DATA SHEET

T 2551 EN

Type 33-1 Safety Shut-off Valve (SSV) · Type 33-7 Safety Excess Pressure Valve (SEV)

Self-operated Pressure Regulators

CE **Typetested by TÜV (Type 33-1)**
(for water)

Application

Pressure regulators for set points from **1 to 10.5 bar (SSV) and 1 to 11 bar (SEV) · Valve sizes DN 65 to 250 · Pressure rating PN 16 to 40 · Suitable for water and other liquids up to 150 °C, air and non-flammable gases up to 80 °C**

The pressure regulators consist of a valve, actuator and attached pilot valve. The differential pressure across the regulator is used as auxiliary energy to operate the valve. To open the regulator, this pressure must be at least as high as the minimum differential pressure Δp_{min} specified in Table 1.

The pilot valve determines the function of the regulator depending on how it is hooked up. Its output control pressure and the pressure to be kept constant are transmitted through control lines to the diaphragm of the actuator.

Special features

- Low-maintenance proportional regulators requiring no auxiliary energy
- High dynamic response and small offset, i.e. excellent control accuracy due to the attached pilot valve
- Wide set point range and convenient set point adjustment at the pilot valve
- Single-seated valve with upstream and downstream pressures balanced by a metal bellows
- The Type 33-1 Regulator up to DN 150 complies with requirements of FW 504 published by AGFW (German District Heating Association).

Versions

The pressure regulators consist of a valve with soft-seated plug and a valve body made of cast iron, spheroidal graphite iron (DN 65 to 150) or cast steel as well as an actuator with EPDM rolling diaphragm with an actuator area of A = 640 cm².

Type 33-1 ·Safety shut-off valve (SSV) with integrated pressure reducing valve (Fig. 1) · The regulator controls the downstream pressure p_2 to the set point adjusted at the pilot valve · The regulator closes in the event of valve damage · **Typetested according to AGFW document FW 504**

Type 33-7 · Safety excess pressure valve (SEV) (Fig. 2) for controlling the upstream pressure p_1 to the set point adjusted at the pilot valve.

Fig. 1: *Type 33-1 Pressure Reducing Valve*

Fig. 2: *Type 33-7 Excess Pressure Valve*

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Principle of operation

The medium flows through the valve in the direction indicated by the arrow. The position of the plug determines the flow rate across the area released between plug (3) and valve seat (2).

The valve is fully balanced. The pressure upstream of the plug (3) is transferred through a hole in the plug stem and acts on the outside of the bellows (5), whereas the pressure downstream of the plug acts on the inside of the bellows. As a result, the forces acting on the valve plug are balanced out.

Regardless of whether a pressure reducing valve (Type 33-1) or excess pressure valve (Type 33-7) is used, the upstream pressure p_1 is transmitted to the pilot valve (8) through a control line. In the pilot valve, it is used as auxiliary energy to create the control pressure p_S dependent on the adjusted set point.

In the Type 33-1 Pressure Reducing Valve, the downstream pressure p_2 to be kept constant is transferred to the pilot valve and the bottom of the diaphragm. The pilot valve works in this case as a pressure reducing valve and the control pressure p_S is transmitted to the top of the diaphragm, opposing the controlled variable p_2 and the force of the set point springs.

A drop in the downstream pressure p_2 to be controlled causes the control pressure p_S to rise and the valve opens accordingly. When p_S is equal to p_2, the valve is closed by the force of the set point springs (7).

In the Type 33-7 Excess Pressure Valve, the pilot valve functions as an excess pressure valve. The upstream pressure p_1 to be controlled acts on the top of the diaphragm. The control pressure p_S created at the pilot valve drops as the upstream pressure p_1 rises. The valve opens opposing the force of the set point springs (7). When p_S is equal to p_1, the valve is closed by the force of the set point springs (7).

Type test

The Type 33-1 Regulator as a SSV is typetested (for water) by the German technical surveillance association TÜV. The test mark is available on request.

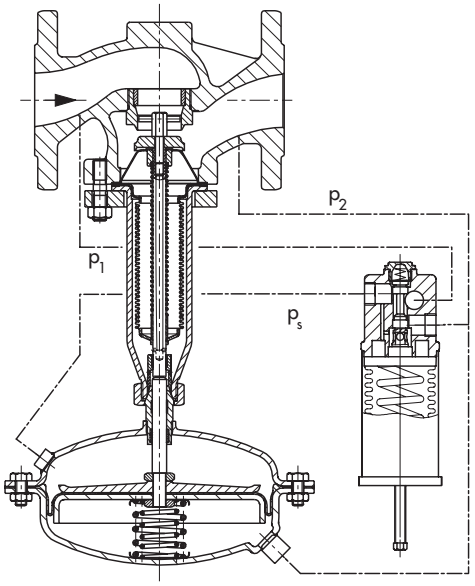
Installation

Install the regulator in horizontal pipelines.

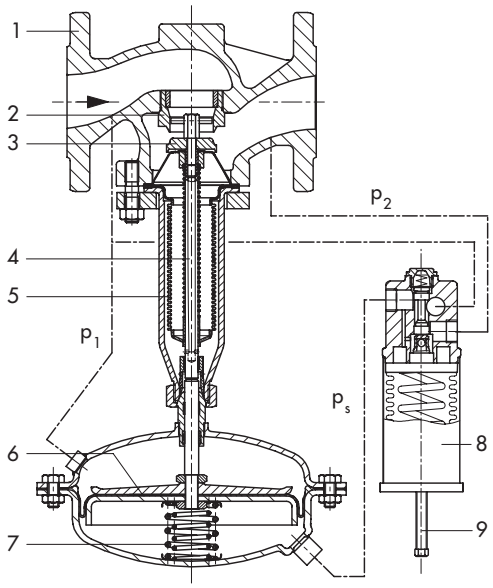
The following points must be observed:

- The direction of flow must match the direction indicated by the arrow on the body
- The actuator must be suspended downwards.

Further details can be found in ▶ EB 2551-1 and ▶ EB 2551-2.



Type 33-1 Safety Shut-off Valve (SSV) with pressure reducing valve



Type 33-7 Safety Excess Pressure Valve

1	Valve body	6	Operating diaphragm
2	Seat (exchangeable)	7	Set point springs
3	Plug (balanced)	8	Pilot valve (PV)
4	Plug stem	9	Set point adjuster
5	Plug spring		

Fig. 3: *Functional diagram*

Table 1: *Technical data · All pressures in bar (gauge)*

Pressure rating		**PN 16 to 40**						
Valve size		DN 65	DN 80	DN 100	DN 125	DN 150	DN 200 [3]	DN 250 [3]
K_{VS} coefficient		50	80	125	190	280	420	500
Value at K_{VS} 0.3 [1]		1.6	1.7	2	2.4	3	5	
x_{FZ} value		0.4	0.35				0.3	
Max. permissible temperature		150 °C [2]						
Minimum differential pressure Δp_{min} in bar		0.4			0.5		0.6	
Set point range (continuously adjustable)	Type 33-1	1 to 10.5 bar						
	Type 33-7 [5]	1 to 11 bar						
Max. perm. differential pressure Δp in bar		16				12	10	
Max. permissible upstream pressure p_1 in bar	Type 33-1	25 bar						
	Type 33-7 [5]	16 bar						
Max. permissible pressure at diaphragm actuator		1 bar above the closing point adjusted at the regulator [4]						
Conformity		CE · EAC						

1) Type 33-1: despite installing a strainer upstream of the regulator, dirt particles may impair the valve shut-off depending on the size of the strainer mesh. On using the SAMSON Type 2 NI Strainer, the maximum leakage rate may correspond to the specified value at K_{VS} 0.3 due to the clogging up of the valve. This value is then significant on sizing the safety excess pressure valve in the plant.

2) Valve body made of cast iron (EN-GJL-250), DN 125 to 250: max. 130 °C, taking into account the material table in DIN 4747-1 for the use of the regulator in hot-water district heating networks.

3) DN 200 and 250 as well as set point range 2 to 16 bar (not typetested) available on request. It is not possible to type test valves in DN 200 and 250 since the test specification only applies to KVS 380 at the maximum. However, their design and function are identical to those of the typetested valve sizes.

4) Type 33-1: to be protected by a downstream (safety) excess pressure valve

5) Not typetested

Table 2: *Materials · Material numbers according to DIN EN*

Valve			
Pressure rating	PN 16	PN 16 · PN 25	PN 16 · PN 25 · PN 40
Body	Cast iron EN-GJL-250	Spheroidal graphite iron EN-GJS-400-18-LT [1]	Cast steel 1.0619
Seat	Stainless steel 1.4006		
Plug with EPDM seal	Stainless steel · 1.4004		
Balancing bellows	Stainless steel 1.4571		
Seal	Graphite on metal core		
Actuator			
Diaphragm cases	Sheet steel DD11 (StW22)		
Diaphragm	EPDM with fabric reinforcement		
Sealing element	EPDM seal		
Pilot valve			
Body	Brass CC754S/1.4541		
Plug	Brass CW617N		
Metal bellows	Brass CW502L		
Control lines	CrNiMo steel		
Screw fittings	Steel		

1) DN 150 and smaller

Dimensional drawing

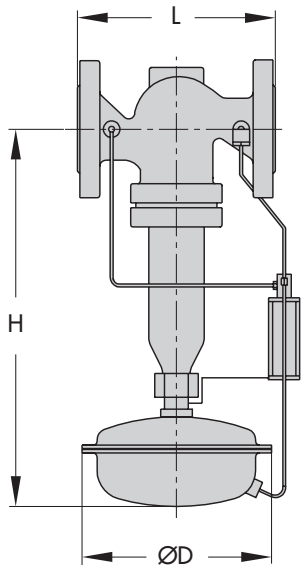


Fig. 4: *Dimensions*

Table 3: *Dimensions in mm and weights*

Valve size	**DN**	**65**	**80**	**100**	**125**	**150**	**200**	**250**
Face-to-face dimensions	L	290	310	350	400	480	600	730
Height [1]	H	495		550	635	755	925	
Actuator area		A = 640 cm²						
Diaphragm housing	ØD	380						
Weight for PN 16 [2]		53 kg	58 kg	66 kg	96 kg	140 kg	280 kg	330 kg

[1] +15 mm for PN 40
[2] +10 % for cast steel 1.0619 and spheroidal graphite iron EN-GJS-400-18-LT

Ordering text

Type 33-1 Safety Shut-off Valve (SSV) with pressure reducing valve
DN …
Body material …
PN …

Type 33-7 Safety Excess Pressure Valve (SEV)
DN …
Body material …
PN …