



ORIGINAL INSTRUCTIONS

Instruction Manual
Reed Auto switch – Rod / Rail mounting -
Magnetic Field Resistant
Series D-P70 / D-P74 / D-P75 / D-P80



The intended use of the auto switch is to detect and control the position of an actuator using magnetic detection.

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.
- 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.

Warning

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

2 Specifications

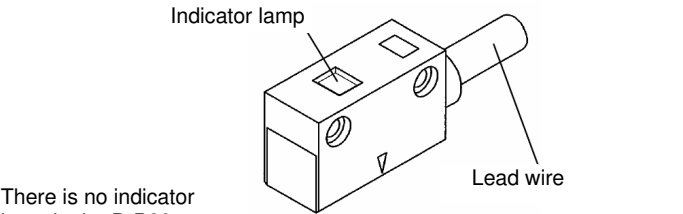
2.1 D-P70 / D-P74 / D-P75 / D-P80 specifications

Model	D-P70	D-P74	D-P75	D-P80
Wiring style	2 wire			
Application	Relay, PLC		PLC	Relay, PLC
Load voltage (max.)	100 VAC	24 VDC	100 VAC	24 VDC
Load current (max. or range)	20 mA	5 to 40 mA	5 to 20 mA	40 mA
Contact protection	Built in		None	
Internal volt drop	-	2.4 V max.	-	
Internal resistance	10 Ω max.	-	-	1 Ω max.
Leak current (max.)	1.8 mA	-	1.2 mA	-
Operating time	1.2 ms			
Indicator lamp ^{*)}	Red LED	Red LED	Red LED	None
Lead wire	φ6.8 oilproof heavy duty vinyl cable, (2 cores, 0.75 mm ²)			
Magnetic field proof	15000 A AC ^{*)}			
Impact proof	300 m/s ²			
Insulation resistance	50 MΩ or more at 500 VDC mega			
Proof voltage	1500 VAC for 1 min. (between case and lead wire)			
Ambient temperature	-10 to 60°C			
Protection structure	IP67 to IEC 60529 (JISC 0920)			

^{*)}1: The indicator lamp for D-P70 and D-P75 is ON (Red) when the switch is OFF. For the D-P74 the indicator lamp is ON (Red) when the switch is ON.
^{*)}2: The magnetic field proof value is for when the auto switch is separated from an electrode of a spot-welding machine by 40 mm minimum.

3 Names of Individual parts

D-P70 / D-P74 / D-P75 / D-P80



There is no indicator lamp in the D-P80.

4 Installation

4.1 Installation

Warning

- **Do not install the product unless the safety instructions have been read and understood.**

4.2 Design and Selection

- 1) Confirm the specifications.
Read the specifications carefully and use the product correctly. The product may be damaged or malfunction if it is used outside of the specification range.
- 2) Take precautions when multiple actuators are used close together.
When multiple auto switch actuators are used in close proximity, magnetic field interference may cause the switches to malfunction. Maintain a minimum actuator separation of 40 mm.
- 3) Pay attention to the length of time that a switch is ON at an intermediate stroke position.
When an auto switch is placed at an intermediate position of the stroke and a load is driven at the time the piston passes, the auto switch will operate, but if the speed is too great the operating time will be short and the load may not operate correctly. The maximum detectable piston speed is:

$$V \text{ (mm/s)} = \frac{\text{Auto switch operating range (mm)}}{\text{Load operating time (ms)}} \times 1000$$

4 Installation (continued)

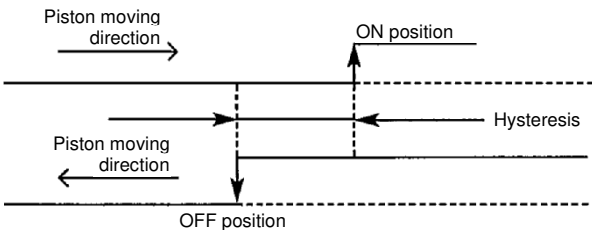
- 4) Keep wiring as short as possible
As the wire length to a load is increased, the inrush current at switch ON becomes greater, which may shorten the product life (the switch will stay constantly ON).
Use a contact protection box (CD-P11 / CD-P12) when the wire length is 5 m or longer.
- 5) Pay attention to the internal voltage drop of the switch.
 - 1) Switches with an indicator light
 - If auto switches are connected in series, take note that there will be a large volt drop because of internal resistance in the LED's (refer to internal voltage drop in the auto switch specifications).
[The voltage drop will be “n” times larger when “n” auto switches are connected].
Even though an auto switch operates normally, the load may not operate.
 - In the same way, when operating below a specified voltage, although the auto switch may operate normally, the load may not operate. Therefore, the formula below should be satisfied after confirming the minimum operating voltage of the load.

Supply voltage	--	Internal volt drop of switch	>	Minimum operating voltage of load
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 - 2) If the internal resistance of an LED causes a problem, select a switch without an indicator light (Model D-P80).
- 6) Do not use a load that generates a surge voltage.
If driving a load such as a relay that generates a surge voltage, use a contact protection box.
- 7) Caution for use in an interlock circuit
When an auto switch is used for an interlock signal requiring high reliability, devise a double interlock system by providing a mechanical protection function, or by using another switch (sensor) together with the auto switch.
- 8) Perform periodical maintenance and confirm proper operation.
Ensure sufficient clearance for maintenance activities. When designing an application, be sure to allow sufficient clearance for maintenance and inspections.

4.3 Mounting and Adjustment

- 1) Do not drop or bump the product.
Do not drop, bump or apply excessive impact (300 m/s² or more) while handling. Although the body of the switch may not appear damaged, the inside of the switch may be damaged and cause a malfunction.
- 2) Do not carry an actuator by the auto switch lead wires.
This may not only cause broken lead wires, but it may cause internal elements of the switch to be damaged by the stress.
- 3) Mount switches using the correct tightening torque.
If a switch is tightened beyond the tightening torque range, the mounting screw, mounting bracket or switch may be damaged.
On the other hand, tightening below the tightening torque range may allow the switch to slip out of position.
- 4) Mount an auto switch at the centre of the operating range.
Adjust the auto switch mounting position so that the piston stops at the centre of the operating range (the range in which the switch is ON).
The mounting position shown in the catalogue indicates the optimum position at the end of stroke. If mounted at the end of the operating range (around the borderline of ON and OFF) operation may be unstable.
- 5) The auto switch ON and OFF position operates with a hysteresis. If the hysteresis causes a problem, please consult with SMC.

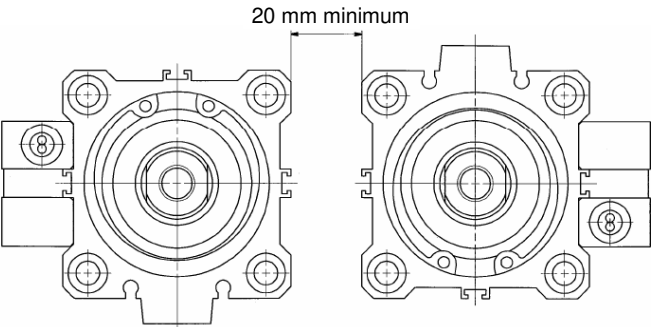


5 Installation (continued)

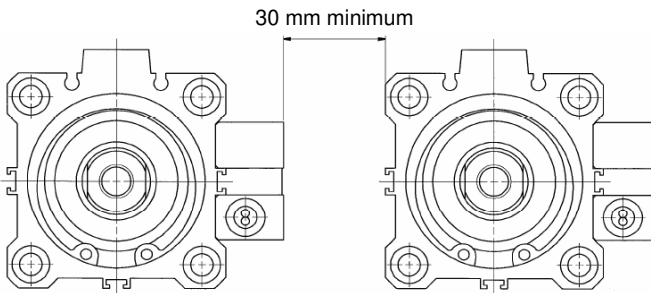
- 6) Confirmation of actuator
The Magnetic Field Resistant auto switches D-P7# and D-P80 type are specifically for use with magnetic field resistant cylinders are not compatible with general cylinders. Magnetic field resistant cylinders are labelled as follows.

耐強磁界用磁石内蔵シリンダ(D-P7 専用)

Built-in magnetic for strong magnetic field use (for D-P7 only)
- 7) Confirmation of mountable minimum stroke.
The mountable minimum stroke for D-P7# and D-P80 auto switches is 25 mm (except CKP1 / CLKP2 series the minimum stroke for mounting magnetic field resistant auto switches is 50 mm).
When the switch is set to less than 25 mm stroke, it is influenced by the magnetic field due to the closeness when the switch is OFF. Therefore please note that the auto switch needs double the safety distance to prevent incorrect actuation.
- 8) Safe separation from other cylinders when a strong magnetic field resistant auto switch is used.
 - Safe distance from the side face of the auto switch



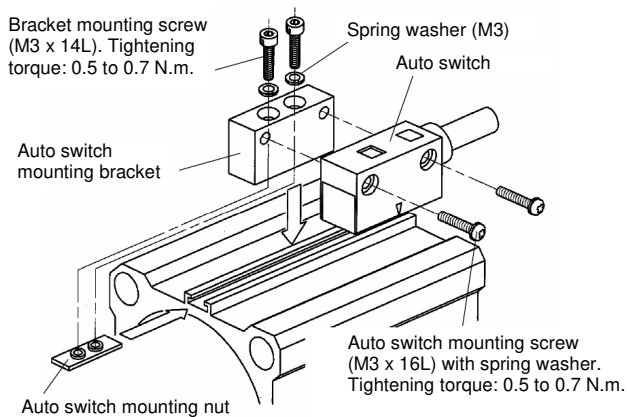
- Safe distance from the upper side of the auto switch.



5.1 Mounting using a mounting bracket

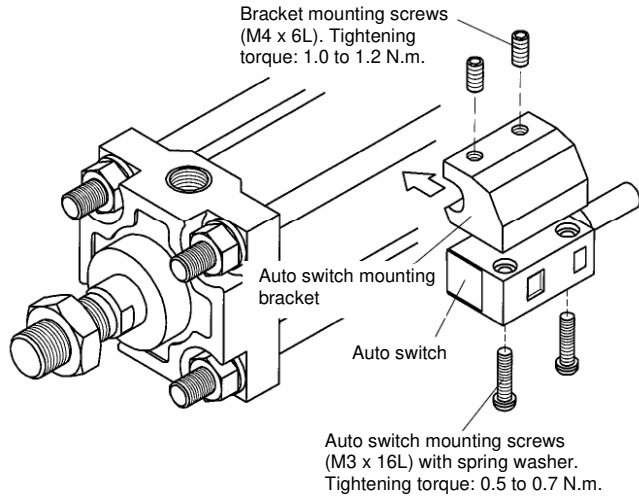
Each actuator has a specified mounting bracket type. Mounting depends on the actuator type. Please refer to the actuator catalogue.
When an auto switch is mounted for the first time, ensure that the actuator is the type with a magnet suitable for a strong magnetic field application, and prepare a mounting bracket corresponding to the actuator.

5.2 Mounting on CDQ2#P (Ø50 to Ø80 mm)

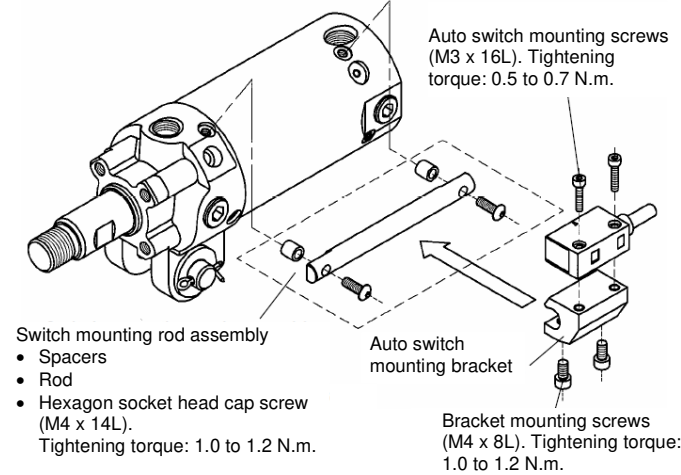


4 Installation (continued)

5.3 Mounting on CDA2#P / CDNA2#P (Ø40 to Ø80 mm)



5.4 Mounting on CKP1 / CLK2P (Ø40 to Ø63 mm)



After confirming the detection position, tighten the bracket mounting screw (M4) to secure the auto switch, making sure that the bottom face of the auto switch is in contact with the cylinder face.

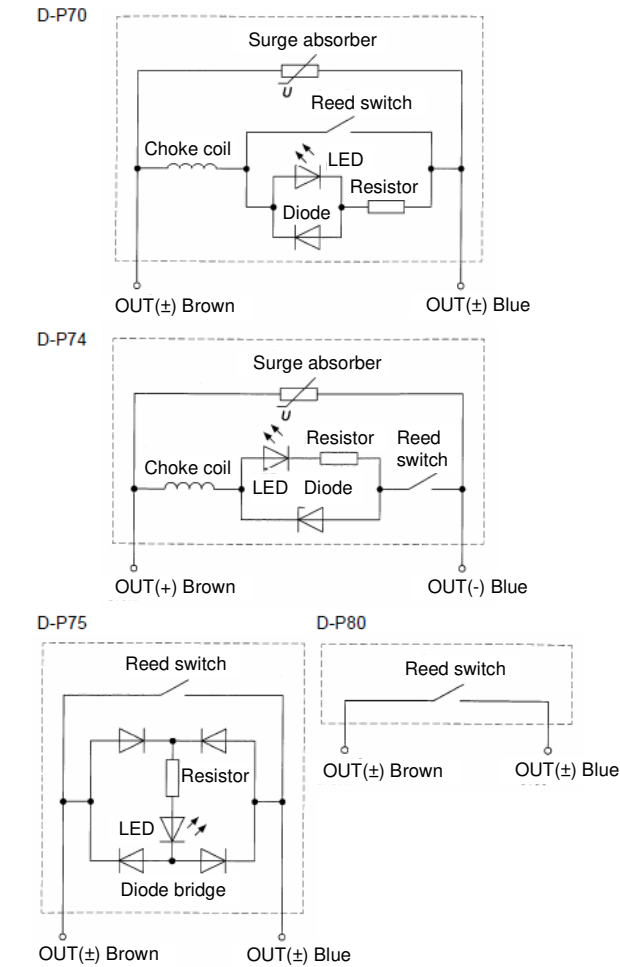
Cylinder series	Applicable bore size (mm)			
	Ø40	Ø50	Ø63	Ø80
CDQ2#P	-	BQP1-050		
CDA2#P / CDNA2#P	BAP1-040		BAP1-063	BAP1-080
CKP1 / CLK2P	BAP1T-040			-

5.5 Wiring

- 1) Avoid repeatedly bending or stressing lead wires.
Broken lead wires can result from wiring layouts which repeatedly apply bending stress or stretching force to the lead wires.
- 2) Be sure to connect the load before power is applied.
If the power is turned ON when an auto switch is not connected to a load, the switch will be instantly damaged due to excess current.
- 3) Confirm proper insulation of wiring.
Check that there is no faulty wiring insulation (contact with other circuits, ground fault, improper insulation between terminals, etc.) Damage may occur due to excess current flow into a switch.
- 4) Do not route wiring with power lines or high voltage lines.
Avoid parallel wiring or wiring in the same conduit with these lines. Control circuits containing auto switches may malfunction due to noise.
- 5) Do not allow short circuit of loads.
If power is turned ON with a load in a short circuit condition, the switch will be instantly damaged due to excess current flow.
- 6) Avoid incorrect wiring
An auto switch with indicator light has polarity. The brown wire is (+), and the blue wire is (-). If connections are reversed, the switch will operate, however, the LED will not light up. Also note that a current greater than that specified will damage the LED and it will no longer operate.

4 Installation (continued)

5.5.1 Wiring diagram



5.6 Environment



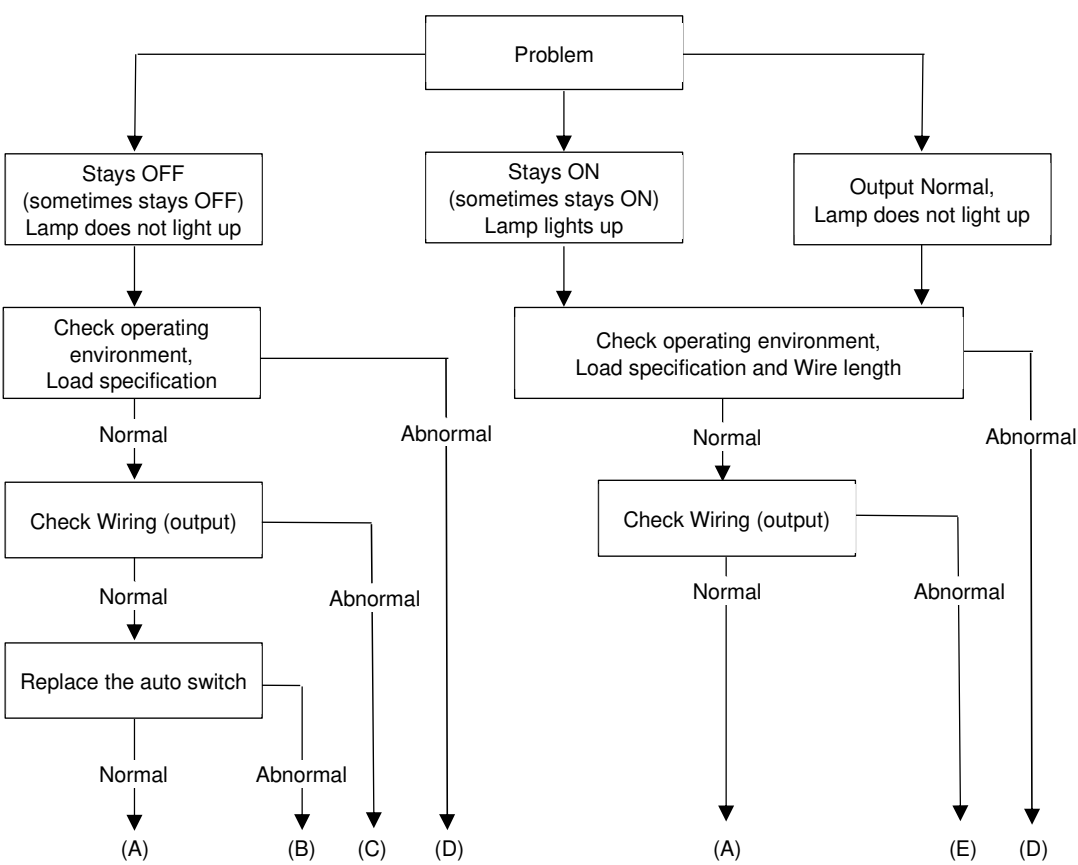
Warning

- Do not use in an environment where oil, 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.
- Do not mount in a location exposed to radiant heat that would result in temperatures in excess of the product specification.
- Do not use in an area where a magnetic field is generated.

- Auto switches can malfunction or magnets inside actuators can become demagnetized.
- Do not use in an environment where the auto switch will be continually exposed to water.
 - Do not use in an environment with temperature cycles.
 - Avoid accumulation of iron waste or close contact with magnetic substances. A large amount of accumulated iron waste such as machining chips or spatter may cause the auto switch to malfunction.
 - Observe the following precautions when using the magnetic field resistant auto switch.
 - a) Do not allow a magnetic field to occur when the cylinder piston is moving.
 - b) When a welding cable or welding gun electrode are near the cylinder, move the cable away from the cylinder.
 - c) The auto switch cannot be used in an environment where welding cables surround the cylinder.
 - d) Consult with SMC when a welding cable or welding gun electrode (or something energized by a secondary current) are near multiple auto switches.
 - Confirmation of Spatter
In an environment where spatter directly hits the lead wire, cover the lead wire with protective tubing. Use protective tubing with a bore size of Ø8 mm or more which has excellent heat resistance and flexibility.

6 Troubleshooting

When detection failure occurs check the switch according to the chart



- (A) = Auto switch failure
(B) = Replace the actuator. Detectable magnetic field inadequate (or no magnet).
(C) = Correct the wiring, replace the load or replace the auto switch after correcting the wiring.
(D) = After checking the operating environment, replace the auto switch.
(E) = Replace the auto switch after correcting the wiring.

7 Maintenance

7.1 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.
- Perform the following maintenance periodically in order to prevent possible danger due to unexpected auto switch malfunction.
 - 1) Securely tighten switch mounting screws. If screws become loose or the mounting position is dislocated, re-tighten them after readjusting the mounting position.
 - 2) Confirm that there is no damage to lead wires. To prevent faulty insulation, replace switches or repair lead wires, etc., if damage is discovered.

8 How to Order

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

9 Outline dimensions

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

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 or www.smc.eu for your local distributor/importer.

SMC Corporation

URL : [https:// www.smcworld.com](https://www.smcworld.com) (Global) [https:// www.smc.eu](https://www.smc.eu) (Europe)
SMC Corporation, Akihabara UDX15F, 4-14-1, Sotokanda, Chiyoda-ku, Tokyo 101 0021
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