

Pneumatic Control Valves Type 3256-1 and Type 3256-7



Fig. 1 · Type 3256-1 Control Valve

Mounting and Operating Instructions

EB 8065 EN

Edition October 2003



Contents	Page
1. Design and principle of operation	4
2. Assembling valve and actuator	6
2.1 Assembly and adjustment	6
2.2 Option of pretensioning for "Actuator stem extends"	7
2.3 Different rated travels of valve and actuator	7
3. Installation	8
3.1 Mounting position	8
3.2 Signal pressure line	8
3.3 Strainer, bypass	9
3.4 Test connection	9
4. Operation	9
5. Maintenance – Replacing parts	9
5.1 Replacing parts of standard valves	10
5.1.1 Packing	10
5.1.2 Seats and/or plugs	11
5.2 Replacing parts of valves with metal bellows seal	12
5.2.1 Packing	12
5.2.2 Metal bellows	13
5.3 Replacing parts of valves with insulating section	13
5.4 Disassembling the flow divider	13
6. Description of nameplates	14
7. Customer inquiries	15

Note!

*Non-electrical control valves which do not have a valve body lined with an **insulating material coating** 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.*

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 instructions, particularly those concerning installation, 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 which includes information about the applied conformity assessment procedure. The declaration 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 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 or by moving parts are to be prevented by means of the appropriate measures.*
- ▶ *Proper shipping and appropriate storage are assumed.*

Caution!

- ▶ *For installation and maintenance work on the control valves, make sure the relevant section of the pipeline is depressurized and, depending on the process medium used, drained as well. If necessary, allow the valve to cool down or warm up to reach ambient temperature prior to starting any work on it.*
- ▶ *Before carrying out any work on the valve, make sure the supply air and control signal are disconnected or interrupted to prevent any hazards from occurring due to moving parts in the control valve.*
- ▶ *Special care is needed when the valve is fitted with an actuator with pre-tensioned springs. These actuators are labeled correspondingly and can also be identified by three long bolts at the bottom of the actuator. Prior to starting any work on the valve, you must relieve the compression from the pre-tensioned springs.*

1. Design and principle of operation

The Type 3256-1 and Type 3256-7 Pneumatic Control Valves consist of a single-seated Type 3256 Angle Valve and either a Type 3271 or Type 3277 Pneumatic Actuator.

The process medium flows through the valve in the direction indicated by the arrow on the valve body. The position of the plug (3) is changed by the signal pressure acting on the diaphragm in the actuator (8).

The plug stem (6) and plug are connected with the actuator stem (8.1) via the stem connector (7). It is sealed by a spring-loaded PTFE V-ring packing (4.2) or by adjustable HT packings.

Fail-safe action:

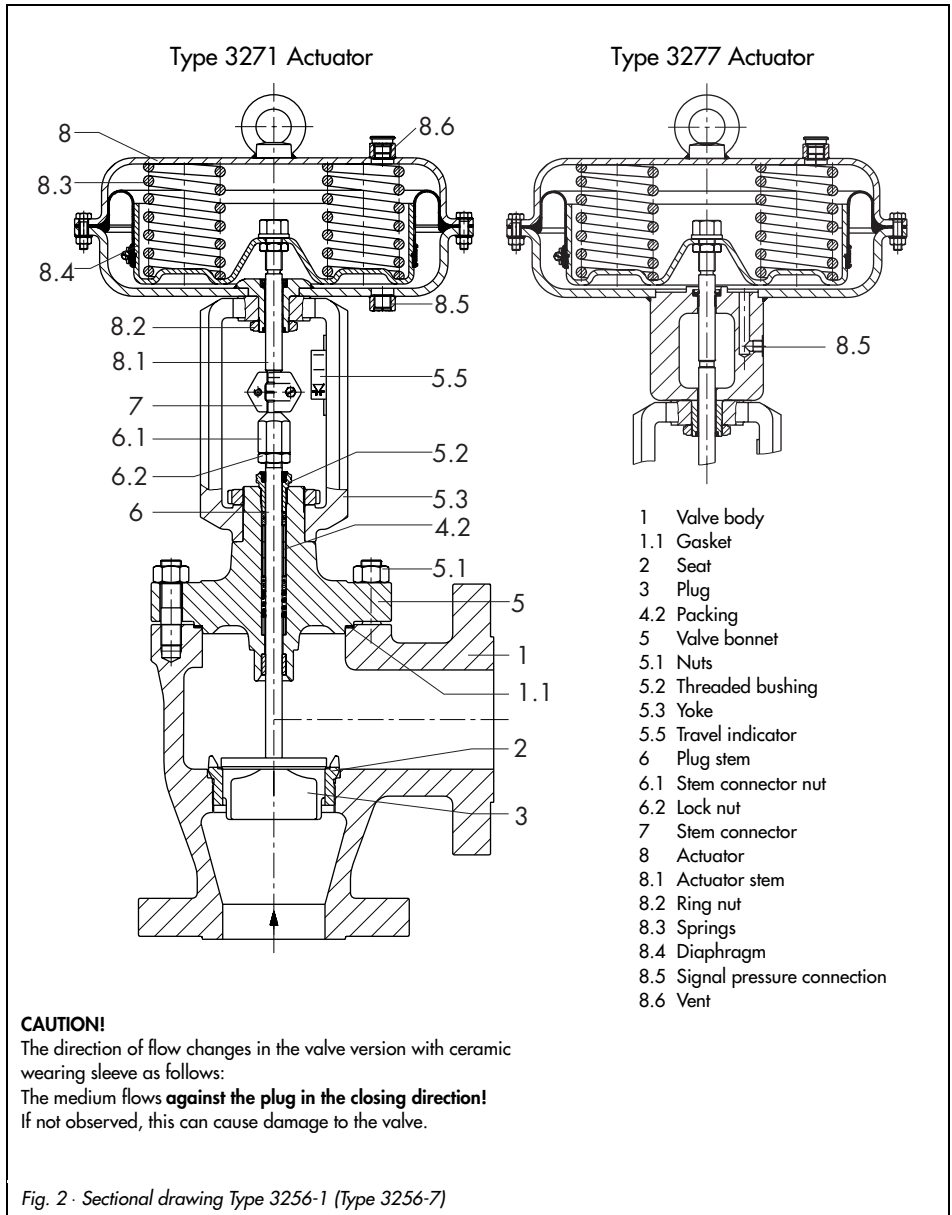
Depending on the arrangement of the compression springs (8.3) in the actuator, the control valve provides two different types of fail-safe actions:

Actuator stem extends:

When the signal pressure is reduced or the supply air fails, the springs move the actuator stem downward, closing the valve. The valve opens when the signal pressure increases, acting against the spring force.

Actuator stem retracts:

When the signal pressure is reduced or the supply air fails, the springs move the actuator stem upwards, opening the valve. The valve is closed when the signal pressure increases, acting against the spring force.



2. Assembling valve and actuator

Instead of the simple pneumatic actuator, a pneumatic actuator with additional handwheel, or an electric actuator can also be attached to the valve.

With all nominal sizes, the standard pneumatic actuator can be replaced with a smaller or larger actuator.

If the travel range of the actuator is larger than that of the valve, the springs in the actuator are pretensioned by the manufacturer so that the travel ranges match.

Each valve is equipped with the accessories required for mounting the standard actuator. If you plan to use a different actuator, the necessary mounting parts must be ordered together with the actuator.

For the necessary parts and their part numbers, refer to overview 1600-0501 to 0550 which is available on request. The original parts are then replaced with these additionally supplied parts.

2.1 Assembly and adjustment

If the valve and actuator have not been assembled by the manufacturer, or the original actuator is replaced with another type or size of actuator, proceed as follows:

1. Loosen the lock nut (6.2) and the stem connector nut (6.1) on the valve. Press plug and plug stem firmly into the seat ring, then thread stem connector nut and lock nut down.
2. Remove the stem connector clamps (7) and the ring nut (8.2) from the actuator. Slide the ring nut over the plug stem of the valve.

3. Place the actuator on the yoke (5.3) and secure with the ring nut (8.2).

4. Read the actuator's nameplate for the actuator's bench range (or bench range with pretensioned springs) and fail-safe action (e.g. 0.2 to 1 bar and "Actuator stem extends").

The lower bench range value (0.2 bar) to be adjusted corresponds to the initial value of the bench range, whereas the upper range value (1 bar) corresponds to the final value of the bench range. The fail-safe action "Actuator stem extends" or "Actuator stem retracts" is marked with the letters FA or FE, resp., on the Type 3271 Actuator, and with symbols on the Type 3277 Actuator.

5. For actuators with **Actuator stem extends**, apply a signal pressure that corresponds to the lower bench range value (e.g. 0.2 bar) to the lower diaphragm chamber connection.

For actuators with **Actuator stem retracts**, apply a signal pressure that

corresponds to the upper bench range values (e.g. 1 bar) to the upper diaphragm chamber connection.

5. Turn the stem connector nut (6.1) by hand until it touches the actuator stem (8.1). Make another quarter of a turn and secure this position with the lock nut (6.2).
6. Attach the stem connector clamps (7) and screw tight. Align the travel indicator scale (5.5) with the tip of the stem connector.

Note concerning removing actuators:

When removing an actuator from a valve, especially an actuator with pretensioned springs, the signal pressure connection must be pressurized first with a pressure that is slightly higher than the lower bench range value (see actuator nameplate) before the ring nut (8.2) can be loosened.

2.2 Option of pretensioning for "Actuator stem extends"

To increase the positioning force, you can pretension this type of actuator by up to 25 % of its travel or bench range during valve adjustment.

If you require, for example, a pretension of 1 bar for a bench range of 0.2 to 1 bar, the bench range shifts by 0.1 bar to range up to 0.3 bar (0.1 bar corresponds to a pretensioning of 12.5 %).

When adjusting the valve, the lower bench range value must now be set at 0.3 bar. The bench range of 0.3 to 1.1 bar must be recorded on the nameplate as bench range with pretensioning springs.

2.3 Different rated travels of valve and actuator

Valve with actuator "Actuator stem extends"

Note!

Actuators with pretensioned springs must always be used when the valve's rated travel is smaller than the rated travel of the actuator.

Example:

Valve size DN 100 with a rated travel of 30 mm and 1400 cm² actuator with a rated travel of 60 mm, bench range (spring range) 0.4 to 2 bar.

1. Set the signal pressure required for pretensioning to 1.6 bar which is slightly higher than the signal pressure of 1.2 bar (1.2 to 2 bar) that corresponds to the actuator's mid-travel (30 mm).

2. Thread on the stem connector nut (6.1) until it touches the actuator stem.
3. Secure this position with the lock nut and mount the stem connector as described in section 2.1.
4. Write the bench range of 1.6 to 2.4 bar valid for the mounted valve on the actuator's nameplate.

Valve with actuator "Actuator stem retracts"

Note!

The springs of actuators with "Actuator stem retracts" cannot be pretensioned.

If you combine a valve with a larger actuator (rated actuator travel higher than rated valve travel), only the first half of the actuator's bench range can be used.

Example:

Nominal valve size DN 100 with a rated travel of 30 mm and a 1400 cm² actuator with a rated travel of 60 mm, bench range 0.2 to 1 bar:

At half of the valve travel, the usable bench range is between 0.2 and 0.6 bar.

Caution!

Actuators which have already been pretensioned by the manufacturer are labeled correspondingly.

Additionally, they can also be identified by three long bolts at the bottom actuator case.

3. Installation

3.1 Mounting position

The valve and actuator can be mounted in any position, however, for valves with DN 100 and larger, the valve should be installed horizontally with the actuator pointing upward to make maintenance routines easier.

In cases where the actuator weighs more than 50 kg or the control valves are fitted with an insulating section or bellows seal, the actuator needs to be supported or suspended.

Important!

The valve must be installed free of stress.

Flush the pipeline thoroughly prior to installing the valve.

Note!

Control valves with insulating section or bellows seal may only be insulated up to the cover flange of the valve body for medium temperatures below 0 °C as well as temperatures above 220 °C.

Valves that should meet the requirements of NACE MR 0175 standard should not be insulated.

3.2 Signal pressure line

For valves with actuator "Actuator stem extends", connect the signal pressure line to the lower diaphragm case, and for valves with actuator "Actuator stem retracts" to the upper diaphragm case.

With Type 3277 Actuator, the lower connection is located on the side of the yoke on the lower diaphragm case.

3.3 Strainer, bypass

We recommend that you install a strainer upstream of the control valve.

Ideally, hand-operated shut-off valves upstream of the strainer and downstream of the control valve as well as a bypass line should be installed so that the plant does not have to be shut down for maintenance routines.

3.4 Test connection

Versions with metal bellows (Fig. 5) are equipped with a test connection (11.1) at the upper flange. This allows the tightness of the bellows to be checked.

Especially for applications with liquids and vapors, you should install a suitable leakage indicator (e.g. contact pressure gauge, drain into an open vessel or sight-glass).

4. Operation

(e.g. reversing the operating direction, etc.) Please refer to the Mounting and Operating Instructions EB 8310 EN for the Type 3271 Pneumatic Actuator and EB 8311 EN for the Type 3277 Actuator.

5. Maintenance – Replacing parts

The control valve is subject to normal wear, especially at the seat, plug and packing. Depending on the application conditions that prevail, the valve must be inspected at appropriately scheduled intervals to prevent any problems before they occur.

If any leakage occurs to the atmosphere, this may be because the packing is leaking.

If the valve does not seal properly, this may be because tight shut-off is prevented by dirt between the seat and plug or because the seating surface is damaged.

We recommend that you disassemble the parts, thoroughly clean them and replace them, if necessary.



Note!

Before servicing or disassembling the control valve, first relieve the corresponding section of the plant of pressure and, depending on the process medium, drain it as well.

Let the plant section cool down to reach ambient temperature, if necessary.

As the process medium cannot drain completely out of the valve, be aware that some of the process medium could still be in the valve. This is particularly the case for valves with insulating sections.

We recommend that you remove the valve from the pipeline.

Important! *On carrying out any work on the valve, first disconnect the signal pressure, remove the signal pressure line and remove the actuator from the valve.*

Note on SAMSON special tools

Suitable seat wrenches and special tools as well as the appropriate tightening torques can be found in EB 029 EN (formerly WA 29 EN). The instructions can be viewed on the Internet at http://www.samson.de/pdf_en/e00290en.pdf.

Disassembling the actuator:

1. Then remove the stem connector (7) and unscrew the ring nut (8.2).
For actuators "Actuator stem extends" and especially for actuators with pre-tensioned springs, apply a signal pressure that is higher than the lower bench range value (see nameplate) to the actuator.
2. Lift the actuator off the valve yoke.

5.1 Replacing parts of standard valves

5.1.1 Packing

If the packing (4) leaks, its V-ring packing parts (4.2) and sealing parts (4.5 and 4.6) must be replaced as described below:

Disassembly

1. Screw off nuts (5.1) and lift the valve bonnet (5) including the plug stem and plug off the body.
2. Unscrew the stem connector nut and the lock nut (6.1 and 6.2) from the plug stem. Unthread the threaded bushing (5.2) out of the stuffing box.
3. Pull the plug and plug stem from the valve bonnet.
4. Take all the packing parts from the packing chamber using a suitable tool. Replace damaged parts.
Thoroughly clean the packing chamber.

Assembly

1. Apply lubricant (order no. 8150-0111) to all parts as well as to the plug stem (6). Do not use lubricant for graphite packings.
2. Install plug in the valve body and insert a new gasket (1.1).
3. Carefully slide the valve bonnet over the plug stem and place it on the valve body. Secure with nuts (5.1).
4. Carefully slide the packing parts over the plug stem into the packing chamber. Make sure you keep the proper order. Depending on the nominal size, the number of bushings (4.3) may vary.

5. Screw in the threaded bushing (5.2) and tighten.
For high-temperature packings, tighten the threaded bushing only slightly. In case of leakage, tighten only slightly as well.
6. Screw the lock nut (6.2) and the stem connector nut (6.1) on the plug stem without tightening them.

7. Mount the actuator as described in section 2.1 and adjust the lower and upper bench range.

5.1.2 Seats and/or plug

When replacing the seat or plug, you should also replace the packings (4.2 or 4.5 and 4.6).

Seat:

1. Remove the nuts (5.1) and lift the valve bonnet (5) including plug stem and plug off the valve body.
2. Unscrew seat (2) using a suitable seat wrench (see EB 029 EN).
3. Apply lubricant (order no. 8150-0119) to the thread and the sealing conus of the new seat (or the old one after it has been cleaned or reworked) and screw it in.
The tightening torques for the seats are also listed in EB 029 EN.

Plug:

1. Remove the nuts (5.1) and lift the valve bonnet (5) including plug stem (6) and plug off the valve body (1).
2. Unscrew nuts (6.1, 6.2) and threaded bushing (5.2).
3. Pull the plug out of the valve bonnet.
4. Replace the used plug with a new plug (3) and plug stem (6).
It may be possible to use the old plug again after it has been remachined.
Apply lubricant (order no. 8150-0119) to the plug stem (6) before you insert it.

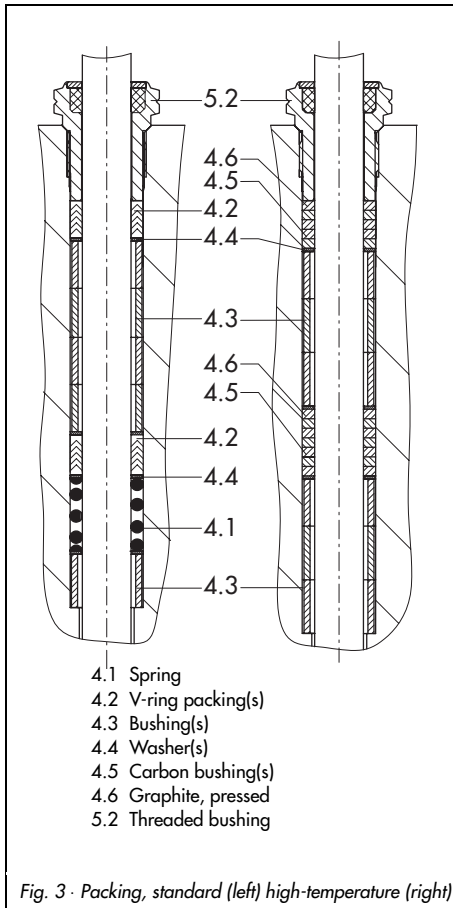
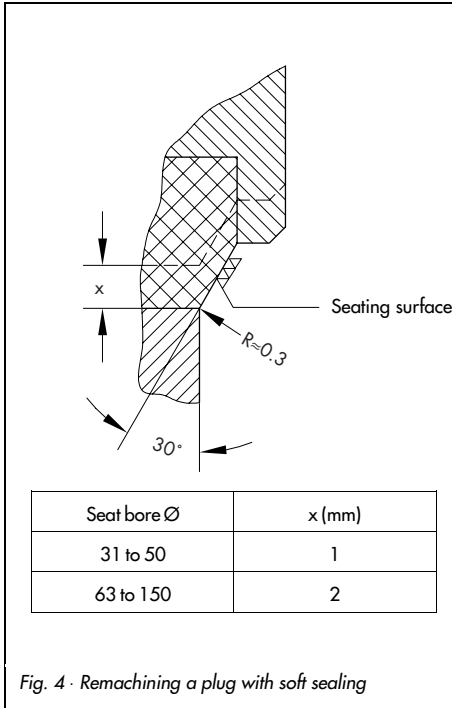


Fig. 3 · Packing, standard (left) high-temperature (right)

Remachining the plug

The plug can be machined when the plug's seating surface is slightly damaged. Plugs with a soft sealing can only be machined up to the dimension x (Fig. 4).

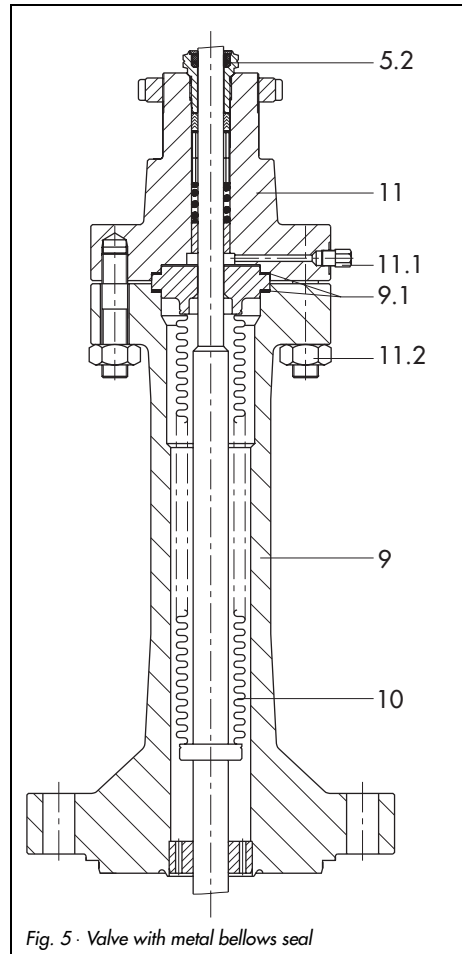


- Legend to Fig. 5
- 9 Intermediate piece
 - 9.1 Gasket
 - 10 Metal bellows
 - 10.1 Bellows flange
 - 11 Bonnet
 - 11.1 Test connection
 - 11.2 Nut

5.2 Replacing parts of valves with metal bellows seal

5.2.1 Packing

Replace parts as described for standard valves in section 5.1.1. However, observe the



following difference: remove nuts (11.2) and separate the bonnet (11) from the intermediate piece (9). Replace gasket (9.1). The bonnet **must not** be separated from the intermediate piece for any other purpose than the replacement of packings!

5.2.2 Metal bellows

The metal bellows (10) can only be replaced as complete bellows seal together with the plug stem. To do this, proceed as described in section 5.1.2 (Fig. 5).

Caution!

Torque must not be transmitted to the metal bellows during disassembly and reassembly of the bellows seal.

5.3 Replacing parts of valves with insulating section

Replace the packings as described for standard valves in section 5.1.1.

Replace the seat and plug as described for standard valves in section 5.1.2.

5.4 Disassembling the flow divider

For versions with flow divider, the flange gasket (1.1) and shims (1.2) must be replaced with new ones each time the flow divider is disassembled.

The number of shims and, hence, the dimension x must be determined when a new gasket is used:

First determine the dimension A, then the dimension B.

The dimension x results from the difference $A - B$ and must be filled out with shims (0.5 mm or 2 mm thick).

The maximum compression should be approximately 0.5 mm.

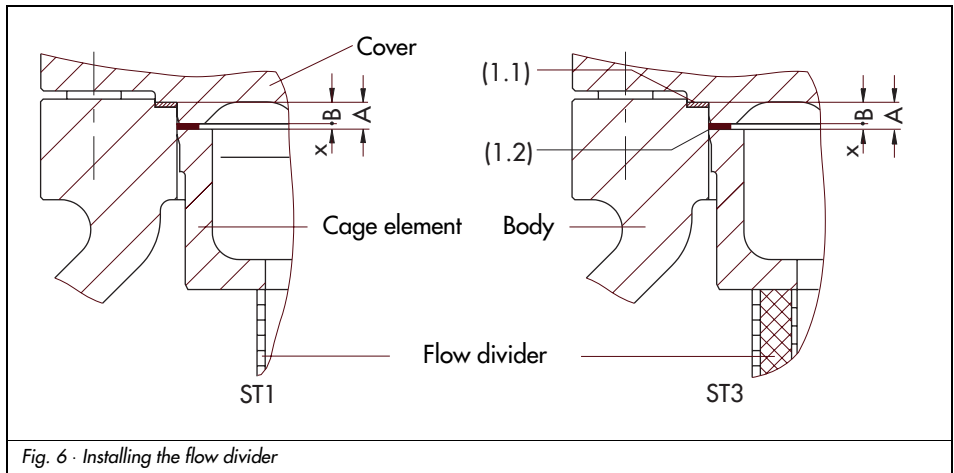
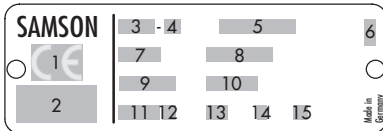


Fig. 6 · Installing the flow divider

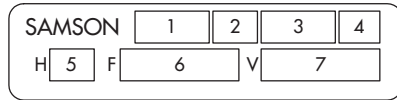
6. Description of nameplates

Valve nameplate



- 1 CE marking or "Art. 3, Abs. 3" (see article 3, § 3 of PED), where applicable
- 2 Ident. number of notified body, fluid group and category, where applicable
- 3 Type designation
- 4 Modification index of valve
- 5 Material
- 6 Year of manufacture
- 7 Nominal size: DIN: DN, ANSI: Size
- 8 Perm. operating pressure at room temperature DIN: PN, ANSI: CL
- 9 Order number with modification index
- 10 Item position on order
- 11 Flow coefficient:
DIN: Kvs value, ANSI: Cv value
- 12 Characteristic:
% equal percentage, **Lin** linear,
DIN: **A/Z**, ANSI: **O/C** for quick opening
- 13 Sealing:
ME metal, **ST** stellited, **Ni** nickel plated
PT soft sealing with PTFE,
PK soft sealing with PEEK
- 14 Pressure balancing: DIN: **D**, ANSI: **B**
- 15 I or III flow divider

Type 3271 Actuator nameplate



- 1 Type designation
- 2 Modification index
- 3 Effective diaphragm area
- 4 Fail-safe action:
FA Actuator stem extends
FE Actuator stem retracts
- 5 Travel
- 6 Bench range (spring range)
- 7 Bench range with pretensioned springs

Type 3277 Actuator nameplate

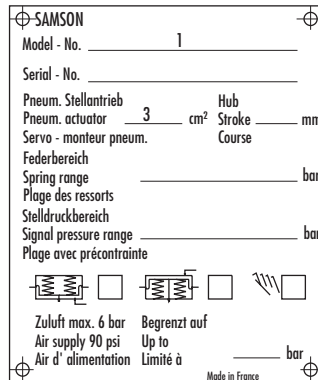


Fig. 7 · Nameplates

7. Customer inquiries

Should you have any questions regarding the control valve, please submit the following details:

- ▶ Order number
- ▶ Type, model number, nominal size and valve version
- ▶ Pressure and temperature of the process medium
- ▶ Flow rate in m³/h
- ▶ Bench range (e.g. 0.2 to 1 bar) of the mounted actuator
- ▶ Has a strainer been installed?
- ▶ Installation drawing

Note!

For dimensions and weights of the different valve versions, refer to the Data Sheet T 8065 EN.



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

EB 8065 EN