

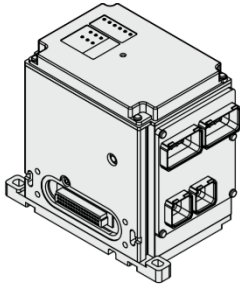


ORIGINAL INSTRUCTIONS

Instruction Manual

Fieldbus device - SI Unit for PROFINET

EX245-SPN1 / SPN2



The intended use of this product is to control pneumatic valves and I/O while connected to the PROFINET 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)<sup>\*)</sup>, and other safety regulations.

- <sup>\*)</sup>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.

	<b>Danger</b>	Danger indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.
	<b>Warning</b>	Warning indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
	<b>Caution</b>	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

2.1 SI Unit specifications

Item		Description
<b>General</b>		
Dimensions (W x L x H)		85 x 148.5 x 130 mm
Weight		1000 g max.
Housing materials		Aluminium, PBT
Max. number of modules		8
Max. number of digital inputs		128
Max. number of digital outputs		64 (independent of solenoid valves)
<b>Electrical</b>		
Internal current consumption at 24 VDC		300 mA or less (via US1)
Reverse Polarity Protection		Included (US1 and US2)
Loop through current between power connector		10 A max.
US1	Operating voltage	24 VDC +20%/-15%
	Under-voltage detection	Detected : < approx. 20.4 VDC Cancelled: > approx. 21.6 VDC
	Max. current	6 A
	Dropout voltage (sensors)	< approx. 17 VDC
US2	Operating voltage	24 VDC +20%/-10%
	Over-voltage detection	Detected : < approx. 21.6 VDC Cancelled: > approx. 22.8 VDC
	Max. current	4 A
	Dropout voltage (valves/loads)	< approx. 17 VDC
	Voltage drop to valve supply	1.2 V at 24 VDC max.
Galvanic isolation		Yes (between US1 and US2)

Solenoid valve	
Applicable series	SY3000/5000/7000, SV1000/2000/3000, VQC1000/2000/4000/5000, VSS8-2/8-4, VSR8-2/8-4
Max. number of solenoid valves	32 solenoid coils
Output type of solenoid	Source/PNP (negative common)
Over current protection	Yes
Over current detection	Yes
<b>Fieldbus</b>	
Bus protocol	PROFINET I/O
Conformance Class C	Yes (for IRT switch function only)
FSU (Fast Start Up)	Yes
MRP (Media Redundancy Protocol)	Yes
Maintenance alarm for Fibre-optic cable	Yes
Vendor ID	0083h
Device ID	0056h
GSD file	GSDML-V2.3-SMC-EX245-V1.0- *****.xml

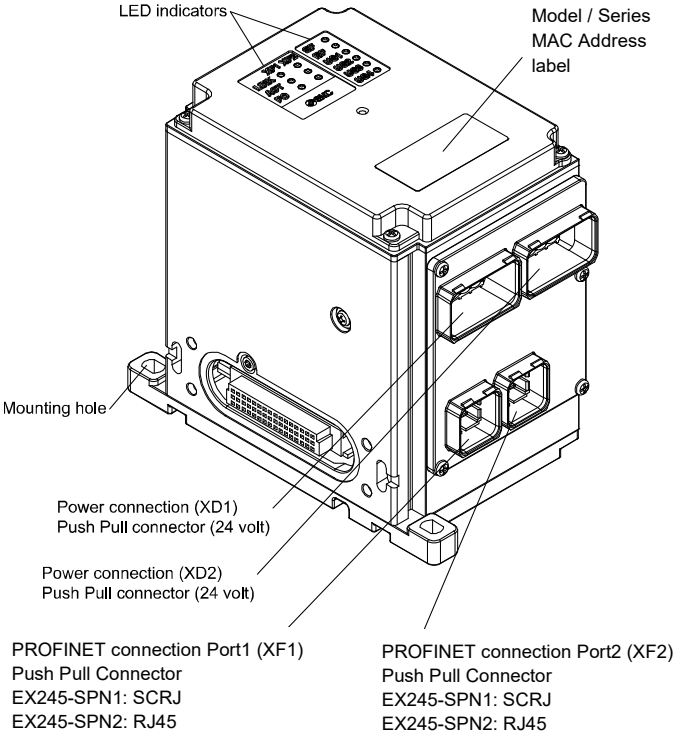
2 Specifications (continued)

2.2 General specifications

Item	Specification
Rated voltage	24 VDC
Allowable instantaneous electrical stop	1 ms maximum
Protection class	IP65 rating to IEC 60529 (when fully installed or fitted with protective cover).
Withstand voltage	500 VAC 1 min. (between FE and all accessible terminals)
Insulation resistance	10 M ohm or more (500 VDC is given between FE and all accessible terminals)
Ambient temperature	Operation: -10 °C to 50 °C Storage: -20 °C to 60 °C
Ambient humidity	35% to 85% RH (non-condensing)
Vibration resistance	10 Hz to 57 Hz (constant amplitude) 0.75 mm 57 Hz to 150 Hz (constant acceleration) 49 m/s <sup>2</sup> 2 hours each direction X, Y and Z
Impact resistance	147 m/s <sup>2</sup> is given 3 times for each direction X, Y and Z
Operating environment	No corrosive gas

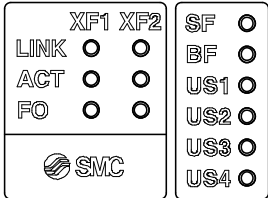
3 Names and Functions of Parts

EX245-SPN1 / SPN2



4 LED Display

The LED indicators are arranged on the SI Unit as shown in the illustration below.



4 LED Display (continued)

Designation	Description	Colour
LINK (XF1)	PROFINET connection on Port1 (XF1)	Green
ACT (XF1)	Data exchange on Port1 (XF1)	Yellow
LINK (XF2)	PROFINET connection on Port2 (XF2)	Green
ACT (XF2)	Data exchange on Port2 (XF2)	Yellow
FO1 (XF1)	Fibre-optic communication diagnostics for Port 1 (XF1)	Orange
FO2 (XF2)	Fibre-optic communication diagnostics for Port 2 (XF2)	Orange
SF	System Fault	Red
BF	Bus Fault	Red
US1	Power Supply for logic / sensors	Green
US2	Power Supply for valves / loads	Green
US3	Option	-
US4	Option	-

\* FO1 and FO2 LED's are used for EX245-SPN1 only (not for EX245-SPN2)

4.1 LINK Indicators

LINK	Meaning
ON	Connection via Ethernet to the SI Unit via Port 1/2 (XF1/2)
OFF	No connection established via Port 1/2 (XF1/2)

4.2 ACT Indicators

ACT	Meaning
ON	Transmission or reception of Ethernet telegrams on Port 1/2 (XF1/2)
OFF	No transmission or reception of Ethernet telegrams on Port 1/2 (XF1/2)

4.3 FO Indicators

FO 1/2	Meaning
OFF	The strength margin of the Fibre-optic communication is more than 2 dB on Port 1/2 (XF1/2).
Flashing	The strength margin of the Fibre-optic communication is more than 0 dB but less than 2 dB on Port 1/2 (XF1/2).
ON	The strength margin of the Fibre-optic communication is 0 dB on Port 1/2 (XF1/2).

4.4 US1 Indicator

US1	Meaning
OFF	US1 is not present or is below the dropout level (< approx. 17 VDC).
Flashing	US1 is below the permissible level but above the dropout level (17 to 20.4 VDC).
ON	US1 is present (> approx. 21.6 VDC).

4.5 US2 Indicator

US2	Meaning
OFF	US2 is not present or is below the dropout level (< approx. 17 VDC).
Flashing	US2 is below the permissible level but above the dropout level (17 to 21.6 VDC).
ON	US2 is present (> approx. 22.8 VDC).

4 LED Display (continued)

4.6 SF and BF Indicators

SF	BF	Meaning
OFF	OFF	No fault (The SI Unit is currently exchanging data with the IO Controller without errors.)
---	Flash	Faulty or no connect message frame (although the SI Unit is physically connected to the bus). <ul style="list-style-type: none"><li>Configuration is defective, or before initial commissioning has been done.</li><li>Device name is different from configuration setting.</li><li>The GSD file is not correct.</li><li>The communication between IO Controller to SI Unit is defective.</li></ul>
OFF	ON	The SI Unit is not connecting to any bus.
Flash at 2.0 Hz	OFF	The connection to the IO Controller is OK but the following diagnostic event occurred. <ul style="list-style-type: none"><li>At least one valve coil has a short circuit.</li></ul>
Flash at 0.5 Hz	---	The following diagnostic event occurred. <ul style="list-style-type: none"><li>At least one connected module has a short circuit or the module layout has changed.</li></ul>
ON	---	The following diagnostic event occurred. <ul style="list-style-type: none"><li>The configuration data sent by the IO Controller does not match the actual layout.</li><li>Power supply is not present or is below the dropout level.</li><li>At least one valve coil has a short circuit and at least one connected module has a short circuit or the module layout has changed. The SI Unit has an internal error.</li><li>An incompatible module is connected to the SI Unit.</li><li>The strength margin of the Fibre-optic. Communication is less than 2 dB</li></ul>

5 Installation

5.1 Installation

Warning

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

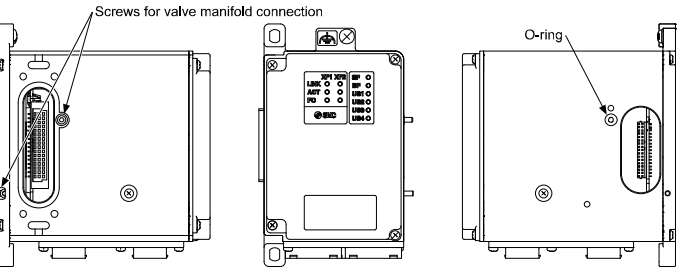
5.2 Environment

Warning

- Do not use in an environment where corrosive gases, chemicals, salt water or steam are present.
- Do not use in an explosive atmosphere.
- 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.

5.3 Connection to Valve Manifold

Connect the valve manifold using the 2 screws on the SI Unit. (hexagonal socket wrench size 2.5 mm). Recommended tightening torque value 0.6 N•m.



5 Installation (continued)

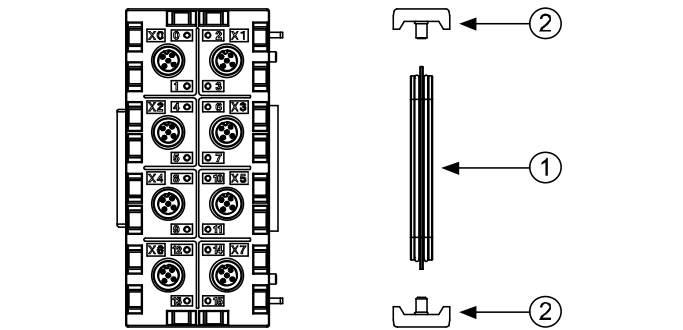
Caution

To ensure a protection rating of IP65, apply the recommended tightening torque (0.6 N•m) and make sure that the O-ring is positioned correctly on the screw.

5.4 Module Connection

Connect the SI Unit, the I/O modules and the End plate with the 2 modular adaptor assemblies and a joint assembly.

- 1 x Joint assembly
- 2 x Modular adaptor assembly (hexagonal socket wrench size 2.5 mm, torque = 1.3 N•m)



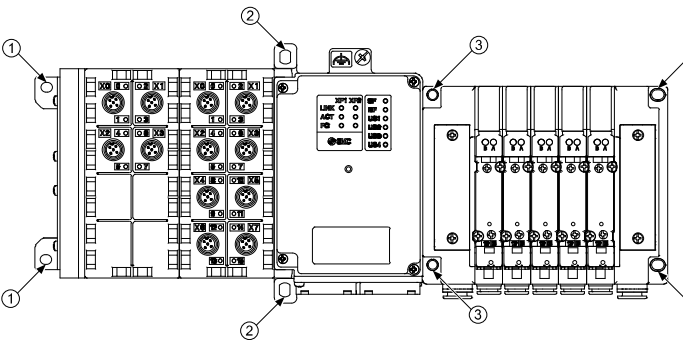
Caution

- For a protection rating of IP65 to be ensured modular adaptor assemblies and joint assembly must be installed between each module correctly.
- To prevent the modules and assemblies being damaged, apply the recommended tightening torque.

5.5 Mounting

To prevent the manifold components being damaged, apply the recommended tightening torque. Mount the manifold using the 8 base mounting positions with screws. Required screws are as follows:

- 2 x M5 (End plate: torque = 1.5 N•m)
- 2 x M5 (SI Unit: torque = 1.5 N•m)
- 4 x M\* (Valve manifold: refer to valve manifold catalogue)



All manifolds are mounted using 8 screws (except VQC4000 which uses 7 screws).

6 Wiring

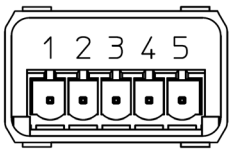
The EX245-SPN1 / SPN2 has two Power connectors (XD1/2) and two PROFINET communication connectors (XF1/2). If only one connector is used, cover the unused connector with the Seal cap so that the protection rating of IP65 is maintained.

6.1 Power / Bus Push Pull Connectors

Caution

- To prevent damage the power supply to the SI Unit must be turned off (de-energised) before the modules are installed or removed.
- The Seal caps must be fitted to all unused bus & power connector ports to ensure an IP65 rating.
- The Seal caps must be fitted to all unused bus & power connector ports to prevent foreign matter such as dust or debris from getting inside the product and eye exposure to the light beam from the SCRJ connectors.
- Power and bus lines must be installed correctly.
- To prevent manifold components of the EX245 from being damaged the supply lines for the electronics and for the load voltage must be protected externally with a fuse.
- Maximum loop through current (10A) between connectors must not be exceeded.
- The SI unit makes use of a CLASS 1 LASER product. Do not stare into beam visible at XF1/2.

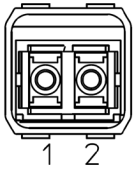
Power Connector



Push Pull Connector (24 V) for Power (XD1 / XD2)

Pin	Description
1	24 V (US1)
2	0 V (US1)
3	24 V (US2)
4	0 V (US2)
5	FE

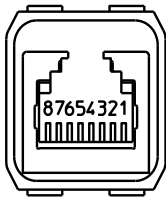
Bus Connector (SCRJ) for EX245-SPN1



Push Pull Connector (SCRJ) for PROFINET (XF1 / XF2)

Pin	Description
1	TX Transmit Data
2	RX Receive Data

Bus Connector (RJ45) for EX245-SPN2



Push Pull Connector (RJ45) for PROFINET (XF1 / XF2)

Pin	Port 1 (XF1) Port type: MDI	Port 2 (XF2) Port type: MDI-X
1	TD+ Transmit data +	RD+ Receive data +
2	TD- Transmit data -	RD- Receive data -
3	RD+ Receive data +	TD+ Transmit data +
4	-	-
5	-	-
6	RD- Receive data -	TD- Transmit data -
7	-	-
8	-	-

6.2 FE Terminal

The SI Unit must be connected to FE (Functional Earth) to divert electromagnetic interference. Connect the grounding cable using the FE terminal screw on the SI Unit. The other end of the grounding cable should be terminated to ground potential. For maximum protection the grounding cable should be as thick and short as reasonably possible.

7 Settings

Refer to the Operation manual on the SMC website (URL: <https://www.smcworld.com>) for details of Settings, Configuration, Commissioning and Diagnostics.

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 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.

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](http://www.smcworld.com) or [www.smc.eu](http://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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