



ORIGINAL INSTRUCTIONS

Instruction Manual
Fieldbus device - SI unit for PROFIBUS DP
EX250-SPR1



The intended use of this product is to control pneumatic valves and I/O while connected to the PROFIBUS DP 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.

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

2 Specifications

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
Operating atmosphere	No corrosive gas
Enclosure rating	IP67 (with assembled manifold)
Weight	250 g

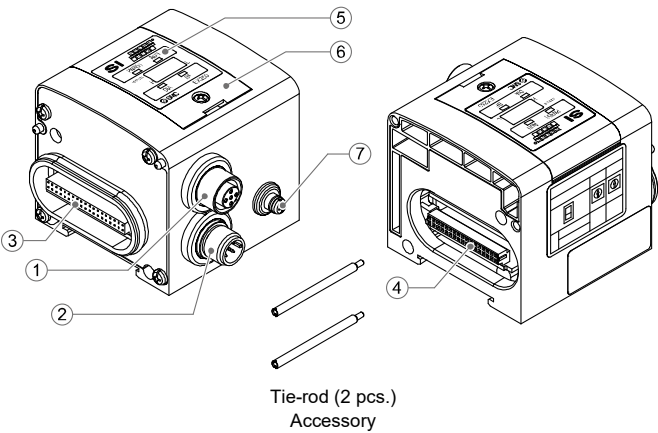
2.2 Electrical specifications

Item	Specification
Power supply voltage range / current consumption	Power supply for SI unit / Input blocks 19.2 to 28.8 VDC 1.1 A maximum, depending on number of input blocks and sensor specifications. Inside SI unit: 0.1 A max.
	Power supply for solenoid valve / outputs 22.8 to 26.4 VDC 2.0 A maximum, depending on number of solenoid valve stations / specification
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)
	Insulation type Photo coupler
	Residual voltage 0.3 VDC or less

2.3 Communication specifications

Item	Specification
Protocol	PROFIBUS DP (EN50170, EN50254)
BUS Interface	EIA RS485
Communication from	Token passing
Transmission rate (kbps)	9.6, 19.2, 45.45, 93.75, 187.5, 500, 1500, 12000
Transmission media	STP cable
Connected nodes	125 stations max.
Network topology	Bus, Tree, Star
Cable length	23 km max. (repeater needed)
Freeze mode	Available
Sync mode	Available
Number of Inputs	32 inputs max.
Number of Outputs	32 outputs max.
ID number	1408 hex (SW setting mode) 1409 hex (HW setting mode)

3 Name and function of parts



No.	Part	Description
1	Communication connector	Connector for communication signals via PROFIBUS DP line.
2	Power supply connector	Supplies power to the solenoid valve, output block, SI unit and input block.
3	Input block connector	Connector for input block.
4	Output block connector	Connector for solenoid valve or output block etc.
5	Display window	Displays the status of the SI unit using LED's.
6	Switch cover	Station number and baud rate are set using the switches inside.
7	FE terminal	Functional Earth (M3 screw).

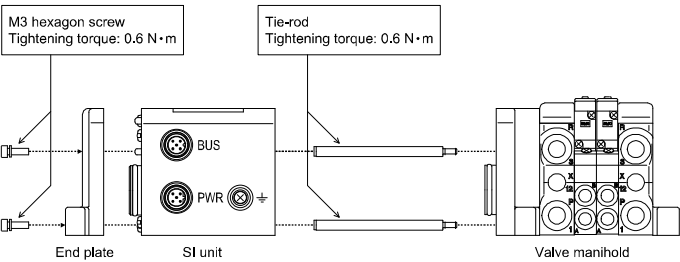
4 Installation

4.1 Installation

Warning

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

Assembly of the units



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).

Assembly Precautions

- Be sure to turn OFF the power supply.
- Check there is no foreign matter inside the SI unit.
- Check there is no damage and no foreign matter stuck to the gasket.
- Tighten the screws with the necessary tightening torque to maintain IP67 enclosure rating.

4.2 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 specifications.

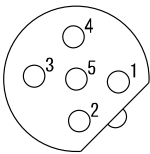
5 Wiring

- Wiring should be carried out with the power supply turned OFF.
- Do not route the communication cable near to high voltage cables such as a power cable or high current electrical cable.

5.1 Communication connector

- Select the appropriate cables (SMC Part No. PCA-1557688) to mate with the connector on the SI unit.

BUS: M12 5-pin socket - reverse

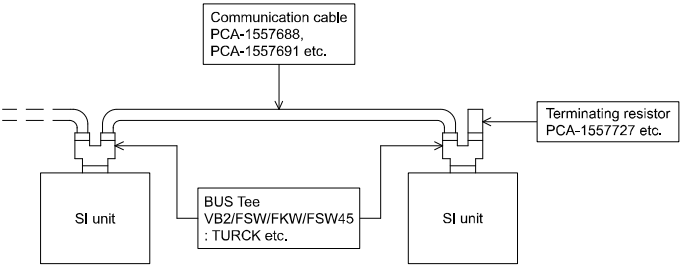


No.	Designation	Description
1	VP	Supply voltage to terminating resistor
2	A-N	Send / receive data - Negative
3	DGND	Ground for terminating resistor
4	B-P	Send / receive data - Positive
5	N.C.	Not used

- Use a Bus Tee connector for communication, for example Turck VB2/FSW/FKW/FSW45 or equivalent.
- Align the key groove of the PROFIBUS DP communication cable (plug) with the communication connector (socket).
- Tighten the locknut on the cable by turning it clockwise by hand.

5.1.1 Bus Terminator

- It is necessary to attach a bus terminating resistor (SMC Part No. PCA-1557727) to the SI unit located at the end of the transmission line.



5.2 Power Supply connector

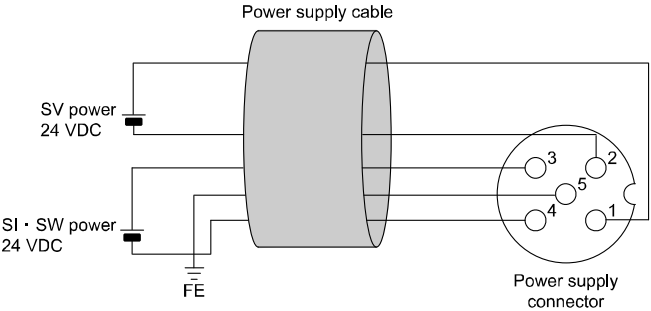
- Connect a power supply cable (SMC Part No. EX500-AP0#0-S) to the power supply connector on the SI unit.

PWR: M12 5-pin plug

No.	Signal	Description	Connector
1	SV24V	24 V for solenoid valve / outputs	
2	SV0V	0 V for solenoid valve / outputs	
3	SW24V	24 V for SI unit / inputs	
4	SW0V	0 V for SI unit / inputs	
5	FE	Functional Earth	

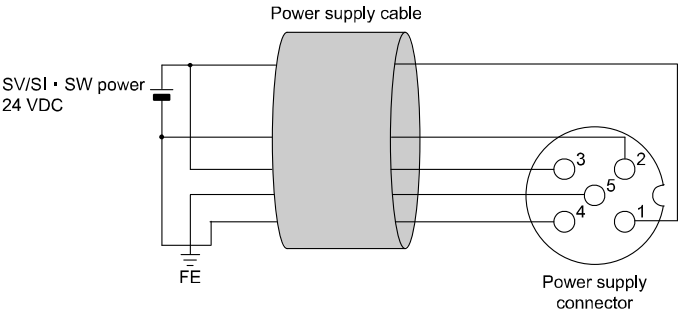
- Within the SI unit there are separate power supply lines for the solenoid valves (SV power supply) and for the input block (SW power supply).
- Supply power to each of them, from a single power supply or from dual power supplies.

5.2.1 Dual Power supplies

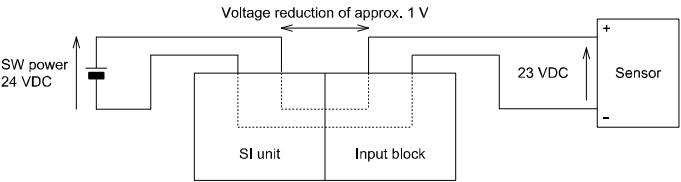


5 Wiring (continued)

5.2.2 Single Power supply

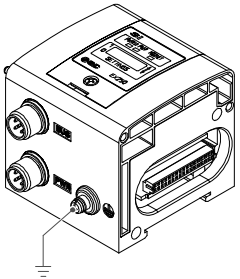


- SW power is supplied to the sensor connected to the input block. There is a voltage drop of approximately 1 V max. inside the SI unit when SW power is supplied. Select a sensor taking this voltage drop into consideration. If 24 V must be supplied to the sensor, it is necessary to increase the SW power supply voltage so that the input voltage of the sensor will be 24 V with the actual load (allowable SW power supply range: 19.2 V to 28.8 V).



5.3 FE Terminal

- Connect the FE 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.

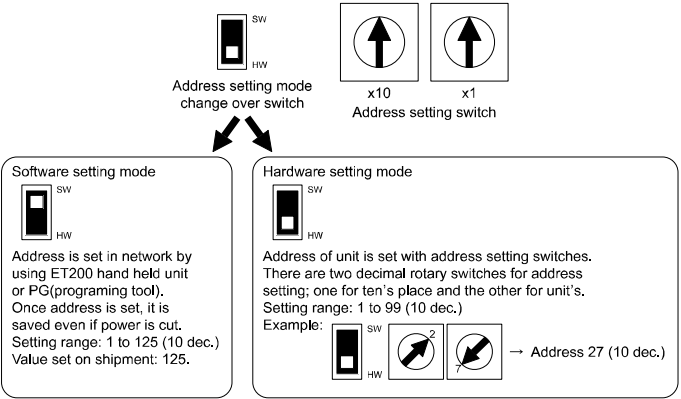


6 Setting

6.1 Switch Setting

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

• Address Setting



* When software setting mode is selected, address setting switches are not active. Moreover, software setting mode and hardware setting mode differ in ID numbers of units.

6 Setting (continued)

6.2 Configuration

In order to configure the SI unit for the PROFIBUS DP network, the appropriate device master file (GSD file) for the SI unit will be required. The GSD file for this product depends on the address setting mode (selected by the address setting mode switch).

GSD file	
SW setting mode	SMCA1408.gsd
HW setting mode	SMCA1409.gsd

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

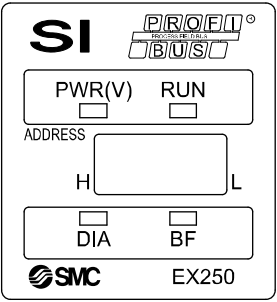
7 How to Order

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 Display



LED	Description	
PWR(V)	OFF	Power supply for solenoids is outside of specification (19 V or less).
	Green ON	Power supply for solenoids is ON
RUN	OFF	Power supply for SI unit is not supplied
	Green ON	Power supply for SI unit is ON
DIA	Red ON	Error detected by diagnostics
BF	Red ON	Bus failure detected

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 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.

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)
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Template DKP50047-F-085O