



ORIGINAL INSTRUCTIONS

Instruction Manual

Fieldbus device - SI unit for DeviceNet®

EX250-SDN1 / EX250-SDN1-X102



The intended use of this product is to control pneumatic valves and I/O while connected to the DeviceNet® 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 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.
- 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
Weight	250 g

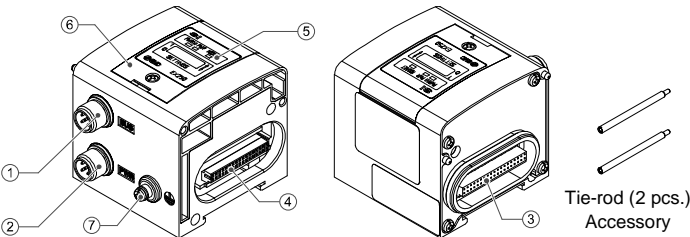
2.2 Electrical specifications

Item		Specifications
Power supply voltage range and current consumption	SI unit power supply (V) and current consumption	Conforms to the DeviceNet® specifications (11 to 25 VDC), 100 mA or less
	Input block power supply (V) and current consumption	19.2 to 28.8 VDC Depends on the number of blocks and sensor specifications: Max. 1 A
	Solenoid valve power supply (V) and current consumption	22.8 to 26.4 VDC (power drop alarm at approx. 19 VDC) Depends on the number of solenoid valve stations: Max. 2 A
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 insulation
	Residual voltage	0.3 VDC or less

2.3 Communication specifications

Item	Specifications	
	EX250-SDN1	EX250-SDN1-X102
Network	DeviceNet® Release2.0	
MAC ID set range	0 to 63 (MAC ID information is maintained even when the power supply is cut if it is set either by the DIP switch or via communication network).	
Baud rate (communication speed)	500 kbps, 250 kbps, 125 kbps (Communication information is maintained even when the power supply is cut if it is set either by the DIP switch or via communication network).	
Slave type	Group 2 Only Server	
Configuration	T branch type, Multi drop type	
Device type	27	
Product code	2401	2404
Setting file: EDS file (download from SMC website)	ex250-sdn1_44_v□.eds	ex250-sdn1_64_v□.eds
Vendor ID	7	
Consumed Connection Size (No. of bytes received)	4 (polled I/O connection, 4 bytes occupied)	4 (polled I/O connection, 4 bytes occupied)
Produced Connection Size (No. of bytes sent)	4 (polled I/O connection, 4 bytes occupied)	6 (polled I/O connection, 6 bytes occupied)
Corresponding messages	Polled command (I/O message, Explicit message)	
Corresponding function	QuickConnect™	

3 Name and function of parts



No.	Part	Description
1	Communication connector	Connector for communication signals via DeviceNet® 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	Address and communication speed, etc. are set using the switches inside.
7	FE terminal	Functional Earth (M3 screw).

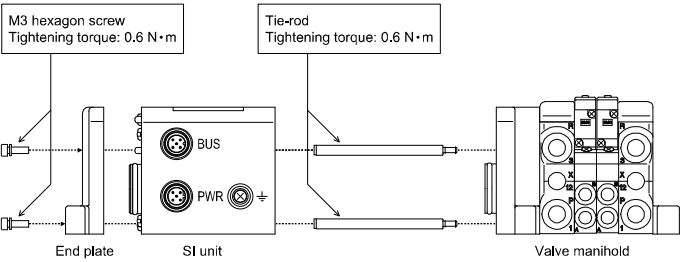
4 Installation

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.
- The drain wire should be connected to ground at one point only in the communication network. Grounding should only be made at one point.

5.1 Communication connector

- Select appropriate cables to mate with the connector on the SI unit. A shielded twisted pair cable for DeviceNet® should be used.

BUS: M12 5-pin plug, A-coded (SPEEDCON)

No.	Signal	Wire colour	Connector
1	DRAIN	-	
2	V+	Red	
3	V-	Black	
4	CAN_H	White	
5	CAN_L	Blue	

- The maximum cable length depends on the communication speed and the cable type used.

Communication speed	Max. network cable length		Drop line length	Cumulative Drop
	Thick cable	Thin cable		
500 kbps	100 m	100 m	6 m or less	39 m max.
250 kbps	250 m	100 m		78 m max.
125 kbps	500 m	100 m		156 m max.

5.1.1 Terminating Resistor

- DeviceNet® requires a terminating resistor installed at each end of the main trunk line (not at the end of a drop line).
- The resistor requirements are: 121 Ω, 1% metal film, 1/4 W.

5.2 Power Supply connector

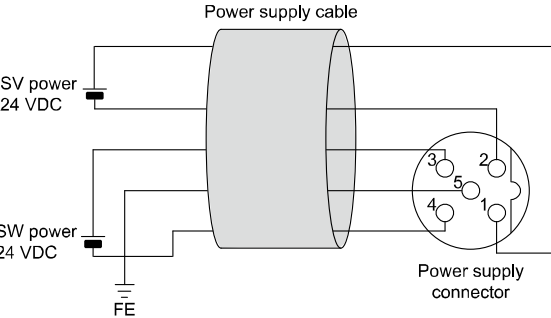
- Connect a power supply cable to the power supply connector on the SI unit.

PWR: M12 5-pin plug, B-coded reverse (SPEEDCON)

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 / input blocks	
4	SW0V	0 V for SI unit / input blocks	
5	FE	Functional Earth	

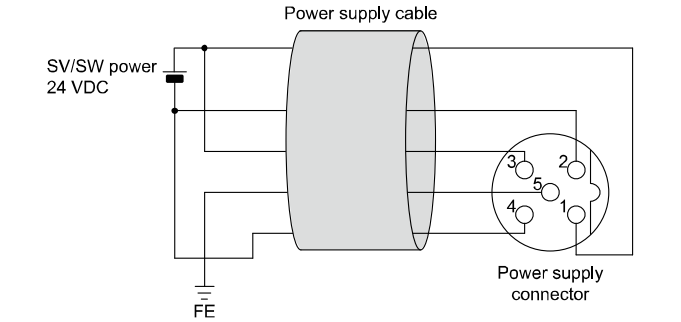
- Within the SI unit there are separate power supply lines for the solenoid valves (SV power supply) and for the input block (SW power supply).
- Supply power to each of them, from a single power supply or from dual power supplies.

5.2.1 Dual Power supplies

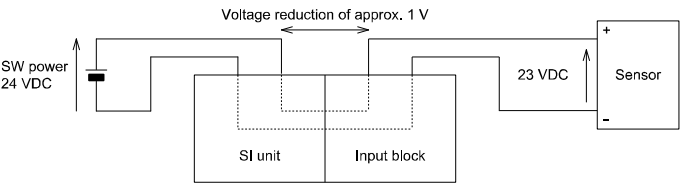


5 Wiring (continued)

5.2.2 Single Power supply

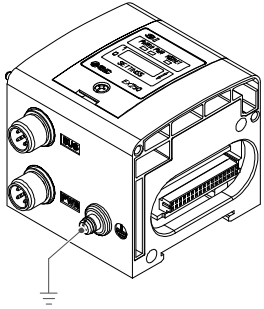


- SW power is supplied to the sensor connected to the input block. There is a voltage drop of approximately 1 V max. inside the SI unit when SW power is supplied. Select a sensor taking this voltage drop into consideration. If 24 V must be supplied to the sensor, it is necessary to increase the SW power 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 Ground Terminal

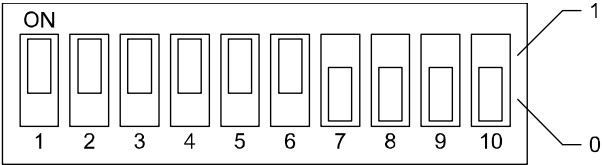
- Connect the ground terminal to ground.
- Individual grounding should be provided close to the product with a short cable to assure the noise resistance of the Fieldbus system.
- Resistance to ground should be 100 ohms or less.



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.



6.1.1 Address setting

- The DeviceNet® address (MAC ID) can be set from 0 to 63 (using switch 1 to 6). The factory default setting is 63.

MAC ID	SW1 2 ⁰ (1)	SW2 2 ¹ (2)	SW3 2 ² (4)	SW4 2 ³ (8)	SW5 2 ⁴ (16)	SW6 2 ⁵ (32)
0	0	0	0	0	0	0
1	1	0	0	0	0	0
2	0	1	0	0	0	0
⋮	⋮	⋮	⋮	⋮	⋮	⋮
62	0	1	1	1	1	1
63	1	1	1	1	1	1

6 Setting (continued)

6.1.2 Communication speed setting

- The DeviceNet® communication speed can be set to 125, 250 or 500 kbps (using switch 7 and 8). The factory default setting is 125 kbps.

Communication speed	SW7	SW8
125 kbps	0	0
250 kbps	1	0
500 kbps	0	1
Not used	1	1

6.1.3 HOLD / CLEAR setting

- Set the reaction of outputs to a communication error (using switch 9).
- The factory default setting is CLEAR.

Status	SW9	Description
CLEAR	0	Clear all outputs.
HOLD	1	Hold the last state before communication error.

6.1.4 HW / SW setting

- Modifications to the address and speed can be made locally (HW mode using switch 10) or over the network (SW mode).
- The factory default setting is "HW mode".

SW10	Mode	Description
0	HW	Set the address and speed locally using the SI unit switches 1 to 8.
1	SW	Set the address and speed over the DeviceNet® network. (switch setting is invalid).

6.1.5 Setting via the DeviceNet® network

- It is possible to set the node address (MAC_ID), DeviceNet® communication speed and output condition when a communication error is generated, via the network, in accordance with the procedure below.

Node Address and Communication speed setting

- Set the switch No. 10 to ON (SW mode).
- Change the instance / attribute value in the DeviceNet® Class as follows.

Class	Instance	attribute	Description	Value
03h (DeviceNet®)	01h	01h	MAC ID (Node address)	0 to 63
	01h	02h	Baud_Rate (communication speed)	0: 125 kbps 1: 250 kbps 2: 500 kbps

- The MAC ID and communication speed set by SW mode on the SI unit will be saved and still valid after the DeviceNet® has been switched off.
- When DeviceNet® power is applied to the SI unit in HW mode, the MAC ID and communication speed set by Software mode is no longer valid and the switch setting is valid instead.

6.2 Configuration

In order to configure the SI unit for the DeviceNet® network, the appropriate device master file (EDS file) for the SI unit will be required.

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

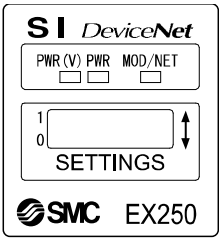
7 How to Order

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 LED Display



LED		Description
PWR (V)	Green LED is ON	Power for solenoid valve is supplied.
PWR	Green LED is ON	Power for DeviceNet® communication is supplied.
MOD/NET	OFF	Power supply is OFF, on-line status or checking for MAC ID duplication.
	Green LED is flashing	I/O connection stand-by (on-line status).
	Green LED is ON	I/O connection established (on-line status).
	Red LED is flashing	I/O connection time-out (minor communication error). *
	Red LED is ON	MAC ID duplication error or BUS OFF error (serious communication error).

*: EX250-SDN1 disconnects the I/O connection when the solenoid valve power supply decreases or when the input block fuse is detected to be broken (EX250-SDN1-X102 does not disconnect the I/O connection).

10 Maintenance

10.1 General Maintenance



- 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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