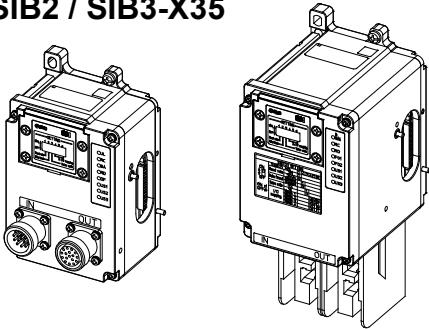




Instruction Manual
Fieldbus device - SI Unit for INTERBUS
EX245-SIB1 / SIB2 / SIB3-X35



The intended use of this product is to control pneumatic valves and I/O while connected to the Interbus 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		EX245-SIB1-X35	EX245-SIB2-X35	EX245-SIB3-X35
Dimensions (W x L x H) mm		85 x 196.3 x 103.5		85 x 148.5 x 61.5
Weight		1400 g	1200 g	750 g
Housing materials		Die-cast aluminium		
Bus / Power connection		Rugged line connector		M23
Max. No. of modules		8		
Max. No. of digital inputs		128		
Max. No. of digital outputs		64 (independent of solenoid valves)		
Electrical				
Internal current consumption at 24 VDC (via US1)		200 mA max.		150 mA max.
Reverse Polarity Protection		Yes (US1 and US2)		
Loop through current between power connectors (US1 and US2)		10 A max.	-	8 A max.
US1	Operating voltage	24 VDC ±10%		
	Under-voltage detection	Detected: < approx. 20.4 VDC Cancelled: > approx. 21.6 VDC		
	Maximum current	6 A		
	Dropout voltage (sensors)	< approx. 17 VDC		
US2	Operating voltage	24 VDC +10%/-5%		
	Under-voltage detection	Detected: < approx. 21.6 VDC Cancelled: > approx. 22.8 VDC		
	Maximum current	4 A		
	Dropout voltage (valves / loads)	< approx. 17 VDC		
Galvanic isolation		Yes (between US1 and US2)		

Solenoid valve			
Applicable series	VQC1000 / 2000 / 4000, SV1000 / 2000 / 3000, VSR8-4, VSS8-4		
Max. No. of solenoid valves	32 valve coils	16 valve coils	32 valve coils
Output type of solenoid	PNP / Source (negative common)		
Over current protection	Yes		-
Over current detection	Yes (100 mA max.)		-
Short circuit protection	-		Yes

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 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 to 57 Hz (constant amplitude) 0.75 mm, 57 to 150 Hz (constant acceleration) 49 m/s ² 2 hours each direction X, Y and Z
Impact resistance	147 m/s ² 3 times each direction X, Y and Z
Operating environment	No corrosive gas

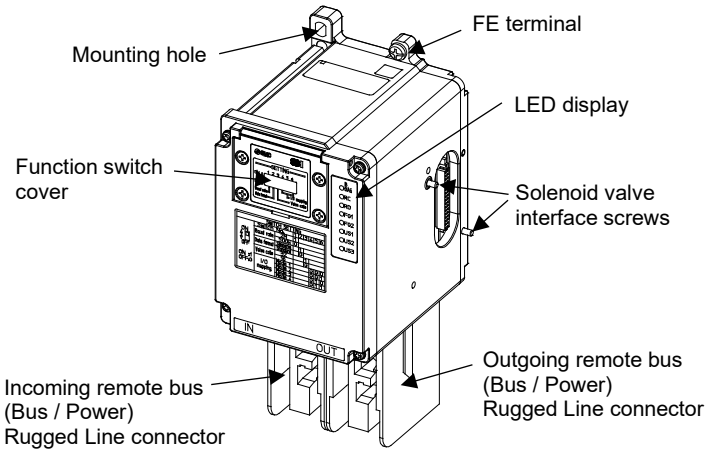
2 Specifications (continued)

2.3 Communication specifications

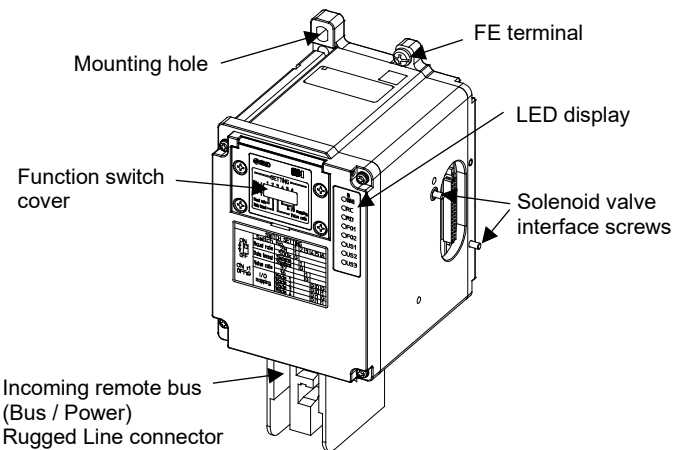
Fieldbus	
Bus protocol	INTERBUS installation remote bus
Interface	EX245-SIB1 / SIB2-X35: Fibre optic EX245-SIB3-X35: Copper, RS-485
Transmission speed	500 kbps / 2 Mbps
ID code	DO (01h), DIO (03h)
Device type	Remote bus device

3 Names and Function of Parts

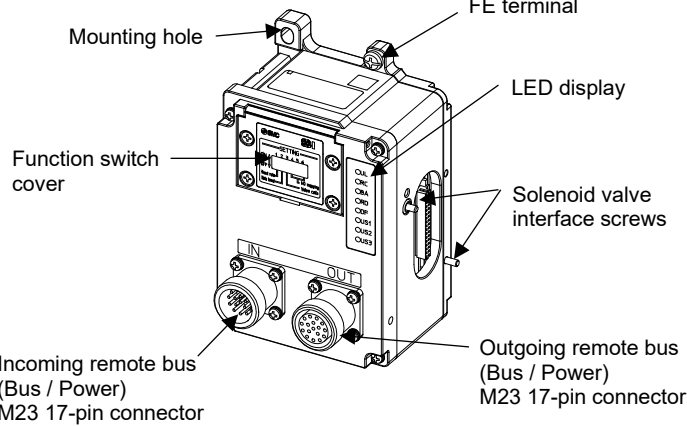
3.1 EX245-SIB1-X35



3.2 EX245-SIB2-X35



3.3 EX245-SIB3-X35



4 LED Display

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

4.1 EX245-SIB1-X35 / EX245-SIB2-X35 LED indicators

- IB
- ☐DIAG
- ☐RC
- ☐RD
- ☐FO1
- ☐FO2
- ☐US1
- ☐US2
- ☐US3

LED	Description	Colour
IB DIAG	INTERBUS diagnostics	Green
RC	Remote bus cable check	Green
RD	Remote bus status (remote bus disabled)	Red
FO1	Monitoring the incoming optical fibre path	Yellow
FO2	Monitoring the outgoing optical fibre path	Yellow
US1	Supply for the bus logic / sensors	Green
US2	Supply for the valves / loads	Green
US3	Additional supplies for loads (US3, US4, etc.)	Green

4.1.1 IB DIAG indicator

IB DIAG	Meaning
OFF	US1 not present.
Flashing at 2 Hz	US1 present, peripheral fault.
Flashing at 0.5 Hz	US1 present, bus not active.
ON	US1 present, bus active, no peripheral fault.

4.1.2 RC indicator

RC	Meaning
OFF	Incoming remote bus connection defective or not active.
ON	Data is sent to the incoming remote bus connection.

4.1.3 RD indicator

RD	Meaning
OFF	Outgoing remote bus switched on.
ON	Outgoing remote bus switched off.

4.1.4 FO1 indicator

FO1	Meaning
OFF	Incoming optical fibre path OK or not used.
ON	Incoming optical fibre path not OK or system reserve reached in controlled operation.

4.1.5 FO2 indicator

FO2	Meaning
OFF	Outgoing optical fibre path OK or not used.
ON	Outgoing optical fibre path not OK or system reserve reached in controlled operation.

4.1.6 US1 indicator

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

4 LED display (continued)

4.1.7 US2 indicator

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

4.1.8 US3 indicator

US3	Meaning
OFF	At least one of the additional supplies for the loads is not present or is below the dropout level (< approx. 17 VDC).
Flashing	At least one of the additional supplies for the loads is below the permissible level but above the dropout level (17 to 21.6 VDC).
ON	All of the additional supplies for the loads are present (> approx. 22.8 VDC).

4.2 EX245-SIB3-X35 LED indicators

○UL
○RC
○BA
○RD
○DF
○US1
○US2
○US3

LED	Description	Colour
UL	Logic supply for bus interface	Green
RC	Remote bus cable check	Green
BA	Bus Active	Green
RD	Remote bus status (remote bus disabled)	Yellow
DF	Device fault	Red
US1	Supply for the bus logic / sensors	Green
US2	Supply for the valves / loads	Green
US3	Additional supplies for loads (US3, US4, etc.)	Green

4.2.1 UL indicator

UL	Meaning
OFF	Logic supply for bus interface is not present.
ON	Logic supply for bus interface is present.

4.2.2 RC indicator

RC	Meaning
OFF	Incoming remote bus connection is defective or not active.
ON	Data is sent to the incoming remote bus connection.

4.2.3 BA indicator

BA	Meaning
OFF	No data transmission.
Flash	Bus active, but no cyclic data transmission. (The INTERBUS master is in the ACTIVE state.)
ON	Data transmission on INTERBUS active. (The INTERBUS master is in the RUN state.)

4.2.4 RD indicator

RD	Meaning
OFF	Outgoing remote bus switched on.
ON	Outgoing remote bus switched off.

4 LED display (continued)

4.2.5 DF indicator

DF	Meaning
OFF	No device faults.
Flashing at 2 Hz	At least one valve coil has a short circuit.
Flashing at 0.5 Hz	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.
ON	At least one connected module has a short circuit or the module layout has changed.

The US1, US2 and US3 indicators for the EX245-SIB3-X35 are the same as for the EX245-SIB1-X35 / EX245-SIB2-X35.

5 Installation

5.1 Installation

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

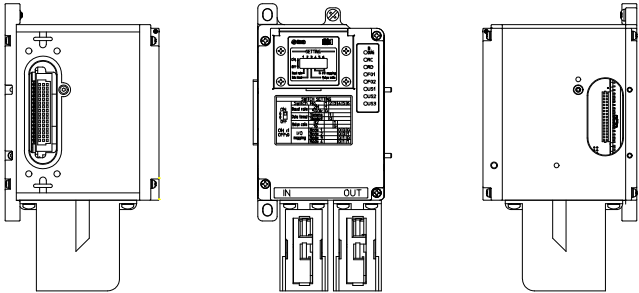
5.2 Environment

 Warning
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- 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).



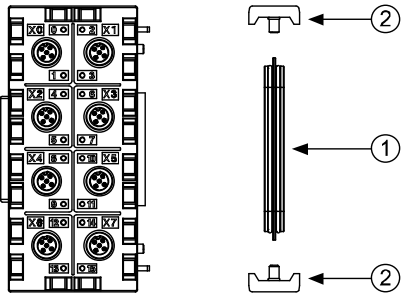
 Caution
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To ensure a protection rating of IP65, apply the recommended tightening torque (0.6 N•m) and make sure that the O-ring is positioned correctly on the screw.

5.4 Module Connection

Connect the SI Unit, the I/O modules and the End plate 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)



5 Installation (continued)

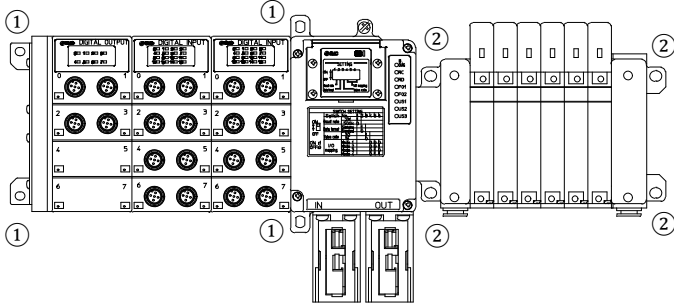
 Caution
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- For a protection rating of IP65 to be ensured the End plate must be installed correctly, and the modular adaptor assemblies and joint assembly must be installed correctly between each module.
- To prevent the modules and assemblies being 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 8 base mounting positions with screws. Required screws are as follows:

- 4 x M5 (End plate and SI unit: torque = 1.5 N•m)
- 4 x M4 or M5 (Valve manifold: refer to valve manifold catalogue)



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

6 Wiring

6.1 Wiring

 Caution

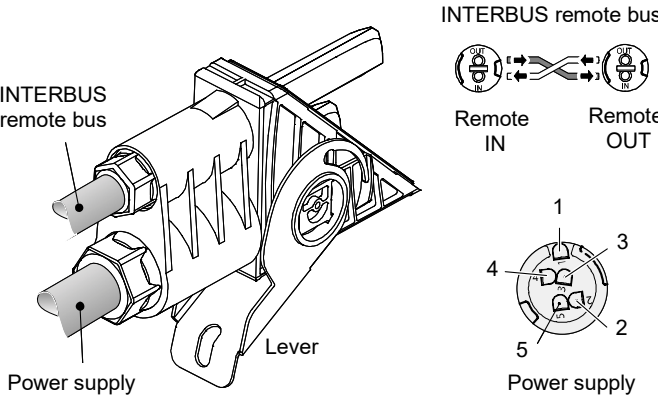
- To prevent damage all power supplies to the SI Unit must be turned

off (de-energised) before the modules are installed or removed.

- The SI Unit is a “remote bus device” and can be connected to a “remote bus line”, but the EX245-SIB2-X35 must be the end device of each remote bus level.
- In the case of EX245-SIB1-X35 and EX245-SIB3-X35, if another device does not follow, cover the outgoing remote bus connector with a seal cap so that a protection rating of IP65 is maintained.
- Power and bus lines must be installed correctly.
- To prevent manifold components from being damaged the supply lines for the electronics and for the load voltage must be protected externally with a fuse.
- The Bus / Power connectors can be connected to the SI Unit in two different ways. The lever of the bus connector must not be used to pull the connector into position (EX245-SIB1 / SIB2-X35).

6.2 Bus / Power connector (EX245-SIB1 / SIB2-X35)

- Only special cables and connectors are suitable for Rugged Line connection. Contact Phoenix Contact GmbH for details.



6 Wiring (continued)

INTERBUS remote bus connection

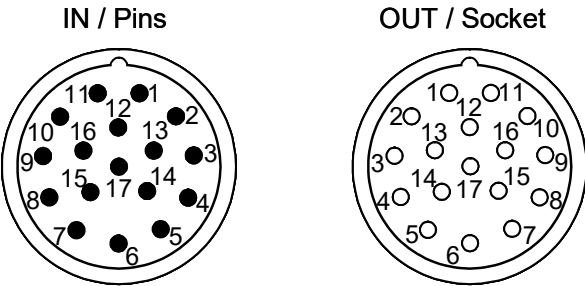
Bus connector	Signal	Direction	Splice ring	Wire colour
Incoming bus	Optical fibre Remote IN	Receive data	IN	Orange
		Send data	OUT	Black
Outgoing bus	Optical fibre Remote OUT	Receive data	IN	Black
		Send data	OUT	Orange

Power Supply connector

Signal	Connection	Wire colour	Identification
24 V (US1)	1	Black	1
0 V (US1)	2	Black	2
24 V (US2)	3	Black	3
0 V (US2)	4	Black	4
FE	5	Yellow	5

6.3 Bus / Power connector (EX245-SIB3-X35)

- The installation remote bus connector can carry a maximum of 8 A (applies only to US1 and US2, pins1 to 4).



Pin	Incoming	Remarks	Outgoing	Remarks
1	0 V (US1)	0 V for logic / sensors	0 V (US1)	0 V for logic / sensors
2	0 V (US2)	0 V for valves / loads	0 V (US2)	0 V for valves / loads
3	24 V (US2)	24 VDC for valves / loads	24 V (US2)	24 VDC for valves / loads
4	24 V (US1)	24 VDC for logic / sensors	24 V (US1)	24 VDC for logic / sensors
5	FE	Functional Earth	FE	Functional Earth
6	N.C.	Not used	N.C.	Not used
7	DO1	Receive data +	DO2	Send data +
8	DO1	Receive data -	DO2	Send data -
9	DI1	Send data line +	DI2	Receive data +
10	DI1	Send data line -	DI2	Receive data -
11	COM1	Data ground	COM	Data ground
12	–	Not used	–	Not used
13	–	Not used	–	Not used
14	–	Not used	–	Not used
15	N.C.	Not used	N.C.	Not used
16	N.C.	Not used	N.C.	Not used
17	–	Not used	–	Not used

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.
- 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.

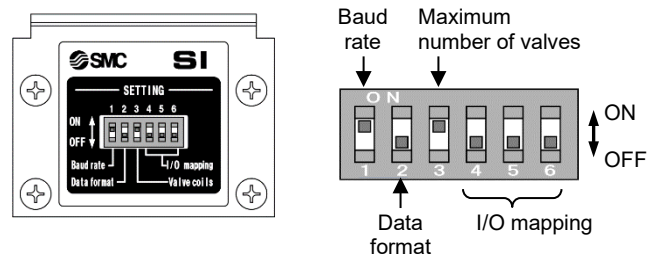
7 Settings

The setting switches are located inside the SI Unit, behind the function switch cover on the front panel.

- The switches should be set with the power supply turned OFF.

Using the DIP switches:

- Unscrew the cover and hinge it upwards.
- The DIP switches can be adjusted with a small flat-blade screwdriver.
- Tighten the cover after setting, making sure that the seals are positioned correctly (tightening torque = 0.3 N•m).
- Changing the switch settings will not take effect until the SI Unit has been powered OFF and then back ON again.



7.1 Baud Rate setting

- Select the baud rate (INTERBUS transmission speed).

Switch No.1	Description
ON	2 Mbps
OFF	500 kbps

7.2 Data format setting

- The SI Unit supports “Standard” and “Siemens (byte swapped)” formats. Select the required data format.
With the Siemens format, Bytes 0 & 1 are swapped and Byte 2 & 3 are swapped, making it suitable for use with Siemens PLC's.

Switch No.2	Description
ON	Siemens (byte swapped) format
OFF	Standard format

7.3 Maximum number of valves setting

- Select the maximum number of valves.

Switch No.3	Description
ON	Max. 32 coils
OFF	Max. 16 coils

7.4 I/O mapping setting

- The SI Unit supports four I/O mapping modes.

Switch setting			I/O mapping	Description
No.4	No.5	No.6		
OFF	OFF	OFF	Mode 1	No diagnostic data is added to the input data.
OFF	OFF	ON	Mode 2	Detailed diagnostic data (4 bytes) is added to the top of input data.
OFF	ON	OFF	Mode 3	Simple diagnostic data (2 bytes) is added to the end of input data.
OFF	ON	ON	Mode 4	Detailed diagnostic data (4 bytes) is added to the end of input data.

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

8 How to Order

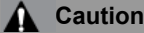
Refer to the operation manual on the SMC website (URL: <https://www.smcworld.com>) for How to order information.

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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