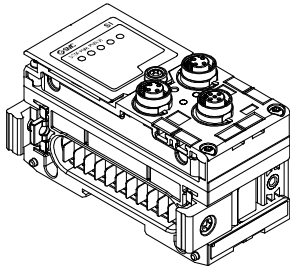




Instruction Manual
Fieldbus device - SI unit for EtherCAT
Series EX600-SEC1 / -SEC2



The intended use of this SI unit is for the control of pneumatic valves and I/O while connected to the EtherCAT 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 and safety requirements for systems and their components.
ISO 4413: Hydraulic fluid power — General rules and safety requirements for systems and their components
IEC 60204-1: Safety of machinery - Electrical equipment of machines - Part 1: General requirements
ISO 10218-1: Robotics — Safety requirements — Part 1: Industrial robots
- 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.

	Danger	Danger indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.
	Warning	Warning indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
	Caution	Caution indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate 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 / 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 condensate)
Ambient storage temperature	-20 to +60 °C
Withstand voltage	500 VAC applied for 1 minute
Insulation resistance	500 VDC, 10 MΩ or more
Enclosure	IP67
Weight	300 g

2 Specifications (continued)

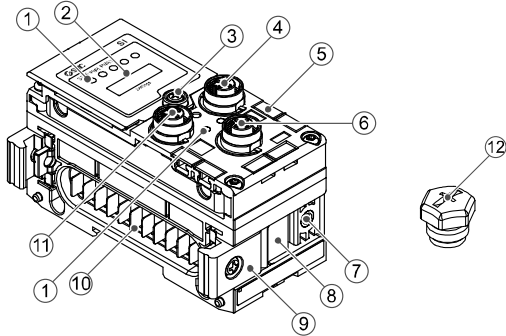
2.2 Electrical specifications

Item		Specifications
Power supply voltage / current	Controller power supply	21.6 to 26.4 VDC 0.1 A max.
	Solenoid valve and output power supply	22.8 to 26.4 VDC 2.0 A or less, according to the solenoid valve specification
Solenoid valve specification	Output type	EX600-SEC1 PNP (negative common) / source
		EX600-SEC2 NPN (positive common) / sink
	Number of outputs	32 outputs (8/16/24/32 selectable)
	Output condition at the time of communication error	HOLD / CLEAR / Force ON
	Connected load	24 VDC and 1.5 W (SMC) solenoid valve with surge voltage suppressor.
	Protection	Short circuit protection

2.3 Communication specifications

Item	Specifications
Fieldbus protocol	EtherCAT (conformance test record V1.2)
Communication speed	100 Mbps
Communication medium	100-Base-TX Ethernet cable (CAT5)
Occupied area (No. of I/O)	512 inputs / 512 outputs maximum
Vendor ID	0x00000114 hex (276)
Product code	0x01000005 (16777221)

3 Name and function of Individual parts



No	Part	Description
1	LED display	Displays the SI unit status.
2	Display cover	Open the cover for switch settings.
3	Display cover screw	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 (plug)	Connector for signal/power to next unit.
11	Connector (BUS IN)	Connector for fieldbus Inputs.
12	Seal cap (2 pcs.)	Fitted to unused connectors.

4 Assembly

4.1 Assembling the unit

Warning

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

- (1) 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.

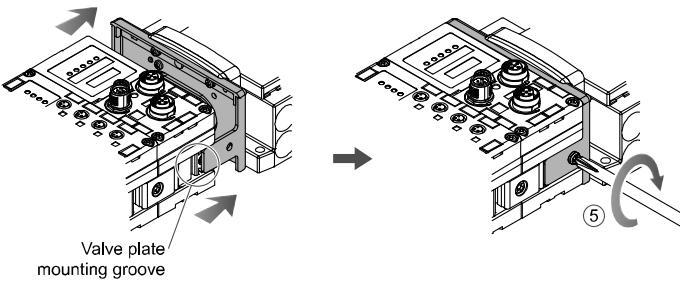
- (2) Add more I/O units. Up to 9 I/O units can be connected to one manifold.

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

- (4) 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).

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

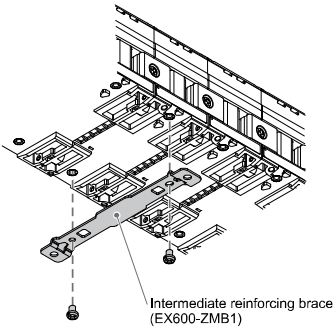
Then fix using the valve plate mounting screws (M4 x 6) supplied (Tightening torque: 0.7 to 0.8 N•m).



5 Installation

• **Direct mounting**

- (1) 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).



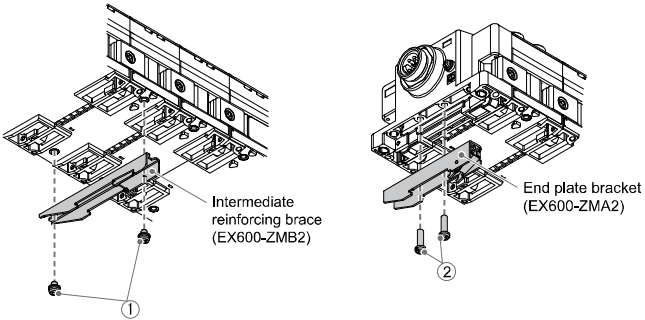
- (2) Mount and tighten the end plate at one end of the unit and mount the intermediate reinforcing brace if required using M4 screws (Tightening torque: 0.7 to 0.8 N•m). Fix the end plate at the valve side while referring to the operation manual for the applicable valve series.

• **DIN rail mounting**

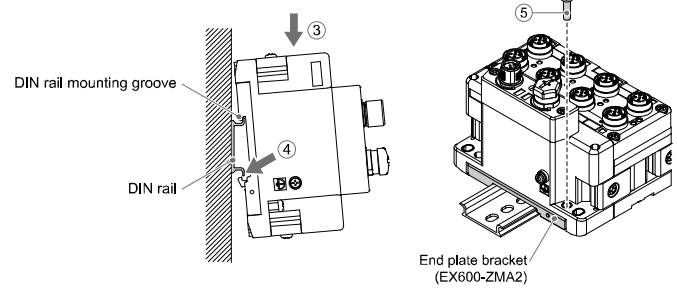
- (1) When assembling six or more units, the middle part of the complete assembly must be fitted with an intermediate reinforcing brace for DIN rail mounting (EX600-ZMB2), using 2-M4 x 6 screws. (Tightening torque: 0.7 to 0.8 N•m).

5 Installation (continued)

- (2) 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).



- (3) Hook the DIN rail mounting groove on to the DIN rail.
(4) Press the manifold using its side hooked to the DIN rail as a fulcrum until the manifold is locked onto the DIL rail.
(5) 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 EtherCAT connection port pin layout is as shown below.

Connector		Pin No.	Signal name
BUS IN	BUS OUT		
		1	TD+
		2	RD+
		3	TD-
		4	RD-

• **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.

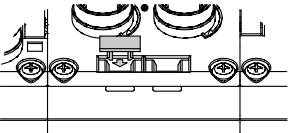
Warning

- 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

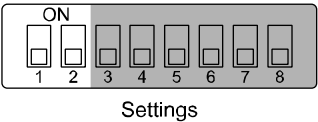
- Do not use in an environment where corrosive gases, chemicals, salt water or steam are present.
- Do not install in a location subject to vibration or impact in excess of the product's specifications.
- Do not mount in a location exposed to radiant heat that would result in temperatures in excess of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

6 Setting

6.1 Switch Setting

- 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).

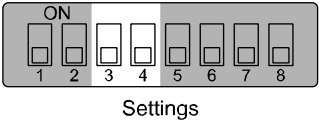
- V_SEL switch setting**
Select the number of outputs (size) occupied by the SI unit.



Settings		Number of occupied valves	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

* Set the number of occupied valve outputs to at least the number of valves used.

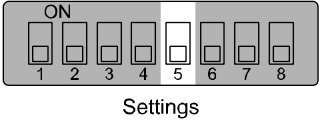
- Diagnostics switch setting**
Allocate the diagnostic data to the input data.



Settings		Mode	Content	Diagnostic size set for the input
3	4			
OFF	OFF	0	Input data only (Default setting)	0 byte
OFF	ON	1	Input data + System diagnosis	4 bytes
ON	OFF	2	Input data + System diagnosis + Unit diagnosis	6 bytes
ON	ON			

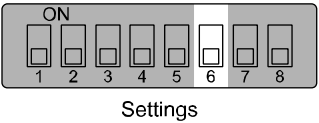
6 Setting (continued)

- HOLD / CLEAR switch setting**
Set the output status when the fieldbus has a communication error or is in the idle state.



Settings	Content
5	
OFF	Output is OFF (Default setting)
ON	Holds the output.

- Configuration memory switch 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, a diagnostic error will be generated.



Settings	Content
6	
OFF	Normal operation mode (Default setting)
ON	Configuration memory mode

- Timing to memorize the configuration →
When power supply for control and input is turned on, with the switch above turned OFF.
- Timing to compare the configuration →
When power supply for control and input is turned on, with the switch above turned ON.

Refer to the operation manual on the SMC website (URL: <https://www.smcworld.com>) for further switch setting information.

6.2 Configuration

- The address is automatically recognized and allocated to the EtherCAT product during configuration. There is no need for the user to set an address.
- To configure the EX600 SI unit with the EtherCAT master, an XML Device Description File is required.

- XML file**
The XML file is required to configure the EX600. The file can be downloaded from the SMC website (URL: <https://www.smcworld.com>).
Product Document → Instruction Manual

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

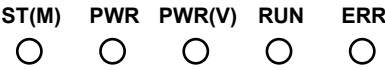
7 How to Order

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

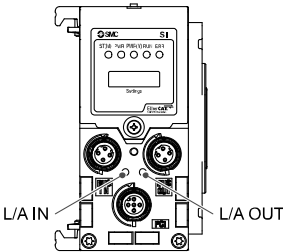
8 Outline Dimensions (mm)

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

9 LED Display



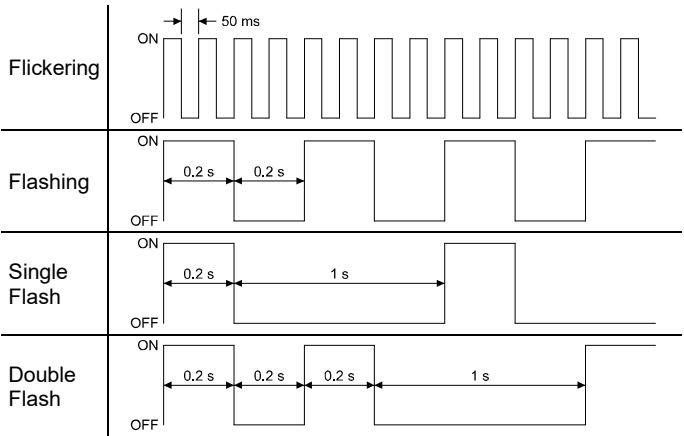
LED	Description
ST(M) PWR PWR(V) OFF	Power supply for control and input is OFF.
ST(M) PWR PWR(V) Green LED's ON	The SI unit is operating normally.
ST(M) PWR PWR(V) ST(M) Red ON	Component failure inside the SI unit.
ST(M) PWR PWR(V) PWR Red ON	Power supply voltage for control and input is abnormal.
ST(M) 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.



LED	LED state	Content
RUN (Green)	OFF	Initialized status
	Flashing	Pre-operational status
	Single Flash	Safe operational status
	ON	Operational status
ERR (Red)	OFF	No communication error
	Flashing	Communication setup error
	Double Flash	Communication error (application watchdog timeout)
(L/A IN) (Green)	OFF	BUS IN side: No Link, No Activity
	ON	BUS IN side: Link, No Activity
	Flickering	BUS IN side: Link, Activity
(L/A OUT) (Green)	OFF	BUS OUT side: No Link, No Activity
	ON	BUS OUT side: Link, No Activity
	Flickering	BUS OUT side: Link, Activity

9 LED Display (continued)

9.1 LED flashing pattern



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, 1-5-5, Kyobashi, Chuo-ku, Tokyo 104-0031, JAPAN
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