

Self-operated Pressure Regulators


Pilot-operated by the process medium



Type 33-1 Safety Shut-off Valve (SSV) with pressure reducing valve Type 33-7 Safety Excess Pressure Valve (SEV)

Application

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

Typetested by TÜV 
(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. 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
- Suitable for 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 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.

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



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 type tested for water by the German Technical Inspectorate (TÜV). The test mark is available on request.

Installation

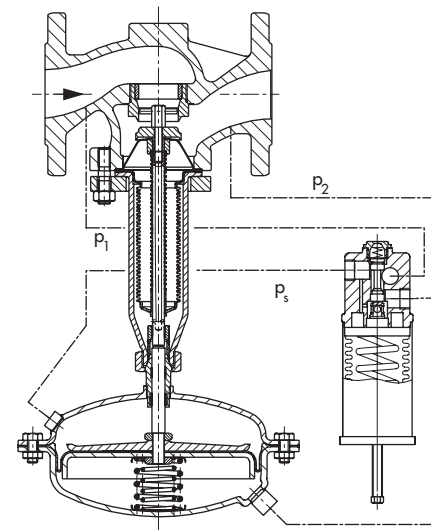
Install the regulator in horizontal pipelines.

The following points must be observed:

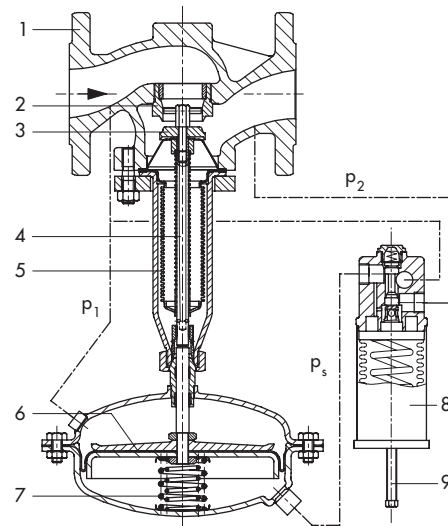
- The direction of flow must match the direction indicated by the arrow on the body
- The actuator must be suspended downwards.



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)

Nominal pressure	PN 16 to 40						
	DN 65	DN 80	DN 100	DN 125	DN 150	DN 200	DN 250
Nominal size ¹⁾	DN 65	DN 80	DN 100	DN 125	DN 150	DN 200	DN 250
K _{V5} coefficient	50	80	125	190	280	420	500
K _{V5} 0.3 ²⁾	1.6	1.7	2	2.4	3	5	
x _{FZ} value	0.4	0.35				0.3	
Max. permissible temperature	150 °C ³⁾						
Minimum differential pressure Δp _{min} in bar	0.4			0.5		0.6	
Set point range ¹⁾ (continuously adjustable)	1 to 10.5 bar						
Type 33-1							
Type 33-7	1 to 11 bar						
Max. perm. differential pressure Δp in bar	16				12	10	
Max. permissible upstream pressure p ₁ in bar	25 bar						
Type 33-1							
Type 33-7	16 bar						
Compliance	CE · EAC						

¹⁾ DN 300 and 400 as well as set point range 1 to 16 bar (not typetested) available 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 2 NI Strainer, the maximum leakage rate may correspond to the specified flow coefficient of K_{V5} 0.3 due to the clogging up of the valve. This coefficient is then significant on sizing the safety valve in the plant.

³⁾ 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.

Table 2: Materials · Material numbers according to DIN EN

Valve	PN 16 to 40		
Nominal pressure	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		
Guide bushing	DU bushing with EPDM seal		
Pilot valve			
Body	Brass CW600N/1.4541		
Plug	Brass CW617N		
Metal bellows	Brass CW502L		
Control lines	Steel, special version: copper		
Screw fittings	Steel		

¹⁾ DN 150 and smaller

Dimensional drawing

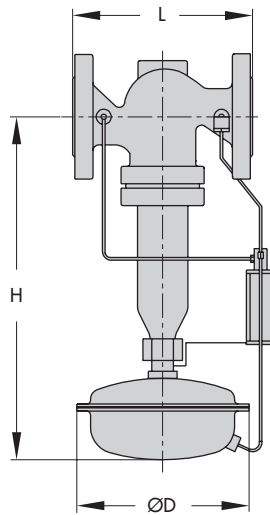


Fig. 4: Dimensions

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 ...

Specifications subject to change without notice



SAMSON AG · MESS- UND REGELTECHNIK
 Weismüllerstraße 3 · 60314 Frankfurt am Main, Germany
 Phone: +49 69 4009-0 · Fax: +49 69 4009-1507
 samson@samson.de · www.samson.de

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