

**Pneumatic Steam Converters
Type 3281-1 and Type 3281-7
Type 3286-1 and Type 3286-7**

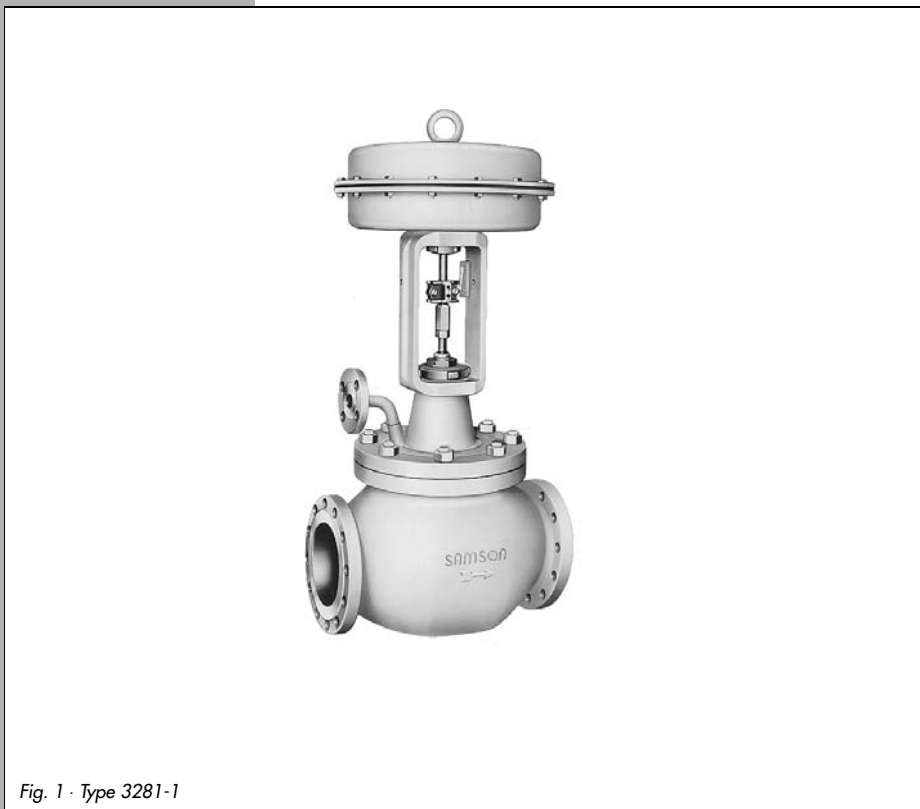


Fig. 1 · Type 3281-1

**Mounting and
Operating Instructions**

EB 8251 EN

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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 valve fulfills the requirements of the European Pressure Equipment Directive 97/23/EC. Valves with a CE marking have a declaration of conformity that includes information on 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, signal 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 valve, make sure the relevant section of the pipeline is depressurized and, depending on the process medium used, 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.*
- ▶ *When working on the valve, make sure that the supply lines for the air supply as well as the control signal are disconnected to prevent any hazards that could be caused by moving parts.*
- ▶ *Special care is needed when the actuator springs are pre-tensioned. These actuators are labeled correspondingly and can also be identified by three long bolts on the bottom actuator case. Prior to starting any work on the valve, you must relieve the compression from these pre-tensioned springs.*

1. Design and principle of operation

The Type 3281-1 and Type 3281-7 as well as Type 3286-1 and Type 3286-7 Pneumatic Steam Converter consist of either the Type 3281 Globe Valve or Type 3286 Angle Valve together with either the Type 3271 or Type 3277 Pneumatic Actuator.

The process medium flows through the valve in the direction indicated by the arrow. The position of the plug (3) determines the flow rate through the valve seat (2) as well as the pressure p_2 .

The plug (3) is moved by changing the signal pressure acting on the diaphragm of the actuator (8).

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

The spray water is fed to the flow divider (13) through the connecting pipe (5.5) and then through the holes in the cage element (13.1).

After passing the throttling area between the valve seat and plug, the steam flow rate reaches its maximum velocity and comes into contact with the spray water on the inside wall of the flow divider (13). The steam and the water which is carried along with the steam are split up and mixed in the closely meshed wire of the flow divider. At the same time, the steam velocity is reduced. The heat released during this process is transferred over the large surface area of the wire mesh to the spray water which leads to fast evaporation. The mixture of water and steam exits the flow divider as fine mist with a high steam content. The re-

maining evaporation process is completed shortly downstream of the steam-converting valve.

Fail-safe position:

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

Actuator stem extends:

When the signal pressure is reduced or the supply air fails, the springs move the actuator stem downwards, closing the valve.

The valve opens as the signal pressure increases and overcomes the force exerted by the actuator springs.

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 closes as the signal pressure increases and overcomes the force exerted by the actuator springs.

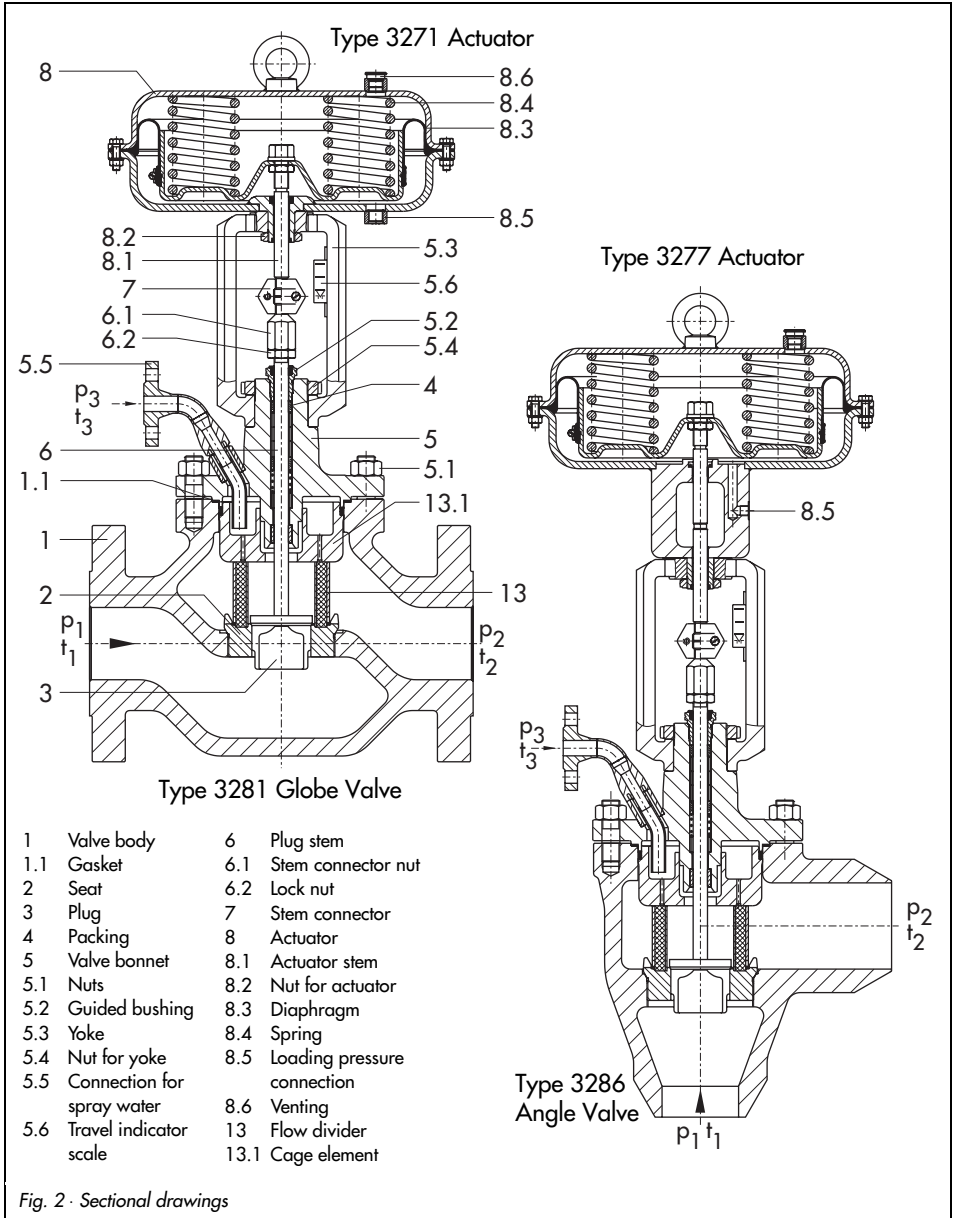


Fig. 2 · Sectional drawings

2. Assembling the valve and actuator

A pneumatic actuator with an additional handwheel or an electric actuator can be mounted to the valve in place of the simple pneumatic actuator.

The standard pneumatic actuator can be replaced by a larger or smaller actuator, regardless of the nominal valve size.

If the travel range of the actuator is larger than that of the valve in a valve/actuator combination, the spring assembly in the actuator is preloaded by the manufacturer to make the travels match.

Each valve is equipped with the parts required for mounting its standard actuator. If you intend using a different actuator, the matching mounting parts need to be ordered together with the actuator.

The necessary parts with their order numbers can be found in the overview sheet **1600-0501...0550** available on request. These additionally delivered parts are then used instead of the original parts.

2.1 Assembly and adjustment

If the actuator has not already been mounted by the manufacturer on the valve or you intend replacing the original actuator with an actuator of a different sort or size, proceed as follows to mount the actuator on the valve:

1. Loosen the lock nut (6.2) and stem connector nut (6.1) at the valve.
Firmly press the plug and plug stem into the seat ring, then thread the stem connector nut and lock nut downwards.
2. Unscrew the coupling parts (7) of the stem connector 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 screw tight using the ring nut (8.2).
4. Read the bench range (or bench range with pre-tensioned springs) and the actuator's fail-safe action indicated on the nameplate of the actuator (e.g. 0.2 to 1 bar and "Actuator stem extends").

The lower bench range value (0.2 bar) corresponds to the lower range value of the signal pressure to be adjusted, the upper bench range value (1 bar) to the upper range value of signal pressure.

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

5. For actuators with "**Actuator stem extends**", apply a loading pressure corresponding to the lower signal pressure range (e.g. 0.2 bar) to the connection on the bottom diaphragm chamber.
For actuators with "**Actuator stem retracts**", apply a loading pressure corresponding to the upper signal pressure range (e.g. 1 bar) to the connection on the top diaphragm chamber.
6. Turn the stem connector nut (6.1) by hand until it touches the actuator stem (8.1), then turn it another 1/4 turn and secure this position using the lock nut (6.2).
7. Attach the coupling parts (7) of the stem connector and screw them tight.
Align the travel indicator scale (5.6)

with the tip on the side of the stem connector.

Note about disassembling actuators

On removing an actuator mounted on a valve, and in particular, in a version with pre-tensioned springs, a loading pressure slightly higher than the lower bench range (see nameplate on the actuator) must be applied to the loading pressure connection before the ring nut (8.2) can be unscrewed.

2.2 Option of pre-tensioning springs in actuator version "Actuator stem extends"

To achieve a more powerful positioning force, the springs in the actuators can be pre-tensioned by up to 25 % of its travel or bench range during the valve adjustment procedure.

For example, the springs should be pre-tensioned by 0.1 bar for a bench range of 0.2 to 1 bar. This means the bench range is shifted by 0.1 bar to achieve a range from 0.3 to 1.1 bar (0.1 bar corresponds to pre-tensioning the springs by 12.5 %). On adjusting the valve, a signal pressure of 0.3 bar must now be set as the lower signal pressure range.

It is essential that the new bench range (e.g. 0.3 to 1.1 bar) is recorded on the nameplate as bench range with pre-tensioned springs.

2.3 Valve and actuator with different rated travels

Actuator version "Actuator stem extends"

NOTE! Valves that have a smaller rated travel than that of the actuators must always use pre-tensioned spring ranges.

Example:

Valve DN 100 with a rated travel of 30 mm is to be mounted to an actuator 1400 cm² with a rated travel of 60 mm and a bench range from 0.4 to 2 bar.

1. Set the signal pressure required to pre-load the springs to 1.6 bar. This signal pressure value is above the signal pressure of 1.2 bar that corresponds to the mid-travel of the actuator (30 mm).
2. Thread the stem connector nut (6.1) until it touches the actuator stem.
3. Secure this position using the lock nut. Attach the stem connector as described in chapter 2.1.
4. Record the bench range (e.g. 1.6 to 2.4 bar) valid for the mounted valve on the nameplate of the actuator.

Actuator version "Actuator stem retracts"

The actuator springs in the version "Actuator stem retracts" cannot be pre-tensioned!

If a valve is mounted to an oversized actuator (rated travel of the actuator is larger than that of the valve), only the first half of the actuator's bench range can be used.

Example:

Valve DN 100 with a rated travel of 30 mm and an actuator 1400 cm² with a rated travel of 60 mm and a bench range from 0.2 to 1 bar:

For mid-travel of the valve, a bench range from 0.2 to 0.6 bar can be used.



NOTE!

Actuators that have already been pre-tensioned by the manufacturer without a valve have a label affixed to them.

Additionally, they are recognizable due to the three long bolts on the bottom diaphragm case.

3. Installation

3.1 Mounting position

The steam-converting valve must be mounted upright in horizontal pipes with the actuator pointing upwards.

NOTE!

The valve must be installed with the least amount of vibrations possible and without any tension.

The steam line must be pickled and blown through to ensure that sealing material, weld splatter and other impurities that could be carried along with the steam do not impair the proper functioning of the valve. In cases where there is no suitable transition piece for the valve, remove the actuator with valve bonnet, cage element and flow divider and mount a blind flange on the valve body.

3.2 Steam traps

Mount connections with automatic steam traps at the lowest part of the upstream and downstream lines to ensure that the plant can function reliably.

3.3 Spray water connection

Install a swing check valve in the inlet pipe for the spray water supply to prevent water hammering from occurring. In addition, we recommend installing a strainer at this point.

3.4 Signal pressure line

For valves mounted to actuator versions "Actuator stem extends", connect the signal pressure to the loading pressure connection on the bottom diaphragm case and for valves mounted to actuator versions "Actuator stem retracts", connect the signal pressure to the connection on the top diaphragm case.

The lower loading pressure connection is located at the side of the yoke underneath the bottom diaphragm case in the Type 3277 Actuator.

3.5 Strainer and bypass

We recommend installing a SAMSON Type 2 Strainer upstream of the valve body.

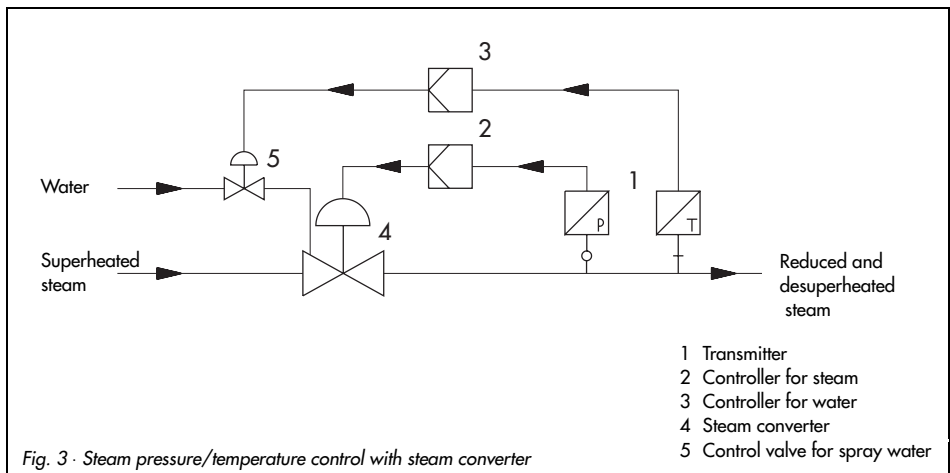
If the plant should continue to operate during valve maintenance, install a shut-off valve both upstream of the strainer and downstream of the control valve as well a bypass.

4. Operation

4.1 Start-up

On starting up the plant (Fig. 3), the controller for steam (2) must be set to "manual" to ensure that the plant can warm up slowly by slightly opening the steam converter.

The controller (3) for water spray must be set to "automatic" to ensure that it can quickly react to changes at the temperature sensor of the transmitter.



5. Maintenance – Replacing parts

The control valve is subject to natural wear especially at the seat, plug and packing. Depending of the application conditions that prevail, the valve must be inspected at appropriately scheduled intervals to prevent any problems before they occur. If any leaks occur to the atmosphere, the packing may be leaking. If the valve does not seal properly, this may be because tight shut-off is prevented by dirt or other impurities between the seat and plug or because the seating surfaces have been damaged. We recommend removing the parts, thoroughly cleaning them and, replacing them with new parts, if necessary.



Important!

If you intend carrying out maintenance work on the valve, first relieve the corresponding plant section 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 the some of the process medium could still be in the valve. This is particularly the case for valve versions with insulating sections.

Note concerning SAMSON special tools:

The appropriate seat wrenches and special tools as well as the tightening torques required for assembling the valve are listed in EB 029 EN (formerly WA 029 EN). Also available at http://www.samson.de/pdf_en/e00290en.pdf

Important!

Prior to carrying out any work on the valve body, dismantle the cold water line first. The signal pressure must be disconnected, the signal pressure line removed and the actuator dismantled. We recommend removing the valve from the pipeline.

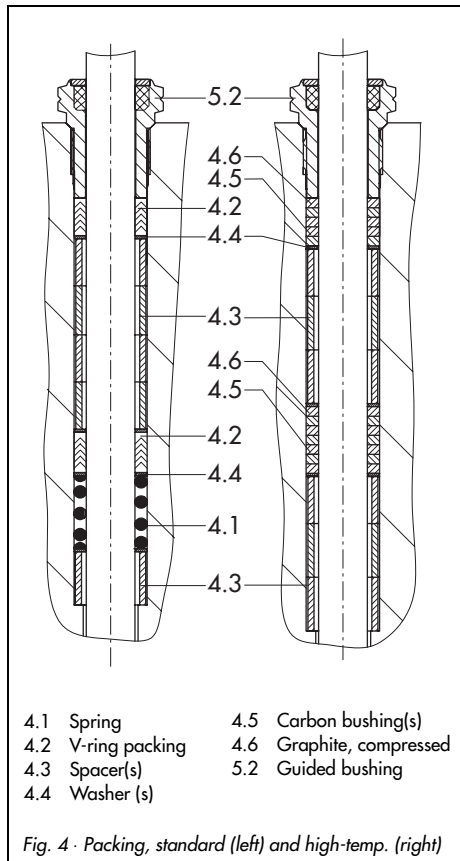


Fig. 4 · Packing, standard (left) and high-temp. (right)

Dismounting the actuator:

1. Unscrew ring nut (8.2) and remove the stem connector (7).
For the actuator version with "actuator stem extends", especially for the version with pre-tensioned springs, apply a loading pressure to the actuator which is slightly higher than the lower bench range (see nameplate) to allow the ring nut (8.2) to be unscrewed.
After you have loosened the nut, disconnect the supply pressure again.
2. Remove the actuator from the valve yoke.

5.1 Replacing parts in the standard valve**5.1.1 Packing**

If the valve leaks at the packing, the packing (4.2) and seal elements (4.5 and 4.6) must be replaced as follows:

Disassembly

1. Unscrew the nuts (5.1) and lift the valve bonnet (5) together with the plug stem and plug off from the valve body.
2. Unscrew the stem connector nut (6.1) and lock nut (6.2) off the plug stem. Unthread the guided bushing (5.2) out of the packing.
3. Pull the plug together with the plug stem out of the valve bonnet.
4. Pull all the packing parts using a suitable tool out of the packing space. Replace any damaged parts with new ones.
Carefully clean the packing space.

Assembly

1. Apply lubricant (order no. 8150-0111) to all parts as well as the plug stem (6). Do not use any lubricant for graphite packing!
2. Place the plug into the valve body and insert a new flat gasket (1.1).
3. Place the valve bonnet carefully over the plug stem onto the valve body and screw the nuts (5.1) tight.
4. Carefully slide the packing parts over the plug stem into the packing space. Make sure the packing parts are replaced in the right order. Note that the number of spacers (4.3) varies depending on the nominal size.
5. Thread in the guided bushing (5.2) and tighten. For high-temperature packing, tighten the guided bushing only slightly, even if it starts to leak, it should only be tightened slightly.
6. Screw the lock nut (6.2) and stem connector nut (6.1) onto the plug stem without tightening them.
7. Attach the actuator as described in chapter 2.1 and set the lower and upper bench range as described in chapter 2.1.

5.1.2 Seat and/or plug

When replacing the seat or plug, we recommend replacing the packing (4.2 or 4.5 and 4.6) as well.

Seat:

1. Unscrew the nuts (5.1) and lift the valve bonnet (5) together with the plug stem and plug off the valve body.

2. Unscrew the seat (2) using the appropriate seat wrench. See SAMSON special tools guide EB 029 EN (formerly WA 029 EN).
3. Apply lubricant (order no. 8150-0119) to the thread and sealing cone of the new seat (or the old seat after it has been remachined or thoroughly cleaned) and screw it back in. The tightening torques for the seat are likewise listed in the SAMSON special tools guide EB 029 EN (formerly WA 029 EN).

Plug:

1. Unscrew the nuts (5.1) and lift the valve bonnet (5) together with the plug stem (6) and plug off the valve body (1).
2. Unscrew nuts (6.1, 6.2) and guided bushing (5.2).
3. Plug the plug out of the valve bonnet.
4. Change the plug and insert the new plug 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 fitting it back into the valve.

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. 5).

5.2 Replacing parts in valve with insulating section

Replace the packing as described in chapter 5.1.1 for the standard valve.

Replace the seat and plug as described in chapter 5.1.2 for the standard valve.

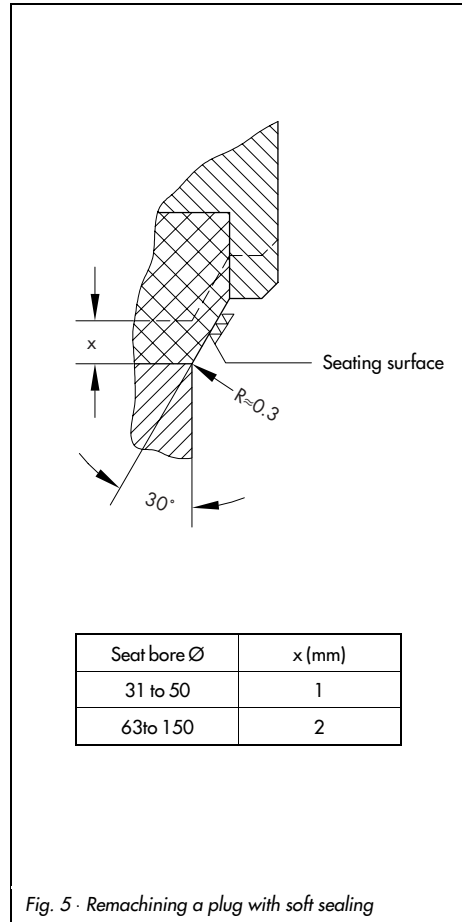


Fig. 5 · Remachining a plug with soft sealing

5.3 Disassembling the flow divider

For valves with flow dividers, the gasket (1.1) and shims (1.2) must be replaced with new ones every time the flow divider is removed. The number of shims required and the dimension x must be determined when a new gasket (1.1) is used:

- ▶ First measure dimension A, then dimension B.
- ▶ Read dimension P for the compression and dimension S for the double-layered graphite cord ring from the table.

- ▶ Calculated dimension x:
 $x = (A + P - B) - 2S$ [mm]
- ▶ Fill out dimension x up to ± 0.3 mm with shims.
- ▶ If dimension x is $\geq S$, insert an additional graphite cord ring.

Nom. size DN	Up to 100	125 to 250	300
S mm	4	8	10
P mm	1.8	3	3.5

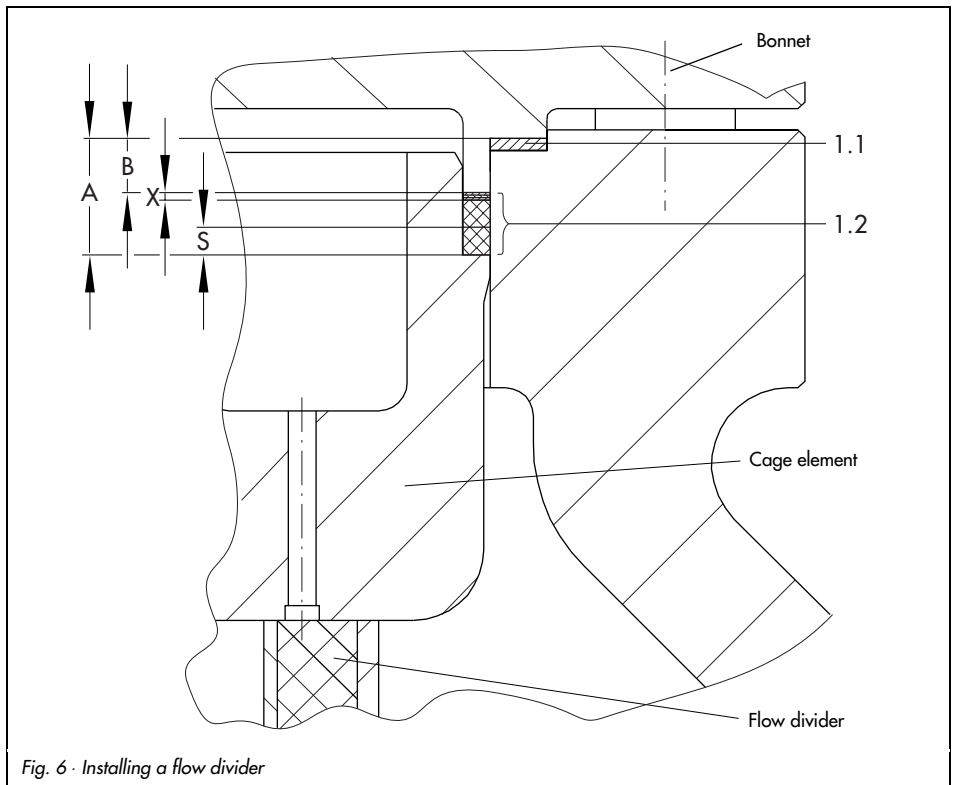
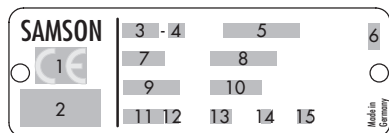


Fig. 6 · Installing a flow divider

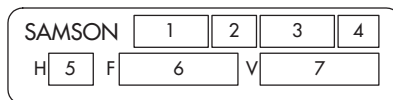
6. Description of nameplates

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 the valve
- 5 Material
- 6 Year of manufacture
- 7 Nominal size: DIN: DN, ANSI: Size
- 8 Permissible excess operating pressure at room temperature: DIN: PN, ANSI: CL
- 9 Order number with modification index
- 10 Item position in the order
- 11 Flow coefficient:
DIN: Kvs value, ANSI: Cv value
- 12 Characteristic:
% equal percentage, **Lin** linear,
DIN: **A/Z** quick opening, ANSI: **O/C**
- 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 pre-tensioned springs

Type 3277 Actuator nameplate

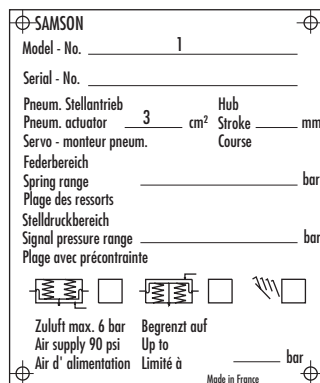


Fig. 7 · Nameplates

7. Customer inquiries

Please submit the following details (see nameplate):

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

Dimensions and weights

Refer to the Data Sheet T 8251 EN for dimensions and weights of the valve.



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