

Pneumatic Control Valve Type 3249-1 and Type 3249-7



Ball-body version



Special version with packing

Fig. 1 · Type 3249-7 Control Valve with Type 3277 Pneumatic Actuator and integral positioner

Mounting and Operating Instructions

EB 8048 EN

Edition January 2005



Contents	Page
1	Design and principle of operation 4
2	Assembling valve and actuator 6
2.1	Assembly and adjustment 6
2.2	Option to pretension the springs for actuator version "Actuator stem extends" 7
3	Installation 8
3.1	Mounting position 8
3.2	Signal pressure line. 8
4	Operation 8
5	Maintenance 8
5.1	Replacing sealing parts or the plug 9
6	Description of nameplates 10
7	Customer inquiries 12

Note!

*Non-electrical actuators and valves do not have their own potential ignition source according to the risk assessment in the rare incident of an operating fault, corresponding to EN 13463-1: 2001 paragraph 5.2, and therefore do **not** fall within the scope of the European Directive 94/9/EC.*

Refer to paragraph 6.3 of EN 60079-14:1977 VDE 0165 Part 1 concerning connection to equipotential bonding system.



General safety instructions

- ▶ *The control valve may only be mounted, started up or serviced by fully trained and qualified personnel, observing the accepted industry codes and practices. Make sure employees or third persons are not exposed to any danger. All safety instructions and warnings in these mounting and operating instructions, particularly those concerning assembly, start-up and maintenance, must be observed.*
- ▶ *The control valves fulfill the requirements of the European Pressure Equipment Directive 97/23/EC. Valves with a CE marking have a declaration of conformity that includes information about the applied conformity assessment procedure.
The corresponding declaration of conformity can be viewed and downloaded on the Internet at <http://www.samson.de>.*
- ▶ *For appropriate operation, make sure that the control valve is only used in areas where the operating pressure and temperatures do not exceed the operating values which are based on the valve sizing data submitted in the order. The manufacturer does not assume any responsibility for damage caused by external forces or any other external influence! Any hazards which could be caused in the control valve by the process medium, operating pressure, signal pressure or by moving parts are to be prevented by means of the appropriate measures.*
- ▶ *Proper shipping and appropriate storage of the control valve are assumed.*
- ▶ **Caution!** *For installation and maintenance work on the valve, make sure the relevant section of the pipeline is depressurized and, depending on the process medium, drained as well. If necessary, allow the control valve to cool down or warm up to reach ambient temperature prior to starting any work on the valve.*
- ▶ *Prior to performing any work on the valve, make sure the supply air and control signal are disconnected or blocked to prevent any hazards that could be caused by moving parts.*
- ▶ *Special care is needed for pneumatic control valves when the actuator springs are pretensioned. These actuators are labeled correspondingly and can also be identified by three long bolts protruding from the bottom of the actuator. Prior to starting any work on the control valve, relieve the compression from the pretensioned springs.*

1 Design and principle of operation

The Type 3249 Angle Valve can be combined with either a Type 3271 or a Type 3277 Pneumatic Actuator with integral positioner attachment.

Standard version:

Angle valve in ball body design, with clamp connection of the bonnet without packing. The stem is sealed by means of an EPDM diaphragm with PTFE layer.

Special version:

Angle valve with screwed-on valve bonnet and additional V-ring packing made from EPDM with PTFE layer.

The standard valve body is equipped with welding ends for welding into pipelines. Special versions are equipped with threaded or flanged ends, or clamp connections.

The control valve body is designed without cavities, allowing it to be cleaned or sterilized prior to the production process according to the CIP (clean-in-place) or SIP (sterilization-in-place) method.

A test connection (4.4) on the special version with packing (4.2) enables monitoring for leakages or the diaphragm (6.3) to be pressurized with a sealing medium.

The process medium flows through the valve in the direction indicated by the arrow. The position of the plug (3) is adjusted by changing the signal pressure acting on the actuator diaphragm. The plug stem (6) is connected to the actuator stem (8.1) via the stem connector (7). The plug stem is sealed with the diaphragm (6.3), and the special version additionally with the backup packing .

Fail-safe position

Depending on how the springs (8.3) are arranged in the actuator, the control valve assumes two different fail-safe positions:

Actuator stem extends

When the pressure is relieved or the supply air fails, the actuator springs move the actuator stem downwards and close the valve. The valve is opened against the force of the springs when the signal pressure increases.

Actuator stem retracts

When the pressure is relieved or the supply air fails, the actuator springs move the actuator stem upwards and open the valve. The valve is closed against the force of the springs when the signal pressure increases.

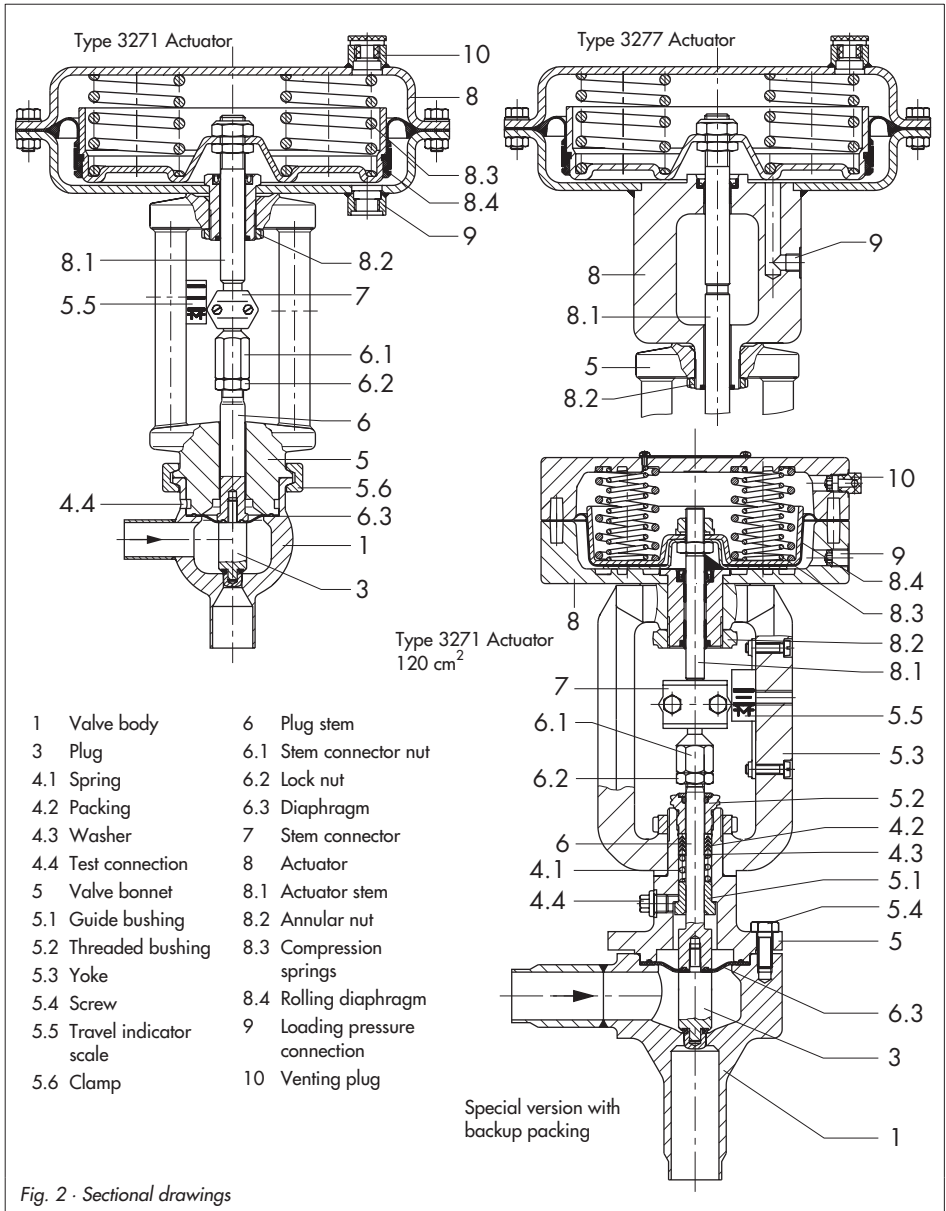


Fig. 2 · Sectional drawings

2 Assembling valve and actuator

Instead of the simple pneumatic actuator, it is also possible to attach an actuator with additional handwheel or an electric actuator.

The standard pneumatic actuator can be replaced by a pneumatic actuator in a different size.

If the travel range of the actuator exceeds that of the valve in the valve-actuator configuration, the manufacturer will adjust the spring assembly of the actuator such that the travels match.

2.1 Assembly and adjustment

If the valve and actuator have not been pre-assembled by the manufacturer or in the case that the original actuator attached to the valve is to be replaced by another actuator of a different type or size, proceed as follows:



Caution!

When you tighten or loosen the lock nut (6.2), make sure to use a wrench to hold the stem connector nut (6.1) stationary. Otherwise the plug stem may rotate and destroy the diaphragm.

1. Loosen the lock nut (6.2) and stem connector nut (6.1) on the valve. Firmly press the plug with the plug stem into the seat. Then thread down the lock nut and stem connector nut.
2. Remove clamps of the stem connector (7) and annular nut (8.2) on the actuator (8). Slide the annular nut over the plug stem.
3. Place the actuator on the valve bonnet (5) and screw tight using the annular nut (8.2).
4. Read the nameplate on the actuator to determine which bench range (e.g. 0.2 to 1 bar or 0.6 to 1 bar) and which direction of action (e.g. "Actuator stem extends") apply.

The direction of action (fail-safe action) "Actuator stem extends" or "Actuator stem retracts" is indicated on the nameplate by FA or FE on the Type 3271 Actuator and by the appropriate symbol on the Type 3277 Actuator.

The lower bench range corresponds to the lower signal pressure range to be adjusted; the upper bench range corresponds to the upper signal pressure range.

5. For actuators with fail-safe action "Actuator stem extends", apply the pressure corresponding to the lower signal pressure range (e.g. 0.2 or 0.6 bar) to the loading pressure connection on the bottom diaphragm chamber.
For actuators with fail-safe action "Actuator stem retracts", apply the pressure corresponding to the upper signal pressure range (e.g. 1 bar) to the loading

pressure connection on the top diaphragm chamber.

6. Turn the stem connector nut (6.1) by hand until it touches the actuator stem (8.1) and then turn it a further 1/4 turn. Screw tight the lock nut.
7. Position clamps of the stem connector (7) and fasten.

Align travel indicator scale (5.3) with tip of the stem connector; for actuators with "Actuator stem extends" align it with lower marking (valve closed) and for actuators with "Actuator stem retracts" align it with top marking (valve open).

Note concerning dismantling the actuator:

On dismantling an actuator with "Actuator stem extends" and especially when an actuator has pretensioned springs, first apply pressure slightly higher than the lower bench range value (see nameplate on actuator) to the loading pressure connection on the bottom diaphragm chamber before loosening the annular nut (8.2).

2.2 Option to pretension the springs for actuator version "Actuator stem extends"

To achieve a greater thrust, the springs of actuators can be pretensioned by 12.5 % or by up to 25 % (for 350 cm²) of their travel or their bench range.

If, with a bench range of 0.2 to 1 bar, the springs are to be pretensioned by 0.1 bar, for example, the bench range is shifted by 0.1 bar, resulting in a new bench range of 0.3 to 1.1 bar (0.1 bar corresponds to a compression of 12.5 %).

Then adjusting the valve, a signal pressure of 0.3 bar is to be set as the lower signal pressure range. The new bench range of 0.3 to 1.1 bar must be marked on the nameplate as bench range with pretensioned springs.

Note!

The springs have already been pretensioned by 50 % for valves in nominal sizes DN 15 to 25 with 7.5 mm travel, bench range 0.6 to 1 bar and fail-safe position "Actuator stem extends".

Caution!

Actuators with springs that have already been pretensioned by the manufacturer without attachment to a valve are marked by an appropriate label.

In addition, such actuators can be identified by three bolts and nuts protruding from the bottom diaphragm case.

3 Installation

3.1 Mounting position

The valve must be installed upright with the actuator on top.

Note!

Remove the clamp (5.4) first and take the entire bonnet assembly off the valve body before welding (valve version with welding ends) in the pipeline.

Note!

Always install the valve free of stress. If necessary, support the pipes close to the connections. Do not attach any supports on the valve or actuator.

Thoroughly flush out the pipeline before installing the valve. Remove the stopper from the test connection (4.4) to allow any leakage that may occur at the diaphragm (6.3) to be monitored.

3.2 Signal pressure line

Connect the signal pressure line for valves with actuator version "Actuator stem extends" to the loading pressure connection on the bottom diaphragm case, and for valves with actuators "Actuator stem retracts" to the loading pressure connection on the top diaphragm case.

The lower connection of Type 3277 Actuator is located on the yoke of the bottom diaphragm case.

4 Operation

(e.g. reversing the direction of action, etc.)

For details, refer to the Mounting and Operating Instructions of the respective pneumatic actuator.

EB 8310 EN for Type 3271 and
EB 8311 EN for Type 3277.

5 Maintenance

The control valve is subject to natural wear in particular at the seat and plug. Depending on the operating conditions, the valve must be checked at regular intervals to prevent problems occurring.

If leakage occurs, this could be caused by a damaged diaphragm (6.3) or the PTFE V-ring packing (4.2) may be defective in the special version.

If the valve does not seal properly, the tight shut-off may be impeded by dirt or other impurities caught between the seat and plug, or by damaged seating surfaces.

Remove the parts, clean them thoroughly and replace them with new ones, if necessary.



Caution!

Before servicing or disassembling the control valve, depressurize the concerned section of the plant and drain it.

Wait until the medium has cooled down, if necessary.

Caution!

As valves are not free of cavities, there might still be residual medium in the valve. We recommend removing the valve from the pipeline or remove the entire valve assembly when the valve is welded in the pipeline. On performing any work on the valve body, first shut off the supply pressure, disconnect the supply pressure line and remove the actuator.

5.1 Replacing sealing parts or the plug

Note!

Prior to performing any work on the valve body, remove the actuator first.

1. Apply pressure higher than the lower bench range (see nameplate) to the actuator.
2. Remove clamps of the stem connector (7) between actuator stem and plug stem and unscrew annular nut (8.2).
3. Lift the actuator off the valve.
4. Remove nuts (6.1 and 6.2).
5. Take off the clamp (5.6) or unscrew the screws (5.4) on the valve bonnet in the special version with packing. Remove carefully the valve bonnet (5) together with plug (3) and diaphragm (6.3). In the special version with packing, also unscrew the threaded bushing (5.2).
6. Pull plug and diaphragm out of the valve bonnet.
Remove the stopper from the test con-

nection (4.4) in the special version.

Unscrew threaded bushing (5.2), remove packing rings (4.2), washer (4.3) and spring (4.1).

Carefully clean the packing chamber.

7. Hold the plug stationary with a suitable tool (SAMSON order no. 1281-0035) and unscrew the plug stem. (Screw connection is stuck with adhesive. It may be necessary to use a hot-air fan).
8. Replace damaged plug and diaphragm with new ones.
9. Carefully degrease the threaded part of the plug and female thread of the plug stem.
Slide new diaphragm onto the plug and apply lubricant (order no. 1400-6991) sparsely to the diaphragm surface that touches the stem.
Apply adhesive to the threaded part (order no. 8121-9004).

Note: If the surface to be stuck is sprayed with activating agent (order no. 8121-9019) beforehand, the hardening time is shortened to one hour. Without the agent, it takes at least 12 hours for the adhesive surfaces to harden.

If you use the old plug, remove any remaining adhesive and degrease the threaded part of the plug!

10. Place the plug in a suitable clamp to prevent it from being damaged and screw the plug onto the end of the plug stem using the two locking nuts with a tightening torque of 10 Nm for DN 15 to 25 and 70 Nm for DN 32 to 50.

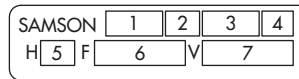
Note!

For DN 15 to 25, check the concentricity of the plug to the plug stem. The deviation may not exceed 0.04 mm.

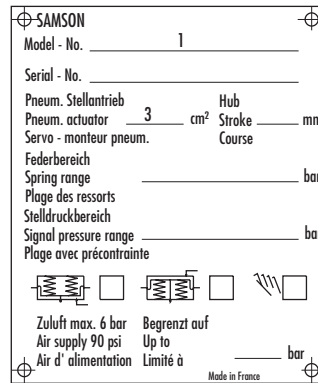
11. Insert the assembled plug into the valve bonnet.
In the special version with packing, slide the spring (4.1), washer (4.3) and new packing rings over the plug stem into the packing chamber.
Insert the threaded bushing (5.2) and tighten it as far as it will go.
12. Apply the lubricant suitable for food processing purposes (order no. 8150-9002) to the clamp (5.6) and the flanges of the valve bonnet and valve body.
Carefully place the valve bonnet on the valve body.
13. Place the clamp in position and tighten the clamp screw.
Hit the clamp lightly with a plastic hammer and tighten the clamp screw again.
Repeat this procedure several times to tighten the clamp as far as it will go.
14. Thread the lock nut (6.2) and nut (6.1) loosely onto the plug stem (6).
15. Mount actuator and adjust the lower or upper bench range as described in section 2.

6 Description of nameplates

Nameplate of Type 3271 Actuator



Nameplate of Type 3277 Actuator



- 1 Type designation
- 2 Modification index
- 3 Effective diaphragm area
- 4 Operating mode:
For Type 3271: FA Actuator stem extends
FE Actuator stem retracts
For Type 3277: Left: Actuator stem extends
Right: Actuator stem retracts
- 5 Travel
- 6 Bench range (spring range)
- 7 Bench range with pretensioned spring

Fig. 3 · Actuator nameplates

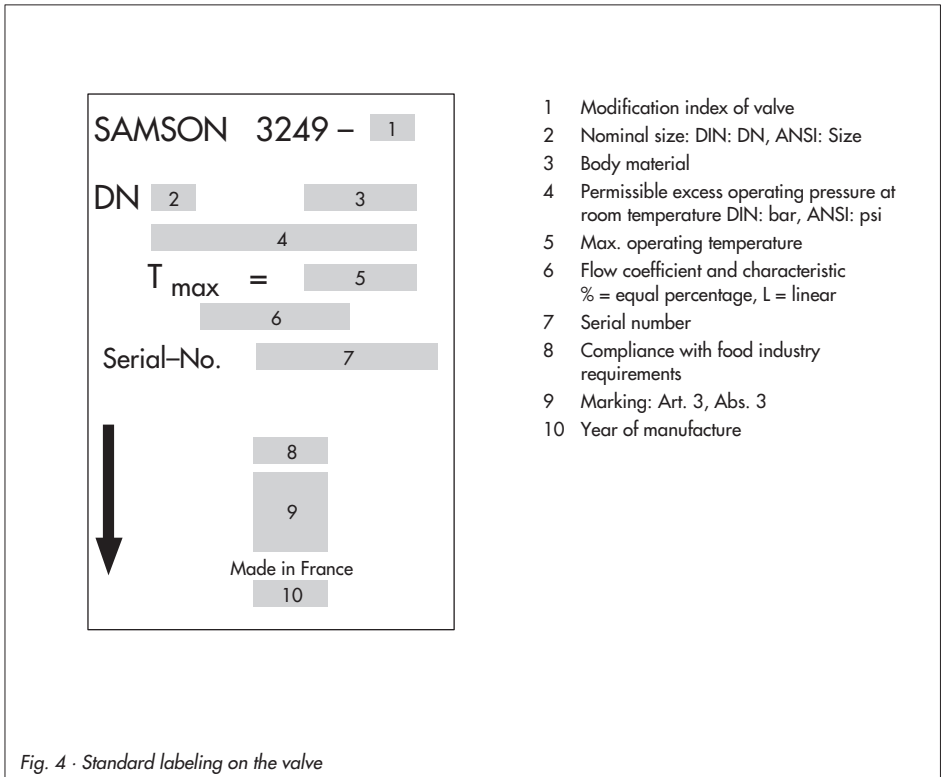


Fig. 4 · Standard labeling on the valve

7 Customer inquiries

Please submit the following details:

- ▶ Type designation and serial number
- ▶ Nominal size and version of the valve
- ▶ Pressure and temperature of the process medium
- ▶ Flow rate in m³/h
- ▶ Bench range of the actuator (e.g. 0.2 to 1 bar)
- ▶ Installation drawing

Dimensions

Refer to the Data Sheet T 8048 EN for the dimensions and weights of the various valve versions.



SAMSON AG · MESS- UND REGELTECHNIK
Weismüllerstraße 3 · 60314 Frankfurt am Main
Phone: +49 69 4009-0 · Fax: +49 69 4009-1507
Internet: <http://www.samson.de>

EB 8048 EN

S/Z 2005-02