Self-operated Pressure Regulators

Pilot operated by the medium

Safety Shut-off Valve (SSV) with Pressure Reducing Valve **Type 33-1**
Safety Excess Pressure Valve (SEV) Type 33-7

Application

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

TÜV--typetested
– for water –

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 to it. The control pressure from the pilot valve and the pressure to be kept constant are transmitted to the actuator diaphragm over control lines.

Special features

- Low-maintenance proportional regulators requiring no auxiliary energy
- High dynamic response and small offset, meaning high control accuracy due to the attached pilot valve
- Wide set point range and easy set point adjustment on the pilot valve
- Single-seated valve with the upstream and downstream pressures balanced by a stainless steel bellows
- Suitable for applications in district heating plants. The regulators comply with AGFW (German District Heating Association) regulations

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 DN 150) or cast steel as well as an actuator with EPDM rolling diaphragm with an effective area of A = 640 cm².

Type 33-1 · Safety Shut-off Valve (SSV) (Fig. 1) with pressure reducing valve to control the downstream pressure p_2 to the set point adjusted at the pilot valve.

Type 33-7 · Safety Excess Pressure Valve (SEV) (Fig. 2) to control the upstream pressure p_1 to the set point adjusted at the pilot valve.

Type 33-1 Pressure Reducing Valve

Type 33-7 Excess Pressure Valve

Fig. 1 · Pilot-operated Type 33- … Pressure Regulators

Principle of operation

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

The valve is fully balanced. The pressure upstream of the plug (3) is transmitted through a hole in the plug stem to 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 or excess pressure valve is used, the upstream pressure p_1 is transmitted to the pilot valve (8) over 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 positioning springs.

A drop in the downstream pressure p_2, which is 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 positioning springs (7).

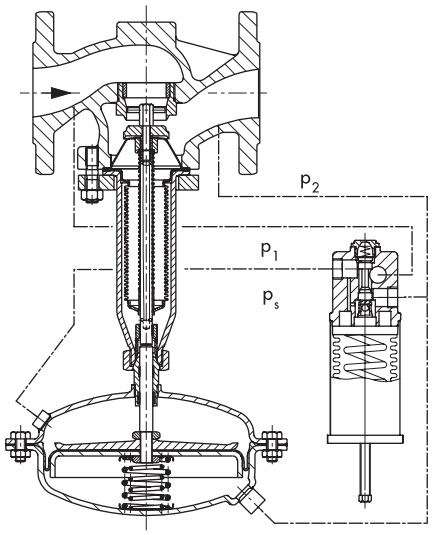
In the Type 33-7 Excess Pressure Valve, the pilot valve functions as an excess pressure valve. The upstream pressure p_1 to be controlled acts on the top of the diaphragm. The control pressure p_s created at the pilot valve drops as the upstream pressure p_1 rises. The valve opens opposing the force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

Installation

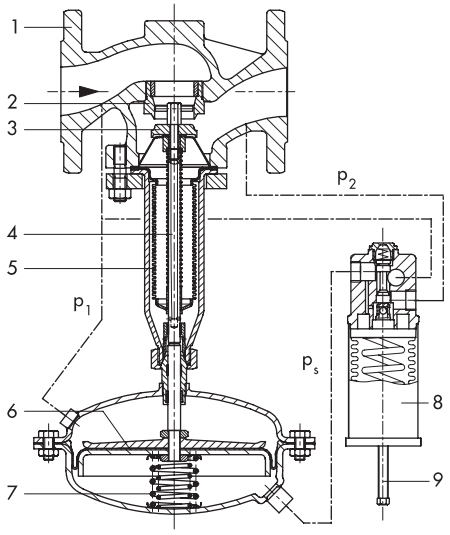
- The regulators are delivered ready for installation. They are only suitable for installation in horizontal pipelines
- Direction of flow must correspond with the arrow on the valve body
- The valve bonnet including the actuator must be suspended downwards

Typetesting

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



Type 33-1



Type 33-7

1 Valve body
2 Valve seat
3 Plug
4 Plug stem
5 Metal bellows
6 Operating diaphragm
7 Positioning springs
8 Pilot valve (PV)
9 Set point adjustment

Fig. 3 · Sectional drawings

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

Nominal pressure	**PN 16 to 40**						
Nominal size [1] DN	65	80	100	125	150	200	250
K_{VS}	50	80	125	190	280	420	500
K_{VS} 0.3 [2]	1.6	1.7	2	2.4	3	5	5
z value	0.4	0.35	0.35	0.35	0.35	0.3	0.3
Max. perm. temperature	150 °C						
Minimum differential pressure Δp_{min} in bar	0.4			0.5		0.6	
Set point range [1], 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						

[1] DN 300 and DN 400 as well as the set point range 1 to 16 bar, not typetested, on request

[2] 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 2NI 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 valve.

Table 2 · Materials · Material numbers according to DIN EN

Valve			
Nominal pressure	PN 16	PN 16/25	PN 16/25/40
Body	Cast iron EN-JL 1040	Spher. graphite iron EN-JS 1049 [1]	Cast steel 1.0619
Seat	Stainless steel 1.4006		
Plug with EPDM soft sealing	Stainless steel · DN 65 to DN 100:1.4006 · DN 125 to DN 250: 1.4301		
Balancing bellows	Stainless steel 1.4571		
Gasket	Graphite with metal core		
Actuator			
Diaphragm cases	Sheet steel DD11 (StW 22 DIN 1614)		
Diaphragm	EPDM with fabric reinforcement		
Guide bushing	DU bushing with EPDM seal		
Pilot valve			
Body	Brass CW600N		
Plug	Brass CW617N		
Metal bellows	Brass CW502L		
Control line	Steel · Copper in special version		
Screw fittings	Steel		

[1] Up to and including DN 150

Pressure-temperature diagrams acc. to DIN EN 12516-1

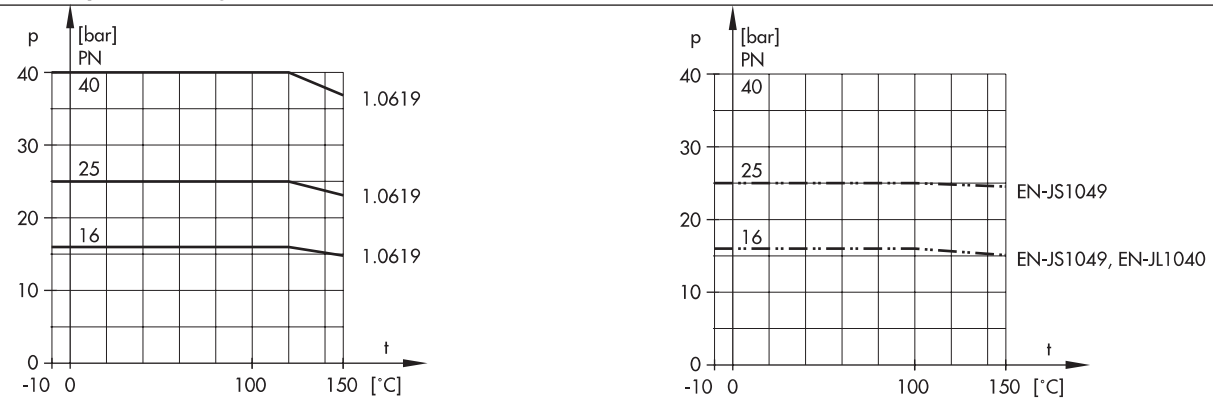


Fig. 4 · Pressure-temperature diagrams

Dimensions and weights

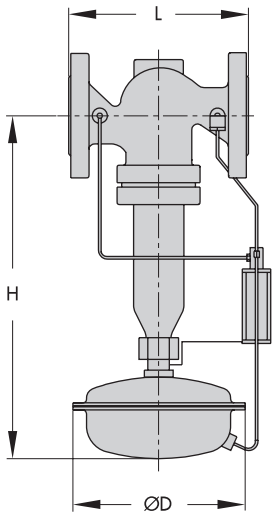


Fig. 5 · Dimensional drawing

Table 3 · Dimensions in mm

Nominal size	DN	65	80	100	125	150	200	250
Length	L	290	310	350	400	480	600	730
Height	H	605		635	685	815	925	
Effective area		A = 640 cm²						
Diaphragm case ∅ D		380						
Weight for PN 16 [1] in kg		53	58	66	96	140	280	330

[1] +10 % for cast steel 1.0619 and spheriodal graphite iron EN-JS 1049

Specifications subject to change without notice.

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