DATA SHEET

T 8251 EN

Series 280 • Type 3281 Steam Conditioning Valve
Type 3281-1 and Type 3281-7 Pneumatic Steam Conditioning Valves

DIN version

Application

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

Valve size	**DN 50 to 300**
Pressure rating	**PN 16 to 160**
Temperatures	**Up to 500 °C**

Special features

Steam conditioners 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 Conditioning Valve together with a Type 3271 Pneumatic Actuator (Type 3281-1 Steam Conditioning Valve) or with a Type 3277 Pneumatic Actuator (Type 3281-7 Steam Conditioning Valve).

The steam conditioning valve largely corresponds to a Type 3251 Globe Valve (▶ T 8051) fitted with a flow divider ST 3.

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 3 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 conditioning valves with their modular design can be equipped with various accessories:
Positioners, limit switches, solenoid valves and other valve accessories according to IEC 60534 [1] and NAMUR recommendation (see Information Sheet ▶ T 8350).

[1] Accessories required. See associated actuator documentation.

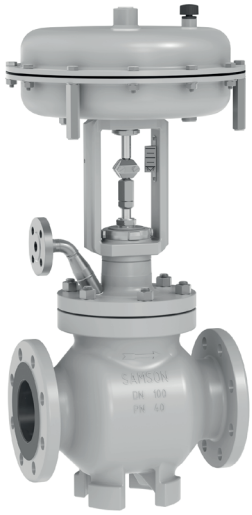
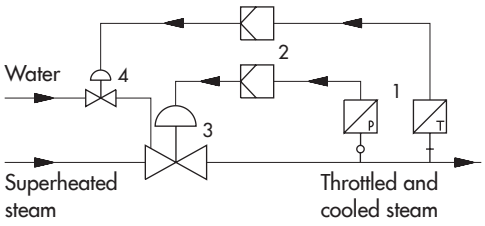


Fig. 1: *Type 3281-1 Pneumatic Steam Conditioning Valve*



1	Transmitter	3	Steam conditioner
2	Controller	4	Control valve for cooling water

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

Versions

Standard version with PTFE packing for temperatures up to 220 °C or with adjustable high-temperature packing up to 350 °C, valve size DN 50 to 300, pressure rating PN 16 to 160

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– **Type 3281-1** (Fig. 1) · Type 3281 Steam Conditioning Valve and Type 3271 Actuator with 350 to 2800 cm² actuator area (see Data Sheets ▶ T 8310-1, ▶ T 8310-2 and ▶ T 8310-3)
– **Type 3281-7** · Type 3281 Steam Conditioning Valve and Type 3277 Actuator with 350 to 750v2 cm² 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 Sheet ▶ T 8310-1
– **ANSI version** · NPS 2 to 12, Class 150 to 900 · See Data Sheet ▶ T 8252
– **Perforated plug**

Principle of operation

The seat (4), plug with plug stem (5) and flow divider (62) are installed in the body (1). The plug stem is connected to the actuator stem (A7) by the stem connector clamps (A26/27) and is sealed by a spring-loaded V-ring packing (15). Alternatively, an adjustable high-temperature packing can be used.

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

The cooling water is fed to the flow divider (62) through the connecting pipe on the bonnet (2) and holes in the clamping element (63). 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. The steam flow and the entrained water are mixed in the narrow wire mesh 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 conditioning 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 that become effective when the supply air fails 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.

Fig. 3 and Fig. 4 show configuration examples.

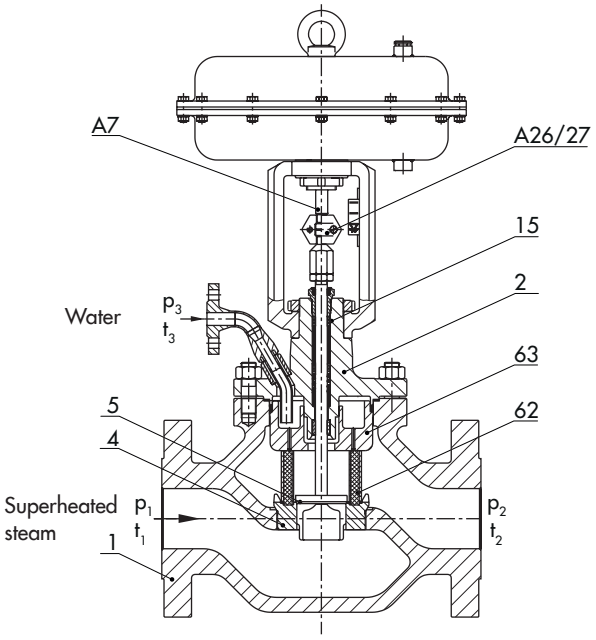


Fig. 3: *Type 3281-1 Pneumatic Steam Conditioning Valve with flanged connections and Type 3271 Actuator*

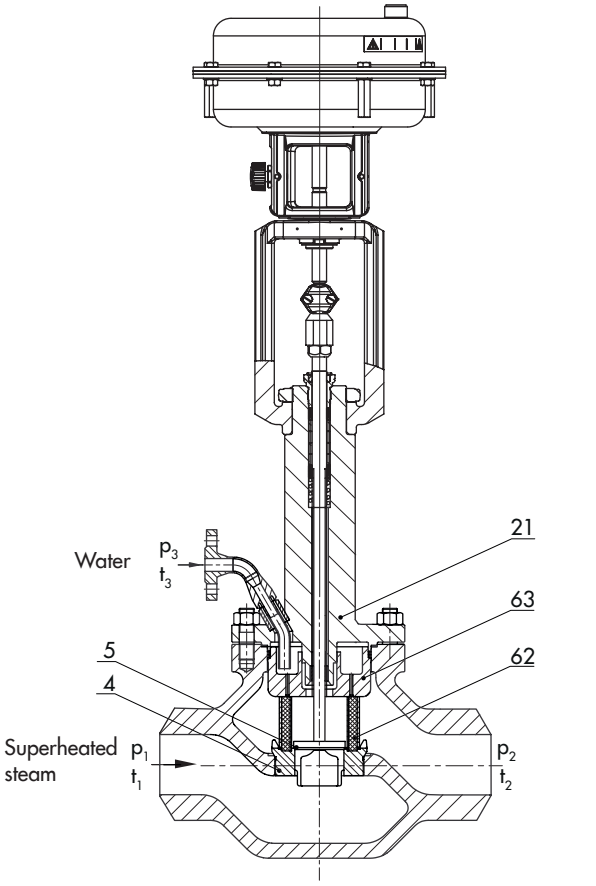


Fig. 4: *Type 3281-7 Pneumatic Steam Conditioning Valve with insulating section, welding ends and Type 3277 Actuator*

Legend for Fig. 3 and Fig. 4

1	Body	21	Insulating section
2	Bonnet with connecting pipe	62	Flow divider ST 3
		63	Clamping element
4	Seat	A7	Actuator stem
5	Plug with plug stem	A26/27	Stem connector clamps
15	Packing		

Table 1: *Technical data of Type 3281 Steam Conditioning Valve*

Material			**Cast steel · 1.0619**	**Cast steel · 1.7357**
Valve size		DN	50 to 300	
Pressure rating		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	
Conformity			CE · EAC	
Temperature ranges · 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
Valve plug	Standard	Metal seal	–10 to +500 °C	
	Balanced with PTFE		–10 to +220 °C	
	Balanced with graphite ring		–10 to +500 °C	
Leakage class 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	

Table 2: *Materials*

Standard version with body and flanges [1]		**Cast steel · 1.0619**	**Cast steel · 1.7357**
Seat and plug [2]	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	
Insulating section		1.0460/1.0619	1.7335/1.7357

1) See the pressure-temperature diagram in Information Sheet ▶ T 8000-2
2) 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
Seat Ø	24			31	38	50	63	80	100	125	150	200	250
Travel	15 mm					30 mm				60 mm			120 mm
DN													
50	•	•	•										
80	•	•	•	•	•	•							
100				•	•	•	•						
150							•	•	•				
200								•	•	• [1]	•		
250								•	•	• [1]	•	•	
300									•	• [1]	•	•	•

[1] Version with balanced plug: seat bore 125 is only possible for PN 63 to 160. A special machined plug and seat bore 150 (special version) are required for PN 10 to 40.

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

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

Valve	DN	50	80	100	150	200	250	300
Length L (flanges and welding ends)	PN 10 to 40	230	310	350	480	600	730	850
	PN 63 to 160	300	380	430	550	650	775	900
Height H4	PN 16 to 40	217	222	242	314	387	442	655
	PN 63 to 160						519	
H8 for actuator	350 cm²	240	240	240	–			
	355v2 cm²	240	240	240	418	–		
	700 cm²	240	240	240	418	418	418	–
	750v2 cm²	240	240	240	418	418	418	–
	1000 cm²	295	295	295	418	418	On request	
	1400-60 cm²	295	295	295	418	418	On request	
	1400-120 cm²	480	480	480	503	503	503 [1]	650
	2800 cm²	480	480	480	503	503	503 [1]	650
	2 x 2800 cm²	480	480	480	503	503	503 [1]	650
H2 (DN 100 and larger with foot)	PN 16 to 40	90	100	160	220	250	310	370
	PN 63 to 160	100	120	180	235	270	300	390

[1] H8 = 650 mm with 250 mm seat bore

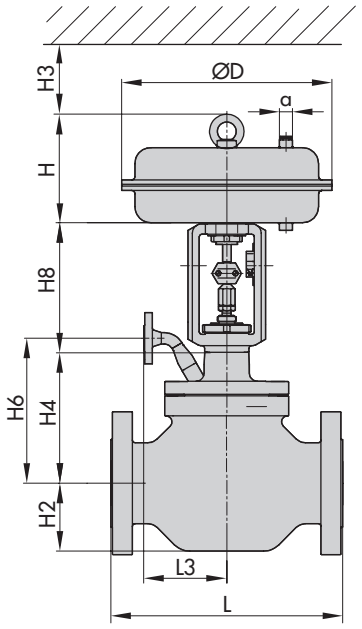
Table 4.2: *Type 3271 and Type 3277 Pneumatic Actuators*

Actuator area		cm²	350	350v2	355v2	700	750v2	1000	1400-60	1400-120	2800	2 x 2800
Diaphragm ØD		mm	280	280	280	390	394	462	530	534	770	770
H [1]	Type 3271	mm	82	92	131	199	236	403	337	598	713	1213
	Type 3277	mm	82	82	121	199	236	–	–	–	–	–
H3 [2]		mm	110	110	110	190	190	610	610	650	650	650
H5	Type 3277	mm	101	101	101	101	101	–	–	–	–	–
Thread	Type 3271		M30x1.5					M60x1.5		M100x2		
	Type 3277		M30x1.5					–	–	–	–	–
a	Type 3271		G ⅜ (⅜ NPT)	G ⅜ (⅜ NPT)	G ⅜ (⅜ NPT)	G ⅜ (⅜ NPT)	G ⅜ (⅜ NPT)	G ¾ (¾ NPT)	G ¾ (¾ NPT)	G 1 (1 NPT)	G 1 (1 NPT)	G 1 (1 NPT)
a2	Type 3277		G ⅜	G ⅜	G ⅜	G ⅜	G ⅜	–	–	–	–	–

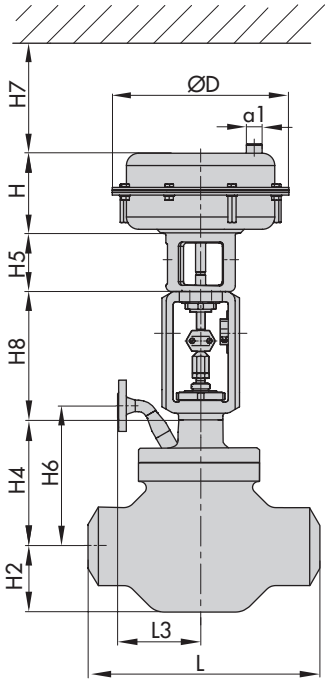
[1] Height including lifting eyelet or female thread and eyebolt according to DIN 580. Height of the swivel hoist may differ. Actuators up to 355v2 cm² without lifting eyelet or female thread

[2] Minimum clearance required to remove the actuator

Dimensional drawings



Type 3281-1 with flanges



Type 3281-7 with welding ends

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 Conditioning Valves*

The weights specified apply to a specific standard device configuration. Weights of other device configurations may differ depending on the version (material, trim or number of actuator springs etc.).

Table 5.1: *Type 3281 Steam Conditioning Valve*

Valve	DN	50	80	100	150	200	250	300
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: *Type 3271 and Type 3277 Pneumatic Actuators*

Actuator area			cm²	350	350v2	355v2	700	750v2	1000	1400-60	1400-120	2800	2 x 2800
Weight	Type 3271	Without handwheel	kg (approx.)	8	11.5	15	22	36	80	70	175	450	950
		With handwheel	kg (approx.)	13	16.5	20	27	41	180	175	300 [1]/ 425 [2]	575 [1]/ 700 [2]	On request
	Type 3277	Without handwheel	kg (approx.)	12	15	19	26	40	–	–	–	–	–
		With handwheel	kg (approx.)	17	20	24	31	45	–	–	–	–	–

1) Side-mounted handwheel up to 80 mm travel
2) Side-mounted handwheel above 80 mm travel

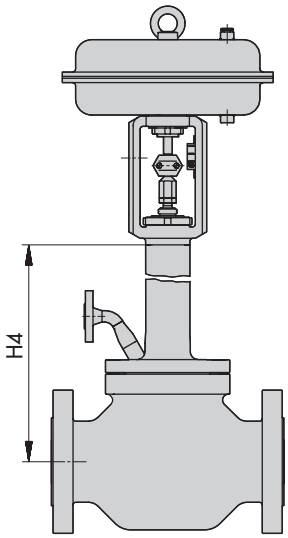
Table 6: *Dimensions in mm for Type 3281 Steam Conditioning Valve with insulating section*

Valve	DN	50	80	100	150	200	250	300
Height H4		487	492	512	665	947	1067	1151

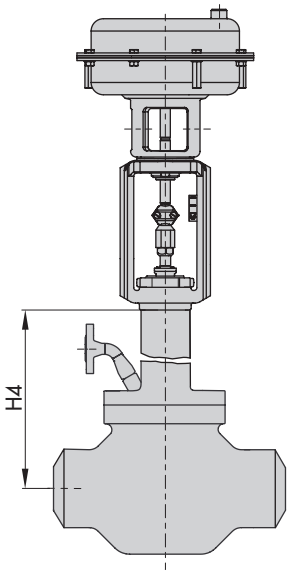
Table 7: *Weights in kg (approx.) for Type 3281 Steam Conditioning Valve with insulating section*

Valve	DN	50	80	100	150	200	250	300
Valve without actuator	PN 16... 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 and flanges



Type 3281-7 with insulating section and welding ends

Selection and sizing of the steam conditioning valve

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

1. Calculate the suitable K_V coefficient according to IEC 60534.
2. Select valve 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).

Associated Information Sheet ▶ T 8000-X

Associated Data Sheets for Pneumatic actuators
▶ T 8310-1
▶ T 8310-2
▶ T 8310-3

Associated Mounting and Operating Instructions
▶ EB 8251

Ordering data

Steam conditioner	Type 3281 Globe Valve
Valve size	DN ...
Pressure rating	PN ...
Body material	Refer 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	... cm²
Fail-safe position	Fail-close or fail-open
Valve accessories	Positioner and/or limit switch