

# Installation & Maintenance Manual

## SI unit - Profibus DP compatible

### Type EX250-SPR1



## Safety Instructions

The unit and this manual contain essential information to protect users and others from possible injury and property damage and to ensure correct handling.

Please confirm that you fully understand the meaning of the following messages (signs) before reading the text, and always follow the instructions.

Please read the Installation & Maintenance Manual for related apparatus and understand it before operating the actuator.

### IMPORTANT MESSAGES

Read this manual and follow the instructions.  
Signal words such as WARNING, CAUTION and NOTE, will be followed by important safety information that must be reviewed carefully.

|                 |  |
|-----------------|--|
| <b>⚠WARNING</b> | Indicates a potentially hazardous situation which could result in death or serious injury if you do not follow instructions. |
| <b>⚠CAUTION</b> | Indicates a potentially hazardous situation which if not avoided, may result in minor injury or moderate injury.             |
| <b>NOTE</b>     | Provides you helpful information.  |

### ⚠WARNING

**Do not disassemble, modify (including change of printed circuit board) or repair.**

An injury or failure can result.

**Do not operate outside of the specification range.**

Fire, malfunction or damage can result.

Please use it after confirming the specification.

**Do not use the product in environments with possible presence of flammable, explosive or corrosion gas.**

Otherwise fire, explosion or corrosion can result.

The product is not designed to be explosion proof.

**Do not apply voltages exceeding 250V between a lead wire and a metal fitting.**

Pay attention to perform an insulation test because it could damage the insulation of the lead wire and cause failure.

**These instructions must be followed when using the product in an interlocking circuit:**

**.Provide double interlocking through another system such as mechanical protection.**

**.Check the product regularly to ensure proper operation.**  
Otherwise malfunction can cause an accident.

**These instructions must be followed when performing maintenance work:**

**.Turn off the power supply**

**.Stop the air supply, exhaust the residual pressure and verify that the air is released before performing maintenance work.**

Otherwise it can cause injury.

## Safety Instructions (continue)

### ⚠CAUTION

**Perform a proper functional check after completing maintenance work.**

Stop operation when an abnormality is observed or the product is not working properly.

Safety cannot be assured due to unexpected malfunctions.

### NOTE

The direct-current power supply should be a UL authorized power supply.

1. Limited voltage current circuit in accordance with UL508

A circuit to which power is supplied by the secondary coil of a transformer that meets the following conditions.

·Max. voltage(with no load): less than 30Vrms(42.4V peak)

·Max. current: (1)less than 8A(including when short circuited)

(2)limited by circuit protector (such as fuse) with the following ratings

| No load voltage (V peak) | Max.current rating (A) |
|--------------------------|------------------------|
| 0 to 20 [V]              | 5.0                    |
| 20 to 30 [V]             | 100 / peak voltage     |

2. UL1310 compatible class 2 power supply unit or circuit of max. 30Vrms (42.4V peak) or less using a UL1585 compatible class 2 transformer as power supply. (Class 2 circuit)

Follow the instructions given below when handling the product.

Failure to follow instructions may damage the unit.

·Operate the product within the specified voltage range.

·Reserve a space around the unit for maintenance.

·Do not remove labels.

·Do not drop, hit or apply excessive shock to the product.

·Do not bend or apply tensile force to cables, or apply a force by placing a heavy load on them.

·Connect wires and cables correctly.

·Do not connect wires while the power is on.

·Do not lay wires or cables with the same wiring route as a power line or high-voltage line.

·Verify the insulation of the wiring.

·Take proper measures against noise such as a noise filter when the product is incorporated in equipment or devices.

·Select an operation environment according to enclosure(IP67).

·Take sufficient shielding measures when installing the product at the following place.

(1)A place where a noise due to static electricity etc. is generated

(2)A place of high electric field strength

(3)A place possibly exposed to radioactivity

(4)A place near power cable

·Do not use the product nearby a place where an electric surge is generated.

·Use the product equipped with a surge absorber when a surge-generating load such as a solenoid valve is driven directly.

·Prevent foreign matter such as remnant of wires from entering the product.

·Do not expose the product to vibration and impact.

·Keep the specified ambient temperature range (+5 to +45°C).

·Do not expose the product to heat radiation from a heat source located nearby.

·Use a precision screw driver with small flat blade when setting rotary switch and DIP switch.

·Perform maintenance and check at regular intervals.

·Perform a proper functional check.

·Do not clean the product with chemicals such as benzine and thinner.

## Specification

### General specification

| Item                       | Specification   |
|----------------------------|---|
| Operating ambient temp.    | +5 to +45°C   |
| Operating ambient humidity | 35 to 85% RH (No dew condensation)  |
| Storage ambient temp.      | -20 to +60°C  |
| Vibration proof            | 10 to 57Hz 0.35mm (Constant amplitude)<br>57 to 150Hz 50m/s <sup>2</sup> (Constant acceleration)                            |
| Impact proof               | 150m/s <sup>2</sup> (peak), 11ms × three times in each direction ± X, Y and Z.  |
| Noise immunity             | Normal mode : ±1500V Pulse duration 1us<br>Common mode : ±1500V Pulse duration 1us<br>Radiation : ±1000V Pulse duration 1us |
| Withstand voltage          | 500V AC for 1min.   |
| Insulation resistance      | 500V DC min10M ohm  |
| Operating environment      | No corrosive gas and no dust  |

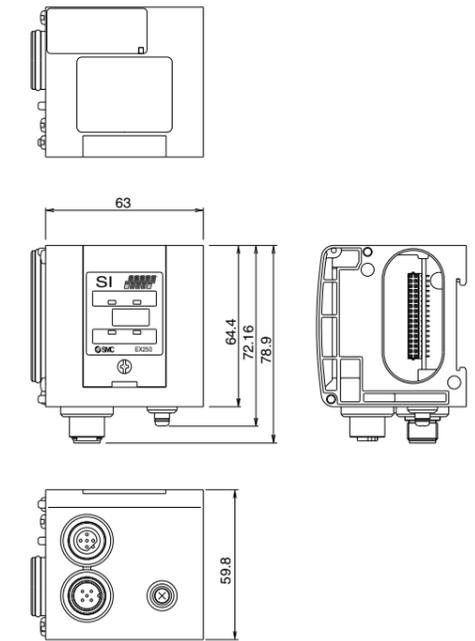
### Electrical and network

| Item                            | Specification                                   |   |
|---------------------------------|---|---|
| Power voltage range             | Power for SI/Input Block<br>Current consumption | 19.2 to 28.8V DC<br>Max. 1.1A or less<br>Depending on the number of Input Block stations and sensor specifications. |
|                                 | Current consumption                             | Power for solenoid valve<br>Current onsumption  |
| Solenoid valve connection spec. | Output type                                     | P-ch MOS-FET Open drain type  |
|                                 | Connection load                                 | Solenoid valve with protection circuit for 24V DC and 1.5W or less surge voltage. (made by SMC)                     |
|                                 | Insulation type                                 | Opto coupler type   |
|                                 | Residual voltage                                | 0.3V DC or less   |

### Communication specification

| Item               | Specification                                 |
|--------------------|---|
| Protocol           | PROFIBUS-DP(EN50170,EN50254)                  |
| BUS interface      | EIA RS485                                     |
| Communication from | Token passing                                 |
| Transmission rate  | 9.6, 19.2, 93.75, 187.5, 500,1500,12000(kbps) |
| Transmission media | STP cable                                     |
| Connect node       | Max. 125 station                              |
| Network topology   | Bus, tree, star                               |
| Cable length       | Max. 23km(Repeater needed)                    |
| Freeze mode        | Available                                     |
| Sync mode          | Available                                     |
| Input point        | Max. 32 points                                |
| Output point       | Max. 32 points                                |
| ID number          | 1408hex(SW setting mode)                      |
|                    | 1409hex(HW setting mode)                      |

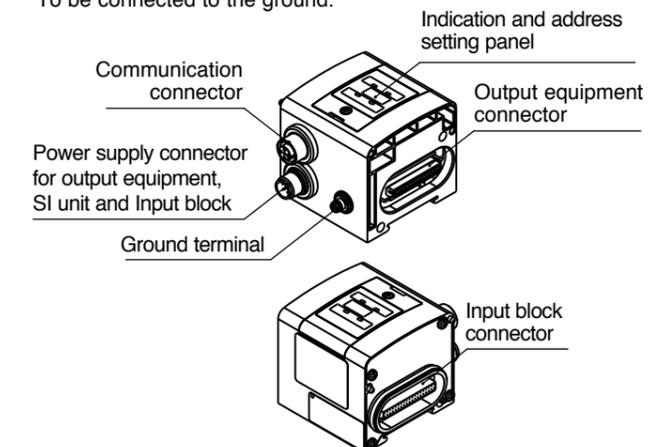
## Outline with Dimensions (in mm)



## Names and Functions of Individual Parts

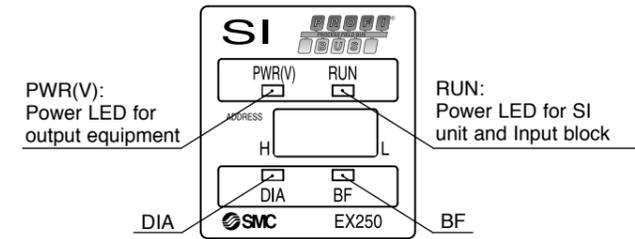
### Body

- Communication connector  
To send and receive communication signals through PROFIBUS-DP line.
- Power supply connector for output equipment, SI unit and Input block  
To supply power to the output equipment such as a solenoid valve, and output block, SI unit and Input block.
- Output equipment connector  
To connect the output equipment such as a solenoid valve and output block.
- Input block connector  
To connect the Input block.
- Indication and address setting panel  
To provide LED's to indicate the condition of the unit, and the setting of the address mode.
- Ground terminal  
To be connected to the ground.



**Names and Functions of Individual Parts (continue)**

**LED indication**

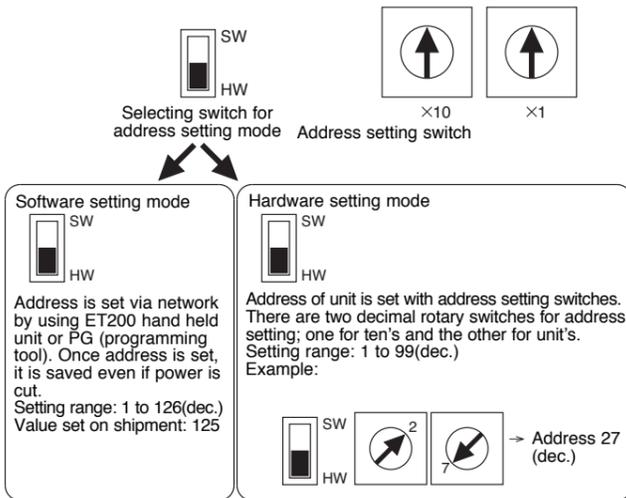


| Indication | Contents   |
|------------|--|
| PWR (V)    | Green Light ON when power for solenoid valves is supplied. Light OFF when supply voltage decreases below 19V |
| RUN        | Green Light ON during normal operation (when power for SI unit is supplied)                                  |
| DIA        | Red Light ON when a failure is detected by self-diagnosis  |
| BF         | Red Light ON when a bus failure is detected  |

**SW Setting**

**SW setting**

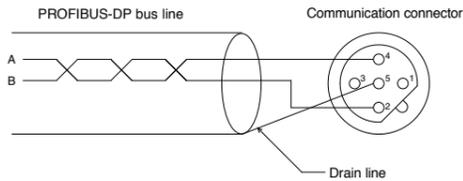
Be sure to turn power supply off before setting the switches of the SI unit. The switches for setting the address are installed under the top cover of the SI unit.



\*When software setting mode is selected, the address setting switches have no effect. Also, please note the software setting mode and hardware setting mode differ in the ID numbers available.

**Wiring**

**Communication wiring**



Cable: Shielded twisted pair cable(Type-A cable)

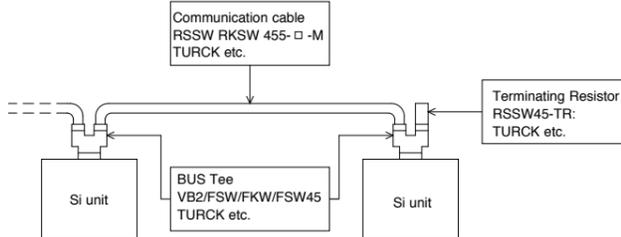
|                             |                             |
|-----------------------------|-----------------------------|
| Inpedance                   | 135 to 165 ohm (3 to 20MHz) |
| Capacity between conductors | 30pF/m or less              |
| Conductor resistance        | 110ohm/km or less           |
| Cable diameter              | 0.64mm or more              |
| Conductor area              | 0.34mm <sup>2</sup> or more |

**Transmission rate & Maximum wiring length**

|                         |     |      |       |       |     |      |       |
|-------------------------|-----|------|-------|-------|-----|------|-------|
| Transmission rate(kbps) | 9.6 | 19.2 | 93.75 | 187.5 | 500 | 1500 | 12000 |
| Wiring length(m)        |     | 1200 |       | 1000  | 400 | 200  | 100   |

**Terminator**

It is necessary to attach bus terminator resistance to the units located at the ends of transmission line.

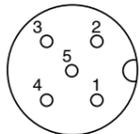


Contact each manufacturer about Communication cable, Bus Tee and Terminating Resistor.

**Power supply connector**

M12 5pin (Plug)

Example of connected cable : SMC EX500-AP0\*0-S etc.

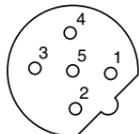


| No. | Description | Function                         |
|-----|-------------|----------------------------------|
| 1   | SV 24V      | For solenoid valve +24V          |
| 2   | SV 0V       | For solenoid valve 0V            |
| 3   | SW 24V      | For SI unit and Input Block +24V |
| 4   | SW 0V       | For SI unit and Input Block 0V   |
| 5   | E           | Earth                            |

**Communication connector**

M12 5pin (socket) reverse

Example of connected Bus Tee: TURCK VB2/FSW/FKW/FSW45 etc.

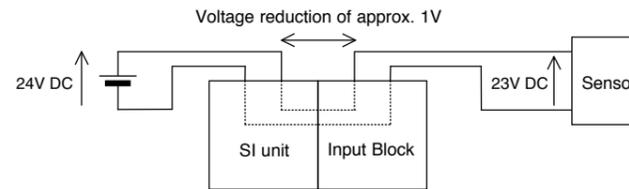


| No. | Description | Function                                |
|-----|-------------|---|
| 1   | VP          | Supply voltage for Terminating Resistor |
| 2   | A-N         | Minus to send/receive data              |
| 3   | DGND        | Ground for Terminating Resistor         |
| 4   | B-P         | Plus to send/receive data               |
| 5   | SHIELD      | Shield                                  |

**Wiring of power supply**

The Power supply connection inside the unit has individual power supplies for solenoid valve actuation (SV power supply) and for Control parts and Sensor (SI-SW power supply). Supply 24V DC for each of them. Either single or dual power supply is available.

Power for a sensor is supplied to the sensor connected to an Input Block. There will be a voltage drop of up to approx. 1V inside the SI unit, therefore select a sensor which will operate with the resultant voltage. If a sensor requires 24V, it is necessary to lower power supply voltage for sensor slightly or secure a power supply for sensor separately without going through the SI unit so that sensor input voltage can be 24V with actual loading (allowable voltage of sensor power supply : 19.2V to 28.8V).



**Contact**

|            |                   |                |                   |
|------------|-------------------|----------------|-------------------|
| AUSTRIA    | (43) 2262 62280   | NETHERLANDS    | (31) 20 531 8888  |
| BELGIUM    | (32) 3 355 1464   | NORWAY         | (47) 67 12 90 20  |
| CZECH REP. | (420) 541 424 611 | POLAND         | (48) 22 211 9600  |
| DENMARK    | (45) 7025 2900    | PORTUGAL       | (351) 21 471 1880 |
| FINLAND    | (358) 207 513513  | SLOVAKIA       | (421) 2 444 56725 |
| FRANCE     | (33) 1 6476 1000  | SLOVENIA       | (386) 73 885 412  |
| GERMANY    | (49) 6103 4020    | SPAIN          | (34) 945 184 100  |
| GREECE     | (30) 210 271 7265 | SWEDEN         | (46) 8 603 1200   |
| HUNGARY    | (36) 23 511 390   | SWITZERLAND    | (41) 52 396 3131  |
| IRELAND    | (353) 1 403 9000  | UNITED KINGDOM | (44) 1908 563888  |
| ITALY      | (39) 02 92711     |                |                   |

**SMC Corporation**

URL <http://www.smcworld.com> (Global) <http://www.smceu.com> (Europe)

Specifications are subject to change without prior notice from the manufacturer.  
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