RACK0 Group7																		
	RACK1 Group0																		
RIO	RACK1 Group1																		
LOGICAL	RACK1 Group2																		
RACK1	RACK1 Group3																		
	RACK1 Group4																		COM A occupied
	RACK1 Group5																		COM B occupied
	RACK1 Group6																		COM C occupied
	RACK1 Group7																		COM D occupied

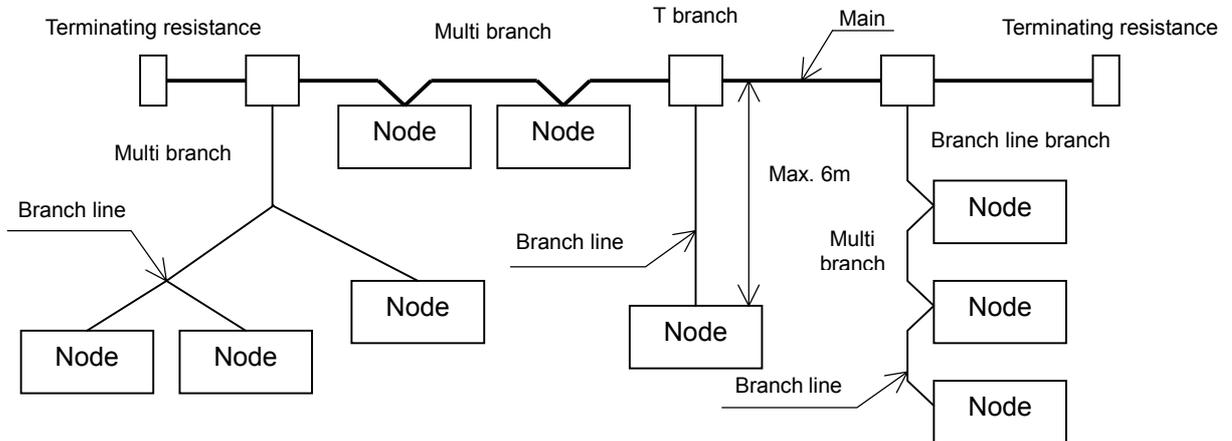
5. How to operate EX500 - GDN1 (DeviceNet)

5 -1. Connection style

DeviceNet unit can be connected by T branch, Multi branch and Branch line branch.

Total extension length of trunk and stay is different depending on communication speed and thickness of communication cable.

EX500 series can be connected only by T branch.



-Wiring length

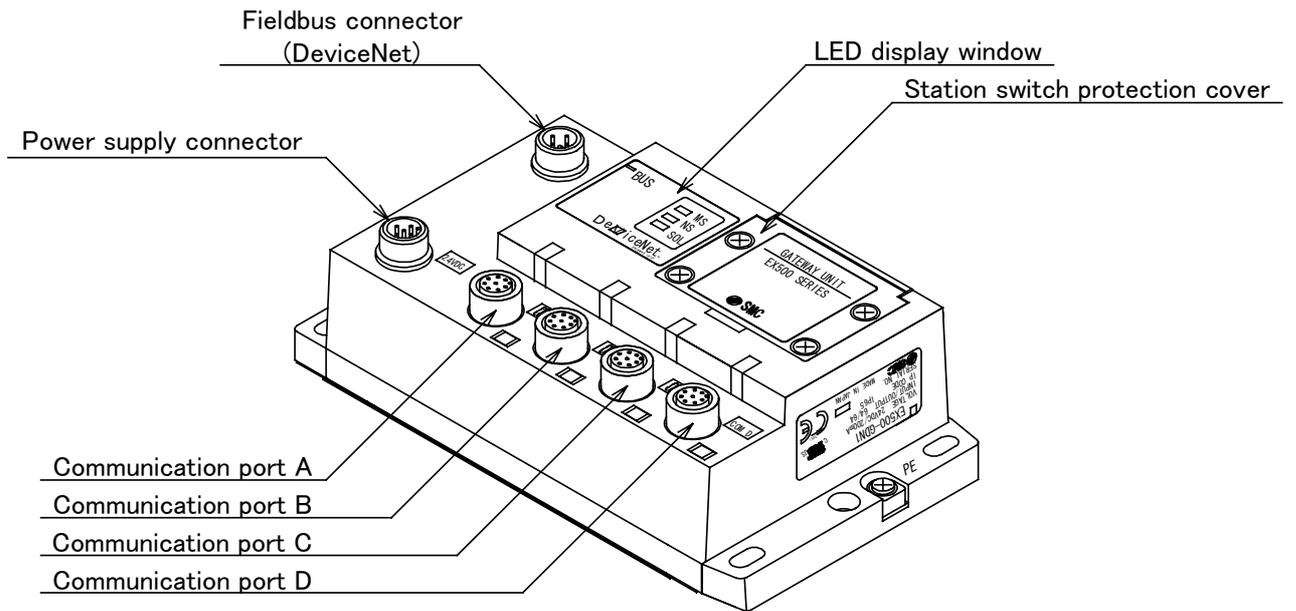
		Communication speed (k bit / sec.)		
		125	250	500
Max. length of Network	Thick cable	500m or less	250m or less	100m or less
	Thin cable	100m or less		
Total length of branch line		156m or less	78m or less	39m or less
Note : Max. length of a branch line is up to 6m.				
Terminating resistance		121 ohms, 1/2W (TURCK p / n = RSM57TR2)		

-Cable specification

Item	Thick cable		Thin cable	
	Signal	Power	Signal	Power
Conductor section area	0.82mm ²	1.65mm ²	0.20mm ²	0.33mm ²
Color	Blue (CAN-L) White (CAN-H)	Red (24VDC), Black (0VDC)	Blue, White	Red, Black
Impedance	120 ohms ± 10%	-	120 ohms ± 10%	-
Propagation delay (Maximum)	1.36ns / ft	-	1.36ns / ft	-
Attenuation rate (Maximum)	500kHz : 0.25dB / ft 125kHz : 0.13dB / ft 1.00MHz : 0.40dB / ft	-	500kHz : 0.50dB / ft 125kHz : 0.29dB / ft 1.00MHz : 0.70dB / ft	-
Conductor resistance (Maximum)	6.9 ohms / 1000ft	3.6 ohms / 1000ft	28 ohms / 1000ft	17.5 ohms / 1000ft

1ft ≙ 0.3048m

5 -2. Parts description

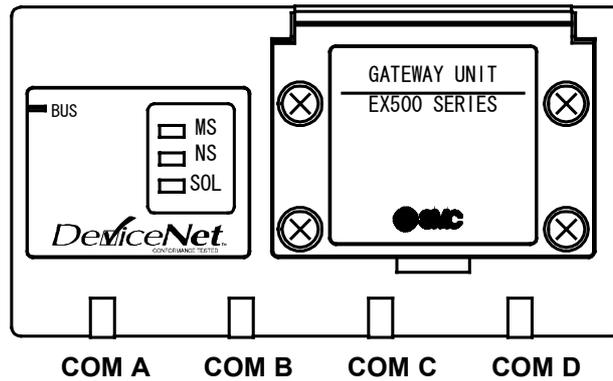


- a. Fieldbus connector : Port for PLC connection.
- b. Power supply connector : The power source for Input Unit, SI Unit, and control and for the solenoid valve is connected through this port.
- c. Communication port : Input Unit Manifold or the Manifold Valve with the SI Unit is connected through this port.
- d. LED display window : The status of power source supply and the PLC communication is displayed here. (Refer to section 5 -3)
- e. Station switch protection cover : Rotary switches for the operation setting are inside. (Refer to section 5 -4)

CAUTION

The station switch protection cover should be tightened with specified tightening torque after it is opened. (Tightening torque : 0.6 N·m)

5 -3. LED display



Display	Content
MS	Operating in a normal condition : Green lights
	Recoverable fault (Memory is abnormal) : Red lights
NS	Not online : Lights off
	Online , Not Allocated : Green flashing
	Online , Allocated : Green lights
	Connection Time - Out : Red flashing
SOL	Critical Link Failure : Red lights
	Solenoid valve source voltage is normal : Lights
COM A	Voltage lowered to 20V or less : Lights off
	Communication port A is receiving data : Lights
COM B	Communication port A has no data : Lights off
	Communication port B is receiving data : Lights
COM C	Communication port B has no data : Lights off
	Communication port C is receiving data : Lights
COM D	Communication port C has no data : Lights off
	Communication port D is receiving data : Lights
	Communication port D has no data : Lights off

CAUTION

When the Input Unit Manifold is not connected, the respective COM LED of the GW Unit will not light up. To monitor the status of COM port, it is necessary to use a Terminal Plug. The COM LED will light up when a Terminal Plug is used. (Refer to section 3 -6 -4)

5 -4. Operation setting

Turn the power supply OFF when setting switches.

Open the station switch protection cover and set the rotary switch with a flat blade screw driver.

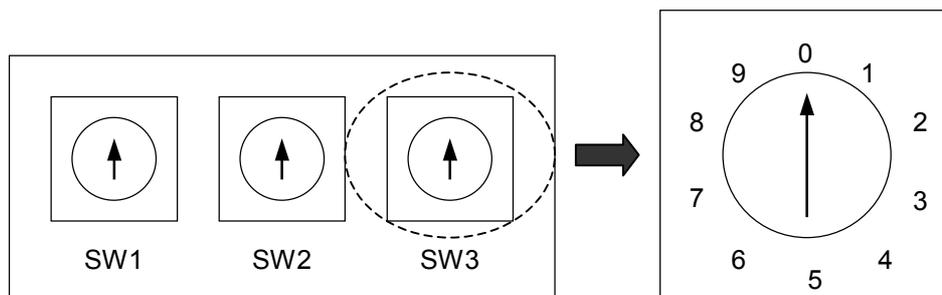


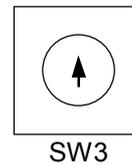
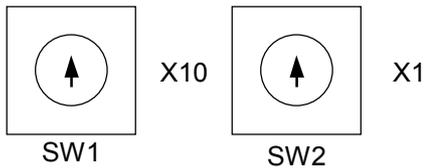
Figure of setting switch

5 -4 -1. Address setting switch (SW1, 2)

These switches set node address. The setting is shown in Table 1.

5 -4 -2. Data rate setting switch (SW3)

This switch set data rate. The setting is shown in Table 2.
The factory default address and data rate are 63 and 125 k bit / sec. respectively.



SW1	SW2	NODE ADDRESS
0	0	0
0	1	1
0	2	2
6	3	63
6	4	PGM
9	9	

Table 1

SW3	DATA RATE
0	125 k bit / sec.
1	250 k bit / sec.
2	500 k bit / sec.
3	PGM
9	

When PGM mode is chosen, the address and data rate are set through network.

Table 2

5 -5. I/O memory map

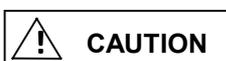
The GW Unit can control 128 input / output points in total. Regardless of I/O points of the equipment, it always occupies each data memory area for 64 inputs and 64 outputs.
Once the address is assigned in the GW Unit, every port then corresponds to a specific "Word" respectively. So "Word (n)" always corresponds to COM A, "Word (n+1)" corresponds to COM B, and so on.

Ex.) n = 1

In case of the input data, the sensor signal data of the Input Manifold which was connected with the COM A port, occupies "Word1" of the I/O memory mapping.

If a sensor signal is stored in the "0 bit" of the Input Manifold, it becomes like the Figure below.
In the same way, in the case of the output data, the contents displayed in "Word1" of the I/O memory mapping is output by the COM A port.

(m,n=0 -)	Branch connector	Data (2 byte)			
		MSB	LSB	MSB	LSB
		15	8	7	0
Word (n)	COM A	Byte (m+1)		Byte (m)	1
Word (n+1)	COM B	Byte (m+3)		Byte (m+2)	
Word (n+2)	COM C	Byte (m+5)		Byte (m+4)	
Word (n+3)	COM D	Byte (m+7)		Byte (m+6)	
⋮	⋮				
⋮	⋮				



Read carefully the user manual of PLC which is used as a master.
The method of PLC setup, reading from or writing to memory differ from one PLC manufacturer to another.

6. How to operate EX500 - GPR1 (PROFIBUS-DP)

6 -1. Communication wiring

A twisted pair cable with shield is used in the communication wiring of PROFIBUS- DP.

A maximum length of cable depend on communication speed.

The specification of cable length is based on TYPE A cable which has parameters shown below.

-Cable specification

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

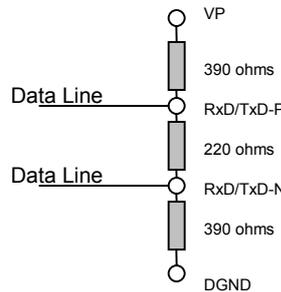
-Communication speed and Longest wiring length

Communication speed	9.6 [k bit/sec]	19.2 [k bit/sec]	93.75 [k bit/sec]	187.5 [k bit/sec]	500 [k bit/sec]	1.5 [M bit/sec]	12 [M bit/sec]
Wiring length		1200 [m]		1000 [m]	400 [m]	200 [m]	100 [m]

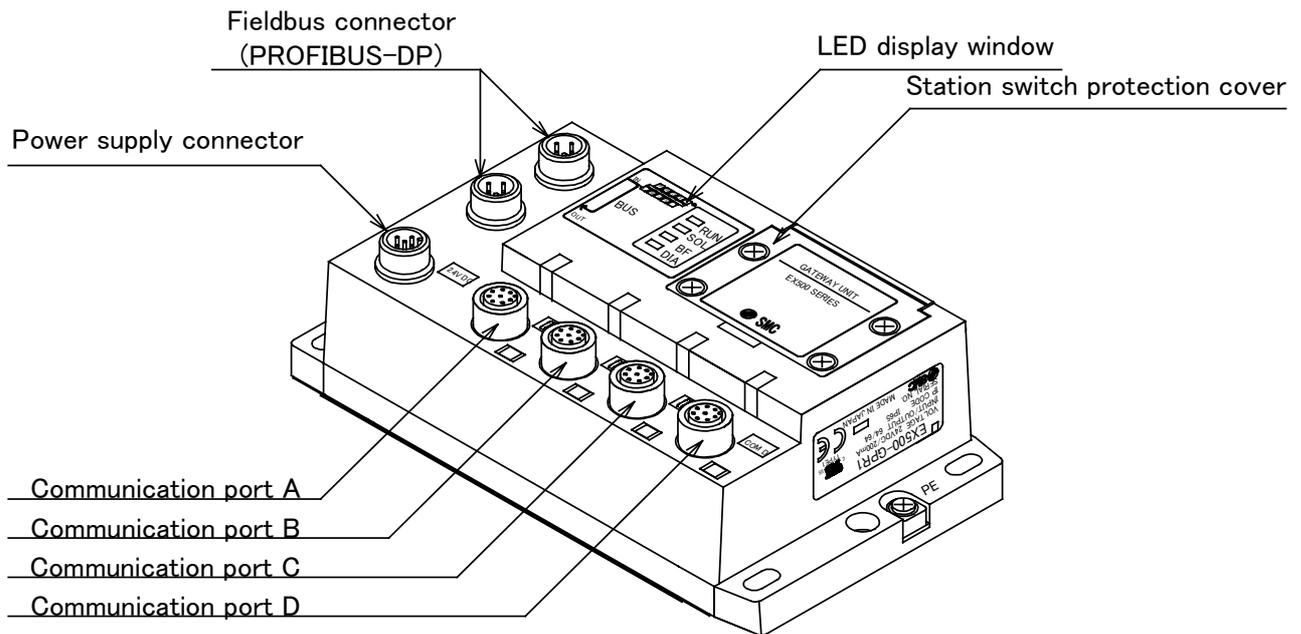
-Terminating resistance

It is necessary to attach terminating resistance to the units located at the ends of transmission line.

Refer to section 6 -4 -2, for setting the terminating resistance.



6 -2. Parts description

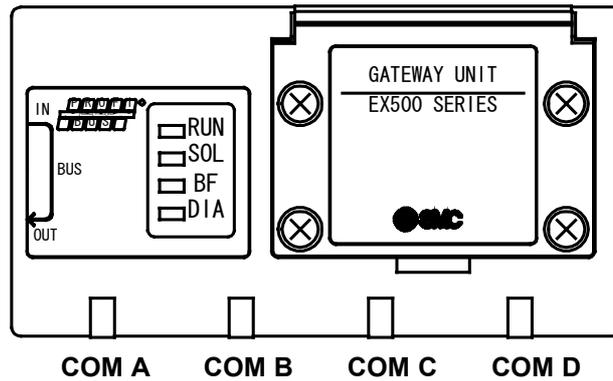


- a. Fieldbus connector : Port for PLC connection.
- b. Power supply connector : The power source for Input Unit, SI Unit, and control and for the solenoid valve is connected through this port.
- c. Communication port : Input Unit Manifold or the Manifold Valve with the SI Unit is connected through this port.
- d. LED display window : The state of the power source supply and the PLC communication is displayed. (Refer to section 6 -3)
- e. Station switch protection cover : Switches for the operation setting are inside. (Refer to section 6 -4)



The station switch protection cover should be tightened with specified tightening torque after it is opened. (Tightening torque : 0.6 N·m)

6 -3. LED display



Display	Content
RUN	Source ON : Lights Source OFF : Lights off
SOL	Solenoid valve source voltage is normal :Lights Voltage lowered to 20V or less :Lights off
BF	PROFIBUS-DP communication is normal : Lights off PROFIBUS-DP communication is abnormal : Lights
DIA	DIA is abnormal : Lights DIA is normal : Lights off
COM A	Communication port A is receiving data : Lights Communication port A has no data : Lights off
COM B	Communication port B is receiving data : Lights Communication port B has no data : Lights off
COM C	Communication port C is receiving data : Lights Communication port C has no data : Lights off
COM D	Communication port D is receiving data : Lights Communication port D has no data : Lights off

CAUTION

When the Input Unit Manifold is not connected, the respective COM LED of the GW Unit will not light up. To monitor the status of COM port, it is necessary to use a Terminal Plug. The COM LED will light up when a Terminal Plug is used. (Refer to section 3 -6 -4)

6 -4. Operation setting

Turn the power supply OFF when setting switches.

Open the station switch protection cover and set the dip switch with a flat blade screw driver.

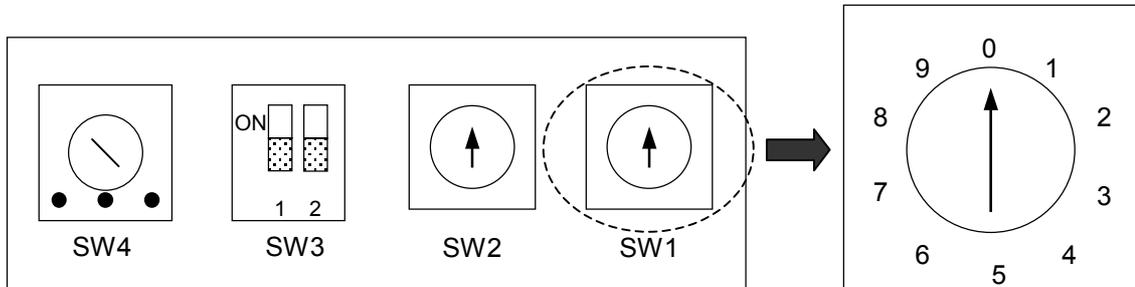
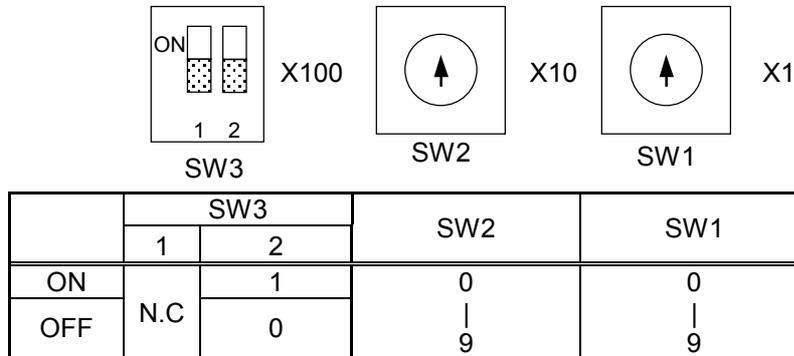


Figure of setting switch

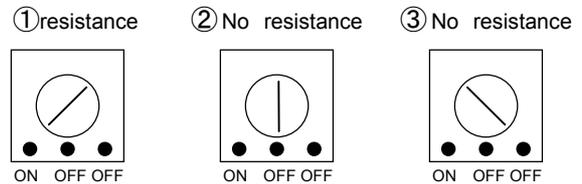
6 -4 -1. Address setting switch (SW1, 2, 3)

These switches set node address. The setting is shown in the following figure.
 The address per one segment can be set in 32 node in case of no Repeater used and is set a maximum of 126 node in case of a Repeater used.



6 -4 -2. Terminating resistance setting switch (SW4)

This switch is to set the terminating resistance.
 The setting is shown in three figures on right.



State of SW4

6 -5. I/O memory map

The GW Unit can control 128 input / output points in total. Regardless of I/O points of the equipment, it always occupies each data memory area for 64 inputs and 64 outputs.
 Once the address is assigned in the GW Unit, every port then corresponds to a specific "Word" respectively. So "Word (n)" always corresponds to COM A, "Word (n+1)" corresponds to COM B, and so on.

Ex.) n = 1

In case of the input data, the sensor signal data of the Input Manifold which was connected with the COM A port, occupies "Word1" of the I/O memory mapping.

If a sensor signal is stored in the "0 bit" of the Input Manifold, it becomes like the Figure below.

In the same way, in the case of the output data, the contents displayed in "Word1" of the I/O memory mapping is output by the COM A port.

-In case of corresponding with " Word "

(m,n=0 -)	Branch connector	Data (2 byte)			
		MSB	LSB	MSB	LSB
		15	8	7	0
Word (n)	COM A	Byte (m+1)		Byte (m)	1
Word (n+1)	COM B	Byte (m+3)		Byte (m+2)	
Word (n+2)	COM C	Byte (m+5)		Byte (m+4)	
Word (n+3)	COM D	Byte (m+7)		Byte (m+6)	
⋮	⋮				
⋮	⋮				

•In case of corresponding with “ Double Word “

(m,n=0 -)	Branch connector	Data (4 byte)								
		MSB	LSB	MSB	LSB	MSB	LSB	MSB	LSB	
		7	0	7	0	7	0	7	0	
Double Word (n, n+1)	COM A / COM B	Byte (m)		1	Byte (m+1)		Byte (m+2)		Byte (m+3)	
Double Word (n+2, n+3)	COM C / COM D	Byte (m+4)		Byte (m+5)		Byte (m+6)		Byte (m+7)		
⋮	⋮									
⋮	⋮									



CAUTION

Read carefully the user manual of PLC which is used as a master.
 The method of PLC setup, reading from or writing to memory differ from one PLC manufacturer to another.

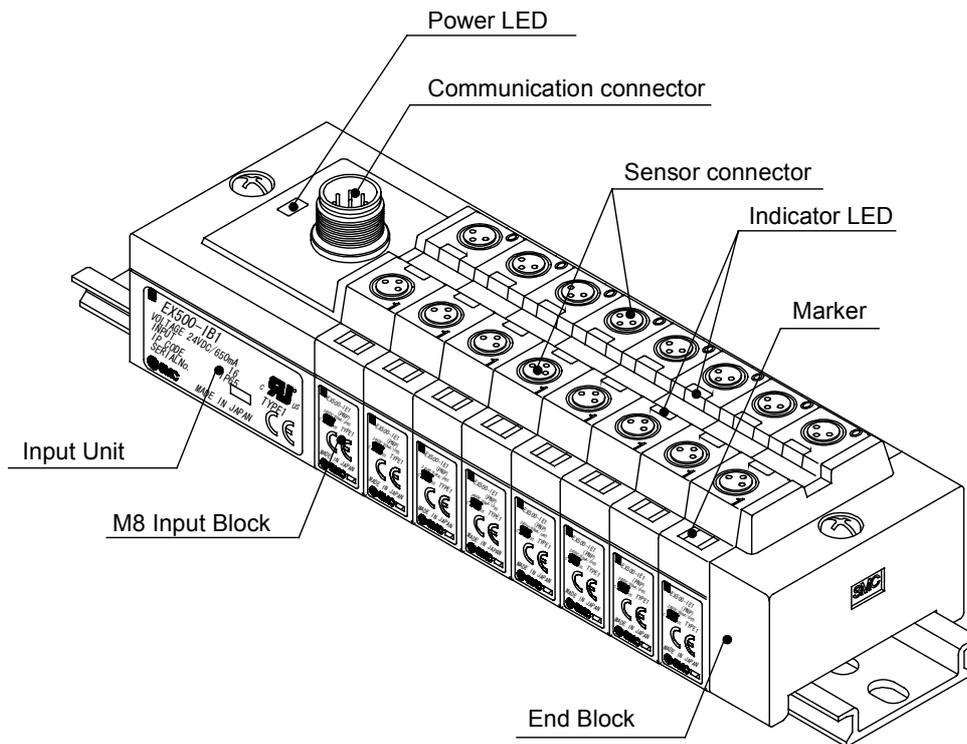
7. Input Unit Manifold

7 -1. Parts description

The Input Unit Manifold is composed of Input Unit (EX500 - IB1 (-X1)), Input Block (EX500 - IE□ (-X1)), End Block and DIN rail.

The Input Unit Manifold can have various combinations depending on the number of input and type of the sensor connector.

Input Block of different sensor specification can not be mixed. All blocks should be either PNP type or NPN type.



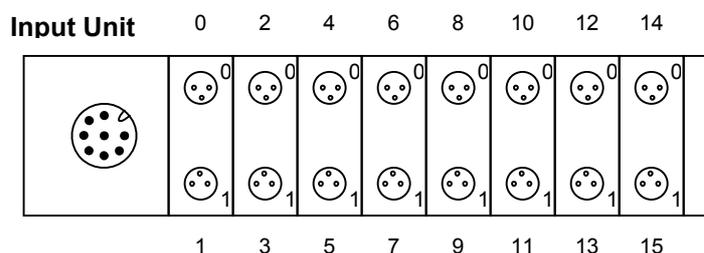
- a. Communication connector : GW Unit or Manifold Valve with SI Unit is connected here.
- b. Power LED : Lights up when power source is ON.
Flashing LED indicates the presence of a short circuit.
Power supply must be reset after fixing the short circuit.
Lights off when power source is OFF.
- c. Sensor connector : Sensor is connected.
- d. Indicator LED : Lights up when sensor signal is ON. (logical " 1 ")
Lights off when sensor signal is OFF. (logical " 0 ")
- e. Marker : Can be used for identifying input number.

7 -2. Correspondence of input number and Input Block

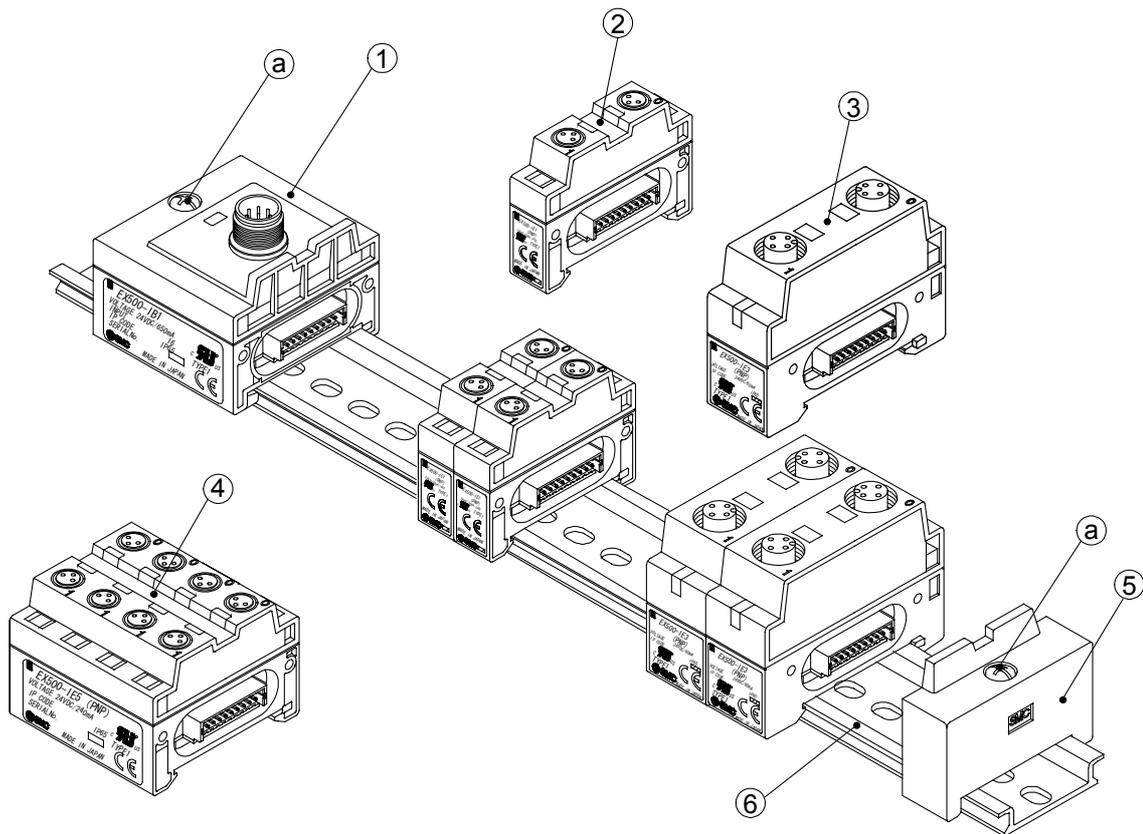
Each Input Unit Manifold can have up to 8 Input Blocks (16 input points).

The first Input Block is always next to Input Unit.

Refer to section 3 -3 for pin out of connectors used on Input Unit and Input Block.



7 -3. Exploded view / Input Unit Manifold

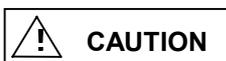


-Parts list

NO.	Parts name	Parts number		Note
		For standard	For RIO	
①	Input Unit	EX500 - IB1	EX500 - IB1 -X1	
②	Input Block (M8 connector)	EX500 - IE□	EX500 - IE□ -X1	PNP ... □: 1, NPN ... □: 2
③	Input Block (M12 connector)	EX500 - IE□	EX500 - IE□ -X1	PNP ... □: 3, NPN ... □: 4
④	8 point unit Input Block (M8 connector)	EX500 - IE□	EX500 - IE□ -X1	PNP ... □: 5, NPN ... □: 6
⑤	End Block	EX500 - EB1		
⑥	DIN rail	VZ1000 - 11 - 1 - □		□ : Length (Refer to the Valve Catalogues)

-Addition of the Input Block

- 1** Loose two screws (a) which are holding the End Block and the Input Unit until they rotate freely.
- 2** Add a new Input Block on a desired location on DIN rail.
- 3** Press the whole assembly together to make a good connection between Input Blocks.
- 4** Tight the two screws (a) to secure the assembly on DIN rail connected together.



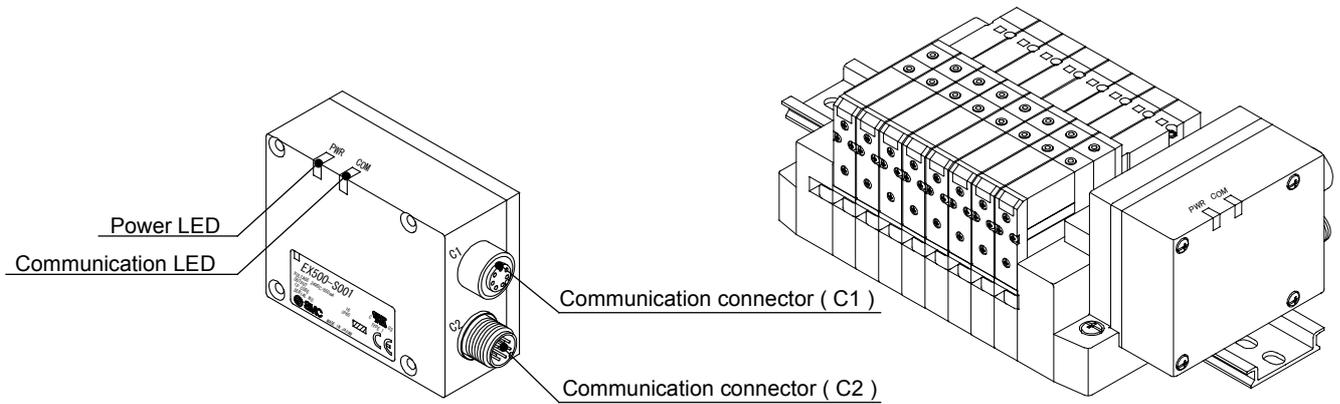
Tight the screws with specified tightening torque. (Tightening torque : 0.6 N•m)

8. Manifold Valve

8 -1. Parts description

Refer to the Catalogues or Technical Instruction Manual of SV and VQC series Manifold Valve for more details.

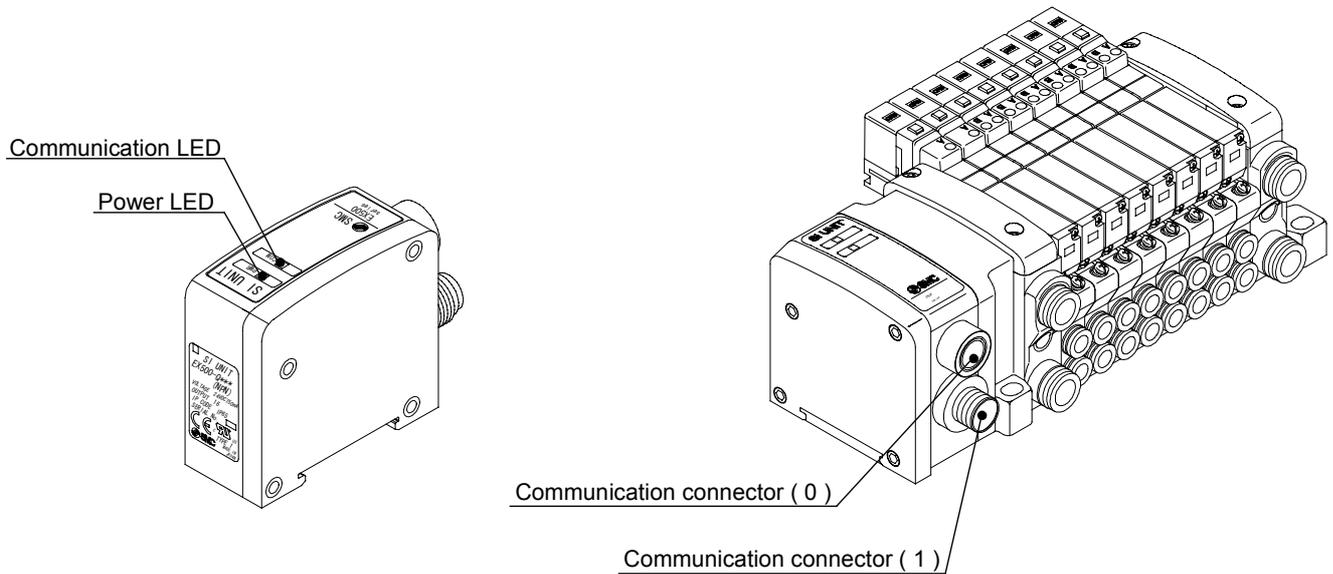
SV series



SI Unit for SV series Manifold

SV1000 series

VQC series



SI Unit for VQC series Manifold

VQC1000 series

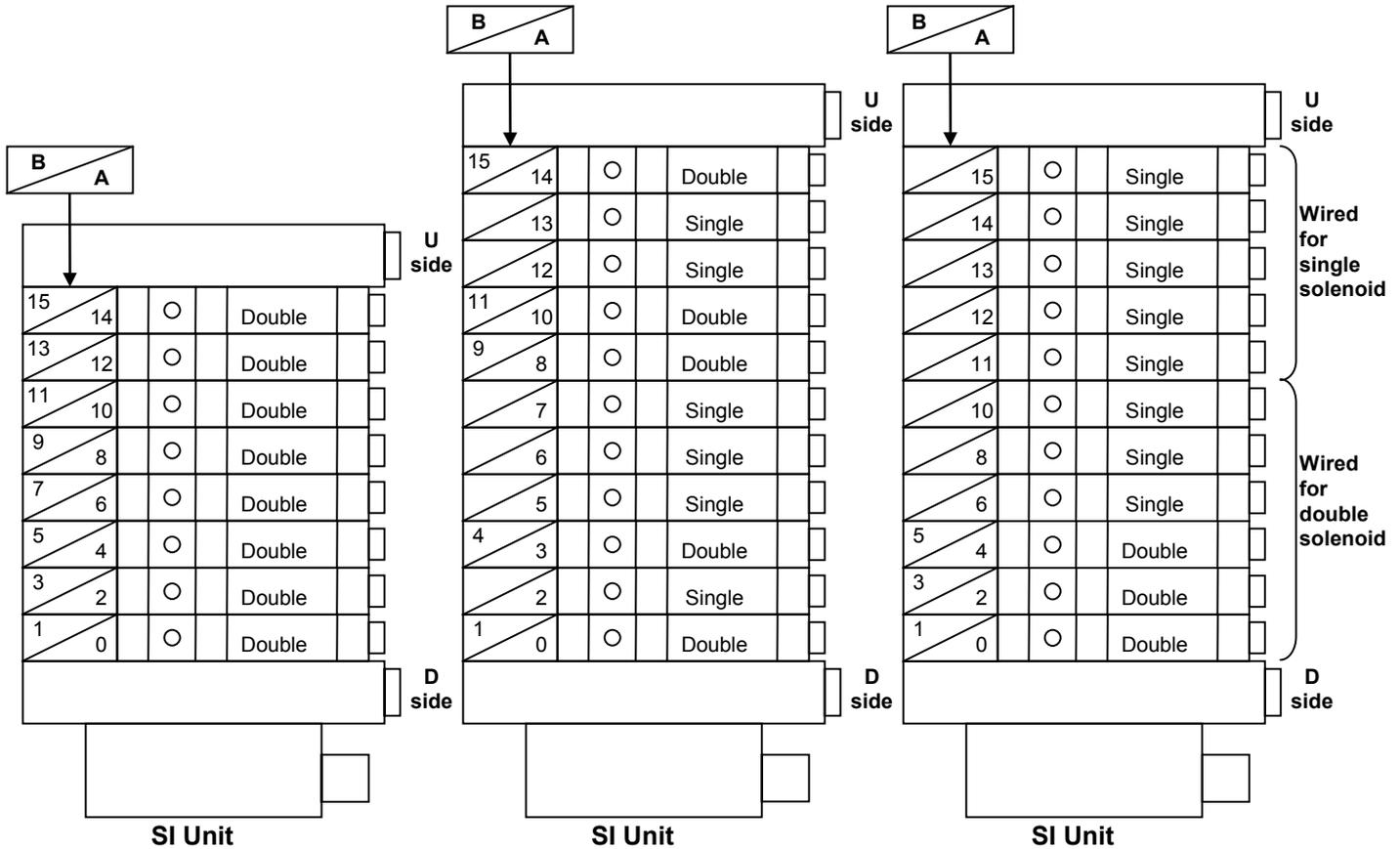
- a. Communication connector : “C1” or “0” port ... Input Unit is connected here.
: “C2” or “1” port ... GW Unit is connected here.
- b. Power LED : Lights up when power source is ON.
: Lights off when power source is OFF.
- c. Communication LED : Lights up when receiving data from the GW Unit.
(communication ON)
: Lights off when there is no communication from the GW Unit.
(communication OFF)

8 -2. Correspondence of output number and Manifold Valve

The output number to the Manifold Valve of the SI Unit is shown in the following figure.
 The SI Unit has output of 16 points.

In case of the Relay Output Module (1 output), it becomes like the Single solenoid valve.

In case of the Relay Output Module (2 output), it becomes like the Double solenoid valve.



Example 1 : 8 stations double solenoid valve

Example 2 : Single and double solenoid valves are mixed



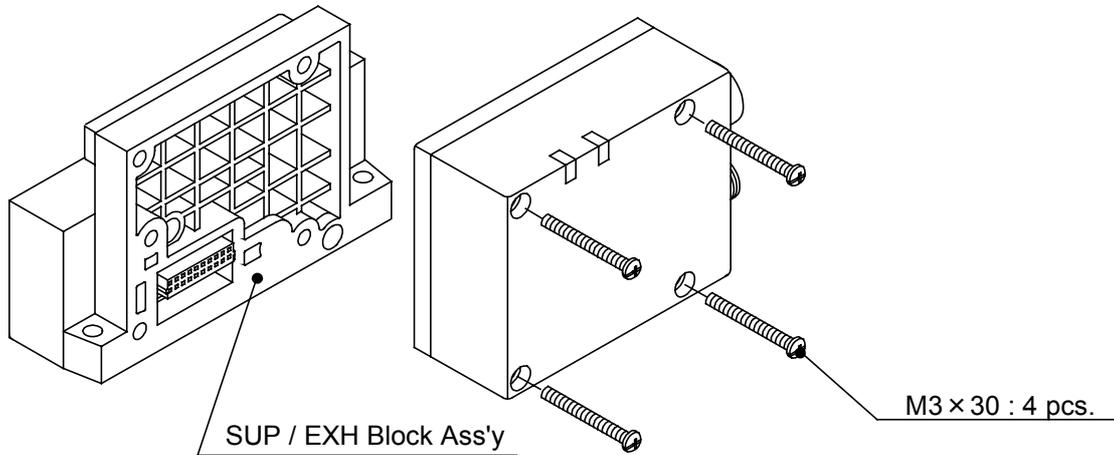
The Manifold Valve combination of Example “ 2 ” shows the single solenoid valve using the Manifold Block Ass’y wired for single solenoid and the double solenoid valve using Manifold Block Ass’y wired for double wiring.

Confirm the Manifold Block assembly configuration i.e. wired for single solenoid or wired for double solenoid before making a control program and so on.

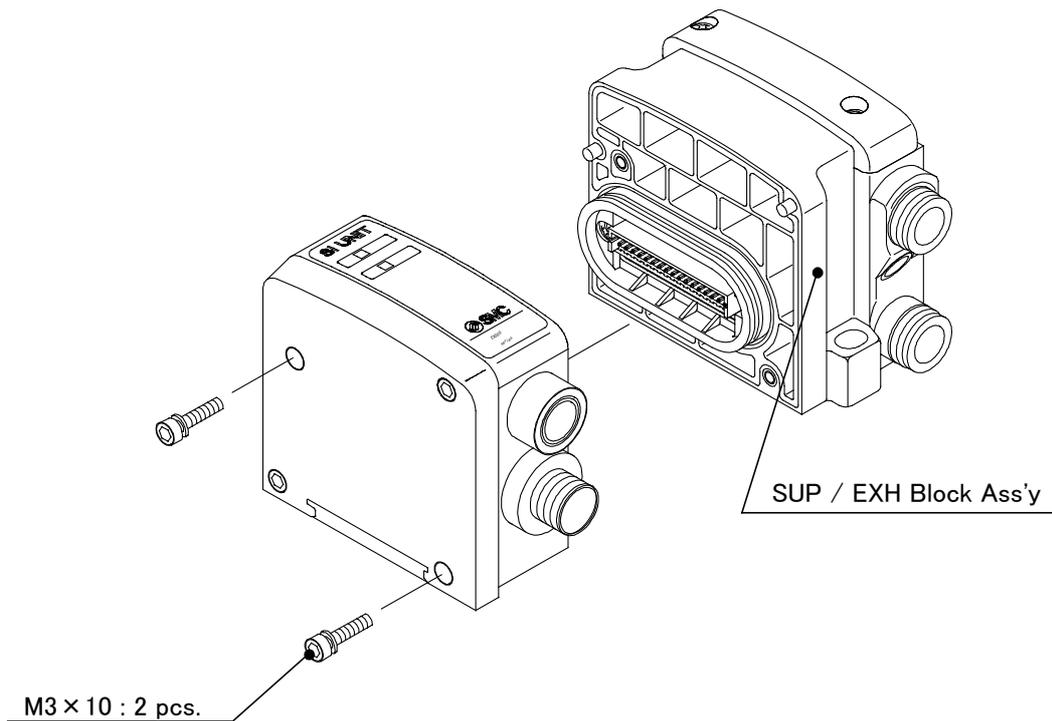
8 -3. How to install the SI Unit

The following figure shows how to install / remove the SI Unit with / from the Manifold Valve.

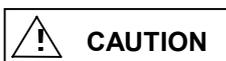
Refer to the Catalogues or Technical Instruction Manual of SV and VQC series Manifold Valve for more details.



SI Unit for SV series Manifold



SI Unit for VQC series Manifold



Tight the screws which hold the SI Unit with SUP / EXH Block Ass'y with specified tightening torque.
 (Tightening torque : 0.6 N·m)

9. Wiring



Wire each cables after turning the power supply OFF.

9 -1. Source wiring

Wiring from power supply to GW’s power supply connector is called Source wiring.
(Refer to section 4 -2, 5 -2, 6 -2)

For pin out of this connector refer to section 3 -2. It is not necessary to supply power to SI Unit, Valve Manifold Block and Input Unit Manifold Block individually.

Power to these units will be supplied from GW Unit’s power supply connector.

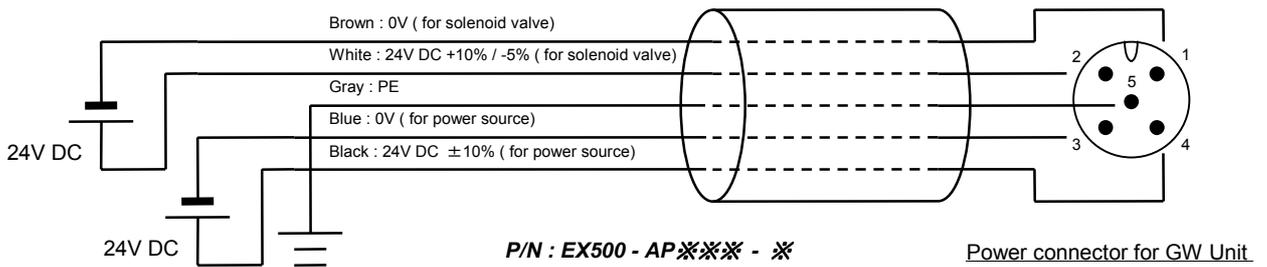
Refer to “ **Safety instructions for power supply** ” when selecting a power supply.

It is recommended to use SMC specified cable for source wiring. (Refer to section 3 -6 -3)

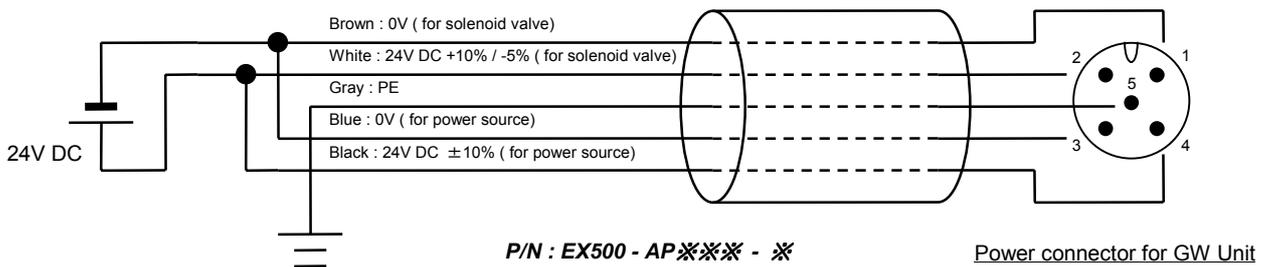


As shown in the following two figures a single power supply or 2 individual power supplies can be used to supply power to SI Unit and Solenoid Valve Manifold.

A. Individual power supply



B. Single power supply



9 -2. Communication wiring

9 -2 -1. Communication wiring to PLC

A. Remote I/O (EX500 - GAB1 -X1) communication wiring

Remote I/O communication cable can be connected with any of the two M12, 4 pin connectors on GW Unit.
(Refer to section 4 -2)

For pin out of M12 connector refer to section 3 -2.

Communication system has two connectors on the GW Unit and they are connected together inside the unit, therefore, either one of them can be use to connecting a PLC with the GW Unit and second one could be used for daisy chaining another GW Unit.

It is recommended to use SMC specified cable to connect a PLC with GW Unit. (Refer to section 3 -6 -1)
Rockwell Automation specified Remote I/O cable can be used too.



1. If more than 1 GW Units are desired in the system, connect the units together one by one using a communication cable.
2. Set the terminating resistance at the last GW Unit. (Refer to section 4 -4 -3 for detail)
3. Use the Water Proof Cap on an unused Communication connector. (Refer to section 3 -6 -5)

B. DeviceNet (EX500 - GDN1) communication wiring

Communication between a DeviceNet GW Unit and PLC is accomplished through a M12, 5 pin connector.
Refer to section 5 -2 for detail. For pin out of this connector refer to section 3 -2.

It is recommended to use SMC specified Communication Connector Cable. (Refer to section 3 -6 -1 for detail)



1. Follow the communication cable specification. (Refer to section 5 -1)
2. Use a terminal resistor at both ends of main truck line to absorb the reflection. (Refer to section 5 -1)

C. PROFIBUS-DP (EX500 - GPR1) communication wiring

Communication between a PROFIBUS-DP GW Unit and PLC is accomplished through a M12, 5 pin connector.
Refer to section 6 -2 for detail. For pin out of this connector refer to section 3 -2.

Be careful to wire the communication connector for PROFIBUS-DP, because there are for input and for output.



1. Follow the communication cable specification. (Refer to section 6 -1)
2. It is necessary to set the terminating resistance to the units located at the ends of transmission line.
(Refer to section 6 -4 -2)

9 -2 -2. Communication wiring to the SI Unit and the Input Unit

GW Unit is connected with SI Unit or the Input Unit through a M12, 8pin connector.
Refer to sections 4 -2, 5 -2, 6 -2, 7 -1, 8 -1 for detail.

For pin out of this 8pin connector refer to sections 3 -2, 3 -3 -2, 3 -4.

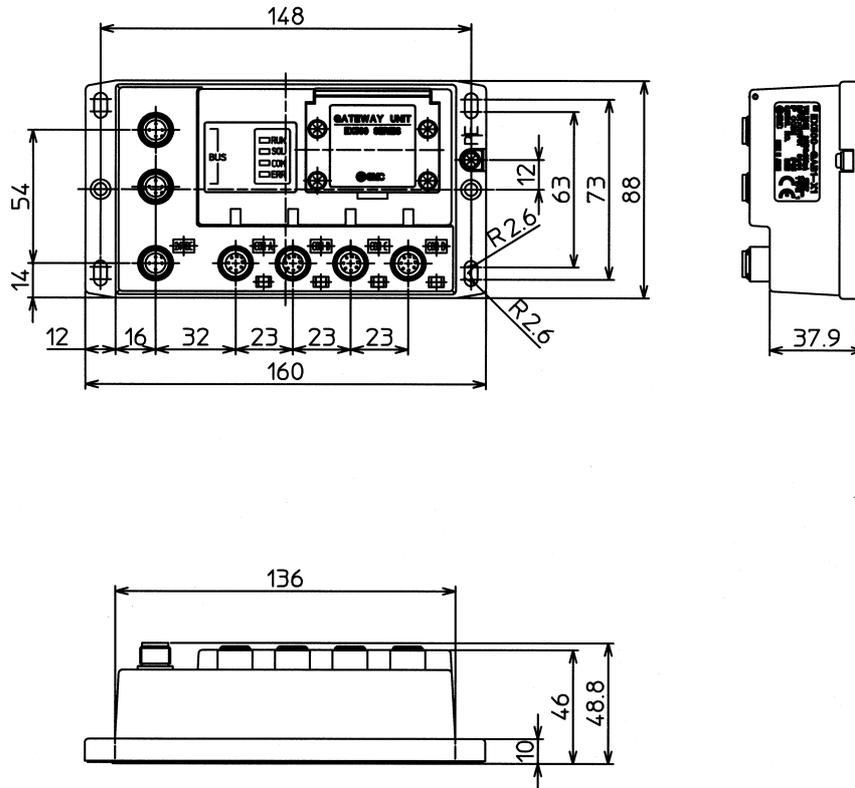
Refer to section 3 -6 -2 for Cable part number to connect a GW Unit with SI Unit or Input Unit.



If Input Unit Manifold is not connected with the SI Unit, a Terminal Plug should be hooked up with port C1 (for SV series valve manifold) or port 0 (for VQC series valve manifold). Without this plug COM LED on the GW Unit will not light up. (Refer to section 3 -6 -4)

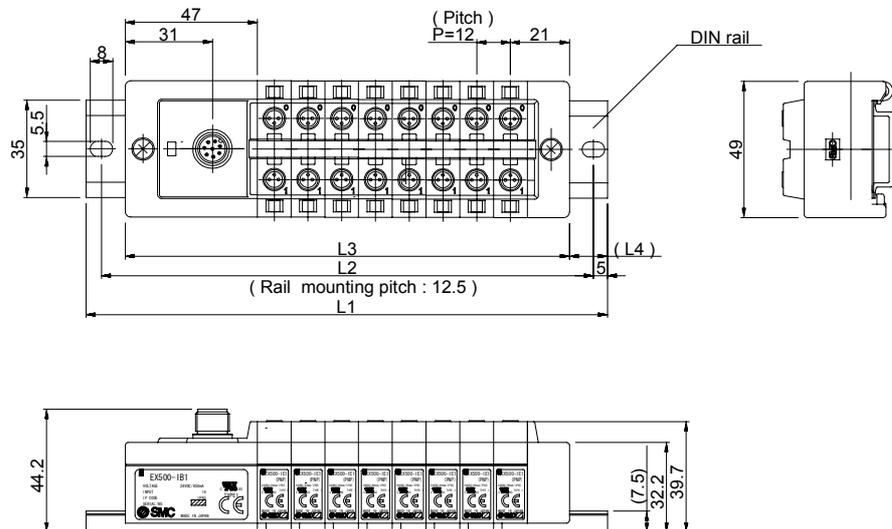
10. Dimension

10 -1. Gateway (GW) Unit



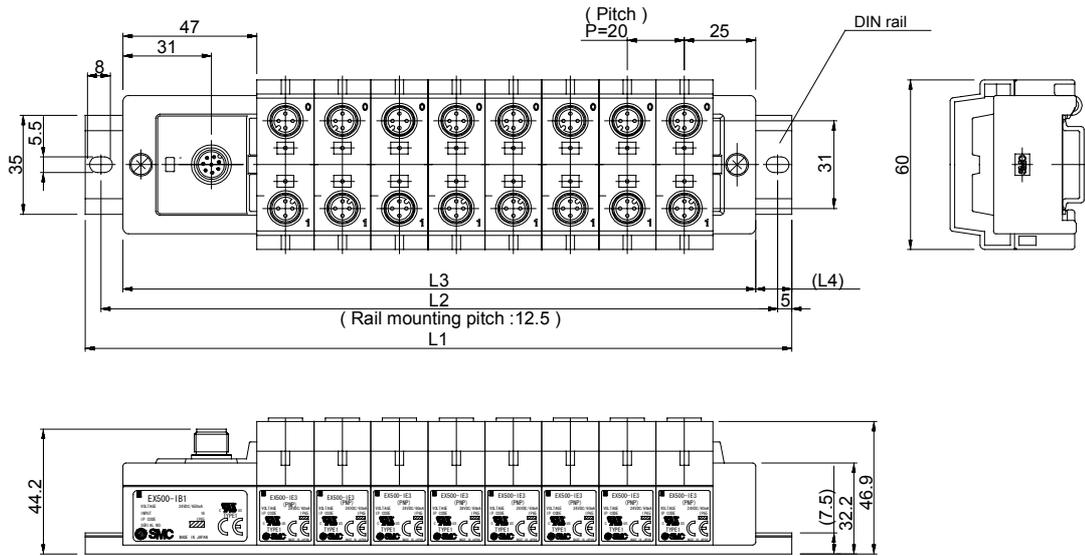
10 -2. Input Unit Manifold

•In case of M8 Input Block



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

-In case of M12 Input Block



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

10 -3. Manifold Valve

Refer to the Catalogues or Technical Instruction Manual of SV and VQC series Manifold Valve for more details.

11. Trouble shooting

•Whole system

NO.	Item	Remedies
1	The solenoid valve does not work.	<ul style="list-style-type: none"> • Check the power supply for the solenoid valve is supplying 24VDC. (Refer to section 9 -1) • Check the Branch Cable with M12 Connector is properly connected with the SI Unit. (Refer to section 8 -1) • Check the Power LED and the Communication LED of the SI Unit light up. (Refer to section 8 -1)
2	The solenoid valve does not work as in the program.	<ul style="list-style-type: none"> • Check the wiring specification of Manifold Block Ass'y. (Refer to section 8 -2)
3	The Power LED of the Input Unit is flashing.	<ul style="list-style-type: none"> • There is possibility that the input sensor has a short-circuit . Check that the sensor is not bad. • Check the power supply for a possibility that the current in power supply line is above the specification.
4	Connecting sensor does not start signal.	<ul style="list-style-type: none"> • Check the power supply to make sure that 24VDC is supplied. (Refer to section 9 -1) • Check whether or not the Indicator LED of each block lights up. (Refer to section 7 -1)
5	COM A - D does not light.	<ul style="list-style-type: none"> • Check whether or not the Input Unit is connected with the branch of the COM port which does not light up. Check the Branch Cable with M12 Connector is properly connected with the Input Unit. (Refer to section 7 -1) • Check that a Terminal Plug is connected with port C1 or C0 if Input Unit Manifold, is not connected. (Refer to section 9 -2 -2)

•Remote I/O communication

NO.	Item	Remedies
1	RUN LED lights off.	<ul style="list-style-type: none"> • Check the power supply is supplying 24VDC. (Refer to section 9 -1)
2	COM LED lights off. ERR LED lights.	<ul style="list-style-type: none"> • Check the signal line from PLC is properly connected. (Refer to section 4 -2) • Check wiring and pin out. (Refer to section 3 -2) • Check the RACK Address is correctly set. (Refer to section 4 -4 -1) • Check Starting Quarter is correctly set. (Refer to section 4 -4 -1) • Check Data Rate is correctly set. (Refer to section 4 -4 -2) • Check Last RACK is correctly set. (Refer to section 4 -4 -2) • Check the terminating resistance is correctly set. (Refer to section 4 -4 -3)
3	SOL LED lights off.	<ul style="list-style-type: none"> • Check the power supply for 24VDC (Refer to section 9 -1) • Check the power supply for the solenoid valve is not less than 20V.

•DeviceNet communication

NO.	Item	Remedies
1	The status of MS LED Operating in a normal condition : Green lights Recoverable fault (Memory is abnormal) : Red lights	<ul style="list-style-type: none"> •Check the signal line from PLC is properly connected. (Refer to section 5 -2) •Check Wiring and pin out. (Refer to section 3 -2, 3 -6 -1) •Check communication speed and Address setting switch are correctly set. (Refer to section 5 -4)
2	The status of NS LED Not online : Lights off Online , Not Allocated : Green flashing Online , Allocated : Green lights Connection Time - Out : Red flashing Critical Link Failure : Red lights	<ul style="list-style-type: none"> •Check the signal line from PLC is properly connected. (Refer to section 5 -2) •Check wiring and pin out. (Refer to section 3 -2, 3 -6 -1) •Check communication speed and Address setting switch are correctly. (Refer to section 5 -4)
3	SOL LED lights off.	<ul style="list-style-type: none"> •Check power supply to make sure that 24VDC is supplied to solenoid valve. (Refer to section 9 -1) •Check power supply to solenoid valves is not less than 20VDC.

•PROFIBUS-DP communication

NO.	Item	Remedies
1	RUN LED lights off.	<ul style="list-style-type: none"> •Check the power supply is supplying 24V DC. (Refer to section 9 -1)
2	BF LED lights.	<ul style="list-style-type: none"> •Check the signal line from PLC is properly connected. (Refer to section 6 -2) •Check wiring and pin out. (Refer to section 3 -2) •Check Address setting switch is correctly set. (Refer to section 6 -4 -1) •Check the terminating resistance is correctly set. (Refer to section 6 -4 -2)
3	DIA LED lights.	<ul style="list-style-type: none"> •Check the power supply for the solenoid valve is supplying. (Refer to section 9 -1) •Check the power supply for the solenoid valve is not less than 20VDC.
4	SOL LED lights off.	<ul style="list-style-type: none"> •Check the power supply for the solenoid valve is supplying. (Refer to section 9 -1) •Check the power supply for the solenoid valve is not less than 20VDC.

This technical instruction manual is the day of March, 2001 present one.

Specifications are subjected to change without any notice. Manufacture does not assume any liability arising out of application of any product specified in this manual.