SMC | ORIGINAL INSTRUCTIONS

Instruction Manual
Fieldbus device - SI unit for EtherNet/IP™
EX250-SEN1

The intended use of this product is for the control of 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) [*1], and other safety regulations.
[*1] 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.

⚠ Caution
- Provide grounding to assure the noise resistance of the Fieldbus system.
  Individual grounding should be provided close to the product using a short cable.
- Refer to the operation manual on the SMC website (URL: https://www.smcworld.com) for further Safety Instructions.

2 Specifications

2.1 General specifications

Item	Specification
Ambient temperature	+5 to +45 °C
Ambient humidity	35 to 85% RH (no condensate)
Ambient storage temperature	-20 to +60 °C
Withstand voltage	500 VAC for 1 minute
Insulation resistance	500 VDC min. 10 MΩ
Operating environment	No corrosive gas
Enclosure rating	IP67
Weight	250 g

2.2 Electrical specifications

Item		Specification
Power supply voltage range / current consumption	Power supply for SI unit / Input blocks	24 VDC ±10% / 1.1 A max. SI unit: 0.1 A Input device: 1 A
	Power supply for solenoid valves / outputs	24 VDC +10% / -5% 2.0 A max. depending on the solenoid valve specification.
Number of inputs / outputs		32 inputs / 32 outputs [*1]
Solenoid valve specification	Output type	PNP (negative common) / source
	Connected load	Solenoid valve with surge voltage suppressor of 24 VDC and 1.5 W or less (manufactured by SMC)
	Residual voltage	0.3 VDC or less

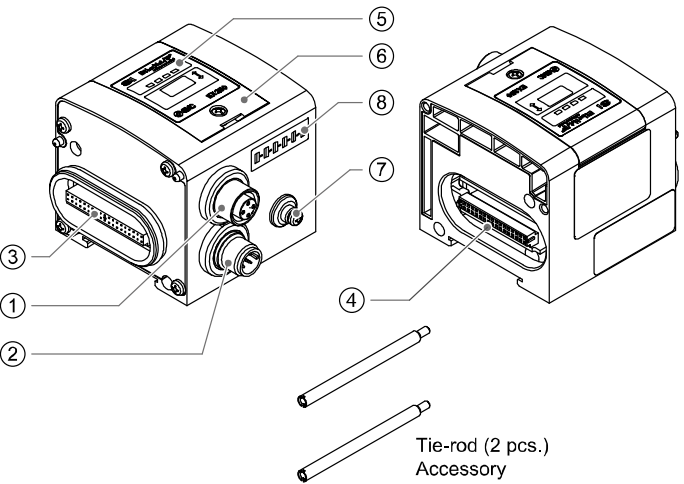*1 Maximum number of outputs is 24 when a Power block is connected.

2.3 Communication specifications

Item	Specification
Protocol	Ethernet (IEEE802.3)
Transmission medium	Standard Ethernet cable (CAT5 or more) (100BASE–TX)
Communication speed	10 Mbps / 100 Mbps (auto selection)
Max. segment length	100 m (328 ft)
Max. transceiver number	2 (per segment)
Communication method	Full duplex / Half duplex (auto selection)
Fieldbus protocol	EtherNet/IP™ release 1.0
I/O message	Input: Data length 6 byte, instance 100 Output: Data length 4 byte, instance 150
Vendor ID	7 (SMC Corporation)
Product type	12 (communication adapter)
Product code	107
IP address setting range	Manual setting by internal switch in SI unit: 192.168.0.1 to 192.168.0.14 or optional setting via DHCP server.
Configuration file	EDS file (Please download from the SMC website)

⚠ Warning
Special products (-X) might have specifications different from those shown in this section. Contact SMC for specific drawings.

3 Name and function of parts

Tie-rod (2 pcs.)
Accessory

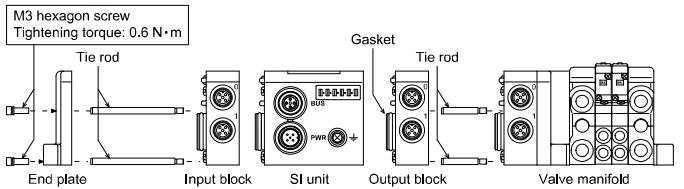| No.	Part	Description
1	Communication connector	Connect to the EtherNet/IP™ line.
2	Power supply connector	Supply power to the SI unit, input blocks, solenoid valve and outputs.
3	Input block connector	Connect to the Input block.
4	Output block connector	Connect the solenoid valve and Output block.
5	Display	LED display to show the SI unit status.
6	Switch cover	Display the power supply and communication status.
7	FE terminal	Functional Earth (M3 screw).
8	MAC address	A unique MAC address of 12 hexadecimal number digits for each SI unit.

4 Installation

4.1 Installation

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

- **Assembly and disassembly of the units**

4.2 Assembly of the SI unit
- Hold the SI unit and the Input / Output blocks together in order to ensure there is no gap between them, while tightening the screws.
- Tighten the screws with the specified tightening torque (0.6 N•m).

4.3 Assembly Precautions
- Be sure to switch off the power.
- Check there is no foreign matter inside the SI unit.
- Check there is no damage and no foreign matter stuck to the gasket.
- Be sure to tighten the screws with the specified torque.

4.4 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.

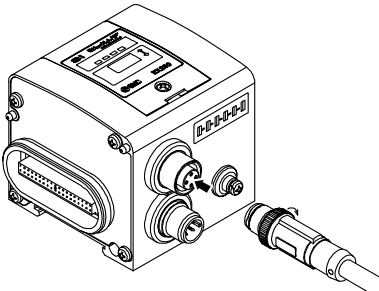## 4 Installation (continued)

4.5 Cable Connection
Select the appropriate cables to mate with the connectors mounted on the SI unit.
○ **Communication connector**

BUS: M12 4-pin socket

No.	Designation	Description
1	TX+	Transmit Data +
2	RX+	Receive Data +
3	TX-	Transmit Data -
4	RX-	Receive Data -

- Align the key groove of the EtherNet/IP™ communication connector (plug) with the connector (socket) on the SI unit.
- Tighten the locknut on the cable by turning it clockwise by hand.
- Confirm that the connector portion does not move.
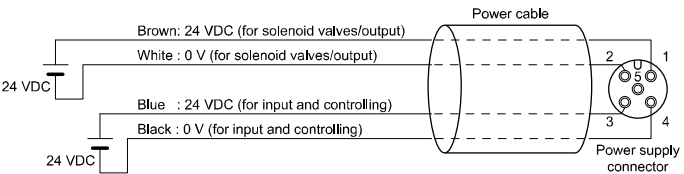

○ **Power supply connector**

PWR: M12 5-pin plug

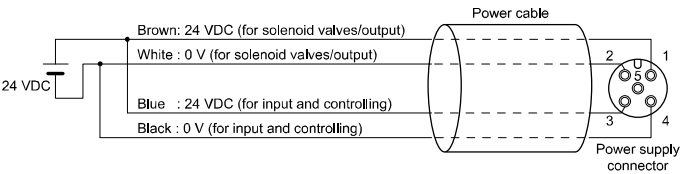| No.	Designation	Description
1	SV 24 V	24 V for solenoid valve / outputs
2	SV 0 V	0 V for solenoid valve / outputs
3	SI 24 V	24 V for SI unit / inputs
4	SI 0 V	0 V for SI unit / inputs
5	-	Not connected

4.6 Connecting one or two power supplies
- Both single and dual power supply systems can be adopted, however the wiring shall be made separately (for solenoid valves / outputs and for input and control) for either system.

- **Dual Power supplies**

- **Single Power supply**

4.7 FE Terminal
- Connect the ground terminal to ground.
- Individual grounding should be provided close to the product with a short cable to assure the noise resistance of the Fieldbus system.
- Resistance to ground should be 100 ohms or less.
- Leave the power supply connector pin 5 ungrounded, in order to ground in one point only.

5 Setting

5.1 Switch Setting

- The switches should only be set with the power supply turned OFF.
- Open the switch protection cover and set the switches with a small flat blade screwdriver.
- Be sure to set the switches before use.
- After setting the switches close the protective cover and tighten the screw with the specified torque (tightening torque: 0.6 N•m).

IP address setting - 192.168.0.X

SW1				X
1	2	3	4	
0	0	0	0	Remote control (refer to manual) *1
1	0	0	0	1
0	1	0	0	2
1	1	0	0	3
-	-	-	-	-
0	1	1	1	14
1	1	1	1	DHCP mode (refer to manual) *2

Communication setting

SW1			Item	Contents
5	6	7		
0	-	-	Communication setting	AUTO: Automatically selected.
1	-	-		MANUAL: According to switch 6 and 7.
1	0	-	Communication speed	10 Mbps
1	1	-		100 Mbps
1	-	0	Communication method	Half duplex
1	-	1		Full duplex

CLEAR / HOLD setting

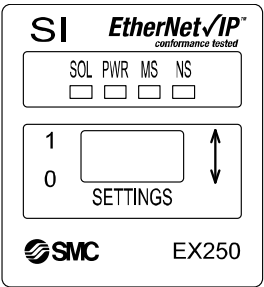| SW1	Contents
8	
0	Output signal is cleared when communication error occurs
1	Output signal is held when communication error occurs

*1 : Remote control (SW1 DIP switches 1-4 OFF).
The EX250 SI unit will respond to the following Rockwell Automation BOOTP/DHCP server commands.
- Enable DHCP
Selecting this function will enable the SI unit to retrieve its boot information from the BOOTP/DHCP server. If DHCP is enabled the SI unit will retrieve its boot information during the next power up.
- Disable BOOTP/DHCP
Selecting this function will disable the SI unit from retrieving its boot information from the BOOTP/DHCP server and causes the SI unit to retain its current configuration during the next power up.
*2 : DHCP Mode (SW1 DIP switch 1-4 ON).
The IP address is acquired via the DHCP server. The IP address is not saved and is lost if power to the SI unit is cycled.
*3 : Hardware Addressing
The IP address range is 192.168.0.1 to 192.168.0.14.

- If the stored IP address of the SI unit is not known, please use the "DHCP Mode" setting.

5.2 Configuration

In order to configure the SI unit for the EtherNet/IP™ network, the appropriate device master file (EDS file) for the SI unit is required.

Technical documentation giving detailed configuration information and the EDS file can be found in the operation manual on the SMC website (URL: https://www.smcworld.com).
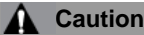
6 Display

LED		Description
SOL	OFF	Power supply for solenoids is below specification
	Green ON	Power supply for solenoids is normal
PWR	OFF	Power supply for Control and Inputs is below specification
	Green ON	Power supply for Control and Inputs is normal
MS	OFF	Power supply for Control and Inputs is OFF
	Green ON	Operating normally
	Green flashing	Setting Error (Device is not configured).
	Red flashing	Recoverable internal error
	Red ON	Unrecoverable internal error
NS	OFF	Power supply for Control and Inputs is OFF or the IP address is not set
	Green flashing	EtherNet/IP™-level communication not established
	Green ON	Multiple EtherNet/IP™-level communications established
	Red flashing	Multiple EtherNet/IP™-level communications time out
	Red ON	IP address duplicated

7 Maintenance

7.1 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.

8 How to Order

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

9 Outline Dimensions (mm)

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

10 Limitations of Use

10.1 Limited warranty and Disclaimer/Compliance Requirements

Refer to Handling Precautions for SMC Products.

11 Product Disposal

This product shall 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.

12 Contacts

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

SMC Corporation