



ORIGINAL INSTRUCTIONS

Instruction Manual  
Auto switch (Solid state) – with Timer  
D-F5NT / D-F7NT / D-G5NT / D-M5NT / D-M5PT



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)<sup>\*)</sup>, 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.

	<b>Caution</b>	Caution indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate 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>Danger</b>	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.

Refer to the operation manual on the SMC website (URL: <https://www.smcworld.com>) for all Safety Instructions.

Warning

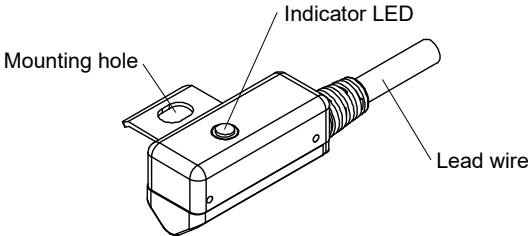
- Special products (-X or -####) might have specifications different from those shown in the Specifications section. Contact SMC for specific drawings.

2 Specifications

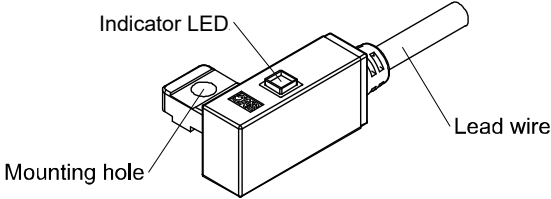
Model No.	D-F5NT, D-F7NT, D-G5NT, D-M5NT	D-M5PT
Wiring type	3-wire	
Output type	NPN	PNP
Output operation	OFF Delay	
Applicable load	IC / relay / PLC	
Power supply voltage	5 / 12 / 24 VDC (4.5 to 28 VDC)	
Current consumption	10 mA or less	12 mA or less
Load voltage	28 VDC or less	-
Load current	40 mA or less	80 mA or less
Internal voltage drop	1.5 V or less (0.8 V or less at 10 mA load)	0.8 V or less
Leakage current	100 µA or less at 24 VDC	
Operating time	1 ms or less	
OFF Delay time	200 ±50 ms	
Indicator LED	Operating range: Red LED is ON	
Electrical entry	Grommet	
Lead wire	Oilproof heavy-duty vinyl cord φ4 mm, 0.3 mm <sup>2</sup> , 3-wires	
Insulation resistance	50 MΩ or more at 500 VDC mega (between case and cable)	
Withstand voltage	1000 VAC 1 minute (between case and cable)	
Ambient temperature	-10 to 60 °C	
Enclosure	IP67 to IEC 60529 (JISC0920)	

3 Names of Individual parts

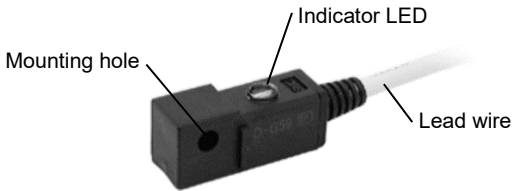
- D-F5NT (Tie-rod mounting)



- D-F7NT (Rail mounting)



- D-G5NT (Band mounting)



- D-M5NT / D-M5PT (Direct mounting)



4 Installation

4.1 Installation



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

4.2 Design and Selection

- 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.
- 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.
- 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:

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

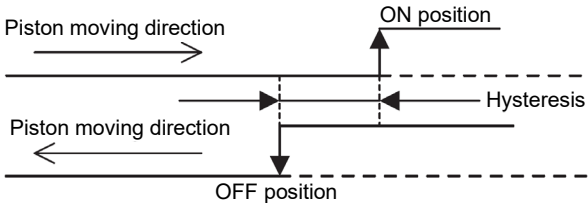
- Keep wiring as short as possible  
Although long wire length does not affect the switch function, it is recommended to keep it to 100 m or less.
- Do not use a load that generates surge voltage.  
Although a zener diode for surge protection is connected at the output side of a solid state auto switch, damage may still occur if the surge is applied repeatedly. When a load such as a relay or solenoid which generates surge is directly driven, use a type of switch with built in surge protection.
- 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.

- Perform periodic 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

- Do not drop or bump the product.  
Do not drop, bump or apply excessive impact (1000 m/s<sup>2</sup> or more) while handling. Although the body of the switch may not appear damaged, the inside of the switch could be damaged and cause a malfunction.
- 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.
- 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.
- Mount a switch at the centre of the operating range.  
Adjust the auto switch mounting position so that the piston is 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.
- The auto switch ON and OFF position operates with a hysteresis. If the hysteresis causes a problem, please consult with SMC.



4 Installation (continued)

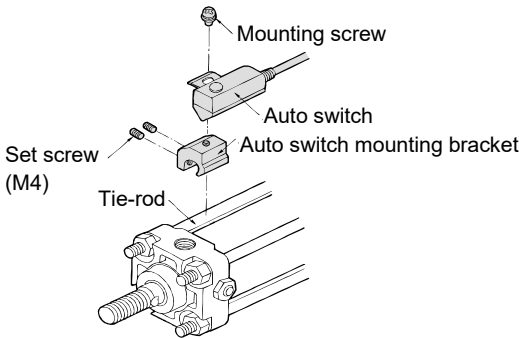
4.4 Mounting

Each actuator has a specified mounting bracket type. Mounting depends on the actuator type and bore size. 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 built-in, and prepare a mounting bracket corresponding to the actuator.

4.5 Setting the switch position

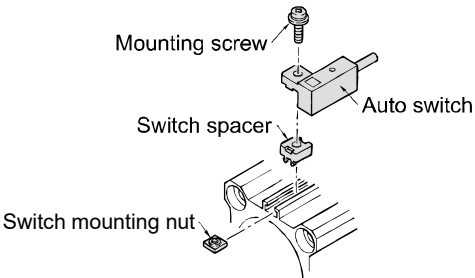
4.5.1 D-F5NT (Tie-rod mounting)

- Fix the auto switch on to the auto switch mounting bracket using the screw (M4) and install the set screws.
- Fit the mounting bracket onto the cylinder tie-rod and then fix the auto switch at the required detecting position with a hexagonal wrench (Be sure to put the auto switch on the surface of the cylinder tube).
- When changing the detecting position, loosen the set screw to move the auto switch and then re-fix the auto switch on the cylinder tube. Tightening torque must be 1.0 to 1.2 N·m.



4.5.2 D-F7NT (Rail mounting)

- Slide the auto switch mounting nut inserted into the mounting rail and set it at the auto switch mounting position.
- Fit the convex part of auto switch mounting arm into the concave part of auto switch mounting rail. Then slide the switch over the nut. (CDQ2 series: Fit the convex part of the auto switch mounting arm through the auto switch spacer into the concave part of the auto switch mounting rail).
- Push the auto switch mounting screw lightly into the mounting nut through the hole in the auto switch mounting arm.
- After reconfirming the detecting position, tighten the mounting screw to secure the auto switch. Tightening torque must be 0.5 to 0.7 N·m.



4.5.3 D-G5NT (Band mounting)

- Set the actuator at the stroke end.
- Set the switch in the area where the auto switch Red LED is ON (detection end position).
- Based on dimensions A and B in the actuator catalogue, set the switch position. Tighten the mounting screw to a torque of 1.0 to 1.2 N·m.

