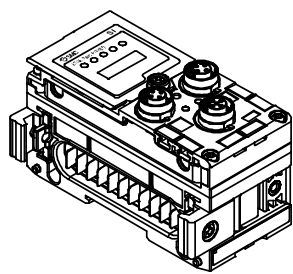




Instruction Manual

Fieldbus device - SI unit for EtherNet/IP™

EX600-SEN1 / -SEN2



The intended use of this product is to control pneumatic valves and I/O while connected to the EtherNet/IP™ protocol.

1 Safety Instructions

These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of "Caution," "Warning" or "Danger." They are all important notes for safety and must be followed in addition to International Standards (ISO/IEC) ^{*)}, and other safety regulations.

^{*)} ISO 4414: Pneumatic fluid power - General rules relating to systems.

ISO 4413: Hydraulic fluid power - General rules relating to systems.

IEC 60204-1: Safety of machinery - Electrical equipment of machines. (Part 1: General requirements)

ISO 10218-1: Manipulating industrial robots - Safety, etc.

- Refer to product catalogue, Operation Manual and Handling Precautions for SMC Products for additional information.
- Keep this manual in a safe place for future reference.

Caution	Caution indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.
Warning	Warning indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
Danger	Danger indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

Warning

- Always ensure compliance with relevant safety laws and standards.
- All work must be carried out in a safe manner by a qualified person in compliance with applicable national regulations.

2 Specifications

The EX600 range of units can be connected to a fieldbus to realize the reduction of input or output device wiring and a distributed control system. The system communicates with the fieldbus through the SI unit. One SI unit can be connected to manifold valves with up to 32 outputs, and to input, output, I/O units to a maximum of 9 units.

2.1 General specifications

Item	Specifications
Ambient temperature	-10 to +50 °C
Ambient humidity	35 to 85%RH (no condensation)
Ambient storage temperature	-20 to +60 °C
Withstand voltage	500 VAC applied for 1 minute
Insulation resistance	500 VDC, 10 MΩ or more
Enclosure rating	IP67 (manifold assembled)
Weight	300 g

2 Specifications (continued)

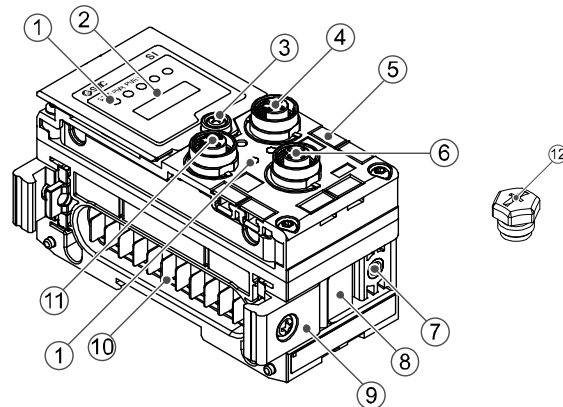
2.2 Electrical specifications

Item	Specifications		
Power supply voltage / current	Control and Input power supply	24.0 VDC 2.0 A max.	
	Solenoid valve and Output power supply	24.0 VDC 2.0 A max.	
	Internal current consumption	120 mA maximum	
Solenoid valve specification	Output type	EX600-SEN1	PNP / source (negative common)
		EX600-SEN2	NPN / sink (positive common)
	Number of outputs	32 outputs	
	Applicable valve series	24 VDC and 1.0 W max. Solenoid valve with surge voltage suppression (manufactured by SMC)	
	Output condition during communication error	HOLD / CLEAR / Force ON	
Protection function	Short circuit protection		

2.3 Communication specifications

Item	Specifications
Protocol	EtherNet/IP™ (conformance version: Composite11)
Communication medium	Standard EtherNet cable (CAT5 or more, 100BASE-TX)
Communication speed	10 / 100 Mbps
Communication type	Full duplex / Half duplex
IP address setting range	Setting by switch: 192.168.0 or 1.1 to 254 By DHCP server: arbitrary address
Device information	Vendor ID: 7 (SMC Corporation) Device type: 12 (communication adapter) Product code: 126
Network Topology	Star, Linear Bus and Ring (including DLR)

3 Name and function of parts



No	Part	Description
1	LED display	Displays the SI unit status.
2	Display cover	Display cover for switch setting.
3	Display cover screw	To open the display cover.
4	Connector (BUS OUT)	Connector for Fieldbus Outputs.
5	Marker groove	Groove for identification marker.
6	Connector (PCI)	Connector for Handheld terminal.
7	Valve plate hole	Hole for valve plate mounting.
8	Valve plate groove	Groove for valve plate mounting.
9	Joint bracket	Bracket for joining to adjacent units.
10	Unit connector	Connector for signal/power to next unit.
11	Connector (BUS IN)	Connector for Fieldbus Inputs.
12	Seal cap (2 pcs.)	For all unused M12 connectors

4 Assembly

4.1 Assembling the unit

Warning

Do not install the product unless the safety instructions have been read and understood.

- Connect an I/O unit to the end plate. Digital and analogue units can be connected in any order. Joint bracket screw tightening torque: 1.5 to 1.6 N•m.

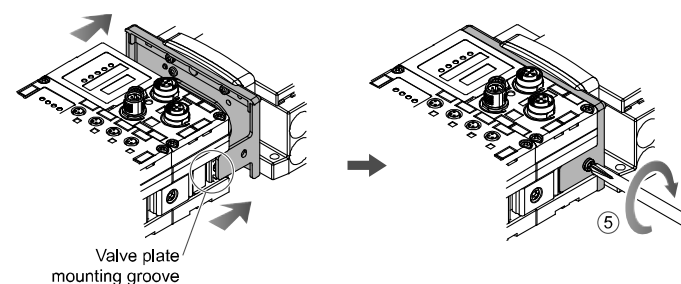
- Add more I/O units. Up to 9 I/O units can be connected to one manifold.

- Connect the SI unit. After connecting the required I/O units, connect the SI unit. The connection method is as above.

- Mount the valve plate (EX600-ZMV#) to the valve manifold using the valve screws (M3 x 8) supplied. (Tightening torque: 0.6 to 0.7 N•m).

- Connect the SI unit assembly to the valve manifold. Insert the valve plate into the valve plate mounting groove.

Then fix using the valve plate mounting screws (M4 x 6) supplied (Tightening torque: 0.7 to 0.8 N•m).

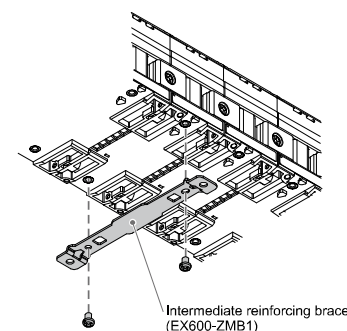


5 Installation

- Do not expose to direct sunlight. Use a suitable protective cover.
- Do not install in a location subject to vibration or impact in excess of the product's specifications.
- Do not mount in a location exposed to radiant heat that would result in temperatures in excess of the product's specifications.

• Direct mounting

- When assembling six or more units, the middle part of the assembly must be fitted with an intermediate reinforcing brace (EX600-ZMB1) before mounting using 2-M4x5 screws (Tightening torque: 0.7 to 0.8 N•m).



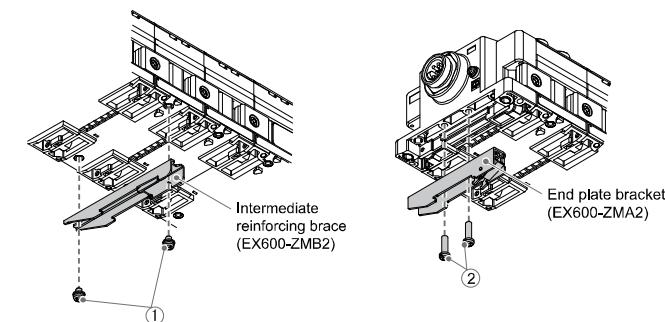
- Mount and tighten the end plate at one end of the unit and mount the intermediate reinforcing brace if required using M4 screws (Tightening torque: 0.7 to 0.8 N•m). Fix the end plate at the valve side while referring to the operation manual for the applicable valve series.

5 Installation (continued)

• DIN rail mounting

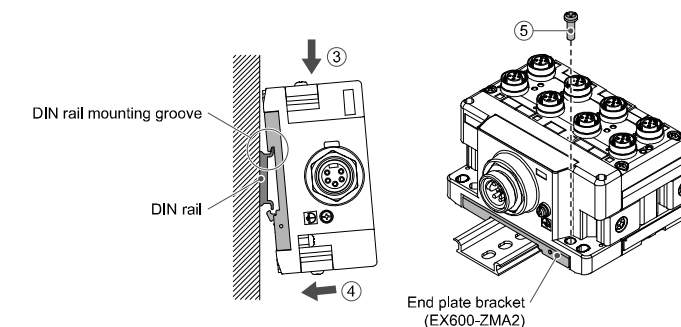
- When assembling six or more units, the middle part of the complete assembly must be fitted with an intermediate reinforcing brace for DIN rail mounting (EX600-ZMB2), using 2-M4 x 6 screws. (Tightening torque: 0.7 to 0.8 N•m).

- Mount the end plate bracket (EX600-ZMA2) to the end plate using 2-M4 x 14 screws (Tightening torque: 0.7 to 0.8 N•m). For the SY series, use end plate bracket (EX600-ZMA3).



- Hook the DIN rail mounting groove on to the DIN rail.
- Press the manifold using its side hooked to the DIN rail as a fulcrum until the manifold is locked onto the DIN rail.

- Fix the manifold by tightening the DIN rail fixing screws (M4 x 20) on the end plate bracket (Tightening torque: 0.7 to 0.8 N•m). Refer to the Operation Manual for the applicable valve series on the SMC website (URL: <https://www.smcworld.com>) for the mounting method of the valve manifold.



5.1 Wiring connections

• Communication Connector

Select the appropriate cables to mate with the connectors on the SI unit. The EtherNet/IP™ connection port pin layout is as shown below.

Connector	Pin No.	Signal name
BUS IN / BUS OUT	1	TX+
	2	RX+
	3	TX-
	4	RX-

• Power Supply Connector

The system is operated using power supplied from the EX600-ED# end plate. Refer to the end plate instruction manual and operation manual for the power supply connection details.

The M12 connector cable for fieldbus and power supply connections has two types, Standard M12 and SPEEDCON compatible. If both plug and socket have SPEEDCON connectors, the cable can be inserted and connected by turning it a 1/2 rotation. A standard connector can be connected to a SPEEDCON connector.

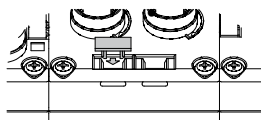
Warning

- Be sure to fit a seal cap (EX9-AWTS) on any unused connectors. Proper use of the seal cap enables the enclosure to maintain IP67 specification.

5 Installation (continued)

5.2 Identification marker

The signal name of the input or output devices and unit address can be written on the marker and can be installed on each unit. Mount a marker (EX600-ZT1) into the marker groove as required.



5.3 Environment

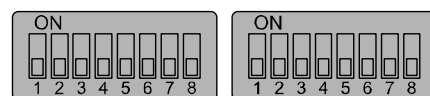
Warning

- Do not use in an environment where corrosive gases, chemicals, salt water or steam are present.
- Do not install in a location subject to vibration or impact in excess of the product's specifications.
- Do not mount in a location exposed to radiant heat that would result in temperatures in excess of the product's specifications.

6 Settings

6.1 Switch Settings

- Open the display cover.
- Turn OFF the power before setting the switches.
- Set the switches using a small flat blade screwdriver, referring to the information below.
- After setting the switches close the cover and tighten the screw (Tightening torque: 0.3 to 0.4 N•m).
- When the power supply is turned ON the switch setting will become effective.



Settings1

Settings2

Configuration memory setting

When the manifold configuration memory switch is set ON and the

power supply is switched ON, the system will compare the stored configuration with the manifold configuration. If the configuration is different, diagnostic error will be generated.

Settings1	Content
1	
OFF	Normal operation mode (default setting)
ON	Configuration memory mode

Baud rate setting

Allocates the diagnostic data to the input data.

Settings1		Content
2	3	
OFF	OFF	1 Mbps (default setting)
OFF	ON	500 kbps
ON	OFF	250 kbps
ON	ON	125 kbps

IP address setting

Set the IP address of the SI unit.

Settings1	Settings2								IP Address
8	1	2	3	4	5	6	7	8	
OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	192.168.0.1
OFF	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	192.168.0.2
:	:	:	:	:	:	:	:	:	:
OFF	ON	OFF	ON	ON	ON	ON	ON	ON	192.168.0.253
OFF	OFF	ON	ON	ON	ON	ON	ON	ON	192.168.0.254
ON	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	192.168.1.1
ON	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	192.168.1.2
:	:	:	:	:	:	:	:	:	:
ON	ON	OFF	ON	ON	ON	ON	ON	ON	192.168.1.253
ON	OFF	ON	ON	ON	ON	ON	ON	ON	192.168.1.254
ON/OFF	ON	ON	ON	ON	ON	ON	ON	ON	DHCP mode
ON/OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	Remote control mode

6 Settings (continued)

- DHCP mode is the mode to obtain IP address from DHCP server. Obtained IP address is lost when the power supply is cut.
- Remote control mode is the mode to respond to commands via the BOOTP/DHCP server provided by Rockwell Automation. Refer to the BOOTP/DHCP server manual for further details.
- Settings1 switch number 3 to 7 are not used and should remain OFF.



Settings3

V_SEL setting

A function to select the number of occupied valve outputs. The number of outputs (size) occupied by the SI unit is selected. Set the number of occupied valve outputs to at least the number of valves used.

Settings3		Number of occupied valve outputs	SI unit output data size
1	2		
OFF	OFF	32 outputs	4 bytes (default)
OFF	ON	24 outputs	3 bytes
ON	OFF	16 outputs	2 bytes
ON	ON	8 outputs	1 byte

Diagnostics setting

Allocates the diagnostic data to the input data.

Settings3		Mode	Content	Diagnostic size for input
3	4			
OFF	OFF	0	Input data only (default)	0 bytes
OFF	ON	1	Input data + system diagnostic	4 bytes
ON	OFF	2	Input data + system diagnostic + unit diagnostics (up to 10 units)	6 bytes
ON	ON	3 *	Input data + system diagnostic + unit diagnostics (up to 64 units)	12 bytes

* Mode 3 is a function for extension in the future. Do not use it.

Hold / Clear setting

Sets the output status when the fieldbus has a communication error or is in idling state.

Settings 3	Content
5	
OFF	Output is OFF (default setting).
ON	Hold the output.

EtherNet/IP™ setting

Settings 3			Communication speed	Full / Half duplex
6	7	8		
OFF	ON/OFF	ON/OFF	Automatic	Automatic
ON	OFF	OFF	10 Mbps	Half duplex
ON	OFF	ON	10 Mbps	Full duplex
ON	ON	OFF	100 Mbps	Half duplex
ON	ON	ON	100 Mbps	Full duplex

6.2 Configuration

Technical documentation giving detailed configuration information can be found on the SMC website (URL: <https://www.smcworld.com>).

7 How to Order

Refer to the operation manual or catalogue on the SMC website (URL: <https://www.smcworld.com>) for How to order information.

8 Outline Dimensions (mm)

Refer to the operation manual or catalogue on the SMC website (URL: <https://www.smcworld.com>) for outline dimensions.

9 LED Display

ST(M) PWR PWR(V) MS NS



SI unit status

LED	Description
ST(M) PWR PWR(V) ○ ○ ○ OFF	Power supply for control and input is OFF.
ST(M) PWR PWR(V) ● ● ● Green LED's ON	The SI unit is operating normally.
ST(M) PWR PWR(V) ● ○ ○ ST(M) Red ON	Component failure inside the SI unit.
ST(M) PWR PWR(V) ○ ● ○ PWR Red ON	Power supply voltage for control and input is abnormal.
ST(M) PWR PWR(V) ○ ○ ● PWR(V) Red ON	Power supply voltage for outputs is abnormal.
ST(M) PWR PWR(V) ○ ○ ○ ST(M) Green flashing	A unit other than the SI unit is detected.
ST(M) PWR PWR(V) ○ ○ ○ ST(M) Red flashing	<ul style="list-style-type: none"> The valve ON/OFF counter has exceeded the set value. The valve is short circuited or disconnected.
ST(M) PWR PWR(V) ○ ○ ○ ST(M) Red/Green flashing alternately	<ul style="list-style-type: none"> Connection error between units. Configuration memory error has occurred.

Communication status

LED	Description
MS ○ MS OFF	Power supply for control and input is OFF.
MS ○ MS Green flashing	The SI unit has not been configured correctly or the Fieldbus is idling.
MS ● MS Green ON	The SI unit is operating normally.
MS ○ MS Red flashing	Recoverable error.
MS ● MS Red ON	Component inside the SI unit is faulty.
NS ○ NS OFF	Power supply for control and input is OFF or the IP address is not set.
NS ○ NS Green flashing	The SI unit received an IP address, but connection is not established.
NS ● NS Green ON	Connection is established.
NS ○ NS Red flashing	Connection time out.
NS ● NS Red ON	IP address is duplicated.

10 Maintenance

10.1 General Maintenance

Caution

- Not following proper maintenance procedures could cause the product to malfunction and lead to equipment damage.
- If handled improperly, compressed air can be dangerous.
- Maintenance of pneumatic systems should be performed only by qualified personnel.
- Before performing maintenance, turn off the power supply and be sure to cut off the supply pressure. Confirm that the air is released to atmosphere.
- After installation and maintenance, apply operating pressure and power to the equipment and perform appropriate functional and leakage tests to make sure the equipment is installed correctly.
- If any electrical connections are disturbed during maintenance, ensure they are reconnected correctly and safety checks are carried out as required to ensure continued compliance with applicable national regulations.
- Do not make any modification to the product.
- Do not disassemble the product, unless required by installation or maintenance instructions
- Stop operation if the product does not function correctly.

11 Limitations of Use

11.1 Limited warranty and Disclaimer/Compliance Requirements

Refer to Handling Precautions for SMC Products.

12 Product disposal

This product should not be disposed of as municipal waste. Check your local regulations and guidelines to dispose of this product correctly, in order to reduce the impact on human health and the environment.

13 Contacts

Refer to www.smcworld.com or www.smc.eu for your local distributor / importer.

SMC Corporation

URL: <https://www.smcworld.com> (Global) <https://www.smc.eu> (Europe)
SMC Corporation, 4-14-1, Sotokanda, Chiyoda-ku, Tokyo 101-0021, Japan
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