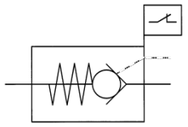
ORIGINAL INSTRUCTIONS

Instruction Manual

Pilot Check Valve with State Detection

XT34-303-X2



The intended use of this product is to stop the flow of pressurized air in one direction and to detect the safe state of the check valve for diagnostics in safety related circuits.

Validated according to ISO13849, see section 2.

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) [*1)], and other safety regulations.

[*1)] 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.

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.
- To ensure safety of personnel and equipment the safety instructions in this manual must be observed, along with other relevant safety practices.

⚠ 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

- **The compatibility of the product is the responsibility of the person who designs the equipment or decides its specifications.**
- Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results. The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product. This person should also continuously review all specifications of the product referring to its latest catalogue information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.

1 Safety Instructions - continued

- **Only personnel with appropriate training should operate machinery and equipment.**
  The product specified here may become unsafe if handled incorrectly.
  The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.
- **Do not service or attempt to remove product and machinery/equipment until safety is confirmed.**
  1) The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.
  2) When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut. Read and understand the specific product precautions of all relevant products carefully.
  3) Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.
- **Contact SMC beforehand and take special consideration of safety measures if the product is to be used in any of the following conditions**.
  1) Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
  2) Installation on equipment in conjunction with atomic energy, railways, air navigation, space, shipping, vehicles, military, medical treatment, combustions and recreation, or equipment in contact with food and beverages, emergency stop circuits, clutch and brake circuits in press applications, safety equipment or other applications unsuitable for the standard specification described in the product catalogue.
  3) An application which could have negative effects on people, property, or animals requiring special safety analysis outside the scope of ISO 13849 described in this document.
  4) Use in an interlock circuit, which requires the provision of double interlock for possible failure by using a mechanical protective function, and periodical checks to confirm proper operation.
- **Always ensure compliance with relevant safety laws and standards.**
- All electrical work must be carried out in a safe manner by a qualified person in compliance with applicable national regulations.

⚠ Caution

The product is provided for use in manufacturing industries.
The product herein described is basically provided for peaceful use in manufacturing industries.
If considering using the product in other industries consult SMC beforehand and exchange specifications or a contract if necessary.
If anything is unclear, contact your nearest sales branch.

2 Specifications

2.1 Pilot Check Valve

Fluid	Air
Operating pressure range [Note 1)]	0.1 MPa to 0.7 MPa
Pilot pressure range	More than 50% of the operating pressure (0.25 MPa or more)
Ambient and fluid temperature	-5 to +60 °C (no freezing)
Max. operating frequency	2 times per second
Min. operating frequency	Every 30 days
Response time	0.1 second
Lubrication [Note 2)]	Not required
Air quality	5 µm filtration or better
Standards	Complies with the basic and well-tried safety principles of ISO 13849-2:2012
B_{10} [Note 3)]	4.2 million cycles
B_{10d} [Note 3)]	8.4 million cycles

2 Specifications - continued

Note 1) Please use caution regarding the max. operating pressure when soft nylon or polyurethane tubing is used.
Note 2) If lubrication is used in the system, use class 1 turbine oil (no additive), ISO VG32.
Note 3) The B_{10} figure is estimated from SMC life tests. The B_{10d} figure is derived from B_{10} using the assumption in ISO 13849-1:2008 Annex C. Please contact SMC for further details.

2.2 Auto Switch

Switch model No.	D-M9PASAPC
Wiring	3 wire
Output	PNP
Application	IC circuit / Relay / PLC
Power voltage	5/12/24 VDC (4.5 to 28 VDC)
Current consumption	10 mA or less
Load voltage	-
Load current	40 mA or less
Internal voltage drop	0.8 V or less at 10 mA load current (2 V or less at 40 mA)
Current leakage	100 µA or less at 24 VDC
Operating time	1 ms or less
Electrical entry system	Grommet
Lead wire	Vinyl sheath cable 2.7 x 3.2 oval, 0.15 mm^2, 3 wire
Impact resistance	1000 m/s^2
Vibration resistance	10 to 150 Hz, at the smaller amplitude, 1.5 mm or 20 m/s^2 in X, Y, Z directions for 2 hours each (De-energized)
Insulation resistance	50 MΩ or more at 500 VDC (between terminals and housing)
Withstand voltage	1000 VAC for 1 minute (between terminals and housing)
Ambient temperature	-10 to +60 °C
Protection structure	IEC60529 standard IP67, JISC0920

3 Installation

3.1 Installation

⚠ Warning

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

3.2 Environment

⚠ Warning

- Do not use in an environment where corrosive gases, chemicals, salt water or steam are present.
- Do not use in an explosive atmosphere.
- Do not expose to direct sunlight. Use a suitable protective cover.
- Do not install in a location subject to vibration or impact. Check the product specifications.
- Do not mount in a location exposed to radiant heat.

3.3 Piping

⚠ Caution

- Before piping make sure to clean up chips, cutting oil, dust etc.
- When installing piping or fittings, ensure sealant material does not enter inside the port. When using seal tape, leave 1.5 to 2 threads exposed on the end of the pipe/fitting.
- Tighten fittings to the specified tightening torque.
- Excessive tighten torque through the flats of the body could could damage the product. First tighten it by hands and then use a proper wrench to tighten it further at a wrench tightening angle of 30° to 45°. The reference value for the tightening torque is 3 to 5 N･m.

Installation - continued

3.4 Lubrication

⚠ Caution

- SMC products have been lubricated for life at manufacture, and do not require lubrication in service.
- If a lubricant is used in the system, use turbine oil Class 1 (no additive), ISO VG32. Once lubricant is used in the system, lubrication must be continued because the original lubricant applied during manufacturing will be washed away.

3.5 Auto Switch

⚠ Caution

- **Provide sufficient space for maintenance.**
  When designing an application, allow sufficient clearance for maintenance and inspection.
- **Design the circuit to prevent reverse current during open circuit conditions or when the product is forced to operate for functional checks.**
  Reverse current can cause product damage or malfunction.
- **Do not use a load which generates a 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.
- **Pay attention to the leakage current.**
- **The solid state auto switch output will be unstable for 50 ms after power is supplied.**
  During the time after supplying power, the input device (e.g. PLC, relay) may consider the ON position as OFF output or the OFF position as ON output.
  Please set up the application to consider the signals will be invalid within 50 ms after power is supplied.
  Perform a similar setting when using the SMC AHC system (Auto Hand Changing system) MA series.

3.5.1 Mounting and adjustment

⚠ Caution

- **Do not drop or apply impact.**
  The auto switch may be damaged or malfunction if it is dropped, bumped or applied with excessive impact (1000 m/s^2 or more).
- **Do not carry a valve by the auto switch lead wire.**
  This may cause a broken lead wire or damage to the auto switch internal elements.

3.5.2 Wiring

⚠ Caution

- **Check the insulation of the wiring.**
  Check that there is no faulty wiring insulation (short circuits, faulty ground connections, improper insulation between terminals, etc.) as this may damage the auto switch due to over current.
- **Do not route the auto switch wiring in the same place as power cables or high voltage cables.**
  Otherwise auto switch malfunction may result due to noise and inrush current.
- **Avoid repeatedly bending or stretching the lead wire.**
  Broken lead wires will result if bending stresses or tensile forces are applied to the lead wires.
  Stress and tensile forces applied to the connection between the lead wire and auto switch increases the possibility of disconnection.
  The standard of bending radius becomes R20 to 40 mm.
- **Be sure to confirm the load condition (e.g. connection and current value) before power is supplied.**
- **Wiring should be kept as short as possible.**
  Do not use a cable longer than 100 m.
  For long wire lengths, we recommend a ferrite core should be attached to both ends of the cable, to reduce noise.
- **Do not short-circuit the load.**
  The auto switch will be damaged if the load is short-circuited.

3 Installation – continued

- **Avoid incorrect wiring**
  If connections are reversed (power supply wire + and -) on a 3-wire type auto switch, the switch will be protected by a protection circuit. However, if the blue wire is connected to the power supply(+) and the black wire is connected to the power supply (-), the auto switch will be damaged.

3.5.3 Environment

⚠ Warning

- **Do not use the auto switch in the presence of explosive gases.**
  Auto switches are not designed with an explosion proof construction. Fire or an explosion may result.

⚠ Caution

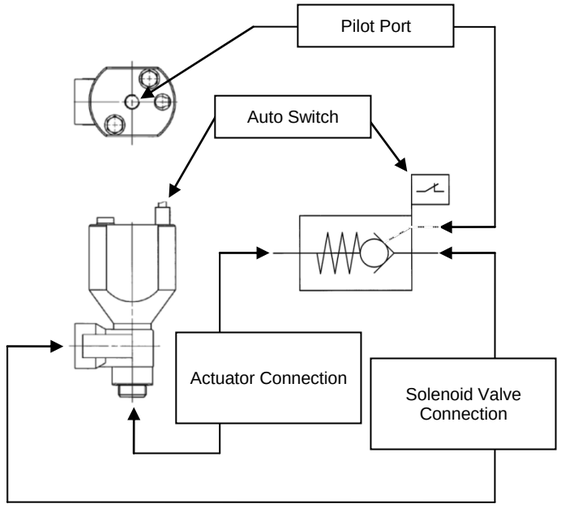
- **Do not use in a location where magnetic fields are generated.**
  Auto switches will malfunction or the magnets inside actuators will become demagnetized.
- **Do not use in an environment where the auto switch will be continually exposed to water.**
  Although auto switches satisfy the IEC standard IP67 construction, do not use in applications continually exposed to water splashes or spray. Otherwise, insulation failure or malfunction may result.
- **Do not use in an environment where oil or chemical splashes can occur.**
  If auto switches are used in an environment with coolants, cleaning solvents, oils or chemicals for even a short time, they may be adversely affected by insulation failure, malfunction due to swelling of the potting resin, or hardening of the lead wires.
- **Do not use in an environment where there are cyclic temperature changes.**
  Temperature cycles other than normal temperature changes can adversely affect the auto switch internally.
- **Avoid accumulation of iron debris or close contact with magnetic substances.**
  When a large amount of iron waste such as machining chips or spatter has accumulated, or a magnetic substance (something attracted by a magnetic) is brought into close proximity with the check valve, it may cause the auto switch to malfunction due to a weakening of the magnetic force inside the check valve.
- **Do not use in a location where surges are generated.**
  When there are units (solenoid lifter, high frequency induction furnace, motor, etc.) which generate a large amount of surge in the area around the check valve with a solid state auto switch, this may cause damage to the auto switch internal circuit.
- **The auto switch is CE marked, but not immune to lightning strikes. Take measure against lightning strikes in the system.**

4 Settings

This check valve is not adjustable. The switch state is ON when the valve is closed , and the switch state is OFF when the valve is open.

Explanation of the check valve ports is shown in Figure 1.

Figure 1



4.1 Circuit diagram Auto Switch

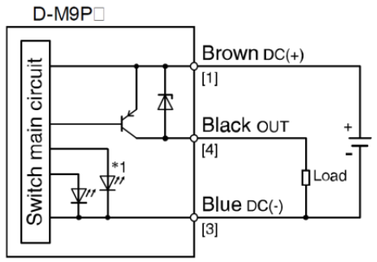
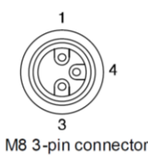


Figure 2

The numbers shown in brackets [ ] indicates the connector pin number.

4.1.1 M8 3-pin connector



M8 3-pin connector

Figure 3

5 How to Order

Order number: XT34-303-X2

6 Outline Dimensions (mm)

6.1 Pilot Check Valve

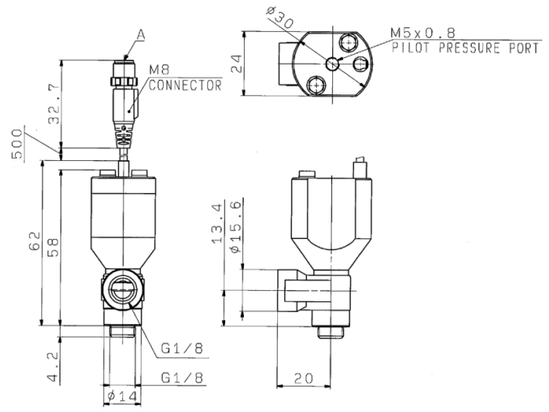


Figure 4

6.2 Auto Switch

External dimensions of Pre-wired connector

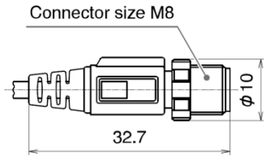


Figure 5

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.

7.2 Auto Switch

⚠ Warning

- **Removal of equipment, and exhausting the compressed air.**
  When equipment is to be removed, first confirm that measures are in place to prevent losing control of the equipment or workpieces from falling, etc. Turn off the power supply, stop the air supply and exhaust all compressed air from the system. Before restarting the equipment, confirm that measures are taken to prevent sudden movement.
- **Never touch the terminals while the power is on.**
  Otherwise electric shock, malfunction and damage to the product can result.

7 Maintenance – continued

⚠ Caution

- **Check that there is no damage to the lead wire.**
  If damage to the lead wire is found, replace the pilot check valve. Do not replace the auto switch from the pilot check valve.
- **Do not use solvents such as benzene, thinner, alcohol etc. to clean the auto switch.**
  This may damage the surface of the body or erase the markings on the body.
  For heavy stains, use a cloth soaked with diluted neutral detergent and fully squeezed, the wipe up the stains again with a dry cloth.

8 Limitations of Use

8.1 Limited warranty and Disclaimer/Compliance Requirements

- **The product used is subject to the following "Limited warranty and Disclaimer" and "Compliance Requirements". Read and accept them before using the product**.

Limited warranty and Disclaimer

1) The warranty period of the product is 1 year in service or 1.5 years after the product is delivered, whichever is first[(1)]. Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.
2) For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided.
   This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.
3) Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalogue for the particular products.

(1) Vacuum pads are excluded from this 1 year warranty.

A vacuum pad is a consumable part, so it is warranted for a year after it is delivered. Also, even within the warranty period, the wear of a product due to the use of the vacuum pad or failure due to the deterioration of rubber material are not covered by the limited warranty.

- **Compliance Requirements**
  1) The use of SMC products with production equipment for the manufacture of weapons of mass destruction (WMD) or any other weapon is strictly prohibited.
  2) The exports of SMC products or technology from one country to another are governed by the relevant security laws and regulations of the countries involved in the transaction. Prior to the shipment of a SMC product to another country, assure that all local rules governing that export are known and followed.

⚠ Caution

- **SMC products are not intended for use as instruments for legal metrology.**
  Measurement instruments that SMC manufactures or sells have not been qualified by type approval tests relevant to the metrology (measurement) laws of each country.
  Therefore, SMC products cannot be used for business or certification ordained by the metrology (measurement) laws of each country.

⚠ Warning

- **This product cannot be used for accurate and precise intermediate stops of an actuator.**
  Due to compressibility of air as a fluid, the actuator will continue to move until it reaches a position of pressure balance, even though the pilot check valve closes with an intermediate stop signal.
- **This product cannot be used to hold a stop position for an extended period of time.**
  Pilot check valves and actuators are not guaranteed for zero air leakage. Therefore, it is sometimes not possible to hold a stop position for an extended period of time. In the event that holding for an extended time is necessary, a mechanical means for holding should be devised.

8 Limitation of Use – continued

- **Consider the release of residual pressure.**
  Actuators may move suddenly due to residual pressure, which can be dangerous during maintenance procedures.
- **When used in a balance control circuit, there are instances in which the check valve cannot release, even though the pilot pressure is 50% of the operating pressure. In this case, the pilot pressure should be the same as the operating pressure.**
- **For reference, SMC has conducted endurance tests in which ON/OFF operation of the check valve was performed at the maximum operating pressure, with a confirmed endurance of 7 million operations.**
  Please be aware that the tests were performed under limited conditions.
- **The check valve has a construction, in which it is closed by the differential pressure generated when the inlet pressure (IN side) or outlet pressure (OUT side) solenoid valve is switched. Be aware that the check valve does not close completely and the outlet pressure (OUT side) may drop when the inlet pressure (IN side) drops gently and the differential pressure becomes smaller than the minimum operating pressure or cracking pressure.**

9 Contacts

AUSTRIA	SMC Pneumatik GmbH,Girakstrasse 8, AT-2100 Korneuburg, Austria
BELGIUM	SMC Pneumatics N.V./S.A. Nijverheidsstraat 20, B-2160 Wommelgem, Belgium
BULGARIA	SMC Industrial Automation Bulgaria EOOD, Business Park Sofia, Building 8-6th floor, BG-1715 Sofia, Bulgaria
CROATIA	SMC IndustrijskaAutomatikad.o.o. ZagrebačkaAvenija 104,10 000 Zagreb
CZECH REP.	SMC Industrial Automation CZ s.r.o. Hudcova 78a, CZ-61200 Brno, Czech Republic
DENMARK	SMC Pneumatik A/S,Egeskovvej 1, DK-8700 Horsens, Denmark
ESTONIA	SMC Pneumatics Estonia Oü,Laki 12, EE-10621 Tallinn, Estonia
FINLAND	SMC Pneumatics Finland Oy, PL72, Tiistinniityntie 4, SF-02031 Espoo, Finland
FRANCE	SMC Pneumatique SA.1, Boulevard de Strasbourg, Parc Gustave Eiffel, Bussy Saint Georges, F-77607 Marne La ValleeCedex 3, France
GERMANY	SMC Pneumatik GmbH, Boschring 13-15, 63329 Egelsbach, Germany
GREECE	SMC Italia Hellas Branch, Anagenniseos 7-9-P.C. 14342 N.Philadelphia, Athens, Greece
HUNGARY	SMC Hungary IpariAutomatizálásiKft.Torbágy u. 19, HU-2045 Törökbálint, Hungary
IRELAND	SMC Pneumatics (Ireland) Ltd.2002 Citywest Business Campus, Naas Road, Saggart, Co. Dublin, Ireland
ITALY	SMC Italia S.p.A.Via Garibaldi 62, I-20061Carugate, (Milano), Italy
LATVIA	SMC Pneumatics Latvia SIA, Dzelzavas str. 120g, Riga, LV-1021, Latvia
LITHUANIA	UAB “SMC Pneumatics”, Oslo g. 1, LT-04123 Vilnius, Lithuania
NETHERLANDS	SMC Pneumatics B.V.De Ruyterkade 120, NL-1011 AB Amsterdam, the Netherlands
NORWAY	SMC Pneumatics Norway AS, Vollsveien 13 C, GranfosNæringspark, N-1366 Lysaker, Norway
POLAND	SMC Industrial Automation Polska Sp. z o.o.ul. Konstruktorska 11A, PL-02-673 Warszawa, Poland
PORTUGAL	SMC España S.A. Zuazobidea 14, 01015 Vitoria, Spain
ROMANIA	SMC Romania S.r.l. StrFrunzei 29, Sector 2, Bucharest, Romania
RUSSIA	SMC Pneumatik LLC. Business centre, building 3, 15 Kondratjevskij prospect, St.Petersburg, Russia, 195197
SLOVAKIA	SMC PriemyselnáAutomatizáciaSpols.r.o. Fantranská 1223, Teplickanadvahom, 01301, Slovakia
SLOVENIA	SMC IndustrijskaAvtomatikad.o.o. Mirnskacesta 7, SLO-8210 Trebnje, Slovenia
SPAIN	SMC España S.A. Zuazobidea 14, 01015 Vitoria, Spain
SWEDEN	SMC Pneumatics Sweden AB,Ekhagsvägen 29-31, SE-141 71 Segeltorp, Sweden
SWITZERLAND	SMC Pneumatik AG,Dorfstrasse 7, Postfach, 8484 Weisslingen, Switzerland
TURKEY	SMC PnömatikSanayiTicaretveServis A.Ş. GülbaharCaddesi, Aydın Plaza, No: 9/4 Güneşli – 34212 , Istanbul
UK	SMC Pneumatics (U.K.) Ltd. Vincent Avenue, Crownhill, Milton Keynes, Buckinghamshire MK8 0AN, United Kingdom

SMC Corporation

URL : http// www.smcworld.com (Global) http// www.smceu.com (Europe)
'SMC Corporation, Akihabara UDX15F, 4-14-1, Sotokanda, Chiyoda-ku, Tokyo 101 0021
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