Installation and Maintenance Manual
Solid State Auto-Switch Series D-S79*, D-S7P*, D-S99*, DS9P*, D-S99V*, D-S9PV*, D-T79*, D-T79*C, D-T99*, D-T99V*

For future reference, please keep this manual in a safe place

This manual should be read in conjunction with the current product catalogue

Safety Instructions

These safety instructions are intended to prevent a hazardous situation and/or equipment damage. These instructions indicate the level of potential hazard by label of "Caution", "Warning" or "Danger". To ensure safety, be sure to observe ISO4414 (Note1), JIS B 8370 (Note2) and other safety practices.
Note 1: ISO 4414: Pneumatic fluid power – Recommendations for the application of equipment to transmission and control systems.
Note 2: JIS B 8370: Pneumatic system axiom.

⚠ **CAUTION :** *Operator error could result in injury or equipment damage.*

⚠ **WARNING :** *Operator error could result in serious injury or loss of life.*

⚠ **DANGER :** *In extreme conditions, there is a possible result of serious injury or loss of life.*

⚠ WARNING

1. **The compatibility of pneumatic equipment is the responsibility of the person who designs the pneumatic system or decides its specifications.**
Since the products specified here are used in various operating conditions, their compatibility for the specific pneumatic system must be based on specifications or after analysis and/or tests to meet your specific requirements.

2. **Only trained personnel should operate pneumatically operated machinery and equipment.**
Compressed air can be dangerous if an operator is unfamiliar with it. Assembly, handling or repair of pneumatic systems should be performed by trained and experienced operators.

3. **Do not service machinery/equipment or attempt to remove component until safety is confirmed.**
   1) Inspection and maintenance of machinery/equipment should only be performed after confirmation of safe locked-out control positions.
   2) When equipment is to be removed, confirm the safety process as mentioned above. Switch off air and electrical supplies and exhaust all residual compressed air in the system.
   3) Before machinery/equipment is re-started, ensure all safety measures to prevent sudden movement of cylinders etc. (Bleed air into the system gradually to create back-pressure, i.e. incorporate a soft-start valve).

4. **Contact SMC if the product is to be used in any of the following conditions:**
   1) Conditions and environments beyond the given specifications, or if product is used outdoors.
   2) Installations in conjunction with atomic energy, railway, air navigation, vehicles, medical equipment, food and beverage, recreation equipment, emergency stop circuits, press applications, or safety equipment.
   3) An application which has the possibility of having negative effects on people, property, or animals, requiring special safety analysis.

⚠ CAUTION

Ensure that the air supply system is filtered to 5 micron.

1. Product specification

Model number	D-S79* D-S99* D-S99V*	D-S7P* D-S9P* D-S9PV*	D-T79* D-T79*C D-T99* D-T99V*
Wiring style	Three wire type		Two wire type
Output style	NPN type	PNP type	—
Application	IC, Relay, PLC		24V DC Relay, PLC
Source voltage	DC5·12·24V (DC4.5~28V)		—
Current consumption	10mA or less		—
Load voltage	DC28V or less	—	DC24V (DC10~28V)
Load current	40mA or less	80mA or less	5~40mA
Internal voltage drop	1.5V or less	0.8V or less	4V or less
Leak current	100μA or less at DC24V		0.8mA or less
Operating time	1ms or less		
Operating indicator lamp*	Red diode lights when ON		
Proof impact	1000m/s²		
Insulation resistance	50MΩ or more at DC500V mega		
Proof voltage	AC1000V for 1 minute (lead wire, between cases)		
Ambient temperature	-10~60°C		
Protection structure	IEC529 standard IP67, JISC0920		

* One colour: Red diode lights when ON
Two colour: Operating position·····Red diode lights
Optimum operating position·····Green diode lights

Installation

Actuators

⚠ WARNING

To eliminate the possibility of magnetic interference between switches, please ensure that, when two or more actuators are used, in parallel, they are kept at least 40mm apart.

⚠ Mid-stoke position sensing
Exercise caution when attempting to detect the piston at mid-position, without stopping, as the switch detection time may be too short, particularly at relatively high actuator speeds. Detectable max. piston speed can be obtained by the following formula:

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

Where possible keep all wiring as short as possible.

⚠ CAUTION

If the 2-wire type solid state auto-switch has a large internal voltage drop, and leakage current is also high, it is possible that the load may not operate correctly due to incorrect load spec. Please confirm the following conditions before operation, and note that the internal voltage drop and leak current have a considerable influence on the serial and parallel connection of the 2-wire solid state switch.

Leak current influence
I.E Voltage generated to the load when the power is turned off.

Voltage generated = Auto-switch leak current x load resistance. If this voltage exceeds the OFF voltage of the load, it is possible that the load may stay ON. In order to match the condition of the controller-input unit and leak current, then auto-switch leak current must be less than input unit OFF current.

Internal voltage drop
Should an internal voltage drop occur, then the load supply voltage will also drop as the switch operates. (Load supply voltage = Source voltage – Internal voltage drop).
When the load supply voltage becomes lower than the switch ON voltage, the load may not operate correctly.

⚠ WARNING

Incorrect load voltage
Although the switch will operate correctly, even if the load current is below the limit of the specification, the indicator light will be 'dimmed'. If the load current falls to 3mA, or lower, the operation may not start.
Ensure that, if using a load that can generate a surge voltage ie. Relay or Solenoid valve, a built-in surge protection circuit is installed.

If an auto-switch is to be used to generate an inter-lock signal, which requires high reliability, then instigate mechanical protection, or place another switch, double inter-lock style, together. Ensure the correct operation of this Inter-lock frequently.
Ensure, when installing this product, that enough space is available for maintenance to be carried out.

⚠ CAUTION

Do not subject this product to **any** form of impact damage.
Do not lift an actuator, fitted with an auto-switch, by the switch lead, as stress may be applied to the inside of the switch.
Ensure auto-switch mounting screw is tightened to the correct torque (see Mounting of switch bracket).
Adjust the auto-switch so that the ON position coincides with the centre of the operating area. If the switch is set to one side or the other of this centre position then inconsistent operation will occur.

Wiring

Do not apply repeated bending or tensile forces to the connecting wiring as this may cause disconnection. Bend radius is approximately R40mm or more.
Connect the load before applying power to the switch, failure to do so may cause excess current to damage the switch.
Ensure wiring is carried out correctly. Not all wiring modes have protection and the switch may be damaged.
Separate signal lines from power/high voltage lines to prevent 'noise'.
Ensure all wiring is correctly and fully insulated.

⚠ WARNING

DO NOT USE THIS SWITCH IN AN EXPLOSIVE ATMOSPHERE.
Do not use this switch in high magnetic fields, as this will damage the switch and actuator magnet.
Do not use this switch in water-laden atmospheres, oil or chemical laden atmospheres.
Do not use this switch in conditions where temperatures are outside of the switch operating Spec.
Protect the switch from weld spatter and accumulation of iron dust etc.

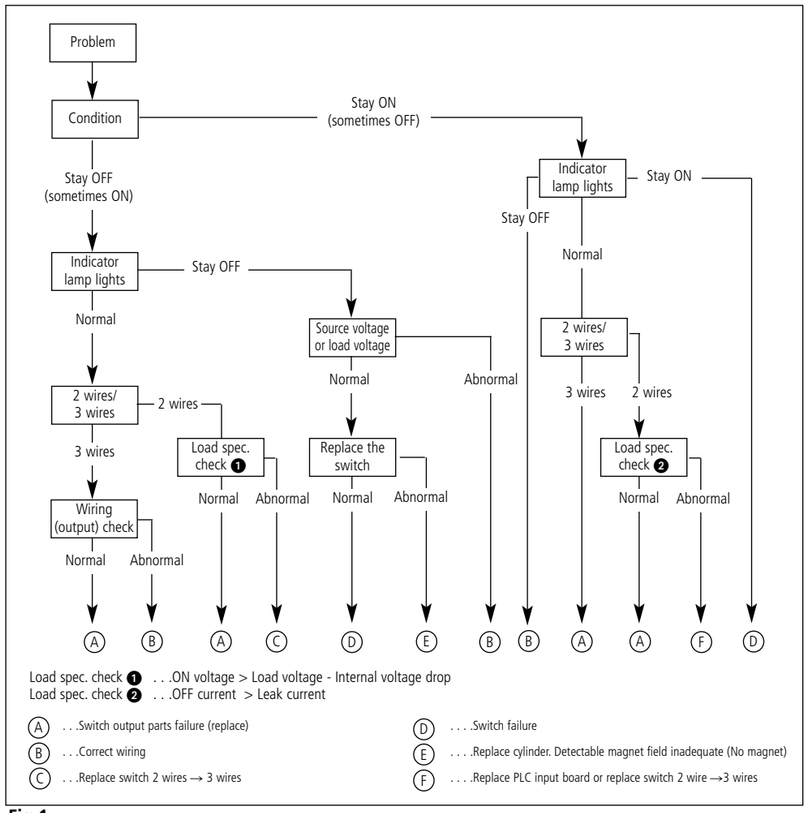

Fig 1

Maintenance

To avoid incorrect operation periodic maintenance should be carried out.
- Check tightness of mounting screw regularly to prevent possible movement of the switch from its set position.
- Regularly check condition of the wiring. Repair insulation damage immediately or replace the switch.
- If a red LED is showing this indicates that the switch has moved from the set position. Re-adjust the switch until the green LED is showing (this is the optimum position).

⚠ CAUTION

If detection failure occurs i.e. LED remains ON follow the faultfinding chart above (Fig 1).

For applications involving contact with water, elasticity, and welding, contact your nearest SMC Office. **(See at the end of this Manual.)**

If the hysteresis, between the ON and OFF position of the switch is incorrect please consult SMC.

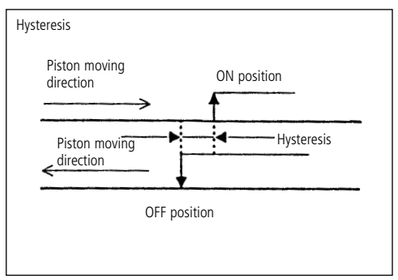

Fig 2

Connector type switch no.

Switch model number	Lead wire with connector	Combination No.
D-T79*CN	—	D-T79*CN
	D-LC05 (0.5m)	D-T79*C
	D-LC30 (3m)	D-T79*CL
	D-LC50 (5m)	D-T79*CZ

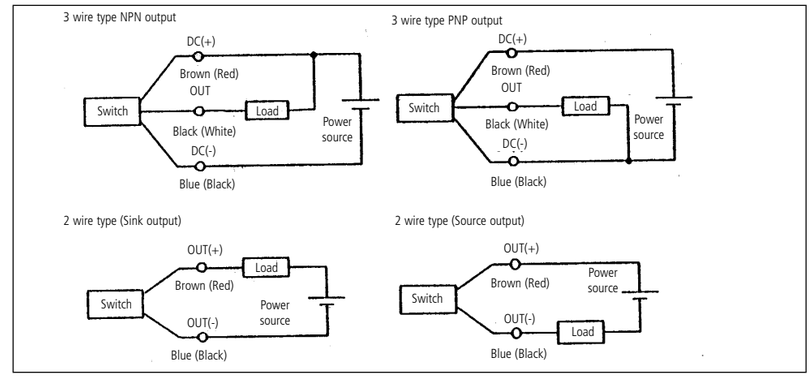

Fig 4

Exterior dimensions

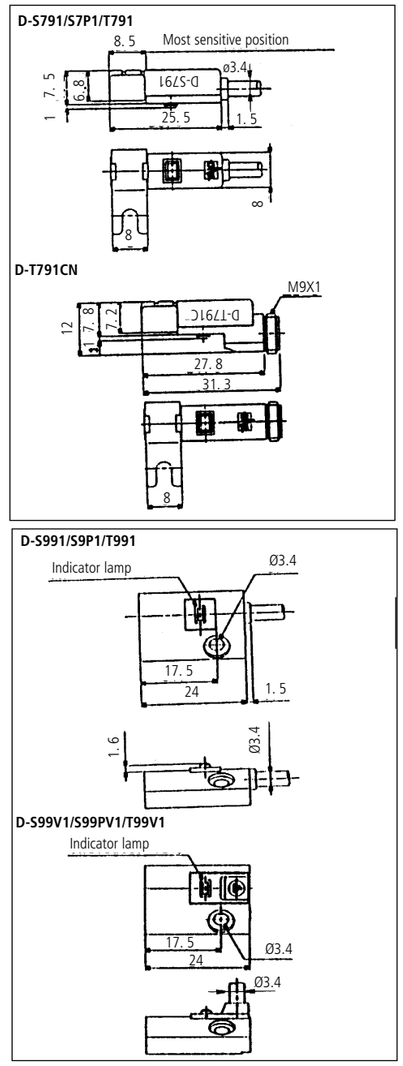

Fig 3

Basic wiring (Fig 4)

Lead wire colour in brackets indicates products complying with IEC.

Connection with PLC (sequence controller)
Depending on the PLC input specification, the output design of 3 wire type switches and 2 wire type switches differ. (See to right)

PLC input specification	3 wire output type	2 wire connecting type
Sink input	NPN output	Sink output mode
Source input	PNP output	Source output mode

Mounting of switch bracket

Each actuator has a specified mounting bracket to mount the switch to the actuator. The type of bracket depends on the following:
- Type of actuator, and tube O.D. Please consult the current actuator catalogue for details.

When fitting an auto-switch for the first time please ensure that the actuator is fitted with a magnet and that the brackets are correct for the actuator type.

Appropriate tightening torque

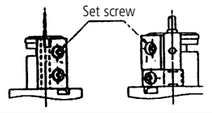

Fig 5
M3 mounting screw correct tightening torque is 0.5 Nm (5.1 kgf.cm)

Setting the switch detection position

Position the actuator at its stroke end.

Single colour display
Move the auto-switch into the centre of the operating range and ensure that the red LED is ON.

Detecting actuator stroke end

Refer to dimensions A & B in the actuator catalogue.

⚠ CAUTION

Inserting the connector
Insert the connector lead into the auto-switch until the sleeve contacts the switch (see below). Ensure that the projected part of the connector engages with the groove of the inserted portion. Tighten the fastening ring hand tight.

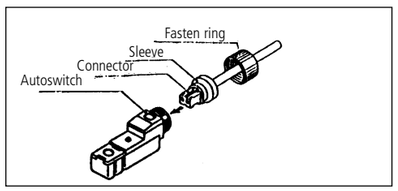

Fig 6

⚠ CAUTION

Ensure that the fastening ring is tightened correctly or water may enter the switch.

⚠ CAUTION

In all cases do not clean with a solvent solution.

When you enquire about the product, please contact the following

SMC Corporation:

ENGLAND	Phone 01908-563888	**TURKEY**	Phone 212-2211512
ITALY	Phone 02-92711	**GERMANY**	Phone 6103-402-0
HOLLAND	Phone 020-5318888	**FRANCE**	Phone 01-64-76-10-00
SWITZERLAND	Phone 052-396 31 31	**SWEDEN**	Phone 08-603 07 00
SPAIN	Phone 945-184100	**AUSTRIA**	Phone 02262-62-280
	Phone 902-255255	**IRELAND**	Phone 01-4501822
GREECE	Phone 01-3426076	**DENMARK**	Phone 70 25 29 00
FINLAND	Phone 09-68 10 21	**NORWAY**	Phone 67-12 90 20
BELGIUM	Phone 03-3551464	**POLAND**	Phone 48-22-6131847
		PORTUGAL	Phone 02-610 8922