

### DIN version

### Application

Final control element (globe valve) for process engineering applications and thermal plants

<b>Nominal size</b>	<b>DN 50 to 500</b>
<b>Nominal pressure</b>	<b>PN 16 to 160</b>
<b>Temperatures</b>	<b>Up to 500 °C</b>



Steam converters reduce the pressure and the temperature to the set points adjusted at the pressure controller and the temperature controller (Fig. 2). They consist of a Type 3281 Steam-converting Valve together with a Type 3271 Pneumatic Actuator (Type 3281-1 Steam Converter) or with a Type 3277 Pneumatic Actuator (Type 3281-7 Steam Converter).

The steam-converting valve largely corresponds to a Type 3251 Globe Valve (► T 8051) fitted with a flow divider St III.

Valve body made of

- Cast steel
- High-temperature cast steel

Low-noise valve plug

- Metal seal
- High-performance metal seal
- Balanced to handle high differential pressures

Water supplied through the flow divider St III ensures:

- Full utilization of the steam's kinetic energy to mix and split up the cooling water
- Fast evaporation independent of the steam flow rate
- Homogenous condition of the throttled and superheated steam
- Prevention of thermal shock or erosion caused by the cooling water entering the valve as the water does not have any contact with the valve body
- Low-vibration and low-noise operation

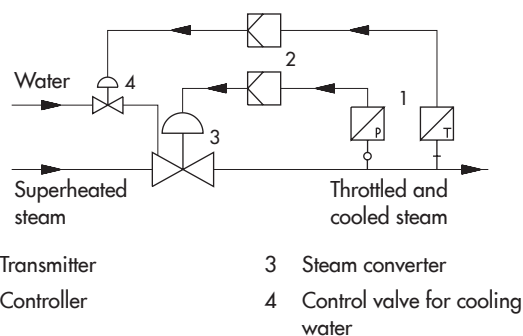
The steam converters, designed according to the modular assembly principle, can be equipped with various accessories: Positioners, limit switches, solenoid valves, and other accessories according to IEC 60534 and NAMUR recommendation (see Information Sheet ► T 8350).

### Versions

**Standard version** with PTFE packing for temperatures up to 220 °C or with adjustable high-temperature packing up to 350 °C, nominal size DN 50 to 500, nominal pressure PN 16 to 160



**Fig. 1:** Type 3281-1 Pneumatic Steam Converter



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

- **Type 3281-1** (Fig. 1) · Type 3281 Steam-converting Valve and Type 3271 Actuator with 350 to 2800 cm<sup>2</sup> actuator area (see Data Sheets ► T 8310-1, ► T 8310-2, and ► T 8310-3)
- **Type 3281-7** · Type 3281 Steam-converting Valve and Type 3277 Actuator with 350 to 750 cm<sup>2</sup> actuator area (see Data Sheet ► T 8310-1)

### Further versions

- **Welding ends** according to DIN EN 12627
- **Insulating section** for temperatures up to 500 °C
- **Additional handwheel** · See Data Sheets ▶ T 8310-1, ▶ T 8310-2, and ▶ T 8310-3
- **ANSI version** · NPS 2 to 20, Class 150 to 900 · See Data Sheet ▶ T 8252
- **Perforated plug**

### Principle of operation

The medium flows through the valve in the direction indicated by the arrow. The valve plug position determines the cross-sectional area between the seat (2) and plug (3).

The cooling water does not have any contact with the valve body. It is fed to the flow divider St III (13) through the connecting pipe (5.5) and the annular chamber formed by 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. The water atomization described is ensured over the whole load range since the steam velocity at the throttling point is independent of the flow rate.

### Fail-safe position

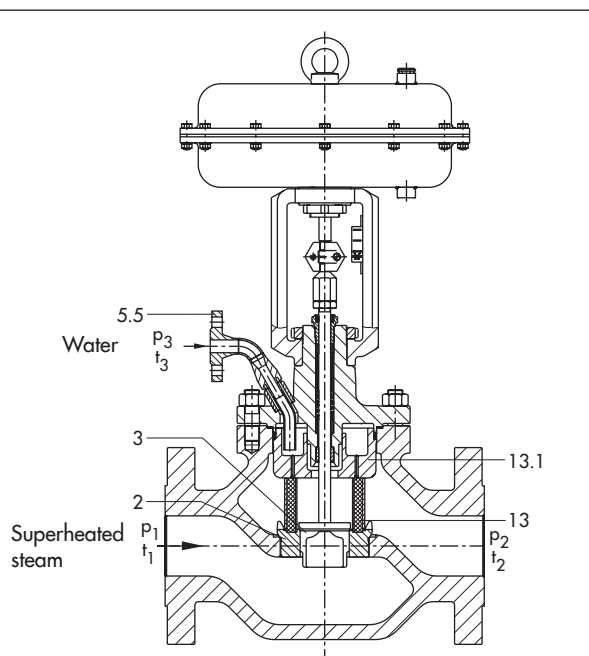
Depending on how the springs are arranged in the pneumatic actuator, the valve has two different fail-safe positions effective upon air supply failure or when the air supply pressure drops.

- **Actuator stem extends (fail-close):** the valve closes when the supply air fails.
- **Actuator stem retracts (fail-open):** the valve opens when the supply air fails.

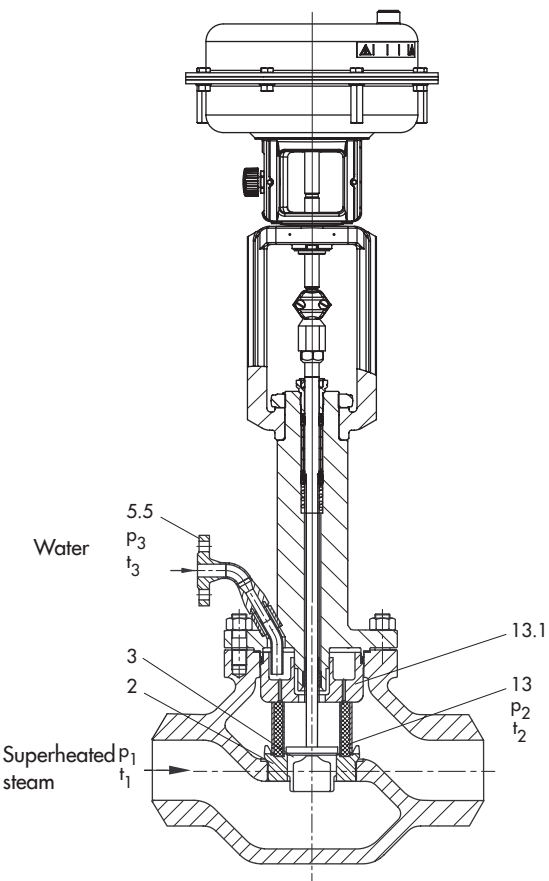
### Differential pressures

The permissible differential pressures can be found in the Information Sheet ▶ T 8000-4.

**Note:** Fig. 3 and Fig. 4 show configuration examples.




**Fig. 3:** Type 3281-1 Pneumatic Steam Converter with flanged connections and Type 3271 Actuator



**Fig. 4:** Type 3281-7 Pneumatic Steam Converter with insulating section, welding ends and Type 3277 Actuator

- |      |                     |
|------|---------------------|
| 2    | Seat                |
| 3    | Plug                |
| 5.5  | Water connection    |
| 13   | Flow divider St III |
| 13.1 | Clamping element    |

**Table 1: Technical data of Type 3281 Steam-converting Valve**

Material		Cast steel · 1.0619	Cast steel · 1.7357
Nominal size	DN	50 to 500 <sup>1)</sup>	
Nominal pressure	PN	16 to 160	
Type of connection	Flanges	All DIN EN versions	
	Welding ends	DIN EN 12627	
Seat-plug seal		Metal seal or high-performance metal seal	
Characteristic		Equal percentage or linear	
Rangeability		50:1	
Compliance			
<b>Temperature ranges</b> · Permissible operating pressures acc. to pressure-temperature diagrams (see Information Sheet ► T 8000-2)			
Body without insulating section		-10 to +220 °C · Up to 350 °C with high-temperature packing	
Body with	Insulating section	-10 to +400 °C	-10 to +500 °C
	Bellows seal	-10 to +400 °C	-10 to +500 °C
Valve plug	Standard	Metal seal	-10 to +500 °C
	Balanced with PTFE		-10 to +220 °C
	Balanced with graphite ring		-10 to +500 °C
<b>Leakage class</b> according to IEC 60534-4			
Valve plug	Standard	Metal seal	IV
		High-performance metal seal	V
	Balanced with PTFE		Standard: IV · High-performance metal seal: V
	Balanced with graphite ring		IV

<sup>1)</sup> DN 400: PN 16 to 63 · DN 500: PN 16 to 40

**Table 2: Materials**

Standard version with body and flanges <sup>1)</sup>		Cast steel · 1.0619	Cast steel · 1.7357
Seat and plug <sup>2)</sup>	Metal seal	1.4006/1.4008	
	Seal ring for balanced plug	PTFE/graphite	
Guide bushings		1.4112	
Packing		V-ring packing: PTFE with carbon; spring: 1.4310 · High-temperature packing	
Body gasket		Graphite seal on metal core	
<b>Insulating section</b>		1.0460/1.0619	1.7335/1.7357

<sup>1)</sup> See the pressure-temperature diagram in Information Sheet ► T 8000-2

<sup>2)</sup> Seats and metal-seated plug also with Stellite® facing or plug made of solid Stellite® available

**Table 3:** Available  $K_{VS}$  coefficients · Versions highlighted in gray also available with balanced plug

$K_{VS}$	3.0	4.8	7.5	12	20	30	47	75	120	190	270	480	750	1100	1500	1900
Seat Ø	24			31	38	50	63	80	100	125	150	200	250	300	350	400
Travel	15 mm					30 mm				60 mm			120 mm			
DN																
50	•	•	•													
80	•	•	•	•	•	•										
100				•	•	•	•									
150							•	•	•							
200								•	•	•	•					
250								•	•	•	•	•				
300									•	•	•	•	•			
400											•	•	•	•	•	
500													•	•	•	•

**Table 4:** Dimensions in mm for the standard versions of Type 3281-1 and Type 3281-7 Pneumatic Steam Converters

**Table 4.1:** Type 3281 Steam-converting Valve · Face-to-face dimensions according to DIN EN 558

Valve	DN	50	80	100	150	200	250	300	400	500
Length L (flanges and welding ends)	PN 10 to 40	230	310	350	480	600	730	850	1100	1250
	PN 63 to 160	300	380	430	550	650	775	900	1150 <sup>1)</sup>	–
Height H4	PN 16 to 40	217	222	242	314	387	442	655	640	760
	519						640 <sup>1)</sup>		–	
H8 for actuator	350 cm <sup>2</sup>	240	240	240	–					
	355 cm <sup>2</sup>	240	240	240	418	–				
	700 cm <sup>2</sup>	240	240	240	418	418	418	–		
	750 cm <sup>2</sup>	240	240	240	418	418	418	–		
	1000 cm <sup>2</sup>	295	295	295	418	418	On request			
	1400-60 cm <sup>2</sup>	295	295	295	418	418	On request			
	1400-120 cm <sup>2</sup>	480	480	480	503	503	503 <sup>2)</sup>	650	650	650
	2800 cm <sup>2</sup>	480	480	480	503	503	503 <sup>2)</sup>	650	650	650
2x2800 cm <sup>2</sup>	480	480	480	503	503	503 <sup>2)</sup>	650	650	650	
H2 (DN 100 and larger with foot)	PN 16 to 40	90	100	160	220	250	310	370	415	On request
	PN 63 to 160	100	120	180	235	270	300	390	On request <sup>1)</sup>	–

1) PN 63

2) H8 = 650 mm with 250 mm seat bore

**Table 4.2:** Types 3271 and 3277 Pneumatic Actuators

Actuator area	cm <sup>2</sup>	350	355	700	750	1000	1400-60	1400-120	2800	2 x 2800
Diaphragm ØD	mm	280	280	390	394	462	530	534	770	770
H <sup>1)</sup>	mm	82	121	199	236	403	287	490 <sup>3)</sup> / 580 <sup>4)</sup>	630 <sup>3)</sup> / 695 <sup>4)</sup>	1130 <sup>3)</sup> / 1195 <sup>4)</sup>
H3 <sup>2)</sup>	mm	110	110	190	190	610	610	650	650	650
H5	Type 3277	mm	101	101	101	–	–	–	–	–
Thread	Type 3271	M30 x 1.5				M60 x 1.5		M100 x 2		
	Type 3277	M30 x 1.5				–	–	–	–	–
α	Type 3271	G 3/8 (3/8 NPT)	G 3/8 (3/8 NPT)	G 3/8 (3/8 NPT)	G 3/8 (3/8 NPT)	G 3/4 (3/4 NPT)	G 3/4 (3/4 NPT)	G 1 (1 NPT)	G 1 (1 NPT)	G 1 (1 NPT)
α2	Type 3277	G 3/8	G 3/8	G 3/8	G 3/8	–	–	–	–	–

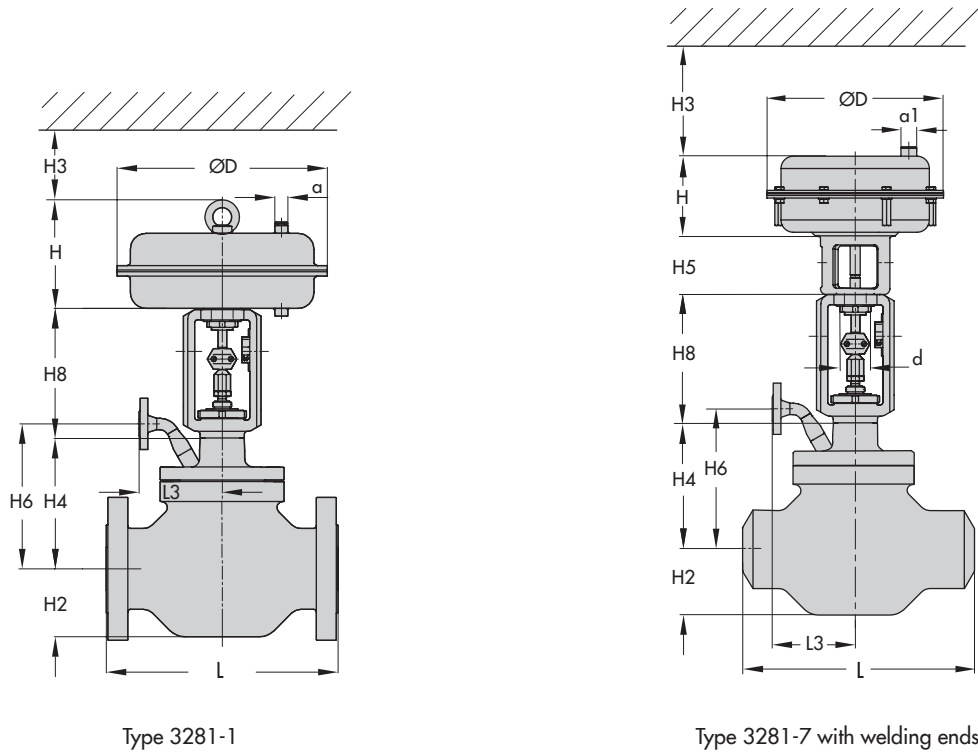
1) Height with welded-on lifting eyelet or height of eyebolt according to DIN 580. Height of the swivel lifting hook may differ. Actuators up to 355 cm<sup>2</sup> without lifting eyelet

2) Minimum clearance required to remove the actuator

3) Height for version with welded-on lifting eyelet (material EN-JS1030)

4) Height for version with female thread (material 1.5638/A352 LC3)

**Dimensional drawings**



Dimensions H6 and L3 for cooling water connection on request

**Table 5:** Weights in kg (approx.) for standard versions of Type 3281-1 and Type 3281-7 Pneumatic Steam Converters**Table 5.1:** Type 3281 Steam-converting Valve

Valve	DN	50	80	100	150	200	250	300	400	500
Valve without actuator	PN 16 to 40	40	68	85	215	450	On request			
	PN 63 to 160	66	105	140	395	660				

**Table 5.2:** Types 3271 and 3277 Pneumatic Actuators

Actuator	cm <sup>2</sup>	350	355	700	750	1000	1400-60	1400-120	2800	2 x 2800
Type 3271 without handwheel	8	15	22	36	85	70	175	450	950	
Type 3271 with handwheel	13	20	27	41	190	175	300 <sup>1)</sup> / 425 <sup>2)</sup>	575 <sup>1)</sup> / 700 <sup>2)</sup>	On request	
Type 3277 without handwheel	12	19	26	40	-					
Type 3277 with handwheel	17	24	31	45	-					

<sup>1)</sup> Side-mounted handwheel up to 80 mm travel

<sup>2)</sup> Side-mounted handwheel above 80 mm travel

**Table 6:** Dimensions in mm for Type 3281 Steam-converting Valve with insulating section

Valve	DN	50	80	100	150	200	250	300	400	500
Height H4		487	492	512	665	947	1067	1151	1109 <sup>1)</sup>	On request <sup>2)</sup>

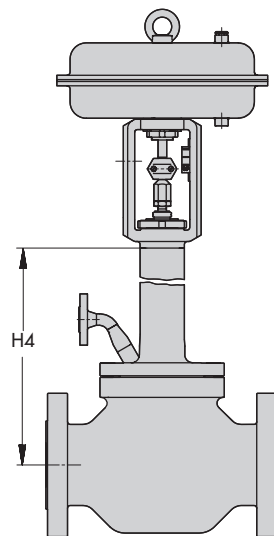
1) Up to PN 63

2) Up to PN 40

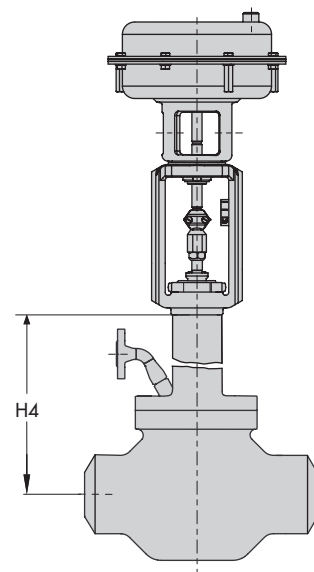
**Table 7:** Weights in kg (approx.) for Type 3281 Steam-converting Valve with insulating section

Valve	DN	50	80	100	150	200	250	300	400	500
Valve without actuator	PN 16 to 40	50	78	105	250	475	On request			
	PN 63 to 160	75	115	160	380	685				

**Dimensional drawings**



Type 3281-1 with insulating section



Type 3281-7 with insulating section and welding ends

## Selection and sizing of the steam converter

The steam converters require particularly careful sizing. Therefore, SAMSON performs the final sizing of the valves.

1. Calculate the suitable  $K_{VS}$  coefficient according to IEC 60534.
2. Select nominal size DN and  $K_{VS}$  coefficient from Table 3.
3. Select materials, pressure, and temperature from Table 1 and Table 2 and from the pressure-temperature diagram (see Information Sheet ▶ T 8000-2).
4. Select accessories from Table 1 and Table 2.
5. Check the installation conditions as described in TV-SK 9778-1.
6. Check the limits of application (more details on request).

## Ordering data

Steam converter	Type 3281 Globe Valve
Nominal size	DN ...
Nominal pressure	PN ...
Body material	According to Table 2
Type of connection	Flanges or welding ends
Plug	Standard or balanced
Characteristic	Equal percentage or linear
Max. and min. flow rate of the superheated steam or cooled steam	in kg/h or t/h
Steam pressure upstream and downstream of the valve	$p_1$ and $p_2$
Steam temperature upstream and downstream of the valve	$T_1$ and $T_2$
Cooling water pressure and temperature upstream of the valve	$p_3$ and $T_3$
Actuator	Type 3271 or Type 3277
Actuator area	... cm <sup>2</sup>
Fail-safe position	Fail-close or fail-open
Valve accessories	Positioner and/or limit switch

Specifications subject to change without notice



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