

## T 2551-1 EN

### Type 33-1 Safety Shut-off Valve (SSV)

Self-operated Pressure Regulators

**CE** Typetested by TÜV  
(for water)

#### Application

Pressure regulators for set points from **1 to 10.5 bar** · Nominal 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 regulator consists 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  $\Delta p_{\min}$  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.

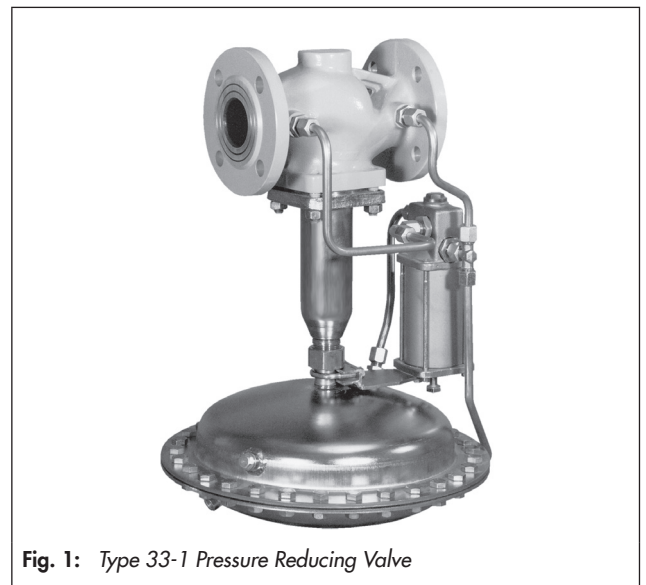
#### Special features

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

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



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

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.

The downstream pressure  $p_2$  to be kept constant is transmitted 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 (7).

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).

## 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.

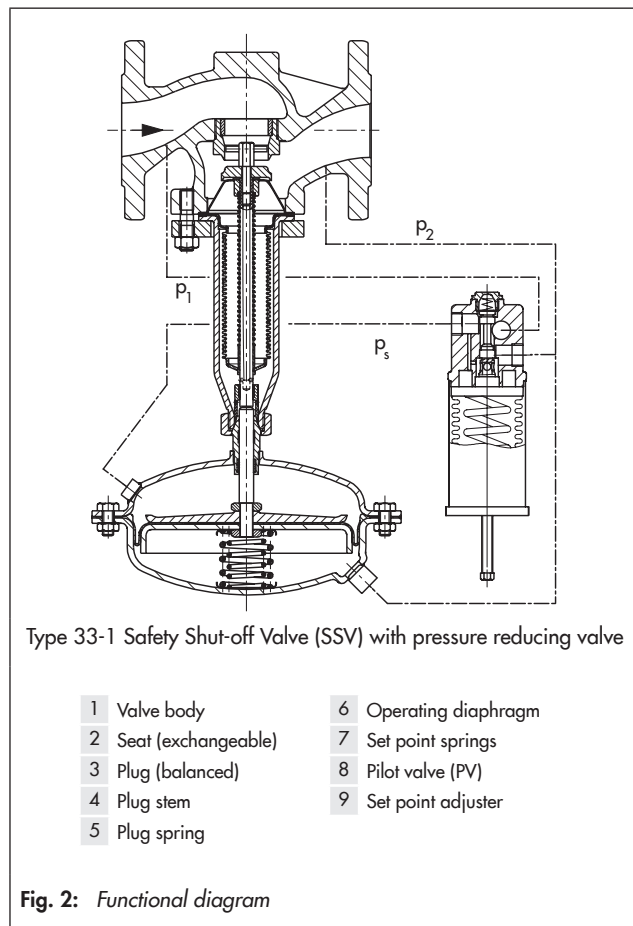


Fig. 2: Functional diagram

## Ordering text

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

DN ...

Body material ...

PN ...

**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 <sup>3)</sup>	DN 250 <sup>3)</sup>
Nominal size	DN 65	DN 80	DN 100	DN 125	DN 150	DN 200 <sup>3)</sup>	DN 250 <sup>3)</sup>
K <sub>V5</sub> coefficient	50	80	125	190	280	420	500
Value at K <sub>V5</sub> 0.3 <sup>1)</sup>	1.6	1.7	2	2.4	3	5	
x <sub>FZ</sub> value	0.4	0.35				0.3	
Max. permissible temperature	150 °C <sup>2)</sup>						
Min. differential pressure Δp <sub>min</sub> in bar	0.4			0.5		0.6	
Set point range (continuously adjustable)	1 to 10.5 bar						
Max. perm. differential pressure Δp in bar	16				12	10	
Max. permissible upstream pressure p <sub>1</sub> in bar	25 bar						
Max. permissible pressure at diaphragm actuator	1 bar above the closing point adjusted at the regulator <sup>4)</sup>						
Conformity	CE · EAC						

- <sup>1)</sup> 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<sub>V5</sub> 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.
- <sup>2)</sup> 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.
- <sup>3)</sup> DN 200 and 250 as well as set point range 2 to 16 bar (not type tested) available on request. It is not possible to type test valves in DN 200 and 250 since the test specification only applies to K<sub>V5</sub> 380 at the maximum. However, their design and function are identical to those of the type tested nominal sizes.
- <sup>4)</sup> Type 33-1: to be protected by a downstream (safety) excess pressure valve

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

Valve	PN 16	PN 16 · PN 25	PN 16 · PN 25 · PN 40
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 <sup>1)</sup>	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		
<b>Actuator</b>			
Diaphragm cases	Sheet steel DD11 (StW22)		
Diaphragm	EPDM with fabric reinforcement		
Sealing element	EPDM seal		
<b>Pilot valve</b>			
Body	Brass CC754S/1.4541		
Plug	Brass CW617N		
Metal bellows	Brass CW502L		
Control lines	CrNiMo steel		
Screw fittings	Steel		

- <sup>1)</sup> DN 150 and smaller

## Dimensional drawing

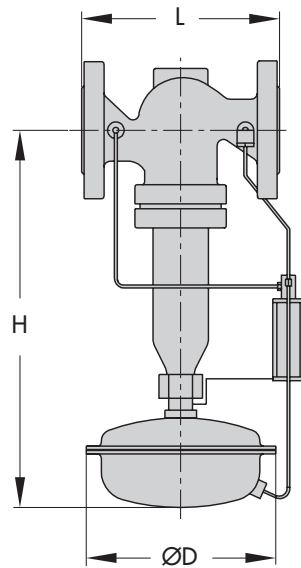


Fig. 3: Dimensions

Table 3: Dimensions in mm and weights

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

<sup>1)</sup> +15 mm for PN 40

<sup>2)</sup> +10 % for cast steel 1.0619 and spheroidal graphite iron EN-GJS-400-18-LT