



Instruction Manual

Fieldbus device - SI Unit for PROFINET

EX245-SPN1A / SPN2A / SPN3A



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)^{*)}, 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

2.1 SI Unit specifications

Item		Description
General		
Dimensions (W x L x H) mm		85 x 127.5 x 89.5 (EX245-SPN1A/2A) 85 x 147.7 x 89.5 (EX245-SPN3A)
Weight		465 g (EX245-SPN1A/2A) 540 g (EX245-SPN3A)
Housing materials		PBT
Max. number of modules		8
Max. number of digital inputs		128
Max. number of digital outputs		64 (independent of solenoid valves)
Electrical		
Internal current consumption at 24 VDC (via US1)		300 mA or less (EX245-SPN1A) 200 mA or less (EX245-SPN2A/3A)
Reverse Polarity Protection		Included (US1 and US2)
Loop through current between power connector		16 A or less (EX245-SPN1A/2A) 6 A or less (EX245-SPN3A)
US1	Operating voltage	24 VDC +20%/-15%
	Under-voltage detection	Detected : < approx. 19.2 VDC
	Max. current	6 A total
US2	Operating voltage	24 VDC +20%/-15%
	Max. current	4 A (independent of valves)
	Voltage drop to valve supply	1.2 V max. at 24 VDC
Galvanic isolation		Yes (between US1 and US2)

Solenoid valve

Applicable series	JSY3000/5000, SY3000/5000, VQC2000/4000,
Max. number of solenoid valves	32 solenoid coils
Output type of solenoid	Source/PNP (negative common)
Over current protection	Yes
Over current detection	Yes

Fieldbus	
Bus protocol	PROFINET I/O
Conformance Class C	Yes (for IRT switch function only)
FSU (Fast Start Up)	Yes
MRP (Media Redundancy Protocol)	Yes
MRPD (Media Redundancy for Planned Duplication)	Yes
Shared device	Yes
PROFenergy	Yes
Web server function	Yes
Net Load Class III	Yes
Maintenance alarm for Fibre-optic cable	Yes (EX245-SPN1A)
Vendor ID	0083h
Device ID	0011h
GSD file	GSDML-V2.3*-SMC-EX245-SPN-*****.xml

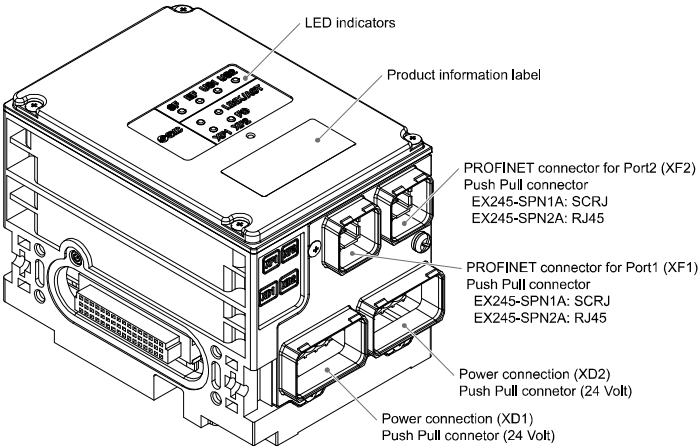
2 Specifications (continued)

2.2 General specifications

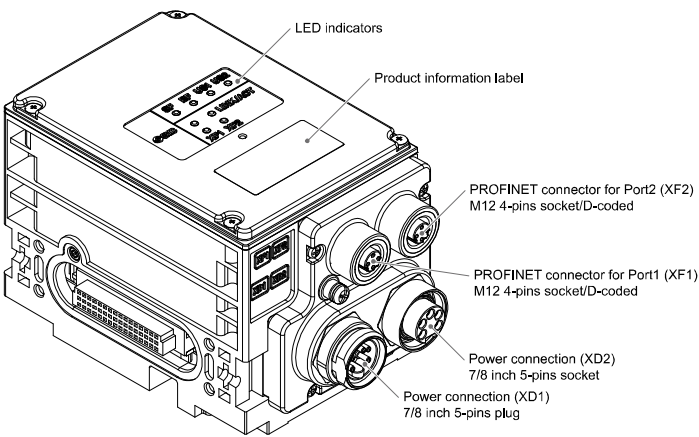
Item	Specification
Rated voltage	24 VDC
Allowable instantaneous electrical stop	1 ms maximum
Protection class	IP65 rating to IEC 60529 (when fully installed or fitted with protective cover).
Withstand voltage	500 VAC 1 min. (between FE and all accessible terminals)
Insulation resistance	10 M ohm or more (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 ² 2 hours each direction X, Y and Z
Impact resistance	147 m/s ² is given 3 times for each direction X, Y and Z
Operating environment	No corrosive gas

3 Names and Function of Parts

3.1 EX245-SPN1A, EX245-SPN2A



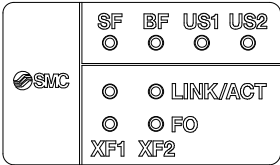
3.2 EX245-SPN3A



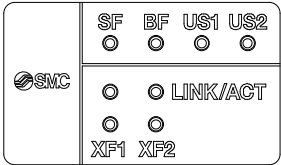
4 LED indicators

The LED indicators are arranged on the SI Unit as shown in the illustration below.
The layout of the LINK/ACT LEDs and FO LEDs are for port 1 on the left side (XF1) and for port 2 on the right side (XF2).

EX245-SPN1A



EX245-SPN2A / SPN3A



Designation	Description	Colour
SF	System Fault	Red
BF	Bus Fault	Red
US1	Power Supply for logic / sensors	Green
US2	Power Supply for valves / loads	Green
LINK/ACT	A combination of LINK and ACT LED Connection status via Ethernet (LINK: Green) Data exchange status (ACT: Orange)	Green / Orange
FO	Fibre-Optic communication diagnostics	Orange

4.1 US1 Indicator

US1	Meaning
OFF	US1 is not present.
Flashing	US1 is below the permissible level (19.2 VDC).
ON	US1 is present.

4.2 US2 Indicator

US2	Meaning
OFF	US2 is not present.
ON	US2 is present.

4.3 SF and BF Indicators

SF	BF	Meaning
OFF	OFF	No fault (The SI Unit is exchanging data with the IO Controller without errors).
ON	---	One of the following may have occurred. <ul style="list-style-type: none">• US1 is below the permissible level (< approx. 19.2 VDC).• The valve coil or the connected module has a short circuit.• The module is disconnected.
	ON	One of the following may have occurred. <ul style="list-style-type: none">• No connection to the IO Controller.• Device name is not correct.• IP address is not set or not correct.• The GSD file is not correct.• The configuration data sent by the IO Controller does not match the actual layout.
Alternately flash at 1 Hz SF ON BF OFF ⇔ SF OFF BF ON		One of the following may have occurred. <ul style="list-style-type: none">• Firmware update in progress.• Forced output by Web server function in progress.
Simultaneously flash at 1 Hz SF ON BF ON ⇔ SF OFF BF OFF		Firmware update failed.

4 LED indicators (continued)

4.4 LINK / ACT Indicator

LINK/ACT	Meaning
Green ON	Connection via Ethernet to the SI Unit via Port 1/2 (XF1/XF2)
Green OFF	No connection established via Port 1/2 (XF1/XF2)
Orange ON	Transmission or reception of Ethernet telegrams on Port 1/2 (XF1/XF2)
Orange OFF	No transmission or reception of Ethernet telegrams on Port 1/2 (XF1/XF2)
Green Flash at 1 Hz	Received node flash request

4.5 FO Indicator

FO 1/2	Meaning
OFF	No fault. The strength margin of the Fibre-optic communication is greater than 2 dB on Port 1/2 (XF1/XF2).
Flash at 1 Hz	The strength margin of the Fibre-optic communication is greater than 0 dB but less than 2 dB on Port 1/2 (XF1/XF2).
ON	The strength margin of the Fibre-optic communication is 0 dB on Port 1/2 (XF1/XF2).

5 Installation

5.1 Installation

Warning

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

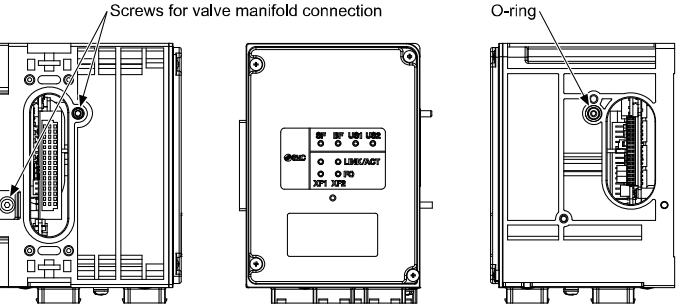
5.2 Environment

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 Valve Manifold Connection

Connect the valve manifold using the 2 screws on the SI Unit. (hexagonal socket wrench size 2.5 mm).
For torque value, refer to valve manifold catalogue.



Caution

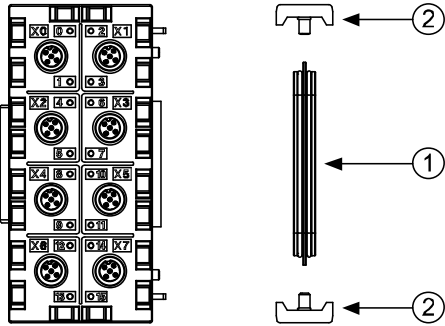
To ensure a protection rating of IP65, apply the recommended tightening torque (0.6 N•m) and make sure that the O-ring is positioned correctly on the screw.

5 Installation (continued)

5.4 Module Connection

Connect the SI Unit, the I/O modules and the End plate using the 2 modular adaptor assemblies and a joint assembly. These are supplied together in the Joint pack.

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



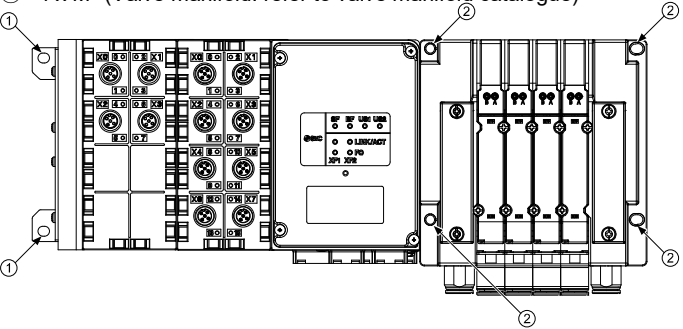
Caution

- For a protection rating of IP65 to be ensured the End plate must be installed correctly, and the modular adaptor assemblies and joint assembly must be installed correctly between each module.
- 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 6 base mounting positions with screws. Required screws are as follows:

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



All manifolds are mounted using 6 screws (except VQC4000 which uses 5 screws).

6 Wiring

The EX245-SPN1A/2A/3A 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 Connection

Caution

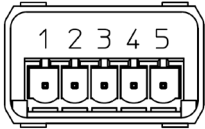
- To prevent damage all power supplies to the SI Unit must be turned off (de-energised) before the modules are installed or removed.
- Seal caps must be fitted to all unused bus & power connector ports to ensure an IP65 rating.
- Seal caps must be fitted to all unused bus & power connector ports to prevent foreign matter such as dust or debris from getting inside the product and to prevent eye exposure to the light beam from the SCRJ connectors on the EX245-SPN1A.
- 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.

6 Wiring (continued)

- Maximum loop through current between power connectors must not be exceeded.
- The EX245-SPN1A makes use of a CLASS 1 LASER product. Do not stare into the beam visible at XF1/2.

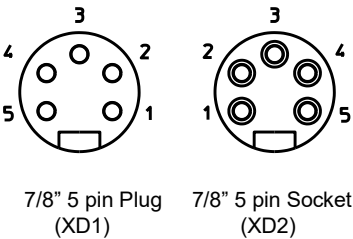
6.2 Power Connector

Pin allocation of Push Pull Connector for EX245-SPN1A/SPN2A



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

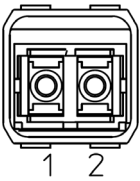
Pin allocation of 7/8" 5 pin Connector for EX245-SPN3A



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

6.3 PROFINET Communication Connector

Pin allocation of Push Pull (SCRJ) Connector for EX245-SPN1A



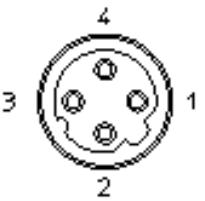
Pin	Description
1	TX Transmit Data
2	RX Receive Data

Pin allocation of Push Pull (RJ45) Connector for EX245-SPN2A



Pin	Port1 (XF1) Port type: MDI	Port2 (XF2) Port type: MDI-X
1	TD+ Transmit	TD+ Transmit
2	TD- Transmit	TD- Transmit
3	RD+ Receive	RD+ Receive
4	-	-
5	-	-
6	RD- Receive	RD- Receive
7	-	-
8	-	-

Pin allocation of M12 4 pin (D-code) Socket for EX245-SPN3A



Pin	Port1 (XF1) Port type: MDI	Port2 (XF2) Port type: MDI-X
1	TD+ Transmit	RD+ Receive
2	RD+ Receive	TD+ Transmit
3	TD- Transmit	RD- Receive
4	RD- Receive	TD- Transmit

6 Wiring (continued)

6.4 FE Terminal

- The SI Unit must be connected to FE (Functional Earth) to divert electromagnetic interference.
- Connect a grounding cable using the FE terminal screw (M4) on the SI Unit, located between the power and bus connectors.
- FE terminal screw tightening torque = 0.7 to 0.8 N•m.
- 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 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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