**Installation & Maintenance Manual Auto Switch ( Reed Switch type) Series D-A90/D-A93/D-A96**  
(D-A90V/D-A93V/D-A96V)  
(Basic Safety Principles according to EN ISO 13849)

The intended use of the Auto switch is to detect a position of a magnet in a pneumatic cylinder. The magnet is installed in e.g. a piston, a slide table, etc.

This manual is only applicable for validated products to ISO 13849. Refer to Doc. No. D’ZZ-SM0116P.

This manual should be used in conjunction with the current product catalogue. Keep this manual in a safe place for future reference.

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**Model Indication Method**

Switch No. 0396 - With indicator lamp  
090 - Without indicator lamp  
Electrode  
No number = to line  
Perpendicularly  

This product is a reed switch type Auto switch of direct mounting specification.

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**Safety Instructions**

This product is class A equipment that is intended for use in an industrial environment. This manual contains essential information for the protection of users and others from possible injury and property damage. To ensure correct handling, please follow the instructions. Please check that you fully understand the meaning of the following messages before going on to read the text, and always follow the instructions.

Please read the Installation & Maintenance Manual of related apparatus and understand it before operating the unit.

**IMPORTANT MESSAGES**

- **ADANGER**: Indicates a hazard with a high level of risk, which if not avoided, will result in death or serious injury.

- **CAUTION**: Indicates a hazard with a high level of risk, which if not avoided, will result in death or serious injury.

- **WARNING**: Indicates a hazard with a medium level of risk, which if not avoided, could result in death or serious injury.

- **CAUTION**: Indicates a hazard with a low level of risk, which if not avoided, could result in minor or moderate injury.

- **WARNING**: Indicates a hazard with a very low level of risk, which if not avoided, could result in moderate or major injury.

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**Design and selection**

**AWARNING**

1. The compatibility of pneumatic equipment is the responsibility of the user. The user is advised to consult a pneumatics system or design its specifications.

2. 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 tests to meet your specific requirements.

3. Only trained personnel should operate pneumatically operated machinery and equipment.

4. 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.

5. Do not service machinery/equipment or attempt to remove component until safety is confirmed.

6. Fabrication or maintenance of machinery/equipment should only be performed after confirmation of safe lock-out control procedures.

7. When equipment is to be removed, confirm the safety process as mentioned above. Switch off air and electric supplies and exhaust all residual compressed air in the system.  

8. The equipment is a class A equipment that is intended for use in an industrial environment. To ensure correct handling, please follow the instructions.

9. Please check that you fully understand the meaning of the following messages before going on to read the text, and always follow the instructions.

10. Please read the Installation & Maintenance Manual of related apparatus and understand it before operating the unit.

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**Safety Instructions (continued)**

**AWARNING**

1. Read the specifications carefully and use the product accordingly. The product may be damaged or malfunction if it is used outside the range of specifications for load current, voltage, temperature or impact.

2. Take precautions when multiple actuators are used close together.

3. Keep wiring as short as possible as the inrush current when the switch is connected to the power source is 20 A 24 V.

4. Pay attention to the internal voltage drop of the switch.

5. Switches with an indicator LED - If switches are connected in series as shown below, take note that there will be a large voltage drop because of the internal resistance of the LED. (refer to internal voltage drop in the auto switch specifications). [The voltage drop will be 0.1 mV times when "on" auto switches are connected.]

Even though an auto switch operates normally, the load may not operate.

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**Design and selection (continued)**

**AWARNING**

1. Ensure sufficient clearance for maintenance. When designing an application, be sure to allow sufficient clearance for maintenance and inspection.

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**Mounting / Adjustment**

1. Do not drop or bump the auto switch.

2. Do not drop, bump or apply excessive impacts (300 m/s² or more). Although the body of the auto switch may not be damaged, the inside of the switch could be damaged and cause a malfunction.

3. Do not apply impact forces by the auto switch lead wires. Never carry an actuator by its lead wires. This may not only cause broken lead wires but may cause internal elements of the auto switch to be damaged by the stress.

4. Mount switches using the correct tightening torque. If an auto switch is tightened beyond the specified tightening torque, the mounting screws, switch brackets or switch may be damaged.

On the other hand, tightening below the specified tightening torque may lead to a deterioration of the service life (contacts remain in the on-position).

5. Mount a switch at the center of the operating range. Although the mounting position of an auto switch so that the piston stops at the center of the operating range.

If mounted at the operating range (around the borderline of ON and OFF), operation may be unstable.

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**Wiring**

1. Avoid repeatedly bending or stretching the lead wires.

2. Broken lead wires can result from wire applications which repeatedly applies bending stress or tensile force to the lead wires.

3. Be sure to connect the load before power is applied.

4. If an auto switch is connected without a load to the power source and the auto switch is switched ON, the switch will be instantly damaged because of excess current.

5. Be sure that there is no faulty wiring insulation (contact with other circuits, ground fault, improper insulation between terminals, etc.). Damage may occur due to noise from these cables.

6. Do not wire with power or high voltage cables.

7. When wiring from power or high voltage cables, avoid parallel wiring in the same conduit. Control circuits containing auto switches may malfunction due to noise from these cables.

8. Do not use short load cables.

9. If the power is turned ON with a load in a short circuit condition, the switch will be instantly damaged because of excess current flow into the switch.

10. Avoid incorrect wiring.

A 24 VDC switch with indicator LED has polarity. The brown lead wire is (+), and the blue lead wire is (-).

If connections are reversed, the switch will operate, however the LED will not turn ON.

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**Operating Environment**

1. Never use in an environment of explosive gases.

2. The use of an auto switch is not intended to prevent explosion. Never use in an atmosphere with an explosive gas since this may cause a serious explosion.

3. Do not use in an area where a magnetic field is generated.

4. Auto switches can malfunction or magnetic inside actuators (cylinder) can become demagnetized.

5. Do not use in an environment where the auto switch will be continually exposed to water.

6. Although switches satisfy IEC standard IP67 protection (JIS C 0920: watertight construction), avoid using switches in applications continually exposed to water splash or spray. Poor insulation or swelling of the potting resin inside switches may cause malfunction.

7. Do not use in an environment with oil or chemicals.

8. Consult SMC if switches are to be used in an environment with coolant, cleaning solvent, varnish, or chemicals. If auto switches are used under these conditions for even a short time, they may be adversely affected by improper drainage or water accumulation due to swelling of the potting resin, or hardening of the lead wires.


Consult SMC if switches are to be used where there are temperature cycles other than normal air temperature changes, as there may be adverse effects inside the switches.

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**Specifications**

**Model number**  
D-A93  D-A93V  D-A96  D-A90  D-A90V  D-A96V

**Wiring type**  
2 wire type  3 wire type  2 wire type

**Application**  
PLC(*)  IC circuit  PLC, IC circuit

**Load voltage**  
24 VDC  4 x 8 VDC  48 VAC/DC or less

**Load current**  
5 to 40 mA  20 mA  10 mA or less

**Internal voltage drop**  
2.4 V or less  3.0 V or less  2.7 V or less  0.8 V or less

**Resistance**  
3.0 V or less

**Contact resistance**

**Operating time**

**Indicator LED**

Red LED lights when ON

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**Operating Environment**

6. Do not use in an environment where there is excessive impact shock.

- When excessive impact (300 m/s² or more) is applied to a reed switch during operation, the switch will malfunction or cut off a signal (less than 0.5 ms or more). Consult SMC regarding the need to use a solid state auto switch depending upon the environment.

- Do not use in an atmosphere with iron waste or close contact with magnetic substances.

- When a large amount of iron waste such as machining chips or spatter is accumulated, or a magnetic substance (something attracted by a magnet) is brought into close proximity with an auto switch cylinder, it may cause the auto switch to malfunction due to a loss of the magnetic force inside the actuator.

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**Maintenance**

1. Perform the following maintenance periodically in order to prevent possible danger due to unexpected auto switch malfunction.

2. Securely tighten switch mounting screws.

3. If screws become loose or the mounting position is distorted, retighten when readjusting the mounting position.

4. Consult SMC if auto switches will be used in an environment with coolant, cleaning solvent, various oils or chemicals. If auto switches are used under these conditions for even a short time, they may be adversely affected by improper drainage or water accumulation due to swelling of the potting resin, or hardening of the lead wires.

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Please read the Installation & Maintenance Manual of related apparatus and understand it before operating the unit.
Installation (continued)
1) Tie-rod mounting: Fix the auto switch in the detecting position with the M2.5 set screw using an auto switch mounting bracket on a cylinder tie-rod, with the bottom surface of the auto switch firmly in contact with the cylinder tube.
2) Fix in the required detecting position with a set screw (M4) using a hexagon driver.
3) Direct mounting: Fit the auto switch into the auto switch mounting groove and set it roughly in the detecting position.
4) After confirming the detecting position, tighten the mounting screw (M2.5) attached, and secure the auto switch.
5) When changing the detecting position, repeat from step 3.

Note1) To protect auto switches, ensure that the main body of the auto switch is inserted into the mounting groove with a depth of 15mm or more.
Note2) The required tightening torque of the hexagon socket head set screw (M4) is 1 to 1.2 Nm.
Note3) When tightening an auto switch mounting screw (M2.5), use a small flat blade screwdriver with a grip diameter of 5 to 6 mm. The required tightening torque is 0.05 to 0.15 Nm.
As a guide, turn 90° from the position where it begins to feel tight.

MY3

Troubleshooting
When detection failure occurs (stay ON / OFF), please check based on the following flow chart.

Internal Circuit and Wiring

When tightening the auto switch mounting screw (M2.5), use a small flat blade screwdriver with a grip diameter of 5 to 6 mm. The required tightening torque is 0.1 to 0.2 Nm.

Note) When tightening the auto switch mounting screw (M2.5), use a small flat blade screwdriver with a grip diameter of 5 to 6 mm. The required tightening torque is 0.05 to 0.1 Nm. As a guide, turn 90° from the position where it begins to feel tight.

Limitations of Use
Any use in an EN ISO 13849 system must be within the specified limits and application conditions. The user is responsible for the specification, design, implementation, validation and maintenance of the safety system (SRP/ICS).

Outline with Dimensions (mm)

D-A90 / D-A90V / D-A96

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D-A93 / D-A93V / D-A96V

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Dimensions for D-A96

Batch Marking

Manufacture’s batch marking

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CDQ2

Auto switch mounting screw

Auto switch

CDQ2

Auto switch mounting screw

Auto switch

Tie-rod

When attaching an auto switch, first insert a switch spacer into the switch mounting groove. When doing this, confirm that it is set in the correct mounting orientation, or re-insert if necessary. Next, insert the auto switch into the groove and slide it until it is positioned under the switch spacer.
After establishing the mounting position, use a small flat blade screwdriver to tighten the switch mounting screw.

Note) When tightening the auto switch mounting screw (M2.5), use a small flat blade screwdriver with a grip diameter of 5 to 6 mm. The required tightening torque is 0.05 to 0.15 Nm. As a guide, turn 90° from the position where it begins to feel tight.

SMC Corporation, Akihabara UDX15F, 4-14-1, Sotokanda, Chiyoda-ku, Tokyo 101-0021

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Names and Function of Parts
D-A90 / D-A93 / D-A96

Mounting screw M2.5 x 4

Indicator lamp

Mounting screw M2.5 x 4.5

CDQ2

Auto switch mounting screw

Auto switch

Tie-rod

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