

Self-operated Pressure Regulators

Universal Excess Pressure Valve Type 41-73



Application

Pressure regulator for set points from **25 mbar** to **28 bar** · Valves in sizes **DN 15** to **100** · Nominal pressure **PN 16** to **40** · For liquids, gases and steam up to **350 °C**

The valve **opens** when the **upstream** pressure increases.



Special features

- Low-maintenance P-regulator requiring no auxiliary energy
- Frictionless plug stem seal with stainless steel bellows
- Control line kit for pressure tapping directly at the body (accessories)
- Wide set point range and convenient set point adjustment on a nut
- Exchangeable actuator and positioning springs
- Spring-loaded single-seated valve with upstream and downstream pressure balancing¹⁾ by a stainless steel bellows
- Plug with soft seal for high sealing requirements
- Standard low-noise plug · Special version with flow divider St I for further noise reduction (refer to Data Sheet T 8081 EN)

Versions

Excess pressure valve to control the upstream pressure p_1 to the adjusted set point. The valve opens when the upstream pressure increases.

Type 41-73 · Standard version

Type 2417 Valve in DN 15 to 100 · Plug with metal seal · Body made of 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 free of non-ferrous metal

Extended versions

Millibar pressure reducing valve (DN 65 to 80)

Pressure set points from 25 to 50 mbar

Safety excess pressure valve

Actuator 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 FPM diaphragm
- EPDM diaphragm with protective PTFE foil
- Actuator for remote set point adjustment (autoclave control)
- Bellows actuator for valves in 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 of stainless steel
- Seat and plug of stainless Cr steel with PTFE soft seal (max. 220 °C) · With EPDM soft seal (max. 150 °C)
- Hard-faced seat and plug for low-wear operation
- Free of oil and grease for high-purity applications
- Wetted plastic parts complying with FDA regulations (max. 60 °C)

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

Principle of operation (Fig. 2)

The medium flows through the valve body (1) in the direction indicated by the arrow. The position of the valve plug (3) determines the flow rate across the area released between the valve's plug and seat (2). The plug stem (5) with the plug is connected to the actuator stem (11).

To control the pressure, the operating diaphragm (12) is pretensioned by the set point springs (7) and the set point adjuster (6). As a result, the valve is closed by the force of the positioning springs in pressureless state ($p_1 = p_2$).

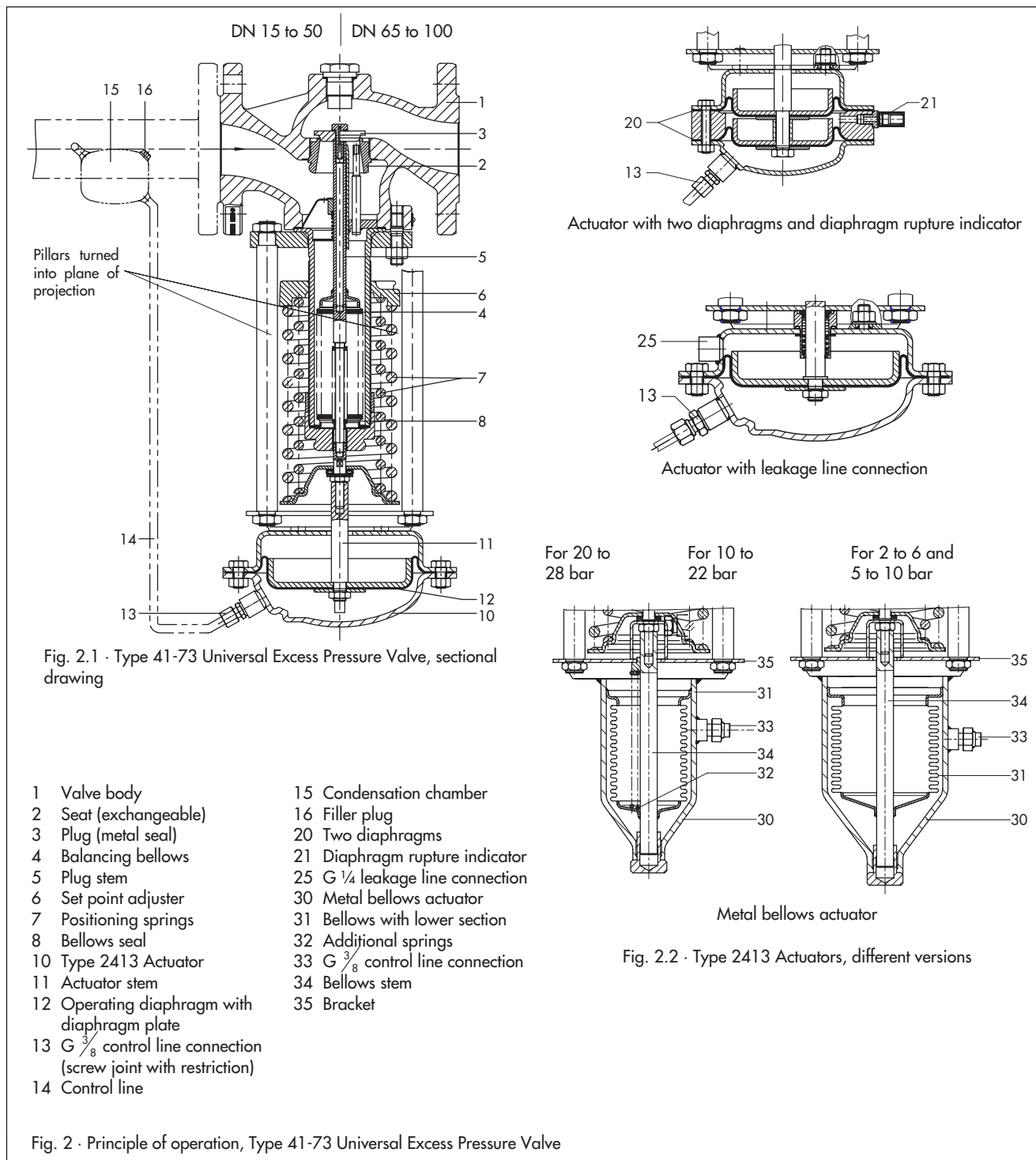
The upstream pressure p_1 to be controlled is tapped upstream of the valve and transmitted through the control line (14) to the operating diaphragm (12) where it is converted into a positioning

force. This force is used to move the valve plug (3) depending on the force of the positioning springs (7). The spring force can be adjusted on the set point adjuster (6).

When the force resulting from the upstream pressure p_1 exceeds the adjusted pressure set point, the valve is opened proportionally to the change in pressure.

The fully balanced valve is equipped with a balancing bellows (4): The downstream pressure p_2 acts on the inside of the bellows, 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 valve plug are balanced.

The valve can be equipped with a flow divider St I. When retrofitting a flow divider, the valve seat needs to be replaced.



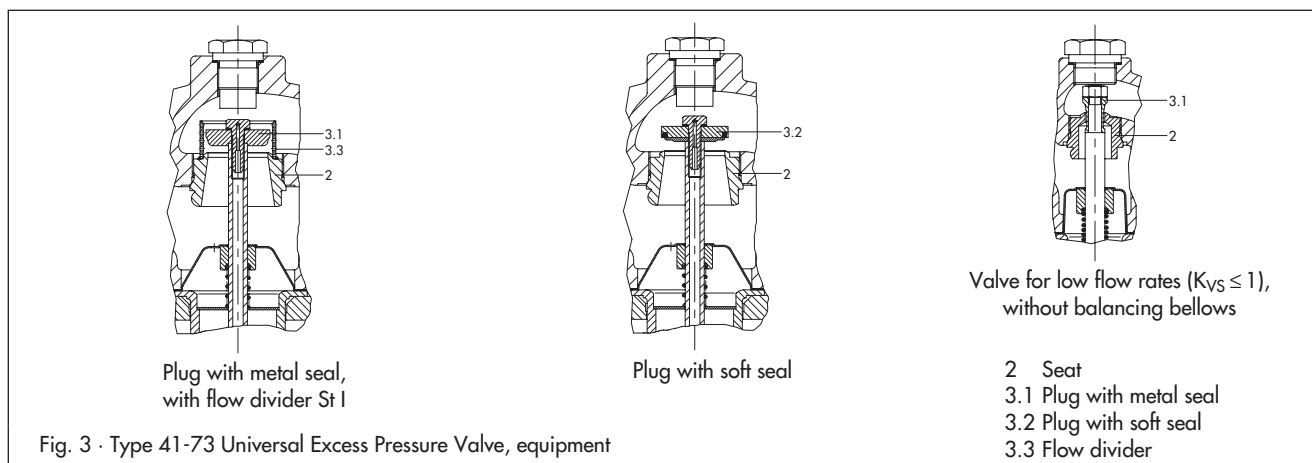


Table 1 · Technical data · All pressures in bar (gauge)

Valve	Type 2417		
Nominal pressure	PN 16, PN 25 or PN 40 (according to DIN 2401)		
Nominal size	DN 15 to 50	DN 65 to 80	DN 100
Max. perm. differential pressure Δp	25 bar ¹⁾	20 bar ¹⁾	16 bar
Temperature ranges	Refer to pressure-temperature diagram (Fig. 6)		
Valve plug	Metal seal: max. 350 °C · Soft seal, PTFE: max. 220 °C · Soft seal, EPDM, FPM: max. 150 °C Soft seal, NBR: max. 80 °C ³⁾		
Leakage class (standard version)	Metal seal: leakage class I ≤ 0.05 % of K_{VS} coefficient · Soft seal: leakage class IV		
Actuator with diaphragm	Type 2413		
Set point ranges	25 to 50 mbar · 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 the actuator	1.5 × max. set point ²⁾		
Max. perm. temperature	Gases 350 °C, however, max. 80 °C at the actuator ³⁾ · Liquids 150 °C, with condensation chamber max. 350 °C · Steam with condensation chamber max. 350 °C		
Actuator with metal bellows	Type 2413		
Effective area	33 cm ²	62 cm ²	
Perm. pressure at the 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⁾ Millibar excess pressure valve: max. 0.5 bar · ³⁾ Max. 60 °C for oxygen
⁴⁾ Set point spring 4400 N

Table 2 · Materials · Material numbers acc. 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	Spheroidal graphite iron EN-JS1049	Cast steel 1.0619	Stainless steel 1.4581
Sitz	CrNi steel			CrNiMo steel
Plug	CrNi steel			CrNiMo steel
Soft sealing ring	PTFE with 15 % glass fiber · EPDM · NBR · FPM			
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 protective PTFE foil			

¹⁾ CrNi steel in stainless steel version · ²⁾ Standard version; for details refer to "Special versions"

Table 3 · K_{VS} coefficients and z values

DN	Seat Ø in mm	$K_{VS}^{2)}$		$K_{VS} I^{1)}$	z ¹⁾
		Standard version	Special version	With flow divider	
15	12		$0.1^{2)} \cdot 0.4^{2)} \cdot 1^{2)}$		
	22	4	2.5	3	0.65
20	12		$0.1^{2)} \cdot 0.4^{2)} \cdot 1^{2)}$		
	22	6.3	$2.5 \cdot 4$	5	0.6
25	12		$0.1^{2)} \cdot 0.4^{2)} \cdot 1^{2)}$		
	22	8	$2.5 \cdot 4 \cdot 6.3$	6	0.55
32	38		8		
		16		12	0.55
40	38		$8 \cdot 16$		
		20		15	0.45
50	38		16		
		32		25	0.4
65	64		$20 \cdot 32$		
		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, 1989-01

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

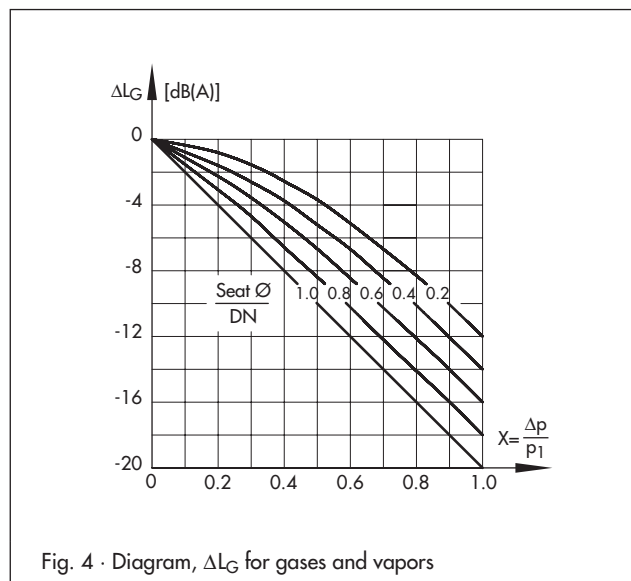


Fig. 4 · Diagram, ΔL_G for gases and vapors

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 valve sizing according to DIN EN 60534, parts 2-1 and 2-2:

$$F_L = 0.95 \quad X_T = 0.75$$

z · Acoustical valve coefficient

$K_{VS} I$ · When a flow divider St I has been installed to reduce the noise level

Flow characteristic differences between valves with and without flow divider do not occur until the valve has passed through approx. 80 % of its travel range

Table 4 · Dimensions in mm and weights

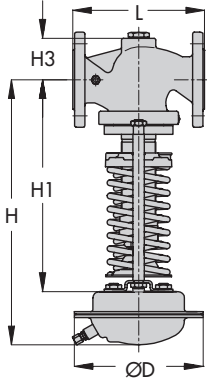
Excess Pressure Valve		Type 41-73								
Nominal size	DN	15	20	25	32	40	50	65	80	100
Set point range in bar	Length L	130	150	160	180	200	230	290	310	350
	Height H1	315			370			500		515
	Height H3	60			85			110		135
0.025 to 0.05	Height H	-						610		-
	Actuator							∅ D = 490 mm, A = 1200 cm ²		
	Valve spring force F									
0.05 to 0.25	Height H	425			480		610	625		
	Actuator	∅ D = 380 mm, A = 640 cm ²								
	Valve spring force F	1750 N								
0.1 to 0.6	Height H	425			480		610	625		
	Actuator	∅ D = 380 mm, A = 640 cm ²								
	Valve spring force F	4400 N								
0.2 to 1.2	Height H	410			460		590	610		
	Actuator	∅ D = 285 mm, A = 320 cm ²								
	Valve spring force F	4400 N								
0.8 to 2.5	Height H	410			465		595	610		
	Actuator	∅ D = 225 mm, A = 160 cm ²								
	Valve spring force F	4400 N								
2 to 5	Height H	390			445		575	590		
	Actuator	∅ D = 170 mm, A = 80 cm ²								
	Valve spring force F	4400 N								
4.5 to 10	Height H	390			445		575	590		
	Actuator	∅ D = 170 mm, A = 40 cm ²								
	Valve spring force F	4400 N								
8 to 16	Height H	390			445		575	590		
	Actuator	∅ D = 170 mm, A = 40 cm ²								
	Valve spring force F	8000 N								
0.005 to 0.05	Approx. weight in kg for cast iron, PN 16 ¹⁾	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 in PN 40 and spheroidal graphite iron in PN 25

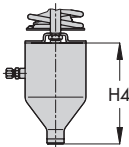
Type 41-73 Universal Excess Pressure Valve

Actuator with two diaphragms:
Height H + 50 mm

Fig. 5 · Dimensions



Type 2413 Actuator with metal bellows



Height		
Effective area	33 cm ²	62 cm ²
H4	200 mm	215 mm
Weight		
DN 15 to 50	8 kg	17 kg
DN 65 to 100	12 kg	18 kg

Installation

Standard installation: Install the regulator with the actuator suspended (pointing down). Install the horizontal pipeline with a slight downward slope on both sides of the valve for condensate drainage.

Install millibar excess pressure valves upright with the actuator pointing up.

For further details on installation refer to EB 2517 EN.

Install the regulator with the direction of flow matching the arrow on the valve body.

- Valve and actuator are delivered as separate units.
- Adapt the control line (not included in the scope of delivery) to the conditions on site. A control line kit for pressure tapping directly at the valve body is available on request (accessories).

Pressure-temperature diagram according to DIN EN 12516-1

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

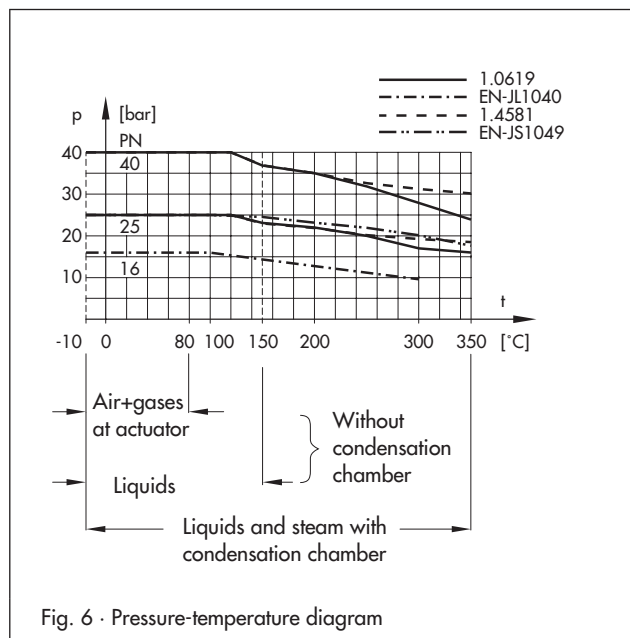


Fig. 6 · Pressure-temperature diagram

Accessories

- Screw joint for connection of the $\frac{3}{8}$ " control line to the filler neck (included in scope of delivery and price). Other screw joints available on request.
- Condensation chamber for steam condensation and protection of the operating diaphragm against excessive temperatures. Required for steam and liquids at temperatures exceeding 150 °C.
- Control line kit (optionally with or without condensation chamber) for direct attachment to the valve and actuator (pressure tapping directly at the valve body, for set points ≥ 0.8 bar).

For details on the accessories refer to Data Sheet T 2595 EN.

Ordering text

Universal Excess Pressure Valve **Type 41-73**

Extended version ...

DN ...

PN ...

Body material ...

Kvs ...

Set point range ... bar

Optionally, accessories ...

Optionally, special version ...

Specifications subject to change without notice.



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T 2517 EN