

Solenoid valve operation instructions

Directional control valves are precision-engineered control devices which should be transported and installed with care and protected from dropping and vibration.

Use for intended purpose

For functional reliability and the safe use of this solenoid valve observe all specified data and instructions on the data sheet, consignment note, nameplate and in these operation and maintenance instructions. Any use outside permitted tolerances and failure to comply with these operation instructions is not intended. Any damage due to this is solely the user's responsibility. No warranty or liability can be claimed if unauthorized interventions or changes are made to the valve or these operation instructions are not observed. The valve is only permitted for use with non-explosive fluids which do not attack the material either chemically or mechanically or which are released by BC-Systemtechnik.

Safety instructions

The safety instructions relate only to the individual solenoid valve. Combinations of the solenoid with other parts or components can give rise to other potential hazards which should be analyzed in a risk assessment of the plant in which the solenoid is installed. Before start-up, make sure that when the solenoid is actuated electrically for the first time fluid flowing from uncontrolled openings cannot be a source of danger.

The maximum surface temperature of the valve must always be lower than the ignition temperature of the potentially explosive atmosphere.

Explosion protection

Installation is only permitted in combination with a matching ATEX solenoid product of BC-Systemtechnik and is limited to the specification on the solenoid nameplate.

The user is responsible for the medium he uses. It should be noted that flammable or potentially explosive gases or liquids are not permitted for use with the valves. Exceptions must be permitted in writing. The maximum surface temperature of the non-electrical part depends on the operating temperature of the fluid and the general ambient temperature and must be lower than the ignition temperature and must not exceed the specified temperatures (e.g., ambient temperature of the solenoid).

The installation and operation of the valve in the plant must not constitute a potential source of ignition.

Other items to note:

- There should be no difference in the electric potential between the valve and other parts of the plant. The solenoid valve must be integrated in the equipotential bonding system of the facility. If necessary, a conducting connection must be provided between the valve and the other plant parts (e.g., by the pipeline).
- The pipeline must be free from particles that could charge electrically.

Depending on the medium carried, if the industrial solenoid valve is installed in the plant, electrostatic charge is possible as a consequence of the flow conditions. Such charges are normally dissipated by a separate cable connection or grounded via the electrically conducting piping system. Tapped holes for connecting a cable are provided in the housing of the solenoid valve.

Caution!

The surface of the electromagnet can become very hot in continuous service. Risk of injury!

Valves with NO function are open without control voltage applied. Take precautions to prevent escape of fluid. The valves are not protected against frost so they are not suitable for freezing fluids. Leak and strength tests with the valve open or closed are permitted up to 1.5 times the maximum operating pressure. Do not actuate the valve during the test.

Plug in connectors only when no voltage is supplied. A.C. solenoids which are not connected (without armature tube and solenoid armature) will be destroyed when actuated.

Installation

Before installing the solenoid valve, make sure that the technical specifications on the nameplate, e.g., operating pressure, voltage, current type, power consumption, operating and ambient temperatures, agree with the available conditions and specifications.

Make sure to install the solenoid valve in the correct position and flow direction. The valve is designed for a specific direction of flow and its function defined. Wrong installation will therefore damage the solenoid valve's function. This risk is reduced by indelible marking at the connections.

P for inlet, A for outlet and R for return flow and for 3/2 directional control valves for the second outlet. The preferred installation position is with upright solenoid. Compare the arrowed direction / connection marking (P,A,R) on the housing with the flow direction of the medium.

Install the solenoid valve clean and with care. Make sure that no foreign material such as packaging residue, sealant, welding scale, sand or chips from damaged or off-size thread enters the pipeline or the valve.

Flush the pipeline several times at different pressure intervals before installation. According to DIN 3394 and DIN EN 161, a dirt trap must be installed upstream any shutoff valve to ensure proper function with neutral media. Contamination can cause clogging of small pipelines such as at the pilot duct or the vent and impair or even block functions such as closing / opening of the valve.

If a valve with sleeve connection is installed, do not use the coil as lever. The connection flanges, including sealing materials and connectors are made to the standards common in pipeline construction and are the plant designer's responsibility.

Elements used in safety controls must be inspected for condition and function at regular intervals. This includes an inspection for wear and function of all parts. The inspection intervals depend on the conditions of use, such as contamination of the fluid, switching frequency, on-time, pressure and temperature. Depending on the efficiency alone or in combination, these factors can require shorter or permit extended maintenance intervals.

Start-up

Depending on the application and the medium carried, the surface temperature of the valve housing can be higher or lower than the ambient temperature. Plant designers normally insulate pipelines with high temperature differences to ambient temperature for reasons of energy. The housing of the industrial fitting should also be insulated. The magnetic coils should not be insulated because heat tends to accumulate and valve maintenance

would be unnecessarily complicated.

If the housing is insulated the risk of burning is minimized. The decision of whether insulation is or is not provided is made by the plant designer and is therefore his responsibility. A small residual risk remains due to the higher surface temperature at the magnetic coil which depends on the switching frequency.

Caution: The surface temperature can be higher than +100°C.

Caution: Start an A.C. solenoid only when it is installed on the iron part. If a solenoid is operated without iron part, the amperage is higher than permitted due to the winding and therefore the solenoid will be destroyed by heat.

Some valves have settable closing control which must be set when the valve is installed.

When this is not done professionally, there is the risk that the setting screw may be removed completely and fluid could escape through the tapped hole. Besides, the default setting of the closure time ensures that no or only slight pressure acts on the pipeline system up to the viscosity of the fluid transported. However, the viscosity of the transported medium may require adjustment of the default setting by the customer/plant operator. For this reason, the adjusting screw must not be fixed in position. Thus, the customer/plant owner is responsible that the mechanics adjust the setting of the screw as required when the equipment is commissioned in order to eliminate the risk that the screw can be removed completely.

Electrical connection

The solenoid systems of the standard range either have a plug connector, a customised cable or a terminal box at the magnetic coil. Before making the electric connection, make sure that the supplying mains voltage and frequency are suitable for the product as specified on the nameplate and the consignment note. The voltage tolerance is +/- 10 % according to VDE 0580.

The on-time is 100%. The operating time is the function at which the coil remains switched on until the load temperature is obtained. Protect all electrical connections from constant exposure to moisture. Provide efficient cover for outdoor installation of the valve. Protection class IP65 means that the product is only designed for brief stress due to moisture.

Have all electrical connections made by a skilled electrician. An absolute requirement for solenoid magnetic coils working in conjunction with an associated rectifier or electronic circuitry is that it is enclosed.

Caution: Operate an A.C. solenoid only in combination with the iron part. If a solenoid is operated without iron part, the solenoid will be destroyed by heat.

Otherwise observe the instructions for the solenoid. This is especially important for operating the solenoid in a potentially explosive atmosphere with ATEX BC solenoid.

Possible trouble:

Check flow direction, voltage, location and operating pressure.

• Valve not closing

- No or insufficient Δp or flow rate
- Control bores clogged
- Armature blocked
- Nominal voltage is still supplied
- Wrong installation position
- Arrowed direction is not the flow direction

• Valve not opening

- Diaphragm or tappet defective
- Relief bore clogged (check sealant or screw connection in outlet)
- Armature is not picked up (audible click)
- Supply voltage is interrupted or insufficient
- Solenoid coil or rectified defective
- Nominal voltage is different from coil voltage
- Armature is blocked in soiled armature space (if the armature fails to move to extreme lift position and the A.C. coil is excited, the coil will fail after a short time (thermal overload).

Maintenance

The solenoid valves should be maintained, inspected and installed only by authorized and qualified personnel. Basically, carry out work only on the cold and depressurized solenoid valve. The electromagnet must be disconnected from the voltage supply. Preventive maintenance is recommended depending on the operating conditions and if changes of switching times are noted.

The owner is responsible for fixing reasonable inspection and maintenance intervals as required by the operating conditions of the valve. Check the valve regularly for leaks and for proper function. All components should be inspected for wear during regular maintenance. The springs should be replaced latest after 1,000,000 switching cycles.

Deposits, dirt, old and worn seals or gaskets may cause valve failure. The seals on the solenoid should also be maintained to ensure that the protection class of the valve does not suffer.

Complete replacement kits are available for overhauling BC products. If you have problems with the installation, operation or maintenance or in case of questions, please contact BC. Actuate the valve regularly to make sure of its function.

Note concerning Pressure Vessel Directive 2014/68/EU

All valves are designed and constructed in conformity with the applicable EU directive (Pressure Vessel Directive). Valves without the CE label on the housing come under Article 3 of the Directive. They are designed and manufactured according to good engineering practice and the CE label must not be fixed to these valves.

Printed booklets, installation and operation instructions can be downloaded at our homepage www.bc-systemtechnik.de

Only the German version is legally valid.