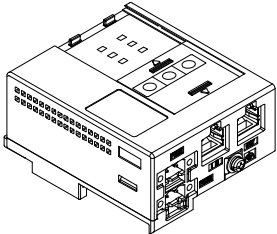




Instruction Manual
Fieldbus device - SI unit for EtherCAT®
EX180-SEC3-X230
EX180-SEC5-X230 / -X231



The intended use of this product is to control pneumatic valves and I/O while connected to the EtherCAT® 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.

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)
Storage temperature	-20 to +60 °C
Withstand voltage	500 VAC applied for 1 minute (between FG and external terminal)
Insulation resistance	10 MΩ or more (500 VDC, between FG and external terminal)
Operating atmosphere	No corrosive gas, no dust
Enclosure	IP20
Weight	EX180-SEC5-X230: 140 g EX180-SEC5-X231: 150 g

2.2 Electrical specifications

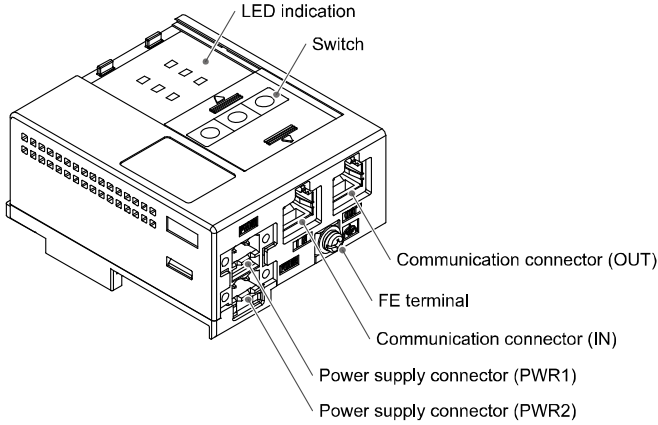
Item	Specifications		
	EX180-SEC3-X230	EX180-SEC5-X230	EX180-SEC5-X231
Power supply for SI unit control	24 VDC, 100 mA max. (internal current consumption)		
Output	Output type	NPN (positive common) / Sink	PNP (negative common) / Source
	Number of outputs	32 outputs	24 outputs
	Interlock	None	Yes
	Connected load	Solenoid valve with surge voltage suppressor of 24 VDC and 1.5W or less (manufactured by SMC)	
	Power supply	24 VDC, 2.0 A	24 VDC, 1.5 A
	Output condition at communication error	CLEAR	

2.3 Communication specifications

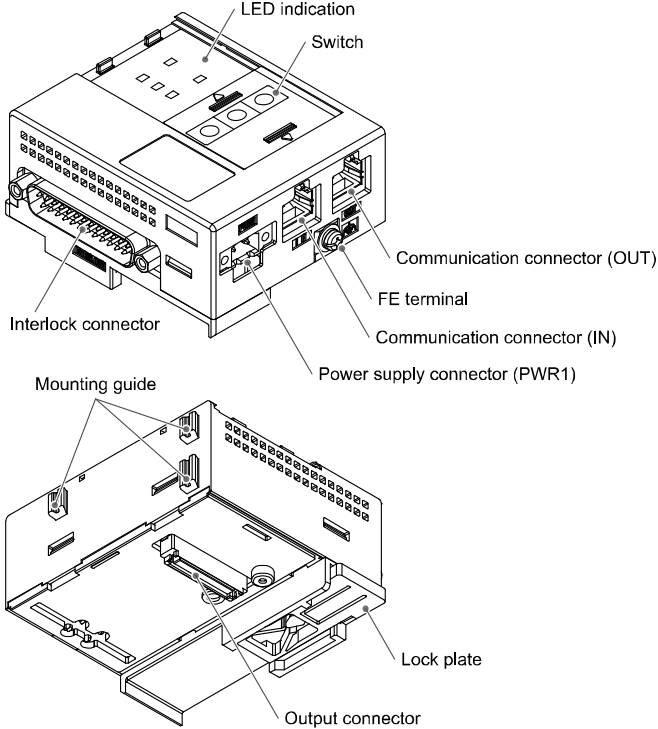
Item		Specifications
Protocol		EtherCAT® (Conformance Test Record V.1.2)
Communication speed		100 Mbps
Occupied area (outputs)		32 points
Support service		CoE (Process data communication, SDO communication)
Transmission medium		Standard Ethernet cable (CAT5) (100BASE-TX) minimum
Network topology		Daisy chain connection
Maximum segment length		100 m
Device ID setting		Manual or Automatic setting
Vendor ID		0x00000114 (276)
Product code	EX180-SEC5-X230	0x01000017 (16777239)
	EX180-SEC5-X231	0x01000016 (16777238)
Configuration file		XML file

3 Name and function of parts

EX180-SEC3/5-X230



EX180-SEC5-X231



Part	Description
LED indication	LED's to indicate the Bus status and SI unit status.
Switch	Switches for address setting.
Communication connector (OUT)	Connector for EtherCAT® communication - OUT side (RJ45 connector)
FE terminal	Functional Earth (M3 screw).
Communication connector (IN)	Connector for EtherCAT® communication - IN side (RJ45 connector)
Power supply connector (PWR1)	Power supply plug (Part No. EX9-CP6-X27) used to supply power for the SI unit.
Power supply connector (PWR2)	Power supply plug (Part No. EX9-CP6-X27) used to supply power for the solenoid valves (EX180-SEC5-X230 only).
Interlock connector	Connector for external interlock circuit - D-sub 25-pin plug (EX180-SEC5-X231 only).
Mounting guide	Connecting parts to align with the groove on the valve manifold.
Lock plate	Used to mount or remove the product on to a DIN rail.
Output connector	Connector for output signal interface to valve manifold.

4 Installation

4.1 Mounting

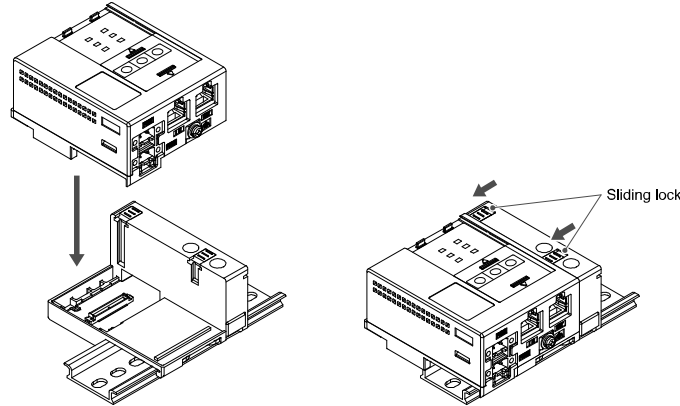
Warning

- Do not install the product unless the safety instructions have been read and understood.
- Applicable valve series: SJ2000, SJ3000, S0700

Caution

- Be sure to turn off the power.
- Check there is no foreign matter inside the SI unit.
- If the SI unit is not assembled properly, the internal PCBs may be damaged or liquid and/or dust may enter into the unit.

- 1) Mount the SI unit to the valve manifold so that the mounting guide of the SI unit case mates with the manifold groove.
- 2) Secure the SI unit using the two sliding locks.



4.2 Environment

Warning

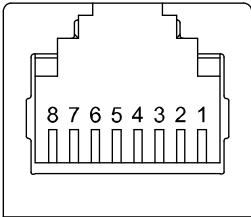
- Do not use in an environment where corrosive gases, chemicals, salt water or steam are present.

- 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 Wiring

5.1 Communication Connector (IN and OUT)

Details of the EtherCAT® communication connector RJ45 8-pin socket (CAT5e).



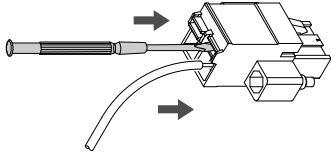
No.	Signal	Description
1	TD+	Transmit Data +
2	TD-	Transmit Data -
3	RD+	Receive Data +
4	-	-
5	-	-
6	RD-	Receive Data -
7	-	-
8	-	-

Connect the Communication connector (IN) to the upstream device (PC, PLC etc.) and connect the Communication connector (OUT) to the downstream device.

5 Wiring (continued)

5.2 Power supply connector

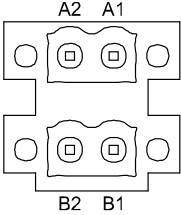
- Connect the power supply wiring to the power supply connector (Part No. EX9-CP6-X27).
- The power supply connector is suitable for use with wire sizes from AWG28 to 16 (0.14 mm² to 1.5 mm²).
- The EX180 power supply structure consists of two systems. These systems can operate using a single or dual power supply.
- Connect the wires to the assigned pins (shown below).



5.2.1 EX180-SEC3/5-X230

Power supply Connector PWR1 and PWR2 (4-pins)

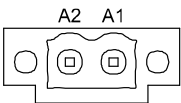
Pin No.	Description
A1	+24 V for SI unit operation
A2	0 V for SI unit operation
B1	+24 V for solenoid valve
B2	0 V for solenoid valve



5.2.2 EX180-SEC5-X231

Power supply Connector PWR1 (2-pins)

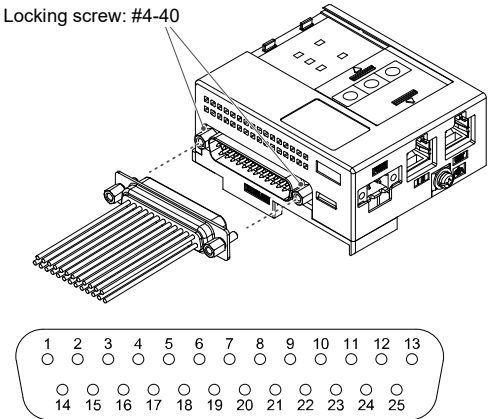
Pin No.	Description
A1	+24 V for SI unit operation
A2	0 V for SI unit operation



- When assembling the connector to the SI unit tighten the wiring screws with a tightening torque of 0.2 to 0.3 N•m.
- The power supply plug EX9-CP6-X27 (50 pcs.) is not included with the product. Please order separately.

5.3 Interlock connector

Interlock connector: D-sub 25-pin plug (EX180-SEC5-X231 only).



Pin No.	Signal	Valve output No.	Pin No.	Signal	Valve output No.
1	EN_00	0	14	EN_01	1
2	EN_02	2	15	EN_03	3
3	EN_04	4	16	EN_05	5
4	EN_06	6	17	EN_07	7
5	EN_08	8	18	EN_09	9
6	EN_0A	10	19	EN_0B	11
7	EN_0C	12	20	EN_0D	13
8	EN_0E	14	21	EN_0F	15
9	EN_10	16	22	EN_11	17
10	EN_12	18	23	EN_13	19
11	EN_14	20	24	EN_15	21
12	EN_16	22	25	EN_17	23
13	COM	Common (0 V)			

5 Wiring (continued)

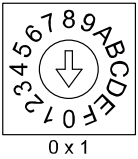
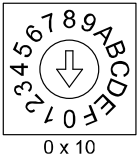
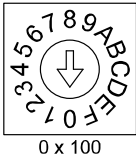
5.4 Ground Connection

- Connect the FE terminal to Functional Earth. Individual grounding should be provided close to the product. Resistance to ground should be 100 ohms or less. Tighten the FG terminal (M3 round head combination screw) firmly with a tightening torque of 0.3 N•m.

6 Setting

6.1 Switch Settings

- The switches should only be set with the power supply turned OFF.
- Set the rotary switches with a small flat blade screwdriver.
- Set the switches before use.



6.1.1 Device ID setting

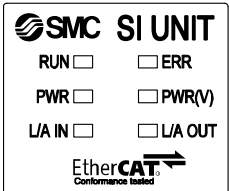
The device ID should be set in the range of 1 to 4095. The default setting is 0.

0 x 100	0 x 10	0 x 1	Device ID
0	0	0	0 *
0	0	1	1
0	0	2	2
:	:	:	:
0	F	F	255
:	:	:	:
F	F	D	4093
F	F	E	4094
F	F	F	4095

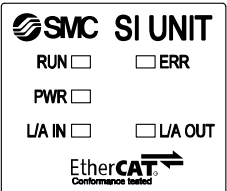
*: Factory default setting is 0. The Device ID should be set in a range of 1 to 4095.

7 LED display

EX180-SEC3/5-X230



EX180-SEC5-X231

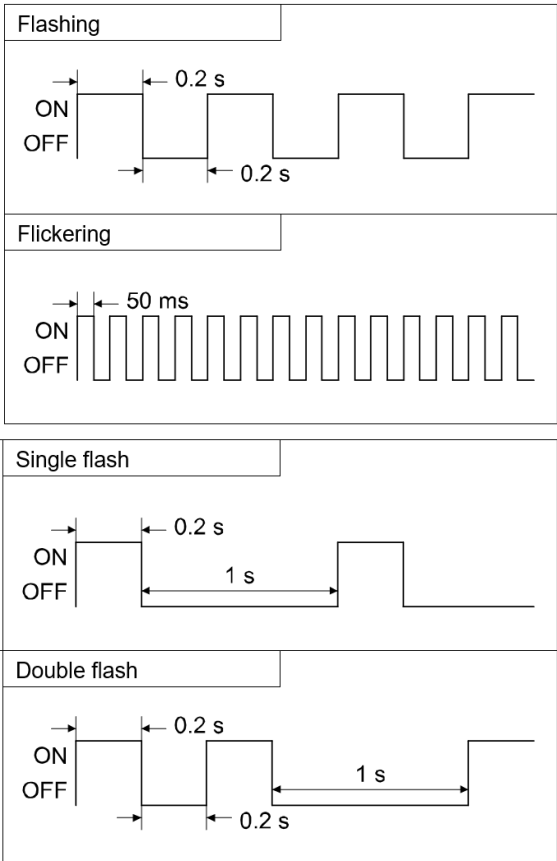


LED	LED Status	Description
RUN (Green)	OFF	Init
	Flashing	Pre-Operational
	Single flash	Safe-Operational
	Flickering	Initialization or Bootstrap
	ON	Operational
ERR (Red)	ON	PDI watchdog timeout
	Double flash	Application watchdog timeout
	Single flash	Unsolicited state change
	Flashing	Invalid configuration
	Flickering	Booting error
PWR (Green)	OFF	No error
	ON	SI unit operating voltage is supplied
PWR(V)* (Green)	OFF	SI unit operating voltage is not supplied
	ON	Load voltage for the valve is supplied
L/A IN (Green)	OFF	Load voltage for the valve is not supplied or outside tolerance range (19 V max.).
	ON	IN side: No link / No activity
	Flickering	IN side: Link / Activity
L/A OUT (Green)	OFF	OUT side: No link / No activity
	ON	OUT side: Link / No activity
	Flickering	OUT side: Link / Activity

* The PWR(V) LED is on EX180-SEC5-X230 only.

8 LED display (continued)

Details of LED flashing / flickering pattern



8 How to Order

Refer to the catalogue or operation manual on the SMC website (URL: <https://www.smcworld.com>) for the “How to Order” information.

9 Outline Dimensions (mm)

Refer to the catalogue or operation manual on the SMC website (URL: <https://www.smcworld.com>) for Outline dimensions.

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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Template DKP50047-F-085O