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

Type 3281 Pneumatic Steam-converting Valve with Type 3271 Actuator

Mounting and Operating Instructions

EB 8251 EN

Edition March 2015

Definition of signal words

DANGER!
Hazardous situations which, if not avoided, will result in death or serious injury

WARNING!
Hazardous situations which, if not avoided, could result in death or serious injury

NOTICE
Property damage message or malfunction

Note:
Additional information

Tip:
Recommended action

1 General safety instructions

– The control valve must be mounted, started up or serviced by fully trained and qualified personnel only; the accepted industry codes and practices are to be observed. Make sure employees or third persons are not exposed to any danger. All safety instructions and warnings given in these mounting and operating instructions, particularly those concerning installation, start-up, and maintenance, must be strictly observed.

– The control valves comply with 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 of conformity can be viewed and downloaded at http://www.samson.de.

– To ensure appropriate use, only use the valve in applications where the operating pressure and temperatures do not exceed the specifications used for sizing the valve at the ordering stage. The manufacturer does not assume any responsibility for damage caused by external forces or any other external factors.

– Any hazards that could be caused in the valve by the process medium, the operating pressure, the signal pressure or by moving parts are to be prevented by taking appropriate precautions.

– Proper shipping and storage are assumed.

WARNING!

– For installation and maintenance, make sure the relevant section of the pipeline is depressurized and, depending on the process medium, drained as well. Depending on the field of application, allow the valve to cool down or heat up to reach ambient temperature before starting any work on it.

– When working on the valve, make sure that the pneumatic air supply as well as the control signal are disconnected to prevent any hazards caused by moving parts.

– Be particularly careful if the actuator springs are preloaded. Such actuators are labeled correspondingly and can also be identified by three long bolts protruding from the bottom of the actuator. Before starting any work on the valve, relieve the compression from the preloaded springs.

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2 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 Converters consist of a Type 3281 Globe Valve or Type 3286 Angle Valve and either a Type 3271 or Type 3277 Pneumatic Actuator.

The medium flows through the valve in the direction indicated by the arrow. The position of the plug (3) determines the flow through the valve seat (2) and, as a result, 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) together with the plug is connected with the actuator stem (8.1) by the stem connector (7) and sealed by either a spring-loaded PTFE V-ring packing (4) or by an adjustable high-temperature packing.

The cooling water is fed to the flow divider (13) through the connecting pipe (5.5) and holes in the clamping element (13.1). After flowing through the cross-sectional area between seat and plug, the steam flow reaches its maximum velocity and comes into contact with the cooling water at the inner wall of the flow divider (13). The steam flow and water carried with it are split up and mixed in the fine-mesh wire fabric of the flow divider. At the same time, the steam velocity is reduced, releasing some of its heat to the water across the large surface of the wire mesh coil, which causes it to evaporate quickly. The steam/water mixture leaves the flow divider as a fine mist with a high steam content. Evaporation is completed a short distance downstream of the steam-converting valve.

Legend for Fig. 1

1	Valve body
1.1	Gasket
2	Seat
3	Plug
4	Packing
5	Valve bonnet
5.1	Nuts
5.2	Threaded bushing
5.3	Yoke
5.4	Nut for 5.3
5.5	Connection for cooling water
5.6	Travel indicator
6	Plug stem
6.1	Stem connector nut
6.2	Lock nut
7	Stem connector
8	Actuator
8.1	Actuator stem
8.2	Ring nut
8.3	Diaphragm
8.4	Spring
8.5	Signal pressure connection
8.6	Vent plug
13	Flow divider
13.1	Clamping element

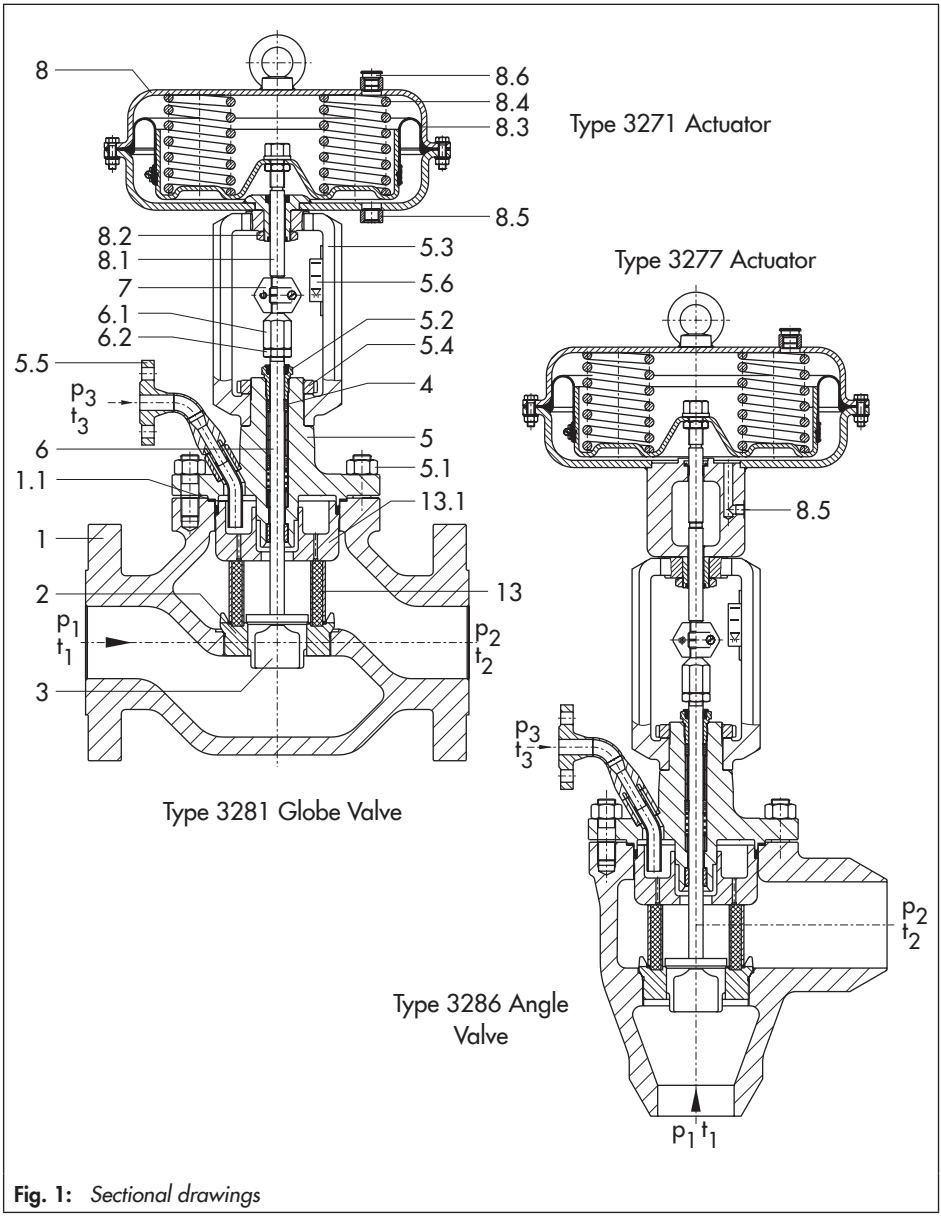


Fig. 1: *Sectional drawings*

Fail-safe position

Depending on how the compression springs (8.4) are arranged in the actuator, the valve has two different fail-safe positions:

– **Actuator stem extends:** when the signal pressure is reduced or the air supply fails, the springs move the actuator stem downward and close the valve.

  The valve opens when the signal pressure is increased enough to overcome the force exerted by the springs.

– **Actuator stem retracts:** when the signal pressure is reduced or the air supply fails, the springs move the actuator stem upward and open the valve.

  The valve closes when the signal pressure is increased enough to overcome the force exerted by the springs.

3 Assembling valve and actuator

The basic pneumatic actuator can be replaced by a pneumatic actuator with additional handwheel or by an electric actuator.

The standard pneumatic actuator can be replaced by a smaller or larger actuator for all nominal valve sizes.

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

Each valve is supplied with the parts required for its standard actuator. If you intend to use a different actuator, order the required mounting parts together with the actuator. The required parts and their order numbers can be found in the overview 1600-0501 to 1600-0550, which is available on request. In this case, the original parts are exchanged for the additionally delivered parts.

3.1 Assembly and adjustment

Proceed as follows if the valve and actuator have not been assembled by SAMSON or if the actuator is to be replaced by an actuator of another type or size:

1. Loosen the lock nut (6.2) and stem connector nut (6.1) on the valve. Firmly press the plug and plug stem into the seat ring and screw the lock nut and stem connector nut downward.
2. Remove the stem connector clamps (7) and the ring nut (8.2) from the actuator. Slide the ring nut over the valve's plug stem.
3. Place the actuator onto the yoke (5.3) and secure it with the ring nut (8.2).
4. Read the bench range (or bench range with preloaded springs) and the actuator's fail-safe action from the actuator's nameplate (e.g. 0.2 to 1 bar and "actuator stem extends").

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

   The fail-safe action "actuator stem extends" (FA) or "actuator stem retracts"

(FE) is marked by FA or FE on the Type 3271 Actuator, and by a symbol on the nameplate of the Type 3277 Actuator.

5. For actuators with "actuator stem extends" fail-safe action, apply a signal pressure that corresponds to the lower bench range value (e.g. 0.2 bar) to the connection on the bottom diaphragm chamber.

   For actuators with "actuator stem retracts" fail-safe action, apply a signal pressure that corresponds to the upper bench range value (e.g. 1 bar) to the connection on the top diaphragm chamber.

6. Screw on the stem connector nut (6.1) by hand until it touches the actuator stem (8.1). Turn the stem connector nut a further quarter turn and secure this position with the lock nut (6.2).

7. Position the stem connector clamps (7) and screw them tight. Align the travel indicator scale (5.6) with the tip of the stem connector clamp.

Note on removing an actuator
When removing an actuator from a valve, especially an actuator with preloaded springs, apply a signal pressure that is slightly higher than the lower bench range value (see actuator nameplate) to the signal pressure connection so that the ring nut (8.2) can be unscrewed.

3.2 Option of preloading springs for "actuator stem extends"

To achieve a greater positioning force, the springs of these actuators can be preloaded by up to 25 % of their travel or their bench range.

When a preload of, e.g. 0.1 bar, is desired for a bench range of 0.2 to 1 bar, the lower bench range value is shifted by 0.1 bar to 0.3 bar (0.1 bar correspond to a preload of 12.5 %). When adjusting the valve, set the lower bench range value to 0.3 bar. Write the new bench range with preloaded springs of 0.3 to 1.1 bar on the nameplate.

3.3 Different rated travels of valve and actuator

Actuator with "stem extends" fail-safe action

Note:
Always use actuators with preloaded springs when the valve's rated travel is smaller than the rated travel of the actuator.

Example: DN 100 valve with 30 mm rated travel and 1400 cm² actuator with 60 mm rated travel; 0.4 to 2 bar bench range.

1. Set the signal pressure required for preloading from 1.2 bar (1.2 to 2 bar), which corresponds to half the actuator's travel (30 mm), to 1.6 bar.

2. Screw 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 3.1.
4. Write the bench range of 1.6 to 2.4 bar valid for the assembled control valve on the actuator's nameplate.

Actuator with "stem retracts" fail-safe action

The springs of an actuator with "stem retracts" fail-safe action cannot be preloaded. When a valve is combined with an oversized actuator (rated actuator travel larger than rated valve travel), only the first half of the actuator's bench range can be used.

Example: DN 100 valve with 30 mm rated travel and 1400 cm² actuator with 60 mm rated travel; 0.2 to 1 bar bench range.

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

WARNING!
Actuators that have already been preloaded by SAMSON without mounting the valve are labeled correspondingly. Additionally, they can be identified by three longer bolts with nuts protruding from the bottom diaphragm case.

4 Installation

4.1 Mounting position

The steam-converting valve must be installed in horizontal pipelines with the actuator on top.

NOTICE
– Install the valve free of stress and with the least amount of vibrations as possible.
– Since sealing parts, weld spatter, and other impurities carried along by the steam may impair the proper functioning of the valve, it is absolutely essential to pickle and blow through the steam line.
– In cases where no corresponding transition piece exists for the valve, remove the actuator together with the valve bonnet, clamping element, and flow divider and mount a blind flange on the valve body.

4.2 Steam trap

Automatic steam traps must be installed at the lowest point in the upstream and downstream lines to ensure proper functioning of the plant.

4.3 Water connection

A check valve must be installed in the inlet pipe for water supply to prevent water hammering from occurring. We also recommend installing a strainer at this point.

4.4 Signal pressure line

Connect the signal pressure line for valves with an actuator with "stem extends" fail-safe action to the connection on the bottom diaphragm case, and for valves with an actuator with "stem retracts" fail-safe action to the connection on the top diaphragm case.

In the Type 3277 Actuator, the lower signal pressure connection is located at the side of the yoke under the bottom diaphragm case.

4.5 Strainer and bypass

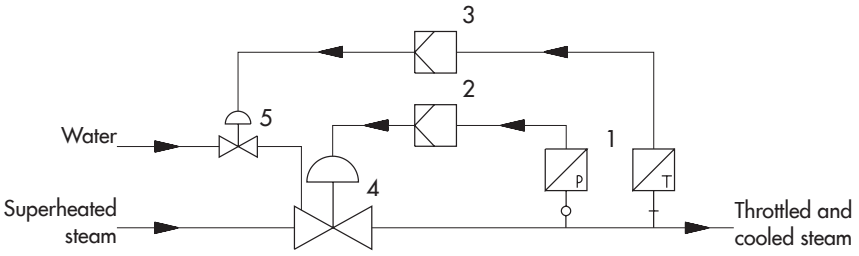
We recommend installing a strainer upstream of the valve. We recommend installing a shut-off valve both upstream of the strainer and downstream of the valve to ensure that the plant does not need to be shut down for maintenance. In addition, install a bypass line.

5 Operation

5.1 Start-up

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

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



1 Transmitter
2 Controller for steam
3 Controller for water
4 Steam converter
5 Control valve for cooling water

Fig. 2: *Steam pressure/temperature control with steam converter*

6 Maintenance

The control valve is subject to normal wear, especially at the seat, plug, and packing. Depending on the operating conditions, check the valve at regular intervals to prevent possible failure before it can occur.

External leakage can indicate that the packing is defective. If the valve does not close tightly, tight shut-off may be impaired by dirt stuck between the seat and plug or by damaged facings.

We recommend removing the parts, cleaning them, and, if necessary, replacing them with new ones.

WARNING!
- *Before performing any work on the control valve, make sure the relevant plant section has been depressurized and, depending on the process medium, drained as well.*
- *When used at high temperatures, allow the plant section to cool down to ambient temperature.*
- *As valves are not free of cavities, residual process medium might still be contained in the valve. This applies to valve versions with insulating section in particular.*

WARNING!
Before starting any work on the valve body, disconnect the cold water line from the valve. Shut off the signal pressure and remove the signal pressure line as well as the actuator.

We recommend removing the valve from the pipeline.

Note on special SAMSON tools:
Suitable seat wrenches and special tools as well as the associated tightening torques are listed in ▶ EB 029 (previously WA 029).

Removing the actuator

1. Unscrew the ring nut (8.2) and remove the stem connector (7).

   For actuators with "stem extends" fail-safe action and particularly for actuators with preloaded springs, apply a signal pressure that is higher than the lower bench range value (see nameplate) to the actuator so that the ring nut can be unscrewed. Disconnect the signal pressure again.
2. Lift the actuator off the valve yoke.

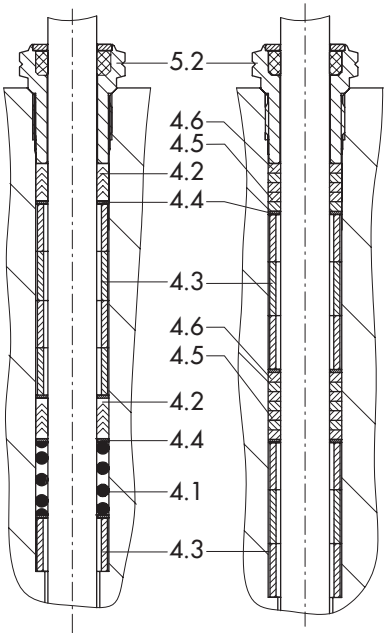
6.1 Replacing parts in standard valves

6.1.1 Packing

If the valve leaks at the packing, replace the packing (4.2) and the sealing parts (4.5 and 4.6) as follows:

Disassembly

1. Unscrew the nuts (5.1) and lift the valve bonnet (5) together with the plug stem and plug off the body.
2. Unscrew the lock nut (6.2) and stem connector nut (6.1) from the plug stem. Unscrew the threaded bushing (5.2) of the packing.
3. Pull the plug together with the plug stem out of the valve bonnet.
4. Pull the entire packing out of the packing chamber using a suitable tool and replace damaged parts. Clean the packing chamber thoroughly.



4.1 Spring
4.2 V-ring packing
4.3 Bushing
4.4 Washer
4.5 Carbon bushing
4.6 Pressed graphite
5.2 Threaded bushing

Fig. 3: *Packing: standard (left), high temperature (right)*

Assembly

1. Apply a suitable lubricant to all the parts and to the plug stem (6). Do not use lubricant on graphite packings.
2. Place plug into the valve body and insert a new gasket (1.1).

3. Carefully slide the valve bonnet over the plug stem onto the valve body and secure it with nuts (5.1).
4. Carefully slide the packing parts over the plug stem into the packing chamber. Make sure you observe the proper order. The number of spacer bushings (4.3) may vary depending on the nominal valve size.
5. Screw in the threaded bushing (5.2) and tighten it. For high-temperature packings, only tighten the threaded bushing slightly; in case of leakage, also retighten it only slightly.
6. Loosely screw the lock nut (6.2) and stem connector nut (6.1) onto the plug stem.
7. Mount the actuator as described in section 3.1 and adjust the upper and lower bench range values as described in section 3.1.

6.1.2 Seats and/or plugs

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

Seat:

1. Unscrew the nuts (5.1) and lift the valve bonnet (5) together with the plug stem and plug off the body.
2. Unscrew the seat (2) with a suitable seat wrench ▶ EB 029 (previously WA 029).
3. Apply a suitable lubricant to the thread and the sealing cone of the new seat. Screw in the seat. For the tightening torques ▶ EB 029 (previously WA 029).

Plug:

1. Unscrew the nuts (5.1) and lift the valve bonnet (5) together with the plug stem and plug off the body.
2. Unscrew nuts (6.1, 6.2) and threaded bushing (5.2).
3. Pull the plug out of the valve bonnet.
4. Replace the old plug with a new plug (3) with plug stem (6). Apply a suitable lubricant to the plug stem (6) before insertion.

6.2 Replacing parts in valves with insulating section

Replace the packing as described for the standard version in section 6.1.1.

Replace the seat and plug as described for the standard version in section 6.1.2.

6.3 Removing the flow divider

The flange gasket (1.1) and shims (1.2) must be renewed each time the valve is disassembled. Before inserting a new gasket (1.1), measure the dimension x and establish how many shims are needed.

1. First measure dimension A and then dimension B.
2. Refer to the table for the dimension P for compression and dimension S for the double-layered graphite cord ring.
3. Calculate dimension x:

   $x = (A + P - B) - 2S$ [mm]
4. Fill out dimension x with shims up to ±0.3 mm.

If dimension x is ≥ S, insert an additional graphite cord ring.

Nominal size DN	Up to 100	125 to 250	300
S [mm]	4	8	10
P [mm]	1.8	3	3.5

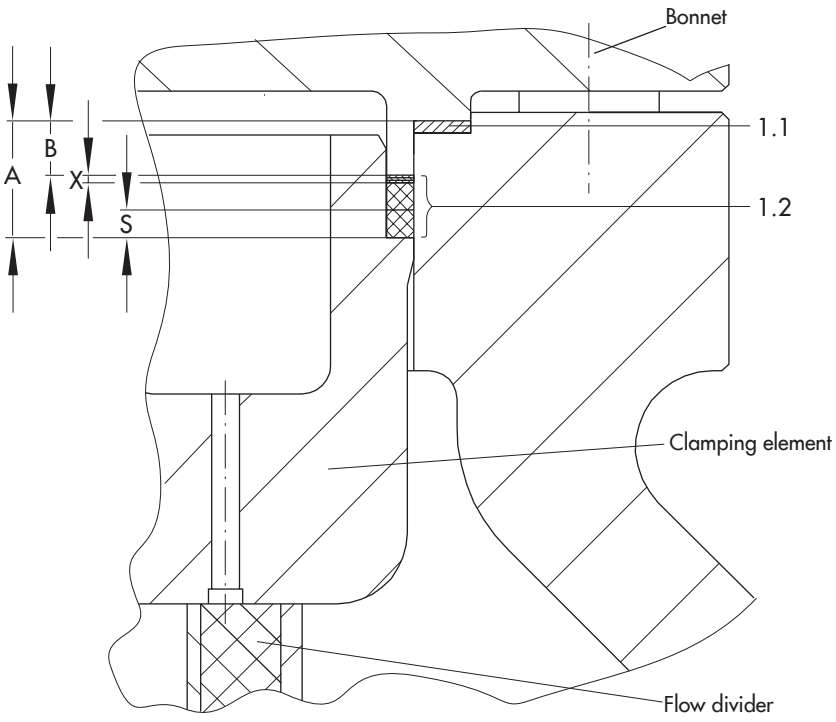
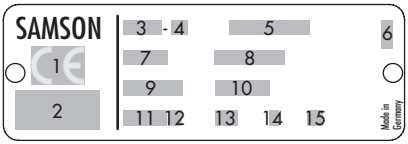


Fig. 4: *Installing the flow divider*

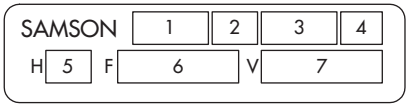
7 Description of nameplates

Valve nameplate



1 CE marking or "Art. 3, Abs. 3", where applicable
2 ID of the notified body, fluid group and category, where applicable
3 Type designation
4 Device modification index
5 Material
6 Year of manufacture
7 Valve size: DIN: **DN**, ANSI: **NPS**
8 Perm. operating gauge pressure at room temperature
DIN: **PN**, ANSI: **CL**
9 Order no. with modification index
10 Order pos.
11 Flow coefficient:
DIN: $\mathbf{K_{VS}}$, ANSI: $\mathbf{C_V}$
12 Characteristic:
% equal percentage, Lin linear,
DIN: **A/Z** (quick opening)
ANSI: **O/C** (quick opening)
13 Plug seal:
MExx Metal
ST Stellite® facing
Ni Nickel-plated
PT Soft seal with PTFE
PK Soft seal with PEEK
14 Pressure balancing
DIN: **D**; ANSI: **B**
15 Flow divider **I** or **III**

Nameplate for Type 3271 Actuator



1 Type designation
2 Modification index
3 Actuator area
4 Operating direction:
FA Actuator stem extends
FE Actuator stem retracts
5 Travel
6 Bench range
7 Bench range with preloaded springs

Nameplate for Type 3277 Actuator

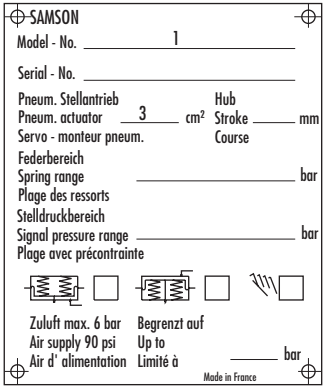


Fig. 5: *Nameplates*

8 Technical data

Dimensions and weights

Note

Refer to the corresponding data sheets for dimensions and weights:

- *Type 3281 – DIN version:*
  ▶ *T 8251*
- *Type 3281 – ANSI version:*
  ▶ *T 8252*
- *Type 3286 – DIN version:*
  ▶ *T 8256*
- *Type 3286 – ANSI version:*
  ▶ *T 8257*

Compliance

The Type 3281 and Type 3286 Valves bear both the CE and EAC marks of conformity.

CE · EAC

9 Customer inquiries

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 m^3/h
- Direction of flow
- Bench range of the actuator (e.g. 0.2 to 1 bar)
- Is a strainer installed?
- Installation drawing

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