

T 2551 EN

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



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 regulators comply with AGFW (German District Heating Association) regulations. AGFW document FW 504 (Type 33-1) and AGFW document FW 506 (Type 33-7) up to DN 150

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 $A = 640 \text{ cm}^2$.

Type 33-1 · Safety shut-off valve (SSV) (Fig. 1) with pressure reducing valve for controlling the downstream pressure p_2 to the adjusted set point · **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 adjusted set point
Typetested according to AGFW document FW 506

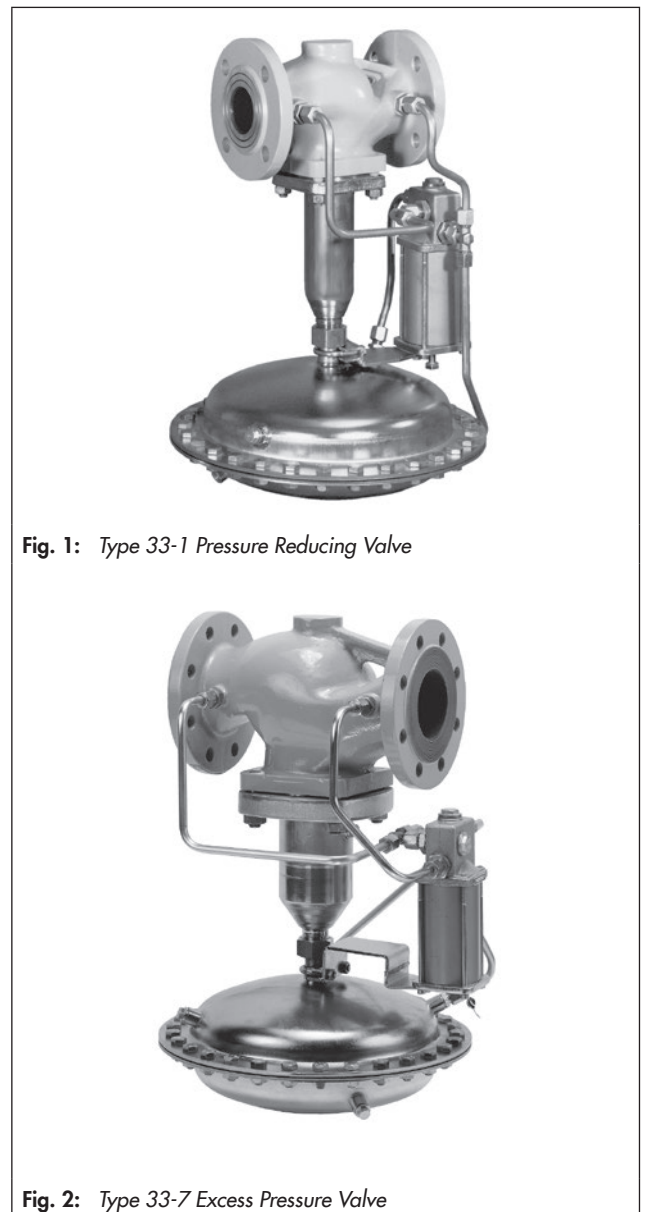


Fig. 1: Type 33-1 Pressure Reducing Valve

Fig. 2: Type 33-7 Excess Pressure Valve

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 regulators (as SSV or SEV) have been typetested for water by the German Technical Inspectorate (TÜV). The test mark is available on request.

Installation

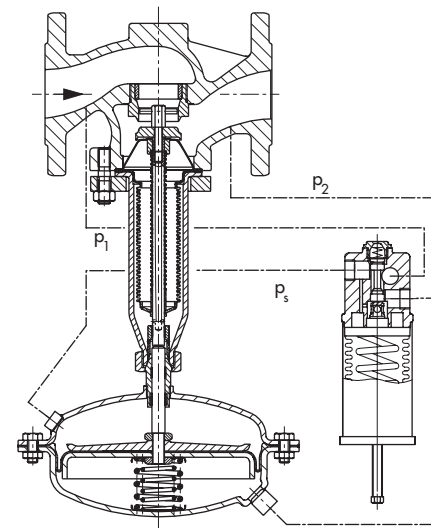
Install the regulator in horizontal pipelines.

The following points must be observed:

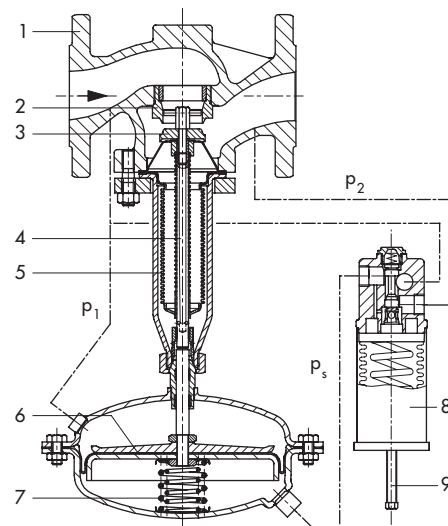
- The direction of flow must match the direction indicated by the arrow on the body
- The actuator must be suspended downwards.



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

Fig. 3: Functional diagram

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

Pressure rating	PN 16 to 40						
	DN 65	DN 80	DN 100	DN 125	DN 150	DN 200 ³⁾	DN 250 ³⁾
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
$K_{VS} 0.3$ 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	1 to 11 bar					
Max. perm. differential pressure Δp in bar	16				12	10	
Max. perm. upstream pressure p_1 in bar	Type 33-1	25 bar					
	Type 33-7	16 bar					
Max. perm. 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 flow coefficient of $K_{VS} 0.3$ due to the clogging up of the valve. This coefficient is then significant on sizing the safety valve or safety excess pressure valve in the plant.
- ²⁾ Valve body EN-JL1040 (cast iron), 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 DN 250 as well as set point range 1 to 16 bar (not type tested) available on request. The test specifications only apply to flow coefficients up to $K_{VS} 380$. As a result, valve sizes DN 200 and DN 250 are not covered. The valves in these valve sizes, however, have the same design and function as the type tested valves.
- ⁴⁾ Type 33-1: to be protected by a downstream (safety) excess pressure valve.

Table 2: Materials · Material numbers according to DIN EN

Valve			
Pressure rating	PN 16	PN 16/25	PN 16, 25 and 40
Body	Cast iron EN-JL1040	Spheroidal graphite iron EN-JS1049 ¹⁾	Cast steel 1.0619
Seat	Stainless steel 1.4006		
Plug with EPDM seal	Stainless steel · DN 65 to 100: 1.4006 · DN 125 to 250: 1.4301		
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

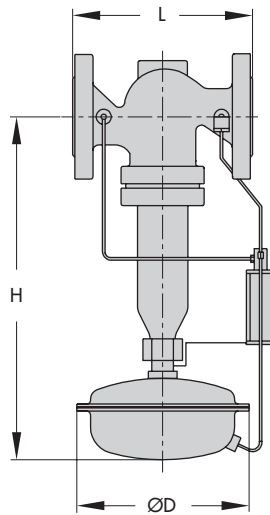


Fig. 4: Dimensions

Table 3: Dimensions in mm and weights

Valve size	DN	65	80	100	125	150	200	250
Overall length	L	290	310	350	400	480	600	730
Height	H	495 ¹⁾		550 ¹⁾	635 ¹⁾	755 ¹⁾	925 ¹⁾	
Actuator area		A = 640 cm ²						
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-JS1049

Ordering text

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

DN ..., PN ..., body material ...

Type 33-7 Safety Excess Pressure Valve (SEV)

DN ..., PN ..., body material ...