



**Instruction Manual**  
**Actuator Position Sensor**  
**D-MP# series**



The intended use of the actuator position sensor is to monitor the position of the actuator while connected to the IO-Link communication 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)<sup>1)</sup>, and other safety regulations.

- <sup>1)</sup> 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: Robots and robotic devices - Safety requirements for industrial robots - Part 1: Robots.
- Refer to the product catalogue, Operation Manual and Handling Precautions for SMC Products for additional information.
- Keep this manual in a safe place for future reference.

|                |  |
|----------------|--|
| <b>Danger</b>  | Danger indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.     |
| <b>Warning</b> | Warning indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury. |
| <b>Caution</b> | 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.
- This product is class A equipment intended for use in an industrial environment. There may be potential difficulties in ensuring electromagnetic compatibility in other environments due to conducted or radiated disturbances.
- Refer to the operation manual on the SMC website (URL: <https://www.smcworld.com>) for more safety instructions.

**Warning**

- Special products (-X or -####) might have specifications different from those shown in the Specifications section. Contact SMC for specific drawings.

**2 Specifications**

**2.1 General specifications**

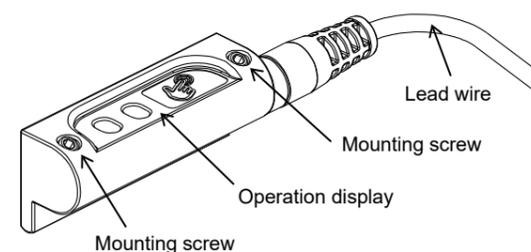
| Model                    | D-MP 025*   | D-MP 050*   | D-MP 100*    | D-MP 200*    |
|--------------------------|---|-------------|--------------|--------------|
| Measurement range        | 25 mm ±1 mm   | 50 mm ±1 mm | 100 mm ±1 mm | 200 mm ±1 mm |
| Power supply voltage     | 15 to 30 VDC, ripple (p-p) 10% or below (with power supply polarity protection)                             |             |              |              |
| Current consumption      | 48 mA or less (when no load is applied)   |             |              |              |
| Repeatability            | 0.1 mm (@25 °C)   |             |              |              |
| Resolution               | 0.05 mm   |             |              |              |
| Linearity                | ±0.3 mm (@25 °C)  |             |              |              |
| Switch output            | NPN or PNP 1 output (push-pull)   |             |              |              |
| Max. load current        | 40 mA   |             |              |              |
| Internal voltage drop    | 2 V or less   |             |              |              |
| Leakage current          | NPN: 0.5 mA or less at load resistance 3 kΩ, 1.5 mA or less at load resistance 750 Ω<br>PNP: 0.1 mA or less |             |              |              |
| Short circuit protection | Yes   |             |              |              |
| Analogue current output  | Output current: 4 to 20 mA<br>Max. load resistance: 500 Ω   |             |              |              |
| Analogue voltage output  | Output voltage: 0 to 10 V<br>Min. load resistance: 2 kΩ   |             |              |              |
| Lead wire                | PUR 4 core φ2.6 0.08 mm <sup>2</sup>  |             |              |              |
| Standards                | CE marked (EMC and RoHS Directive), UL  |             |              |              |
| Impact resistance        | 300 m/s <sup>2</sup>  |             |              |              |
| Insulation resistance    | 50 MΩ or more with 500 VDC Ohmmeter   |             |              |              |
| Withstand voltage        | 1000 VAC 1 minute   |             |              |              |
| Ambient temperature      | -10 to 60 °C  |             |              |              |
| Enclosure rating         | IP67 to IEC 60529 (JISC 0920)   |             |              |              |

**2.2 IO-Link specifications**

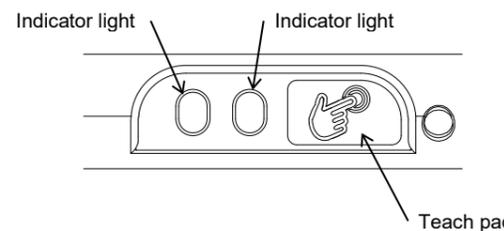
| Model               | D-MP 025*                       | D-MP 050* | D-MP 100* | D-MP 200* |
|---------------------|---------------------------------|-----------|-----------|-----------|
| IO-Link type        | Device                          |           |           |           |
| IO-Link version     | V1.1                            |           |           |           |
| SIO mode            | Available                       |           |           |           |
| Communication speed | COM3 (230.4 kbps)               |           |           |           |
| Minimum cycle time  | 1 ms                            |           |           |           |
| Process data length | Input: 2 bytes, Output: 0 bytes |           |           |           |
| Device ID           | 125 hex                         | 126 hex   | 127 hex   | 128 hex   |
| Vendor ID           | 83 hex                          |           |           |           |

**3 Names of Individual parts**

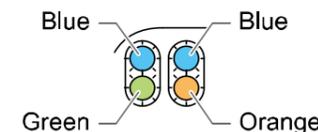
**3.1 D-MP#**



**3.2 Operation Display**



**Operation Light Colours**



| Category       | Mode                       | Indicator light 2 | Indicator light 1 | Description  |
|----------------|----------------------------|-------------------|-------------------|--|
| System status  | Analogue Current output    |                   |                   | Analogue current output active   |
|                | Analogue Voltage output    |                   |                   | Analogue voltage output active   |
|                | IO-Link                    |                   |                   | IO-Link connection active  |
| Switch output  | Error                      |                   |                   | Sensor not ready for operation / Detectable magnetic field is decrease. LED flashing at 4 Hz |
|                | High                       |                   |                   | Switch output High PNP: ON, NPN: OFF   |
|                | Low                        |                   |                   | Switch output Low PNP: OFF, NPN: ON  |
| Magnetic field | Over current error         |                   |                   | Overload of the switch output (over current) LED flashing.                                   |
|                | In measuring range         |                   |                   | Magnetic field registered in measuring range   |
|                | Outside of measuring range |                   |                   | Magnetic field is not registered in measurement range  |

= LED ON, = LED flashing, = LED OFF

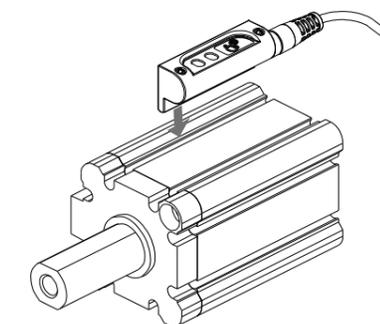
**4 Installation**

**4.1 Installation**

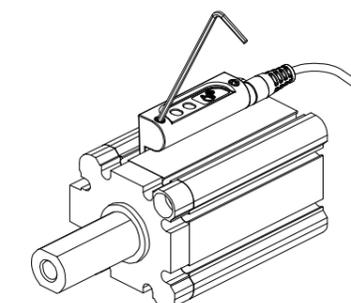
**Warning**

- Do not install the product unless the safety instructions have been read and understood.
- Use the product within the specified operating pressure and temperature range.
- When mounting an actuator position sensor, use a mounting bracket appropriate for the cylinder/actuator.
- The mounting method differs according to the type of actuator and the inner diameter of the tube.
- When mounting a sensor for the first time, check that the cylinder/actuator has a built-in magnet and use an appropriate bracket for the cylinder/actuator. There are also cases when a bracket is not needed.
- Use the correct tightening torque. When tightening mounting screws, use a suitable hexagon wrench (size 1.5). Recommended torque should be 0.2 to 0.4 N·m. Over-tightening can damage the cylinder/actuator and sensor. Loose screws can cause misalignment or a reduction in accuracy during operation. Tightening below the specified tightening torque will allow the position sensor to move out of position.
- Do not carry an actuator by the position sensor lead wire.
- This may cause a broken lead wires or damage to the auto switch internal elements.
- Use only the screws installed in the position sensor body for mounting the position sensor. If other screws are used, the position sensor may be damaged.
- Check and adjust the actual product operation during installation. The auto switch may not operate in the correct actuator mounting position due to the installation environment. Also check and adjust the auto switch operation when used in intermediate stroke positions, according to the operating environment.

- Press the switch down into the cylinder/actuator switch mounting groove as shown.



- Tighten the mounting screws evenly.



**4.2 Environment**

**Warning**

- Do not use in an environment where corrosive gases, condensation, 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.
- Do not use in a location where magnetic fields are generated.

## 4 Installation (continued)

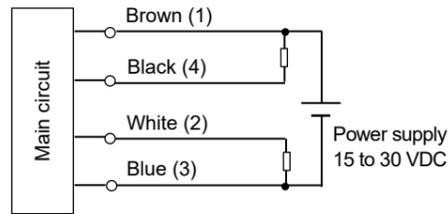
### 4.3 Wiring

#### Caution

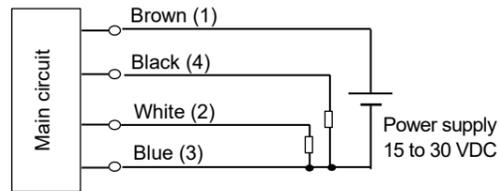
- Do not perform wiring while the power is on.
- Confirm proper insulation of wiring. Check that there is no faulty wiring insulation (short circuits, faulty ground connections, improper insulation between terminals, etc.), as this may damage the auto switch due to over current.
- Do not route the auto switch wiring in the same place as power cables or high voltage cables. Otherwise auto switch malfunction may result due to noise and inrush current.
- Avoid repeatedly bending or stretching the lead wire. Broken lead wires will result if bending stresses or tensile forces are applied to the lead wires. Stress and tensile forces applied to the connection between the lead wire and the product increases the possibility of disconnection. Secure the lead wire to reduce any movement in the area where the lead wire connects with the position sensor.
- Do not allow short-circuit of loads. There is a risk of damage of position sensor.
- Keep wiring as short as possible to prevent interference from electromagnetic noise and surge voltage. Do not use a cable longer than 20 m.

### 4.4 Wiring Diagram

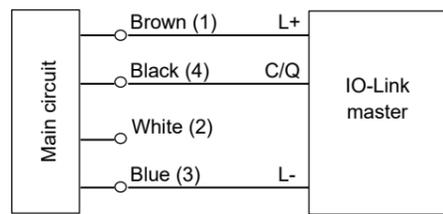
#### SIO mode - NPN output



#### SIO mode - PNP output



#### IO-Link mode



- Analogue output (white) is disabled when IO-Link mode is selected.

### 4.5 Connector pin layout

| Pin number | Wire colour | Description                       |
|------------|-------------|-----------------------------------|
| 1          | Brown       | Power supply DC (+)               |
| 2          | White       | Analogue current / voltage output |
| 3          | Blue        | Power supply DC (-)               |
| 4          | Black       | IO-Link / Switch output (C/Q)     |

## 5 Setting

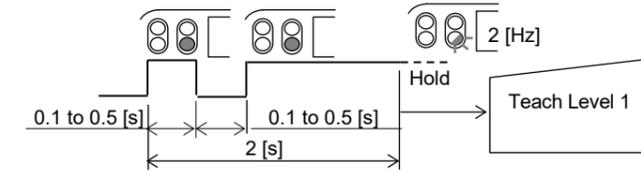
### 5.1 Initial settings

Switch output: Low (NPN = ON, PNP = OFF),  
Analogue output: Current output, Range: Full range

#### Teach pad setting procedure

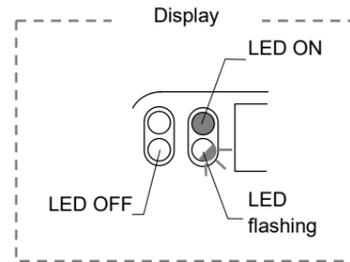
NOTE: For teaching the measurement range, make sure that the piston position is at the start point of the range.

Click the teach pad, and then click and hold down the teach pad.

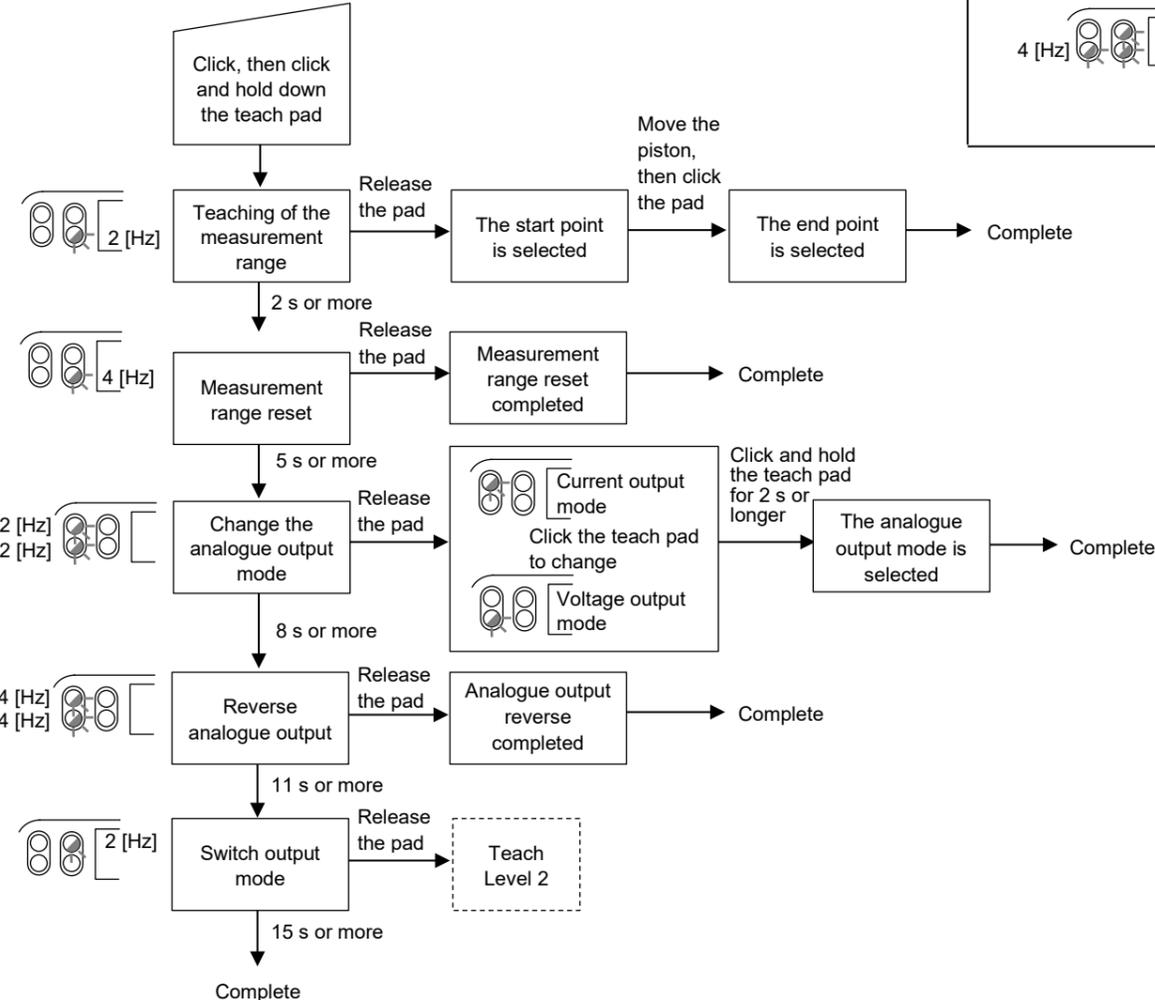


#### Teach Level 1 starts when the indicator LED flashes slowly.

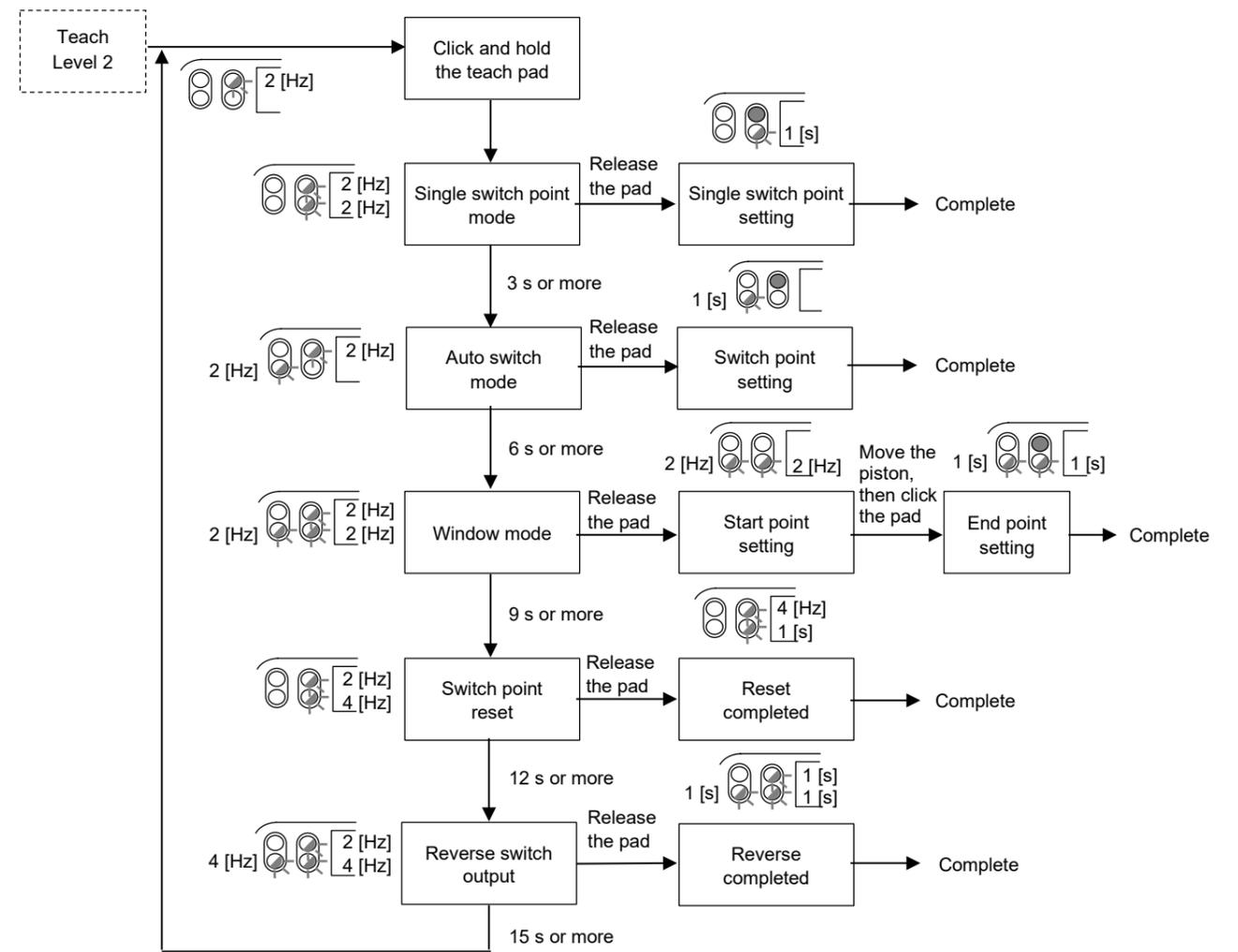
NOTE: If the indicator LED does not flash and setting is not available, wait for 3 seconds and double-click the teach pad again.



### 5.2 Teach Level 1



### 5.3 Teach Level 2



### 5.4 Setting completed

When a magnet (subject to be detected) is present outside of the measurement range, the indicator LED flashes 4 times and setting is complete.



### 5.5 IO-Link parameter settings

• **IODD file**  
IODD (I/O Device Description) is a definition file which provides all properties and parameters required for establishing functions and communication of the device. IODD includes the main IODD file and a set of image files such as vendor logo, device picture and device icon. The IODD file is shown below.

|   | Product No.  | IODD file *                  |
|---|--------------|------------------------------|
| 1 | D-MP025A/B/C | SMC-D-MP025-yyyymmdd-IODD1.1 |
| 2 | D-MP050A/B/C | SMC-D-MP050-yyyymmdd-IODD1.1 |
| 3 | D-MP100A/B/C | SMC-D-MP100-yyyymmdd-IODD1.1 |
| 4 | D-MP200A/B/C | SMC-D-MP200-yyyymmdd-IODD1.1 |

\*: "yyyymmdd" indicates the file preparation date. yyyy year, mm month and dd day.

The IODD file can be downloaded from the SMC website (URL: <https://www.smcworld.com>)

## 6 Maintenance

### 6.1 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.
- (1) Removal of equipment, and exhausting the compressed air.
- When components are removed, first confirm that measures are in place to prevent workpiece from dropping, run-away equipment, etc. Then, cut the supply pressure and electric power, and exhaust all compressed air from the system using the residual pressure release function.
- When machinery is restarted, proceed with caution after confirming that appropriate measures are in place to prevent cylinders from sudden movement.
- Perform the following maintenance regularly to avoid possible danger due to unexpected position sensor malfunction.
  - 1) Securely tighten the position sensor mounting screws.  
If screws become loose or the mounting, position is moved, retighten them after adjusting the mounting position.
  - 2) Check that there is no damage to the lead wire.  
If damage to the lead wire is found, replace the position sensor, or repair the lead wire, to avoid faulty insulation.
- Do not use solvents such as benzene, thinner, alcohol etc. to clean the position sensor.  
These can damage the surface of the body and erase the markings on the body.  
For heavy stains, use a damp cloth that has been soaked with diluted neutral detergent and fully squeezed, then wipe up the stains again with a dry cloth.
- **How to reset the product after a power cut or when the power has been unexpectedly removed**  
Regarding set up, contents of the program may be maintained by customer's application systems.  
Be sure to confirm safety when returning operation of the cylinder and actuator because it could have been stopped in an unstable condition.

## 7 How to Order

Refer to drawings/catalogue 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 Troubleshooting

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

When any position sensor failure occurs, perform the trouble shooting described in the operation manual.

A failure of the position sensor might depend on the operating environment (application etc.) and may need to be tested separately by contacting SMC.

## 10 Limitations of Use

### 10.1 Limited warranty and Disclaimer/Compliance Requirements

Refer to Handling Precautions for SMC Products.

## 11 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.

## 12 Contacts

Refer to [www.smcworld.com](http://www.smcworld.com) or [www.smc.eu](http://www.smc.eu) for your local distributor / importer.

# SMC Corporation

URL: <https://www.smcworld.com> (Global) <https://www.smceu.com> (Europe)  
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Template DKP50047-F-085O