EX250-TF2Z130EN

ORIGINAL INSTRUCTIONS

Instruction Manual
Fieldbus device - SI unit for CANopen
EX250-SCA1A

The intended use of this product is to control pneumatic valves and I/O while connected to the CANopen 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) [*1)], and other safety regulations.

[*1)] 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

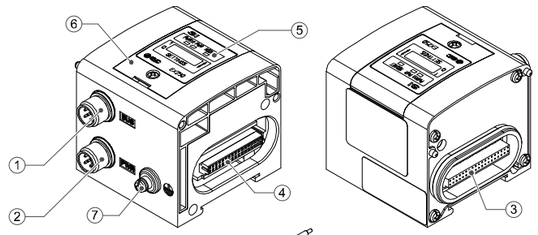
2.2 Electrical specifications

Item		Specifications
Power supply voltage range and current consumption	SI unit power supply (V) and current consumption	18 to 30 VDC (24 VDC typical), 100 mA or less
	Input block power supply (V) and current consumption	24 VDC ±20% Depending on the number of solenoid valve stations: Max. 1.0 A
	Solenoid valve power supply (V) and current consumption	24 VDC +10%/-5% Depending 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	Specification
Applicable system	CANopen CiA DS-301 V4.02 and CiA DS-401
Node-ID setting range	1 to 63 (1 to 127 at the SW mode)
Baud rate setting range (Transmission speed)	1000 k, 800 k, 500 k, 250 k, 125 k, 50 k, 20 k, 10 kbps
COB Identifier	11 bit ID (CAN2.0 A)
No. of Inputs / Outputs	32 points / 32 points

3 Name and function of parts



Tie-rod (2 pcs.)
Accessory

No.	Part	Description
1	Communication connector	Connector for communication signals via CANopen 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).

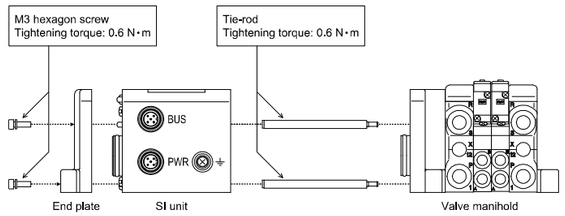
4 Installation

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.

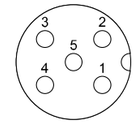
5 Wiring

- 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.

5.1 Communication connector

- Select appropriate cables to mate with the connector on the SI unit.

BUS: M12 5-pin plug

No.	Signal	Wire colour	Connector
1	CAN_SHLD	Shield	
2	CAN_V+	Power supply + for CANopen	
3	CAN_GND	Power supply – for CANopen	
4	CAN_H	CAN_H bus line (dominant high)	
5	CAN_L	CAN_L bus line (dominant low)	

- The maximum bus cable length depends on the Baud rate as follows:

Baud rate	Max. bus cable length
1 Mbit/s	25 m
800 kbit/s	50 m
500 kbit/s	100 m
250 kbit/s	250 m
125 kbit/s	500 m
50 kbit/s	1000 m
20 kbit/s	2000 m
10 kbit/s	5000 m

5.2 Bus cable and Termination resistors

- The cables, connectors, and termination resistors used for CANopen networks shall meet the requirements defined in ISO 11898.
  In addition, the guidelines for selecting cables and connectors are as follows:.
  The table below shows some standard values for DC parameters for CANopen networks with less than 64 nodes.

Bus length [m]	Bus cable specification		Termination resistance [Ω]
	Resistance / length [mΩ/m]	Wire cross section [mm²]	
0⋯40	<70	0.25⋯0.34	124
40⋯300	<60	0.34⋯0.6	150⋯300
300⋯600	<40	0.5⋯0.6	150⋯300
600⋯1000	<26	0.75⋯0.8	150⋯300

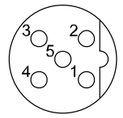
- For drop cables, a wire cross-section of 0.25 to 0.34 mm² would be an appropriate choice in many cases.
  Besides the cable resistance, the real resistance of the connectors should also be considered, when calculating the voltage drop. The resistance of one connector should be in the range of 2.5 to 10 mΩ.

5 Wiring (continued)

5.3 Power Supply connector

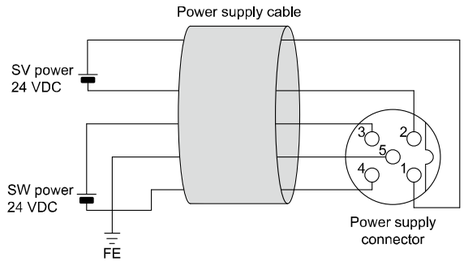
- Connect a power supply cable (SMC Part No. EX9-AC050-1) to the power supply connector on the SI unit.

PWR: M12 5-pin plug, B-coded reverse

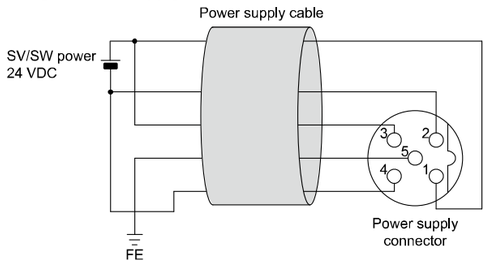
No.	Signal	Description	Connector
1	SV24V	24 V for solenoid valve / outputs	
2	SV0V	0 V for solenoid valve / outputs	
3	SW24V	24 V for SI unit / input blocks	
4	SW0V	0 V for SI unit / input blocks	
5	FE	Functional Earth	

- 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.

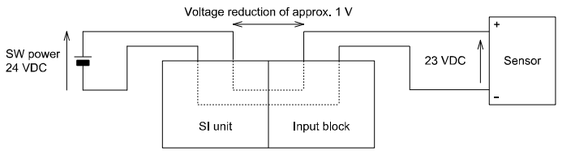
5.3.1 Dual Power supplies



5.3.2 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).



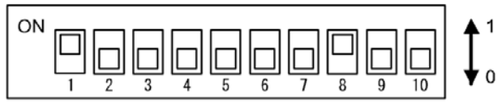
5.4 Ground Terminal

- 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 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 Node ID setting

The Node ID setting range is 0-63 using SW1 to SW6.

Node ID	SW1	SW2	SW3	SW4	SW5	SW6
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

6.1.2 Output Condition setting

SW9	Output condition of solenoid valve when “Stop Remote Node” command is received or stopped state by an error occurs (Error control, Emergency Object). The object 1029h specifies to which state the unit should be set, when an error is detected.
0	Output value shall take the pre-defined condition specified in Error Value Output Object (6207h, 6307h, 5327h). Default: All outputs are CLEARED.
1	Output Value shall be HELD.

6.1.3 Mode setting

SW10	Mode
0	HW Mode. Setting of Node-ID is achieved using rotary coded switches SW1 and SW2. Setting of Baud Rate is achieved using rotary coded switch SW3.
1	SW Mode. Setting of Node-ID is achieved via the network. SW1 and SW2 become invalid. Node-ID can be set in the range 1 to 127. Default is 127 (7Fh).

- Switch SW7 is not used. Switch SW8 must be set to ON.

6.1.4 Baud rate setting

Refer to the operation manual on the SMC website (URL: https://www.smcworld.com) for setting the Baud rate.

6.2 Configuration

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

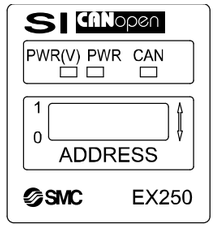
7 How to Order

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

8 Outline Dimensions (mm)

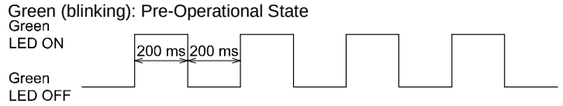
Refer to the operation manual on the SMC website (URL: https://www.smcworld.com) for outline dimensions.

9 LED Display

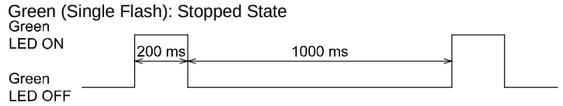


LED		Description
PWR(V)	Green ON	Power for solenoid valves is supplied.
PWR	Green ON	Power for CANopen line is supplied.
CAN	Green ON	SI unit is in the Operational state.
	Green blinking	SI unit is in the Pre-Operational state.
	Green flashing (single flash)	SI unit is in Stopped state.
	Red flashing (single flash)	CAN controller error occurs.
	Red flashing (double flash)	Error Control Event occurs.
	Green / Red flickering	SI unit is in Configuration mode. (LSS services)
	Red Light	SI unit is in "Bus OFF" state.

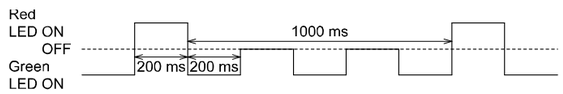
Green (blinking): Pre-Operational State



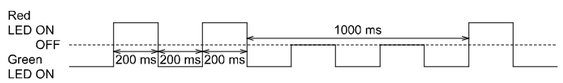
Green (Single Flash): Stopped State



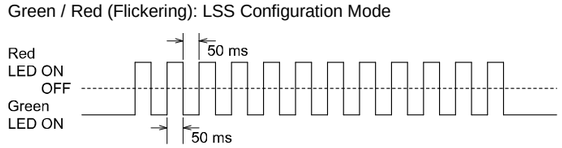
Red (Single Flash): CAN controller error



Red (Double Flash): Error Control Event



Green / Red (Flickering): LSS Configuration Mode



∗: LED Indication is based on CANopen specification (DR-303-3).

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)

SMC Corporation, 4-14-1, Sotokanda, Chiyoda-ku, Tokyo 101-0021, Japan

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