Self-operated Pressure Regulators

Universal Excess Pressure Valve Type 41-73

Application

Excess pressure valves for set points from **5 mbar** to **28 bar** · Valves in **DN 15** to **100** · Nominal pressures **PN 16** to **40** · Suitable for water, gases and vapors up to **350 °C**

The valve **opens** when the upstream pressure rises

Special features

- Low-maintenance proportional regulators requiring no auxiliary energy
- Frictionless plug stem seal with stainless steel bellows
- Control line kit available for tapping the pressure directly at the valve body
- Wide set point range and easy set point adjustment over a nut
- Exchangeable actuator and positioning springs
- Spring-loaded, single-seated valve with upstream and downstream pressure balancing[1)] by a stainless steel bellows
- Plug with soft sealing for high sealing requirements
- Low-noise standard plug · Special version with flow divider St I for further noise level reduction (see Data Sheet T 8081 EN)

Versions

Excess pressure valve for controlling the upstream pressure p_1 to the adjusted set point. The valve opens when the upstream pressure rises.

Type 41-73 · Standard version

Type 2417 Valve · Valve in DN 15 to 100 · Plug with metal sealing · Body made of either cast iron EN-JL1040, spheroidal graphite iron EN-JS1049, cast steel 1.0619 or CrNiMo steel 1.4581

Type 2413 Actuator with EPDM rolling diaphragm and screw fitting · All wetted parts are free of non-ferrous metal

Extended versions

Millibar excess pressure valve (DN 15 to 80 only)

– for pressure set points from 5 to 50 mbar

Safety excess pressure valve

– with leakage line connection and seal or two diaphragms and diaphragm rupture indicator

Fig. 1 · Type 41-73 Universal Excess Pressure Valve

Special versions

– Control line kit for pressure tapping at the valve body (accessories)
– FPM rolling diaphragm for oils
– Free of oil and grease for oxygen with NBR diaphragm
– EPDM diaphragm with PTFE protective foil
– Actuator for remote set point adjustment (autoclave control)
– Bellows actuator for valves DN 15 to 100 · Set point ranges 2 to 6, 5 to 10, 10 to 22, 20 to 28 bar
– Valve with flow divider St I for particularly low-noise operation with gases and vapors
– Version completely in stainless steel
– Stainless Cr steel seat and plug with PTFE soft sealing (max. 220 °C) · With EPDM soft sealing (max. 150 °C)
– Free of oil and grease for high-purity applications
– Seat and plug armored for low-wear operation
– Wetted plastic parts conforming to FDA regulations (max. 60 °C)

1) For $K_{VS} \leq 1$: without balancing bellows

Principle of operation (see Fig. 2)

The medium flows through the valve (1) as indicated by the arrow. The position of the valve plug (3) and the area released between the plug and seat (2) determine the flow rate. The plug stem (5) with the plug is connected to the stem (11) of the actuator (10).

To control the pressure, the operating diaphragm (12) is tensioned by the positioning springs (7) and the set point adjuster (6) so that the valve is closed by the force of the positioning springs when it is relieved of pressure ($p_1 = p_2$).

The upstream pressure p_1 to be controlled is tapped upstream of the valve and transmitted via the control line (14) to the operating diaphragm (12) where it is converted into a positioning force. This force is used to move the valve plug (3) according to the force of the positioning springs (7), which is adjustable at the set point adjuster (6). When the force resulting from the upstream pressure p_1 rises above the adjusted set point, the valve opens proportionally to the change in pressure.

The fully balanced valves are equipped with a balancing bellows (4). The downstream pressure p_2 acts on the inside of the bellows, whereas the upstream pressure p_1 acts on the outside of the bellows. As a result, the forces produced by the upstream and downstream pressures acting on the plug are balanced.

The valves are available with flow divider St I. When the flow divider St I is retrofitted, the valve seat must be replaced.

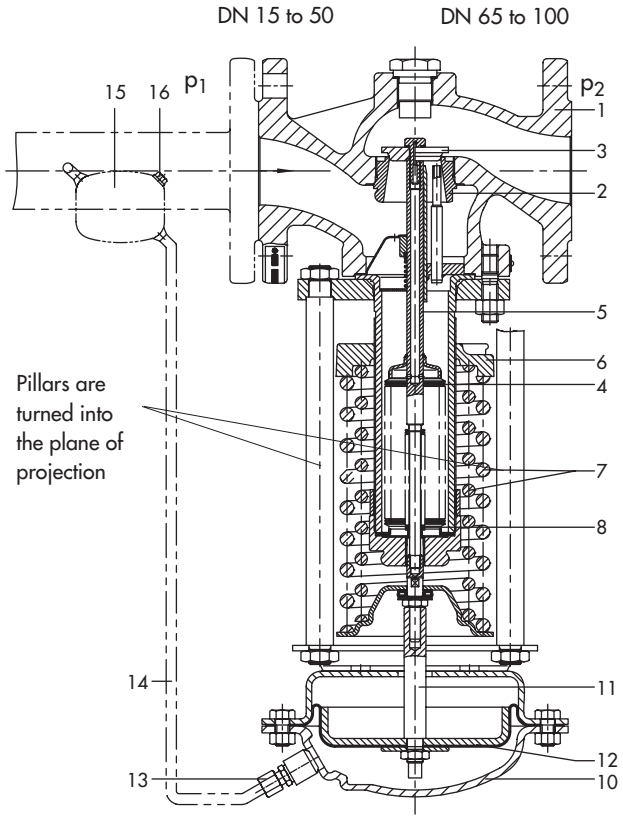
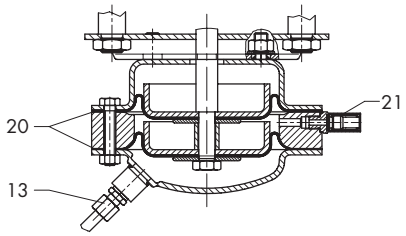
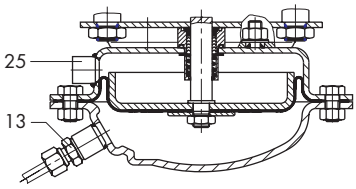


Fig. 2.1 · Type 41-73 Universal Excess Pressure Valve, sectional view

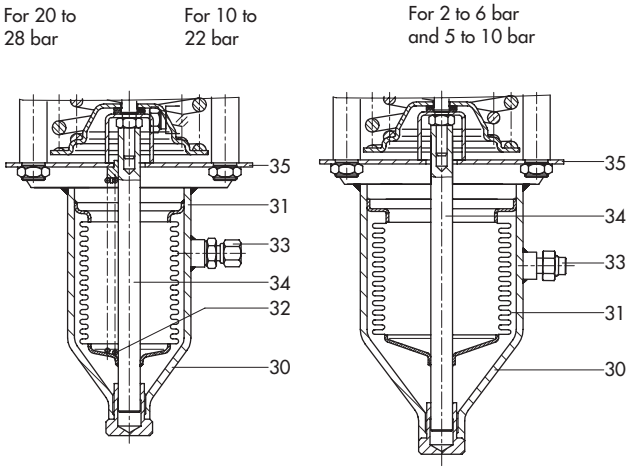
1 Valve body (Type 2417)
2 Seat (exchangeable)
3 Plug (with metal sealing)
4 Balancing bellows
5 Plug stem
6 Set point adjuster
7 Positioning springs
8 Bellows seal
10 Type 2413 Actuator
11 Actuator stem
12 Operating diaphragm with diaphragm plate
13 Control line connection G ⅜ (screw joint with restriction)
14 Control line
15 Condensation chamber
16 Filler plug
20 Two diaphragms
21 Diaphragm rupture indicator
25 Leakage line connection G ¼
30 Metal bellows actuator
31 Bellows with lower part
32 Additional springs
33 Control line connection G ⅜
34 Bellows stem
35 Bracket



Actuator with two diaphragms and diaphragm rupture indicator



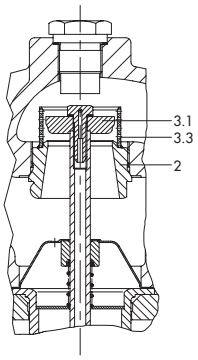
Actuator with leakage line connection



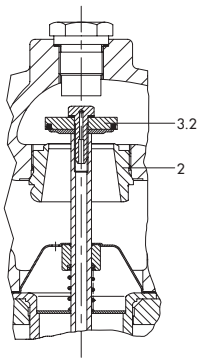
Metal bellows actuator

Fig. 2.2 · Type 2413 Actuators, various versions

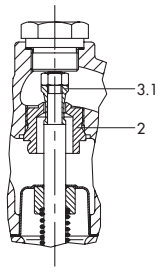
Fig. 2 · Principle of operation, Type 41-73 Universal Excess Pressure Valve



Plug with metal sealing, with flow divider St I



Plug with soft sealing



Valve for small flow rates - $K_{VS} \leq 1$ - without balancing bellows

2 Seat
3.1 Plug with metal sealing
3.2 Plug with soft sealing
3.3 Flow divider

Fig. 3 · Type 41-73 Universal Excess Pressure Valve, equipped

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

Valve	**Type 2417**		
Nominal pressure PN	16, 25 or 40		
Nominal size DN	15 to 50	65 to 80	100
Max. perm. diff. pressure Δp	25 bar[1)]	20 bar[1)]	16 bar
Temperature range	See Fig. 6 · Pressure-temperature diagram		
Valve plug	Metal sealing: max. 350 °C · PTFE soft sealing: max. 220 °C EPDM, FPM soft sealing: max. 150 °C · NBR soft sealing: max. 60 °C		
Leakage rate (standard version)	Metal sealing: Leakage rate I ≤ 0.05 % of K_{VS} · Soft sealing: Leakage rate IV		
Actuator with diaphragm	**Type 2413**		
Set point ranges	5 to 30 mbar[2)] · 25 to 50 mbar[2)] · 0.05 to 0.25 bar · 0.1 to 0.6 bar · 0.2 to 1.2 bar · 0.8 to 2.5 bar · 2 to 5 bar · 4.5 to 10 bar · 8 to 16 bar		
Max. perm. pressure at actuator	1.5 times max. set point of the actuator used [3)]		
Max. perm. temperature	Gases 350 °C, however, max. 80 °C at the actuator · Liquids 150 °C, with condensation chamber max. 350 °C · Steam with condensation chamber max. 350 °C		
Actuator with bellows	**Type 2413**		
Effective area	33 cm²	62 cm²	
Max. perm. pressure at actuator	30 bar	20 bar	
Set point ranges	10 to 22 bar 20 to 28 bar	2 to 6 bar [4)] 5 to 10 bar	
Set point spring	8000 N		

[1)] For millibar excess pressure valve, max. perm. differential pressure Δp: 10 bar · [2)] For millibar excess pressure valve only
[3)] Millibar excess pressure valve: max. 0.5 bar · [4)] Set point spring 4400 N

Table 2 · Materials · Material number according to DIN EN

Valve	**Type 2417**			
Nominal pressure	PN 16	PN 25	PN 40	
Max. perm. temperature	300 °C	350 °C	350 °C	350 °C
Body	Cast iron EN-JL1040 (GG-25)	Spheroidal graphite iron EN JS-1049	Cast steel 1.0619 (GS-C25)	Stainless steel 1.4581
Seat	CrNi steel			CrNiMo steel
Plug	CrNi steel			CrNiMo steel
Seal ring for soft seal	PTFE with 15 % glass fiber · EPDM · NBR			
Guide bushing	PTFE/Graphite			
Balancing bellows and bellows seal	Stainless steel 1.4571			
Actuator	**Type 2413**			
Diaphragm cases	Sheet steel DD11 (StW22) [1)]			
Diaphragm	EPDM with fabric insert [2)] · FPM for oils · NBR · EPDM with PTFE protective foil			

[1)] In stainless steel version, CrNi steel
[2)] Standard version; further details in "Special versions"

Table 3 · K_{VS} coefficients and z values

DN	Seat in mm	K_{VS} [2]		K_{VS} I [1]	z [1]
		Standard version	Special version	With flow divider	
15	12		0.1[2] · 0.4[2] · 1[2]	–	
	22	4	2.5	3	0.65
20	12		0.1[2] · 0.4[2] · 1[2]		
	22		2.5 · 4	–	
		6.3		5	0.6
25	12		0.1[2] · 0.4[2] · 1[2]	–	
	22			–	
		8	2.5 · 4 · 6.3	6	0.55
32	38		8		
		16		12	0.55
40	38		8 · 16		
		20		15	0.45
50	38		16		
		32		25	0.4
65	64		20 · 32		
		50		38	0.4
80	64		32		
		80		60	0.35
100	89		50		
		125		95	0.35

[1] Terms for noise level calculation according to VDMA 24422 (edition 1.89)

[2] For $K_{VS} \leq 1$: Valve without balancing bellows

Valve-specific correction terms

ΔL_G · For gases and vapors:
Values as specified in the diagram in Fig. 4

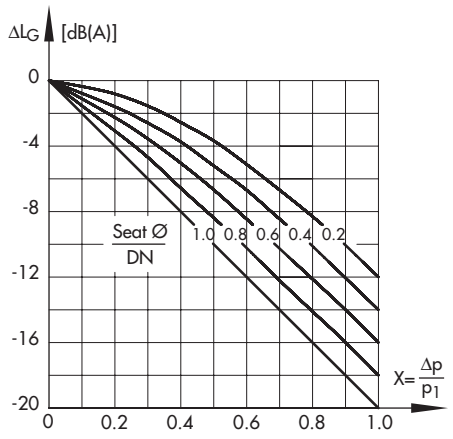


Fig. 4 · Diagram - ΔL_G for gases and vapors -

ΔL_F · For liquids:

$$\Delta L_F = -10 \cdot (X_F - z) \cdot y$$

$$\text{with } X_F = \frac{\Delta p}{p_1 - p_v} \text{ and } y = \frac{K_V}{K_{VS}}$$

Terms for control valve sizing according to DIN EN 60534, Parts 2-1 and 2-2:

$F_L = 0.95$ $X_T = 0.75$

z · Acoustical valve coefficient

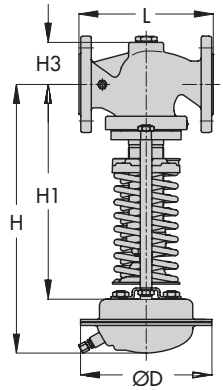
K_{VS} I, K_{VS} · For installation of a flow divider St I as a noise-reducing component · Flow characteristic differences between valves with and valves without flow dividers do not occur until the valve has passed through approx. 80 % of its travel range.

Table 4 · Dimensions in mm and weights

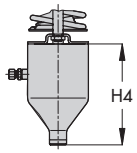
Excess pressure valve		**Type 41-73**								
Nominal size	DN	15	20	25	32	40	50	65	80	100
Set point range in **bar**	Length L	130	150	160	180	200	230	290	310	350
	Height H1	315			370			500		515
	Height H3	60			85			110		35
0.005 to **0.03**	Height H	425						–		
	Actuator	Ø D = 490 mm, A = 1200 cm²								
	Valve spring force F	600 N								
0.025 to **0.05**	Height H	425			480			610		–
	Actuator	Ø D = 490 mm, A = 1200 cm²								
	Valve spring force F	1200 N								
0.05 to **0.25**	Height H	425			480			610		625
	Actuator	Ø D = 380 mm, A = 640 cm²								
	Valve spring force F	1750 N								
0.1 to **0.6**	Height H	425			480			610		625
	Actuator	Ø D = 380 mm, A = 640 cm²								
	Valve spring force F	4400 N								
0.2 to **1.2**	Height H	410			460			590		610
	Actuator	Ø D = 285 mm, A = 320 cm²								
	Valve spring force F	4400 N								
0.8 to **2.5**	Height H	410			465			595		610
	Actuator	Ø D = 225 mm, A = 160 cm²								
	Valve spring force F	4400 N								
2 to **5**	Height H	390			445			575		590
	Actuator	Ø D = 170 mm, A = 80 cm²								
	Valve spring force F	4400 N								
4.5 to **10**	Height H	390			445			575		590
	Actuator	Ø D = 170 mm, A = 40 cm²								
	Valve spring force F	4400 N								
8 to **16**	Height H	390			445			575		590
	Actuator	Ø D = 170 mm, A = 40 cm²								
	Valve spring force F	8000 N								
0.005 to **0.05**	Weight, for cast iron [1], approx. kg	28.5	29.5		35.5	37.5	41	57	64	–
0.05 to **0.6**		22.5	23.5		29.5	31.5	35	51	58	67
0.2 to **2.5**		16	18		23.5	25.5	29	45	52	61
2 to **16**		12	13		18.5	21	24	40	47	56

[1] +10 % for cast steel PN 40 and spheroidal graphite iron PN 25

Dimensions



Type 41-73
Universal Excess Pressure Valve



Type 2413
Actuator with metal bellows

Height H4		
Diaphragm area	33 cm²	62 cm²
H4 in mm	200	215
Weight		
DN 15 to 50	8 kg	17 kg
DN 65 to 100	12 kg	18 kg

Fig. 5 · Dimensions

Installation

Normally, the valve is installed with the actuator suspended downwards. Install pipelines horizontally with a slight downward slope on both sides of the valve for drainage of the condensate.

Millibar excess pressure valves are to be installed standing upright with the actuator pointing upwards.

For further details on installation, refer to Mounting and Operating Instructions EB 2517 EN.

The direction of medium flow must correspond with the arrow on the valve body.

- Valve and actuator are delivered separately.
- The control line must be adapted to match the onsite conditions and is not delivered with the valve; on customer request, a control line kit for the direct pressure tapping at the valve body (see accessories) is available.

Pressure-temperature diagram (acc. to DIN EN 12516-1)

The range of application of the valves and the permissible pressures and temperatures are limited by the pressure-temperature diagram and the nominal pressure ratings.

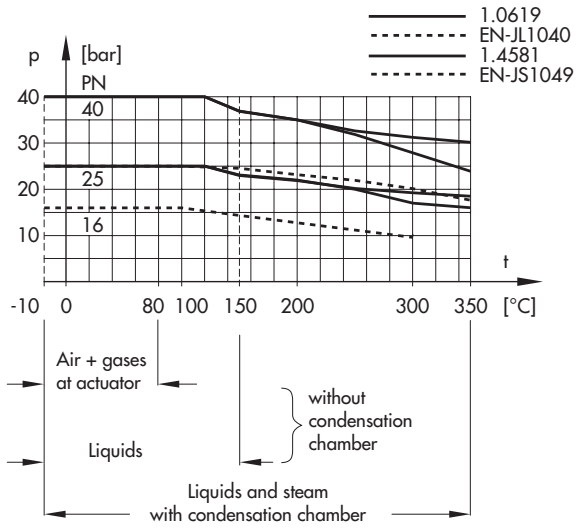


Fig. 6 · Pressure-temperature diagram

Accessories

- Screw joints for connection of the control line 3/8" to the filler neck (included in the scope of delivery and in the price). Other screw joints are available on request.
- Condensation chamber for steam condensation and protection of the operating diaphragm against extreme temperatures. This chamber is necessary for steam and liquids above 150 °C.
- Control line kit - optionally with or without condensation chamber - for direct attachment to the valve and actuator (pressure tapped directly at the valve body, for set points ≥0.8 bar).

Detailed information on accessories can be found in Data Sheet T 2595 EN.

Ordering text

Universal Excess Pressure Valve **Type 41-73**
Extended version ...
DN ...
PN ...
Body material ...
K_{VS} ...
Set point range ... bar
Optionally, accessories ...
Optionally, special version ...

Specifications subject to change without notice.

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