

Series 280

Type 3286-1 and Type 3286-7 Pneumatic Steam Converters Type 3286 Steam-converting Valve



DIN version

Application

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

Nominal size	DN 50 to 300
Nominal pressure	PN 16 to 160
Temperatures	Up to 500 °C



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 3286 Steam-converting Valve together with a Type 3271 Pneumatic Actuator (Type 3286-1 Steam Converter) or with a Type 3277 Pneumatic Actuator (Type 3286-7 Steam Converter). The steam-converting valve largely corresponds to a Type 3256 Angle Valve (► T 8065) fitted with a flow divider St III.

Valve body made of

- Cast steel or
- 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).

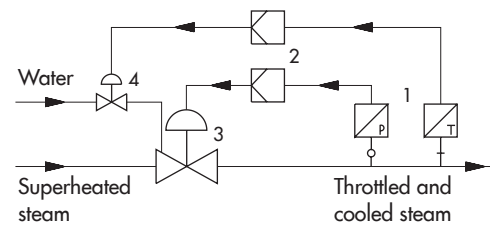
Versions

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 300, nominal pressure PN 16 to 160

- **Type 3286-1** (Fig. 1) · Type 3286 Steam-converting 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)



Fig. 1: Type 3286-1 Pneumatic Steam Converter



- | | |
|---------------|-----------------------------------|
| 1 Transmitter | 3 Steam converter |
| 2 Controller | 4 Control valve for cooling water |

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

- **Type 3286-7** · Type 3286 Steam-converting Valve and Type 3277 Actuator with 350 to 750 cm² actuator area (see Data Sheet ► T 8310-1)

Further versions

- **Welding ends** according to ASME B16.25
- **Insulating section** for temperatures up to 932 °F (500 °C)
- **Additional handwheel** · See Data Sheets ▶ T 8310-1, ▶ T 8310-2, and ▶ T 8310-3
- **ANSI version** · NPS 2 to 12, Class 150 to 900 · See Data Sheet ▶ T 8257
- **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.

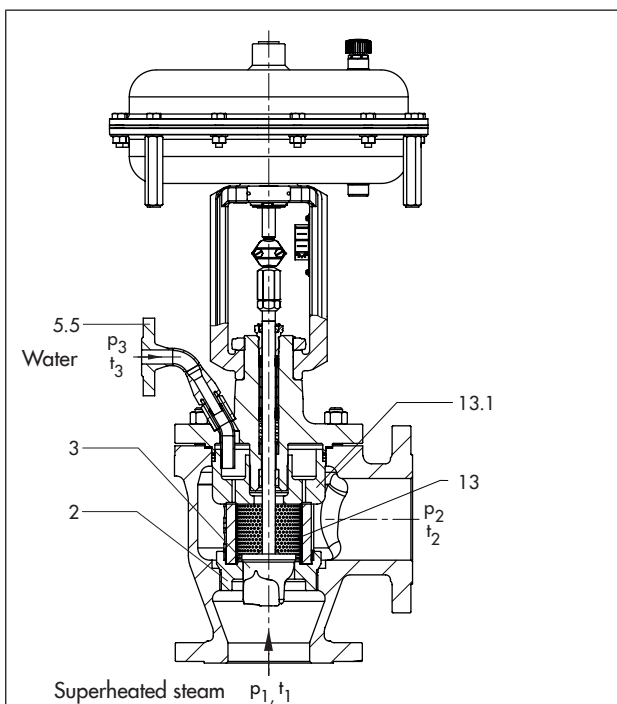


Fig. 3: Type 3286-1 Pneumatic Steam Converter with flanged connections and Type 3271 Actuator

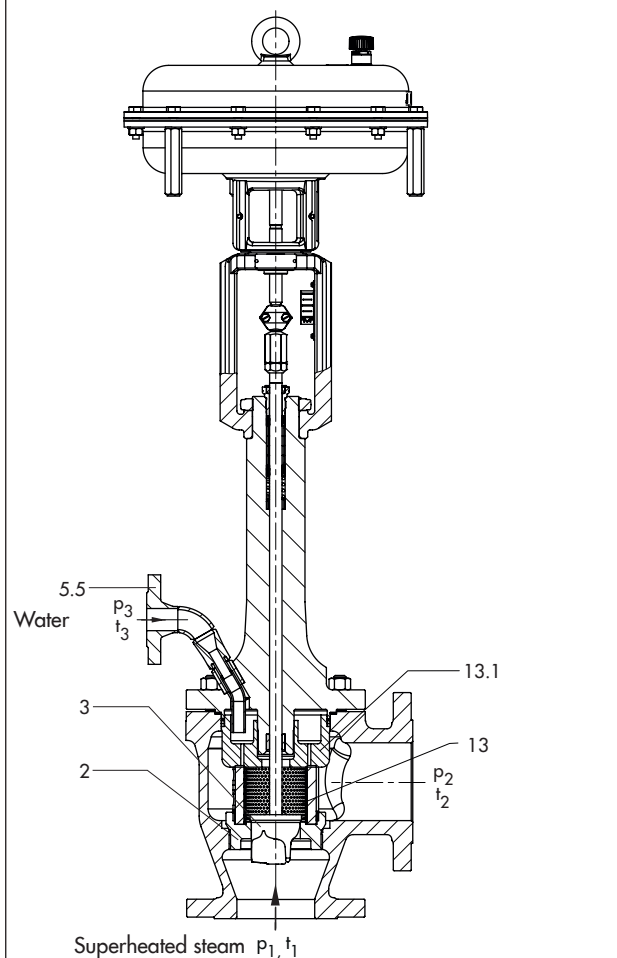


Fig. 4: Type 3286-7 Pneumatic Steam Converter with insulating section, welding ends and Type 3277 Actuator

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

Table 1: Technical data of Type 3286 Steam-converting Valve

Material		Cast steel · 1.0619	Cast steel · 1.7357
Nominal size	DN	50 to 300	
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		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
	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	
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 also pressure-temperature diagrams (► 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								•	•	•	•		
250								•	•	•	•	•	
300									•	•	•	•	•

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 (► 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).

Table 4: Dimensions in mm for the standard versions of Type 3286-1 and Type 3286-7 Pneumatic Steam Converters

Table 4.1: Type 3286 Steam-converting 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	125	155	175	225	275	On request	
	PN 63 to 160	150	190	215	275	325		
Height H4	PN 10 to 160	175	160	170	210	On request		
H8 for actuator	350 cm ²	240	240	240	-			
	355 cm ²	240	240	240	418	-		
	700 cm ²	240	240	240	418	418	-	
	750 cm ²	240	240	240	418	418	-	
	1000 cm ²	295	295	295	418	418	On request	
	1400-60 cm ²	295	295	295	395	395	On request	
	1400-120 cm ²	480	480	480	503	503	503	650
	2800 cm ²	480	480	480	503	503	503	650
2x2800 cm ²	480	480	480	503	503	503 ¹⁾	650	

¹⁾ H8 = 650 mm with 250 mm seat bore

Table 4.2: Types 3271 and 3277 Pneumatic Actuators

Actuator area	cm ²	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 ¹⁾	mm	82	121	199	236	403	287	490 ³⁾ / 580 ⁴⁾	630 ³⁾ / 695 ⁴⁾	1130 ³⁾ / 1195 ⁴⁾
H3 ²⁾	mm	110	110	190	190	610	610	650	650	650
H5	Type 3277 mm	101	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 cm² 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)

Table 5: Weights in kg (approx.) for standard versions of Type 3286-1 and Type 3286-7 Pneumatic Steam Converters

Table 5.1: Type 3286 Steam-converting 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: Types 3271 and 3277 Pneumatic Actuators

Actuator	cm ²	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 ¹⁾ / 425 ²⁾	575 ¹⁾ / 700 ²⁾	On request	
Type 3277 without handwheel	12	19	26	40	-					
Type 3277 with handwheel	17	24	31	45	-					

¹⁾ Handwheel up to 80 mm travel

²⁾ Side-mounted handwheel above 80 mm travel

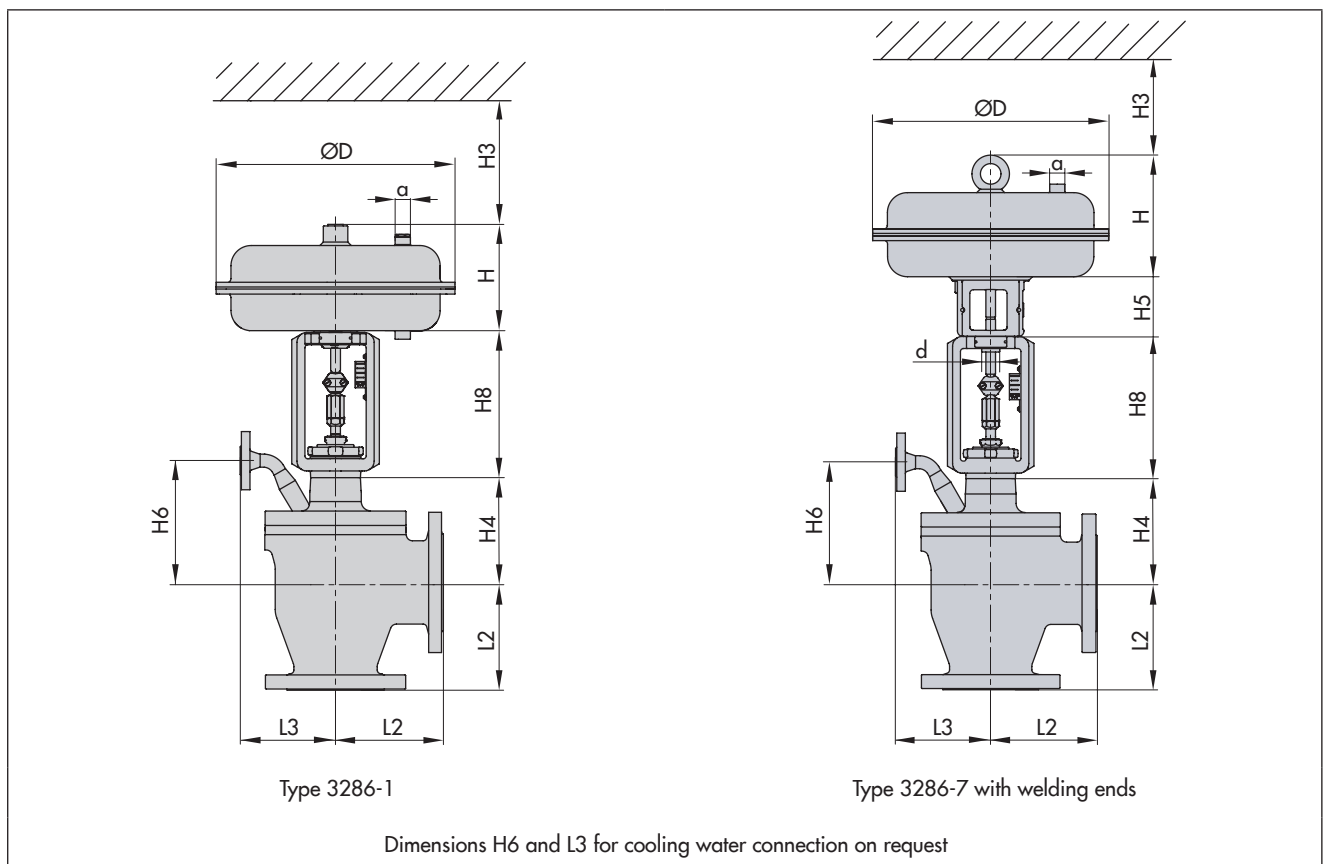
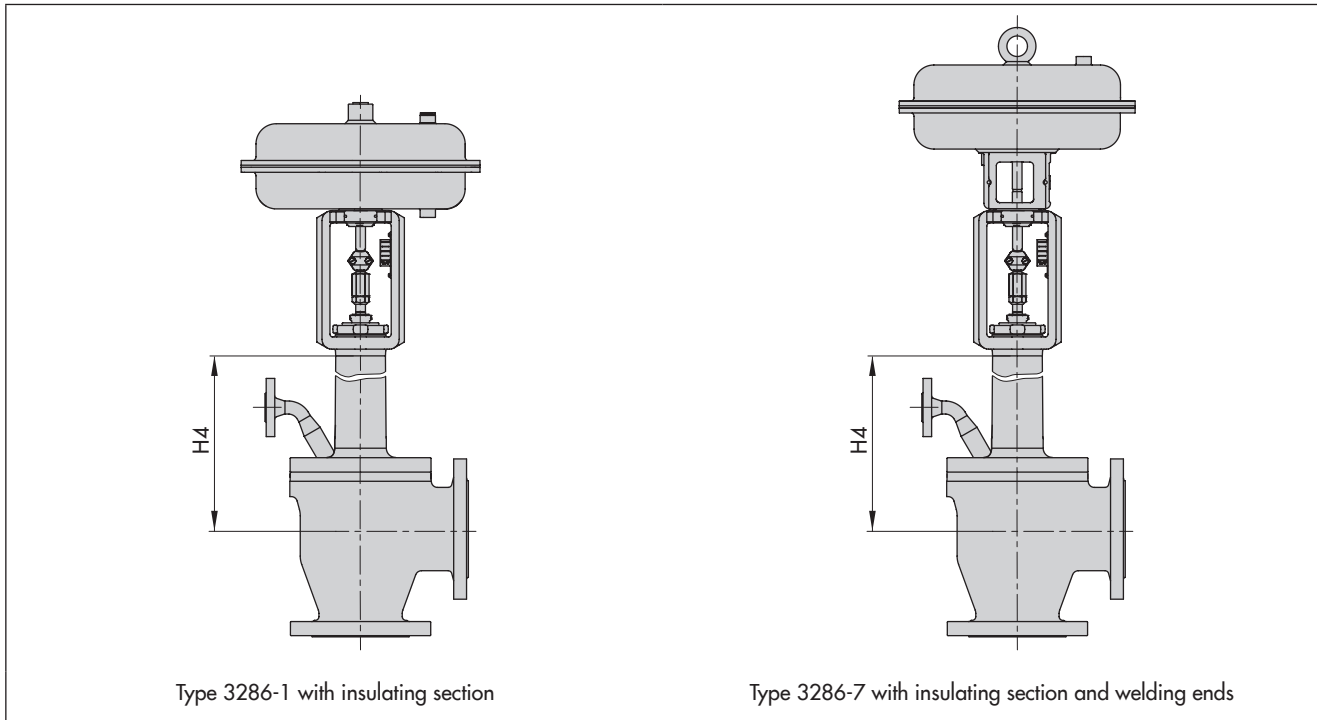


Table 6: Dimensions for the standard version of the Type 3286 Steam-converting Valve with insulating section

Nominal size	DN	15	25	40	50	80	100	150	200	250	300
Height H4		335	330	331	445	430	440	583	On request		

Table 7: Weights (approx. kg) for the standard version of the Type 3286 Steam-converting Valve with insulating section

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



The following specifications are required on ordering:

Steam converter	Type 3286 Angle Valve
Valve 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
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 ²
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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