



Installation and Maintenance Manual

Auto Switch (Reed switch type)

Series D-A90-588 / D-A93-588

D-A90V-588 / D-A93V-588

II 3G Ex nA IIC T5 Gc X -10°C ≤ Ta ≤ +60°C
II 3D Ex tc IIIC T93°C Dc X IP67

ATEX Marking Description	
II 3G Ex nA IIC T5 Gc X -10°C ≤ Ta ≤ +60°C II 3D Ex tc IIIC T93°C Dc X IP67	
Equipment Group II	3D - Category 3 for Dust
3G - Category 3 for Gas	tc – Protected by enclosure
Ex – European standards apply	IIIC – For all types of dust
nA – Non-sparking apparatus	T93°C – max. surface temperature
IIC – For all types of gas	Dc – Equipment Protection Level
T5 – Temperature classification	X – Special conditions for safe use, see instructions
Gc – Equipment Protection Level	
Ta – Ambient temperature	IP67 – Enclosure protection rating

1 Safety Instructions

1.1 General recommendation

This manual contains essential information for the protection of users and others from possible injury and/or equipment damage.

- Read this manual before using the product, to ensure correct handling, and read the manuals of related apparatus before use.

- Keep this manual in a safe place for future reference.
- These instructions indicate the level of potential hazard by label of “Caution”, “Warning” or “Danger”, followed by important safety information which must be carefully followed.
- To ensure safety of personnel and equipment the safety instructions in this manual and the product catalogue must be observed, along with other relevant safety practices.

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 medium level of risk, which if not avoided, could result in death or serious injury.
Danger	Indicates a hazard with a high level of risk, which if not avoided, will result in death or serious injury.

Warning

- . 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 can be used in various operating conditions, their compatibility with the specific pneumatic system must be based on specifications or after analysis and/or tests to meet specific requirements.
- . 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 personnel.
- . Do not service machinery/equipment or attempt to remove components until safety is confirmed.
 - Inspection and maintenance of machinery/equipment should only be performed after confirmation of safe locked-out control positions.
 - 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.

1 Safety Instructions (continued)

- Before machinery/equipment is re-started, ensure all safety measures to prevent sudden movement of cylinders etc. (Supply 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:
 - Conditions and environments beyond the given specifications, or if the product is to be used outdoors.
 - 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.
 - An application which has the possibility of having negative effects on people, property, or animals, requiring special safety analysis.

1.2 Conformity to standards

This product is certified to and complies with the following standards:

ATEX Directive 2014/34/EU	
• EN 60079-0:2012+A11:2013	General requirements
• EN 60079-15:2010	Type of protection “n”
• EN 60079-31:2014	Protection by enclosure “t”

EMC Directive 2014/30/EU	
• EN6100-6-2:2005	Immunity for industrial environments
• EN 55011:2009+A1:2010	Industrial, scientific & medical equipment

2 Installation And Operating Environment

Warning

Design and selection

1. Confirm the specifications.
Read the specifications carefully and use this product appropriately.
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.

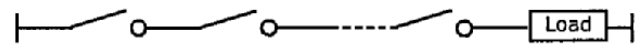
When multiple auto switch actuators are used in close proximity, magnetic field interference may cause the switches to malfunction. Maintain a minimum actuator separation of 40 mm.

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 shortened and the load may not operate correctly. The maximum detectable piston speed is:

$$V[\text{mm/s}] = \frac{\text{Autoswitch operating range [mm]}}{\text{Load operating time [ms]}} \times 1000$$

4. Keep wiring as short as possible.
As the length of the wiring to a load increases, the inrush current at switching ON becomes greater, and this may shorten the product life. (The switch will stay ON all the time).
Use a contact protection box when the wire length is 5m 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 as shown below, take note that there will be a large voltage drop due to internal resistance in the light emitting diodes. (Refer to internal voltage drop in the auto switch specifications).
[The voltage drop will be "n" times greater 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 an 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.

$$\text{Supply voltage} - \text{Internal voltage drop of switch} > \text{Minimum operating voltage of load}$$

2 Installation and Operating Environment (continued)

- 2) If the internal resistance of a light emitting diode causes a problem, select a switch without an indicator light (model D-A90(V)-588).
6. Do not use a load that generates a surge voltage.
If driving a load such as a relay which generates a surge voltage, use a switch with a contact protection box.
7. Cautions for use in an interlock circuit.
When an auto switch is used for an interlock signal requiring high reliability, devise a double interlock system to avoid trouble by providing a mechanical protection function, or by also using another switch (sensor) together with the auto switch.
8. 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.

Warning

Mounting / adjustment

1. Do not drop or apply excessive impacts.
Do not drop, or apply excessive impacts (300 m/s² or more for reed switches) while handling. Although the body of the switch may not be damaged, the inside of the switch could be damaged and cause a malfunction.
2. Do not carry an actuator by the auto switch lead wires.
Never carry a actuator by the 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 proper tightening torque.
If a switch is tightened beyond the range of tightening torque, the mounting screws, mounting brackets or switch may be damaged.
On the other hand, tightening below the range of tightening torque may allow the switch to slip out of position.
4. Mount a switch at the centre of the operating range.
Adjust the mounting position of the auto switch so that the piston stops at the centre of the operating range (the range in which a switch is ON). (The mounting position shown in the catalogue indicates the optimum position at the stroke end).
If mounted at the end of the operating range (around the borderline of ON and OFF), operation may be unstable.

Wiring

1. Avoid repeatedly bending or stretching lead wires.
Broken lead wires can result from wiring layouts which repeatedly apply bending stress or tensile 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.
Be certain 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 flowing into the switch.

4. Do not route the wires with power lines or high voltage lines.
Route wires separately from power lines or high voltage lines, avoiding parallel wiring or wiring in the same conduit .
Control circuits containing auto switches may malfunction due to noise from these other lines.
5. Do not allow short circuit of loads.
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.
6. Avoid incorrect wiring.
A 24 VDC switch with indicator light has polarity. The brown [red] lead wire is (+), and the blue [black] lead wire is (-)
 - 1) If connections are reversed, a switch will operate, however, the light emitting diode will not light up.
Note that exceeding the specified current greater will damage the light emitting diode. It will no longer operate (model: D-A93(V)-588).

Operating environment

1. Do not use in an area where a magnetic field is generated.
Auto switches can malfunction or magnets inside actuators can become demagnetized.
2. Do not use in an environment where the auto switch will be continually exposed to water.
Although switches satisfy IEC standard IP67 construction (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 the switch may cause malfunction.

2 Installation and Operating Environment (continued)

3. Do not use in an environment with oil or chemicals.
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 insulation, malfunction due to swelling of the potting resin, or hardening of the lead wires.
4. Do not use in an environment with temperature cycles.
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 to the inside of the switch.
5. 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 contact point will malfunction and generate or cut off a signal momentarily (1 ms or less). Consult SMC regarding the need to use a solid state switch depending upon the environment.

Warning

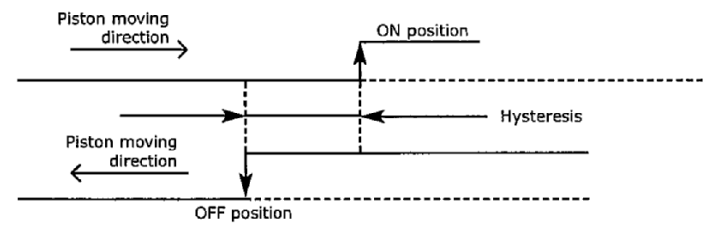
6. Avoid accumulation of iron waste or close contact with magnetic substances.
When a large amount of iron waste such as machining chips or spatter is accumulated, or a magnetic substance (something attracted by a magnet) is brought into close proximity with an actuator with auto switch, it may cause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

Maintenance

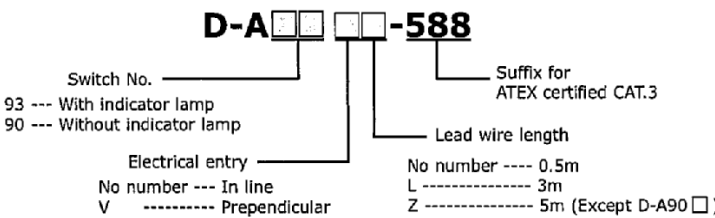
1. Perform the following maintenance periodically in order to prevent possible danger due to unexpected auto switch malfunction.
 - 1) Securely tighten the switch mounting screws.
If screws become loose or the mounting position is dislocated, retighten them after readjusting the mounting position.
 - 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.

Others

1. For durability against water, elasticity, application at welding site, please consult SMC.
2. If the ON / OFF position (hysteresis) causes problems, consult SMC.



3 Model Indication Method



This product is a Reed switch type auto switch of direct mounting specification.
The switch should only be used in areas in which potentially explosive atmospheres are unlikely to be present or only present for short periods of time.

4 Intended Conditions Of Use

The auto switch should be used within the range of specifications below and in the auto switch catalogue.

If labelled with X: special conditions applied:

- 1. Protect the auto switch against all impact or mechanical damage.
- 2. Protect the auto switch from sources of heat which can generate surface temperatures higher than the temperature classification.
- 3. The switch should not be exposed to prolonged sunlight or UV light that can generate surface temperatures higher than the temperature classification. Use a suitable protective cover.

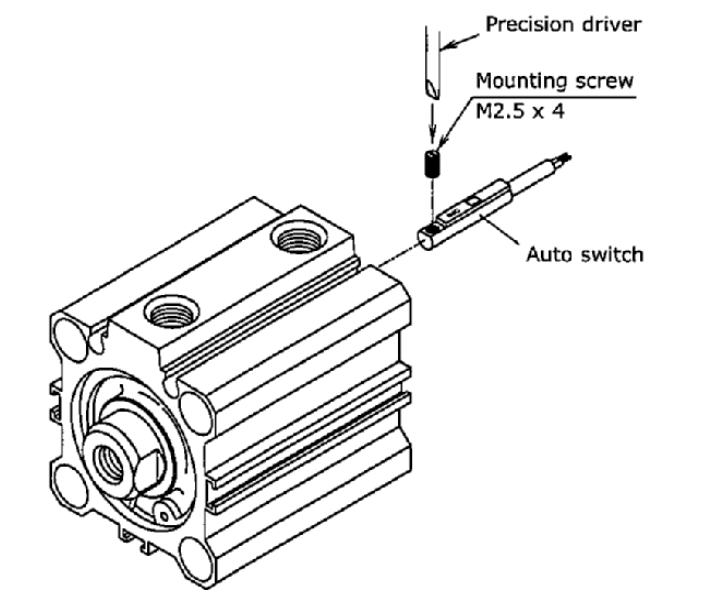
Model number	D-A93-588		D-A93V-588	D-A90-588 / D-A90V-588	
Wiring style	2 wire type				
Application	Relay,PLC			IC, Relay, PLC	
Load voltage	24V DC			24V ^{AC} _{DC} or less	48V ^{AC} _{DC} or less
Load current	5 to 40mA			50mA	40mA
Internal voltage drop	2.4V or less (up to 20mA) 3V or less (up to 50mA)		2.7V or less	----- -----	
Internal resistance	----- -----			1Ω or less (Including 3m lead wire)	
Contact protection circuit	None				
Operating time	1.2ms				
Operating indicator lamp	Red diode lights when ON -----				
Proof impact	300m/s ²				
Insulation resistance	50MΩ or more at DC500V mega				
Proof voltage	AC1500V for 1 minute (lead wire, between cases)				
Ambient temperature	-10 to 60°C				
Protection structure	IECS29 standard IP67, JISC0920				

6 How To Mount / Mounting Bracket

Each actuator has a specified mounting bracket for mounting the auto switch.

"How to mount / Mounting bracket" depends on the actuator type and the tube I.D. Please refer to the actuator catalogue.

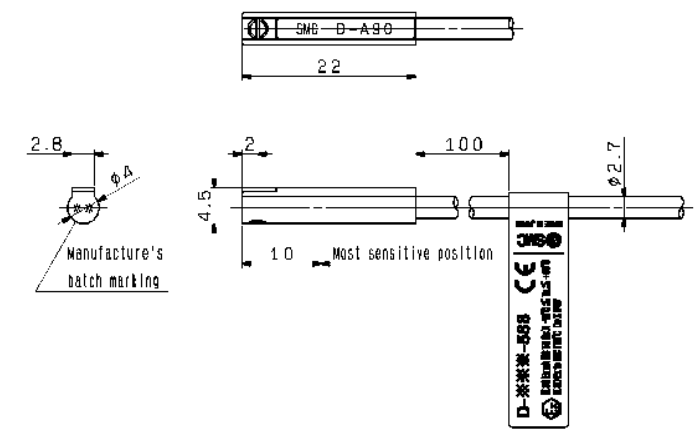
When an auto switch is mounted for the first time, ensure that the actuator is a type including a built in magnet, and select a bracket corresponding to the actuator.



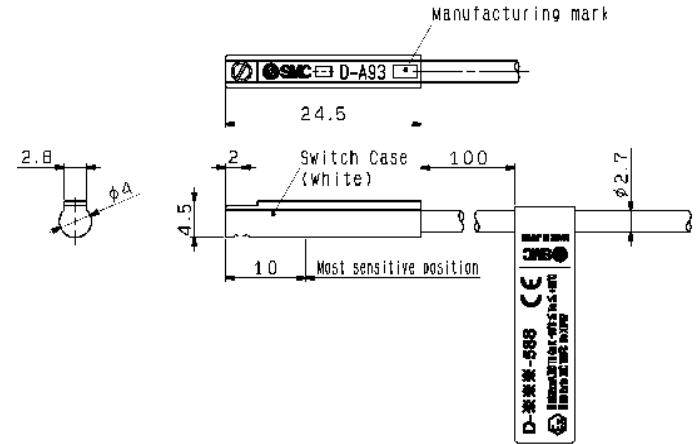
M2.5 mounting screw tightening torque must be 0.1 to 0.2 Nm

8 Outline Dimensions (mm)

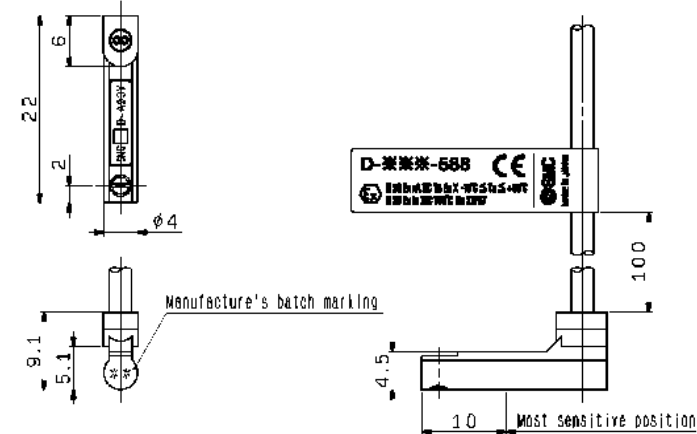
D-A90-588



D-A93-588



D-A90V-588/D-A93V-588



Manufacturers Batch marking

D-A93-588

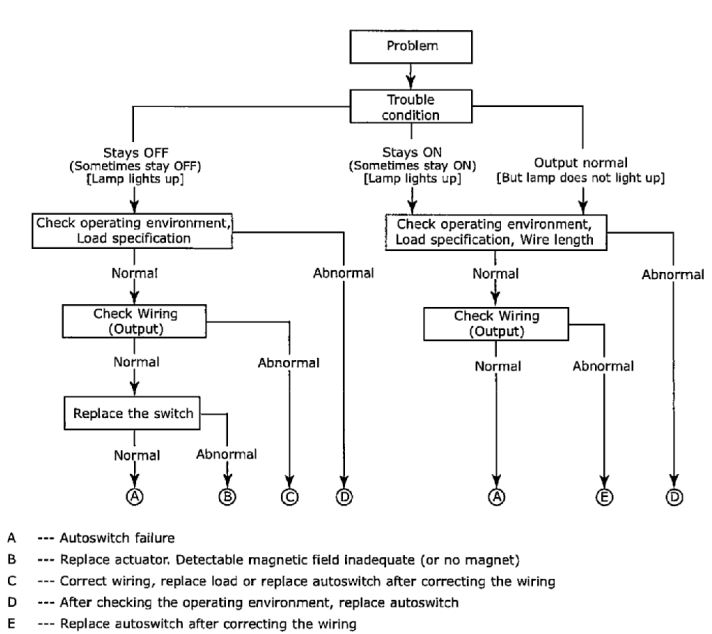
Year		Month	
Mark	Year	Mark	Month
7	2007	1	January
8	2008	2	February
9	2009	3	March
0	2010	4	April
1	2011	5	May
2	2012	6	June
3	2013	7	July
4	2014	8	August
5	2015	9	September
6	2016	X	October
		Y	November
		Z	December

D-A90-588/D-A90V-588/D-A93V-588

Year		Month	
Mark	Year	Mark	Month
7	2007	1	January
8	2008	2	February
9	2009	3	March
0	2010	4	April
1	2011	5	May
2	2012	6	June
3	2013	7	July
4	2014	8	August
5	2015	9	September
6	2016	X	October
		Y	November
		Z	December

9 Troubleshooting

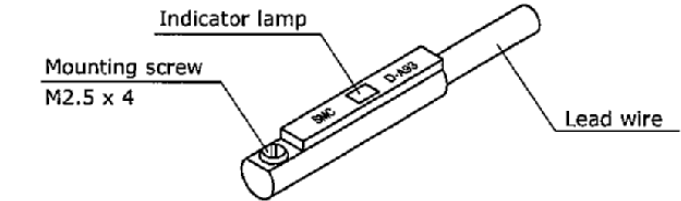
If detection failure occurs (stays ON/OFF), check using the following flow diagram



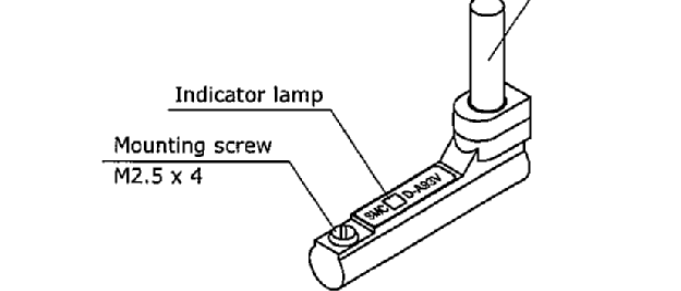
- A --- Autoswitch failure
- B --- Replace actuator. Detectable magnetic field inadequate (or no magnet)
- C --- Correct wiring, replace load or replace autoswitch after correcting the wiring
- D --- After checking the operating environment, replace autoswitch
- E --- Replace autoswitch after correcting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

5 Names And Functions Of Individual Parts

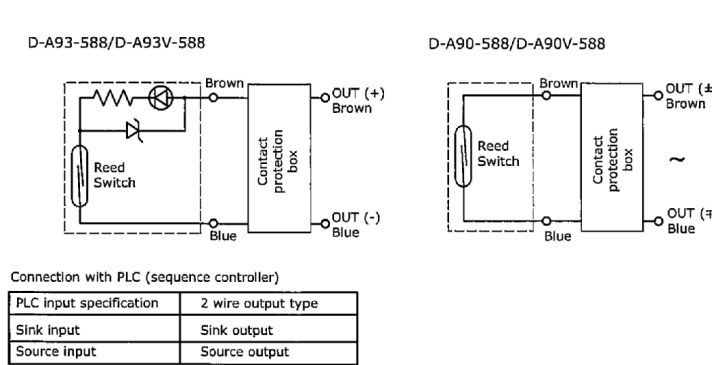
D-A90-588 / D-A93-588



D-A90V-588 / D-A93V-588



7 Basic Wiring



10 Contacts

AUSTRIA	(43) 2262 62280-0	LATVIA	(371) 781 77 00
BELGIUM	(32) 3 355 1464	LITHUANIA	(370) 5 264 8126
BULGARIA	(359) 2 974 4492	NETHERLANDS	(31) 20 531 8888
CZECH REP.	(420) 541 424 611	NORWAY	(47) 67 12 90 20
DENMARK	(45) 7025 2900	POLAND	(48) 22 211 9600
ESTONIA	(372) 651 0370	PORTUGAL	(351) 21 471 1880
FINLAND	(358) 207 513513	ROMANIA	(40) 21 320 5111
FRANCE	(33) 1 6476 1000	SLOVAKIA	(421) 2 444 56725
GERMANY	(49) 6103 4020	SLOVENIA	(386) 73 885 412
GREECE	(30) 210 271 7265	SPAIN	(34) 945 184 100
HUNGARY	(36) 23 511 390	SWEDEN	(46) 8 603 1200
IRELAND	(353) 1 403 9000	SWITZERLAND	(41) 52 396 3131
ITALY	(39) 02 92711	UNITED KINGDOM	(44) 1908 563888

SMC Corporation

URL : [http:// www.smcworld.com](http://www.smcworld.com) (Global) [http:// www.smceu.com](http://www.smceu.com) (Europe)

Specifications are subject to change without prior notice from the manufacturer.

© 2010 SMC Corporation All Rights Reserved.