

Type 41-73 Universal Excess Pressure Valve

Self-operated Pressure Regulators · DIN version

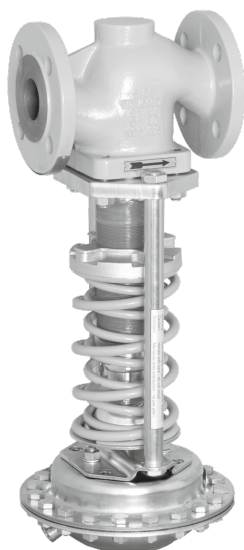


Application

Pressure regulators for set points from **0.05** to **28 bar** · Nominal sizes **DN 15** to **100** · Pressure rating **PN 16** to **40** · Suitable for liquids, gases and vapors up to **350 °C**

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

Type 41-73 Universal Excess Pressure Valve



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 convenient set point adjustment using a nut
- Exchangeable set point springs and actuator
- Spring-loaded, single-seated valve with upstream and downstream pressure balancing by a stainless steel bellows ($K_{VS} \leq 4$: without balancing bellows)
- Soft-seated plug for strict shut-off requirements
- Low-noise plug (standard)
- All wetted parts free of non-ferrous metal

The universal excess pressure valves consist of a Type 2417 Globe Valve and a Type 2413 Diaphragm or Bellows Actuator.

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 DN 15 to 100 · Metal-seated plug · Body made of cast iron EN-GJL-250, spheroidal graphite iron EN-GJS-400-18-LT, cast steel 1.0619, forged steel or stainless steel 1.4408 · **Type 2413 Actuator** with EPDM rolling diaphragm

Version with additional features

- **Excess pressure valve with increased safety**
Actuator with leakage line connection and seal or two diaphragms and diaphragm rupture indicator

Special versions

- Control line kit for tapping the pressure directly at the valve body (accessories)
- With internal parts made of FKM, e.g. for use with mineral oils
- Actuator for remote set point adjustment (auto-clave control)
- Bellows actuator for valves DN 15 to 100 · Set point ranges 2 to 6 bar, 5 to 10 bar, 10 to 22 bar or 20 to 28 bar
- Valve with flow divider ST 1 for particularly low-noise operation with gases and vapors (► T 8081)
- Version entirely of stainless steel
- Stainless Cr steel seat and plug with PTFE soft seal (max. 220 °C) or with EPDM soft seal (max. 150 °C)
- Stellite®-faced seat and plug for low-wear operation
- Version for industrial gases
- Free of oil and grease for high-purity applications
- FDA version ¹⁾

¹⁾ This version is not suitable for direct contact with products manufactured in the food and pharmaceutical industries. It can only be used close to the product.

Design and principle of operation

⇒ See Fig. 1

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

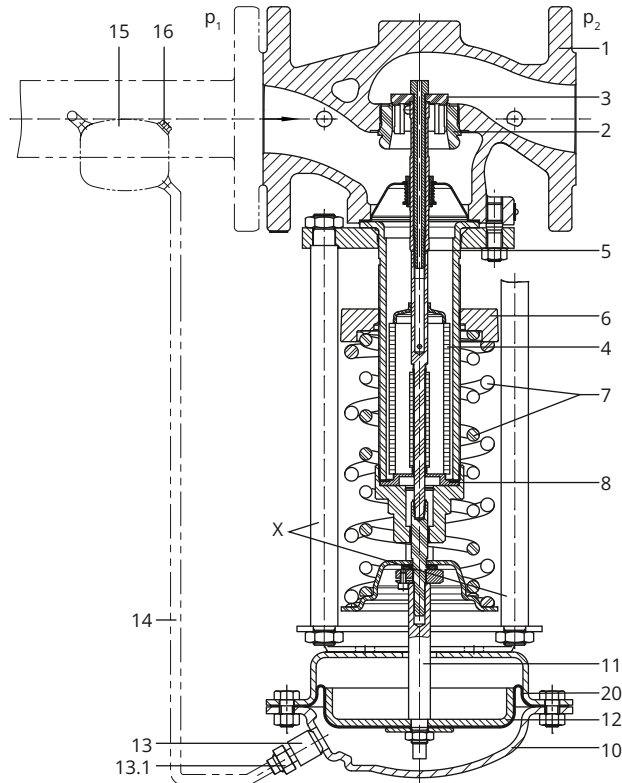
To control the pressure, the operating diaphragm (12) is tensioned by the set point springs (7) and the set point adjuster (6) so that the valve is closed by the force of the set point springs when it is relieved of pressure ($p_1 = p_2$).

The upstream pressure p_1 to be controlled is tapped upstream of the valve and transmitted over 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 set point springs (7). The spring force 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.

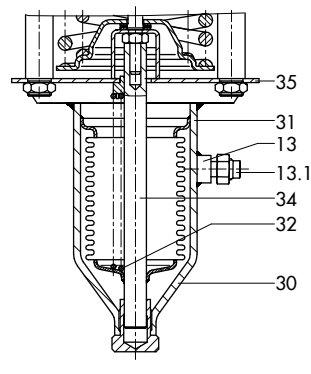
The fully balanced valve has a balancing bellows (4). The downstream pressure p_2 acts on the inside of the bellows, whereas the upstream pressure p_1 acts on the outside of the bellows. As a result, the forces produced by the upstream and downstream pressures acting on the plug are balanced out.

The valves can be supplied with flow divider ST 1. The valve seat must be replaced on retrofitting the flow divider.

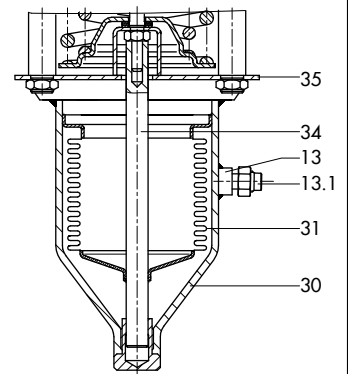
Sectional drawing of Type 41-73 Universal Excess Pressure Valve



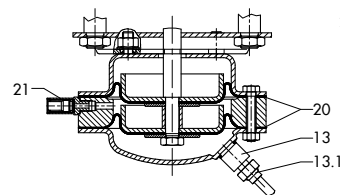
Various versions of Type 2413 Actuator



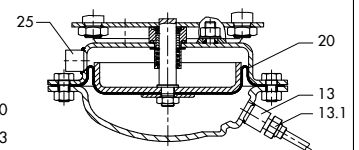
Bellows actuator:
10 to 22 bar · 20 to 28 bar



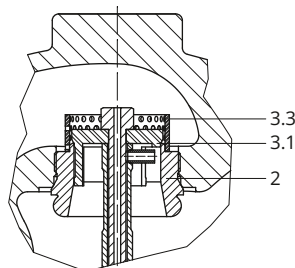
Bellows actuator:
2 to 6 bar · 5 to 10 bar



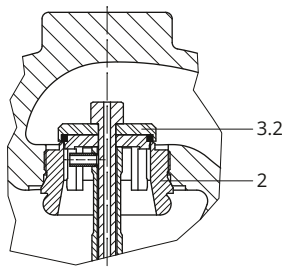
**Diaphragm actuator
with two diaphragms
for increased safety**



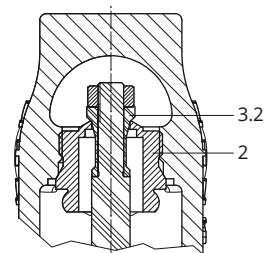
**Diaphragm actuator with
leakage line connection**



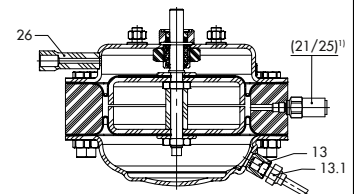
Plug with metal seal,
with flow divider ST 1



Plug with soft seal



Valve for small flow
rates $K_{VS} \leq 4$: without
balancing bellows



**Diaphragm actuator
with two diaphragms
for autoclave regulator**
(overview of diaphragm
actuator connections)

Fig. 1: Functional diagram of Type 41-73 Universal Excess Pressure Valve

1 Valve body (Type 2417)	8 Bellows seal	21 Diaphragm rupture indicator G ¼
2 Seat (exchangeable)	10 Actuator housing of Type 2413	25 Leakage line connection G ¼
3 Plug	11 Actuator stem	26 Control line connection (control pressure)
3.1 Plug with metal seal	12 Diaphragm plate	30 Bellows actuator
3.2 Plug with soft seal	13 Control line connection G ¼ (medium pressure)	31 Bellows with bottom section
3.3 Flow divider	13.1 Screw joint with restriction	32 Additional springs
4 Balancing bellows	14 Control line	34 Bellows stem
5 Plug stem	15 Compensation chamber	35 Crossbeam
6 Set point adjuster	16 Filler plug	
7 Set point springs	20 Operating diaphragm	

Table 1: Technical data of the valve · All pressures in bar (gauge)

Valve		Type 2417		
Nominal size		DN 15 to 50	DN 65 to 80	DN 100
Pressure rating		PN 16, 25 or 40		
Max. perm. differential pressure Δp		16 bar ²⁾ · 25 bar	16 bar ²⁾ · 20 bar	16 bar
Max. permissible temperature ¹⁾	Valve	See ► T 2500 · Pressure-temperature diagram		
	Valve plug	Metal seal: 350 °C · PTFE soft seal: 220 °C EPDM or FKM soft seal: 150 °C · NBR soft seal: 80 °C		
Leakage class according to IEC 60534-4		Metal seal: leakage rate I (≤ 0.05 % of K_{VS}) Soft seal: leakage rate IV (≤ 0.01 % of K_{VS})		
Conformity				

¹⁾ FDA version: Max. permissible temperature 60 °C

²⁾ For PN 16 only

Table 2: Technical data of diaphragm or bellows actuator · All pressures in bar (gauge)

Diaphragm actuator	Type 2413				
Actuator area	640 cm ²	320 cm ²	160 cm ²	80 cm ²	40 cm ²
Set point range	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⁾	2 to 5 bar	4.5 to 10 bar 8 to 16 bar
Max. permissible temperature ³⁾	Gases 350 °C, however, max. 80 °C at the actuator · Liquids 150 °C, with compensation chamber 350 °C · Steam with compensation chamber 350 °C				
Set point spring	1750 N	4400 N			8000 N
Bellows actuator	Type 2413				
Actuator area	33 cm ²			62 cm ²	
Set point range	10 to 22 bar 20 to 28 bar			2 to 6 bar ¹⁾ 5 to 10 bar	
Max. permissible temperature ³⁾	350 °C (limited by the maximum temperature of the valve)				
Set point spring	8000 N				

¹⁾ Set point spring 4400 N

²⁾ Version with actuator with two diaphragms: 1 to 2.5 bar

³⁾ FDA version: Max. permissible temperature 60 °C

Table 3: Max. perm. pressure at actuator

	Set point ranges	Max. perm. pressure above the set point adjusted at the actuator
Diaphragm actuator	0.05 to 0.25 bar · 0.1 to 0.6 bar	0.6 bar
	0.2 to 1.2 bar	1.3 bar
	0.8 to 2.5 bar	2.5 bar
	2 to 5 bar	5 bar
	4.5 to 10 bar · 8 to 16 bar	10 bar
Bellows actuator	2 to 6 bar · 5 to 10 bar	6.5 bar
	10 to 22 bar	8 bar
	20 to 28 bar	2 bar

Table 4: *Weights · Compensation chambers (standard version) made of steel*

Order no.	Designation	Weight, approx.
1190-8788	Compensation chamber 0.7 l	1.6 kg
1190-8789	Compensation chamber 1.5 l	2.6 kg
1190-8790	Compensation chamber 2.4 l	3.7 kg

Table 5: *K_{VS} coefficients and x_{FZ} values · Terms for noise level calculation according to VDMA 24422 (edition 1.89)*

Nominal size	DN 15	DN 20	DN 25	DN 32	DN 40	DN 50	DN 65	DN 80	DN 100		
K _{VS} ¹⁾ (standard version)	4	6.3	8	16	20	32	50	80	125		
x _{FZ}	0.5	0.45	0.4					0.35			
K _{VS} ¹⁾ (special version)	1	1	4	1	4	4	8	4	8	32 ²⁾	80
x _{FZ}	0.6		0.5	0.6	0.5	0.45	0.5	0.45	0.5	0.45	0.4
K _{VS} -1 ¹⁾ (with flow divider ST 1)	3	5	6	12	15	25	38	42	66		

¹⁾ K_{VS} ≤ 4: valve without balancing bellows

²⁾ Max. permissible Δp: 25 bar

Table 6: *Materials · Material numbers according to DIN EN*

Valve		Type 2417					
Pressure rating		PN 16	PN 25	PN 40			
Max. permissible temperature ⁴⁾		300 °C	350 °C				
Body		Cast iron EN-GJL-250	Spheroidal graphite iron EN-GJS-400-18-LT	Cast steel 1.0619	Stainless steel 1.4408	Forged steel 1.0460 ¹⁾	Forged stain- less steel 1.4401/1.4404 ¹⁾
Seat		CrNi steel			CrNiMo steel	CrNi steel	CrNiMo steel
Plug	Material	CrNi steel			CrNiMo steel	CrNi steel	CrNiMo steel
	Seal	PTFE with 15 % glass fiber · EPDM · NBR · FKM					
Guide bushing		Graphite					
Balancing bellows and bellows seal		CrNiMo steel					
Actuator		Type 2413					
		Diaphragm actuator				Bellows actuator	
Diaphragm cases		1.0332 ²⁾				-	
Diaphragm		EPDM with fabric reinforcement ³⁾ · FKM, e.g. for mineral oils · NBR				-	
Bellows housing		-				1.0460/1.4301 (stain- less steel only)	
Bellows		-				CrNiMo steel	

¹⁾ DN 15, 25, 40, 50 and 80 only

²⁾ In corrosion-resistant version (CrNi steel)

³⁾ Standard version; see Special versions for others

⁴⁾ FDA version: Max. permissible temperature 60 °C

Table 7: Dimensions in mm and weights in kg

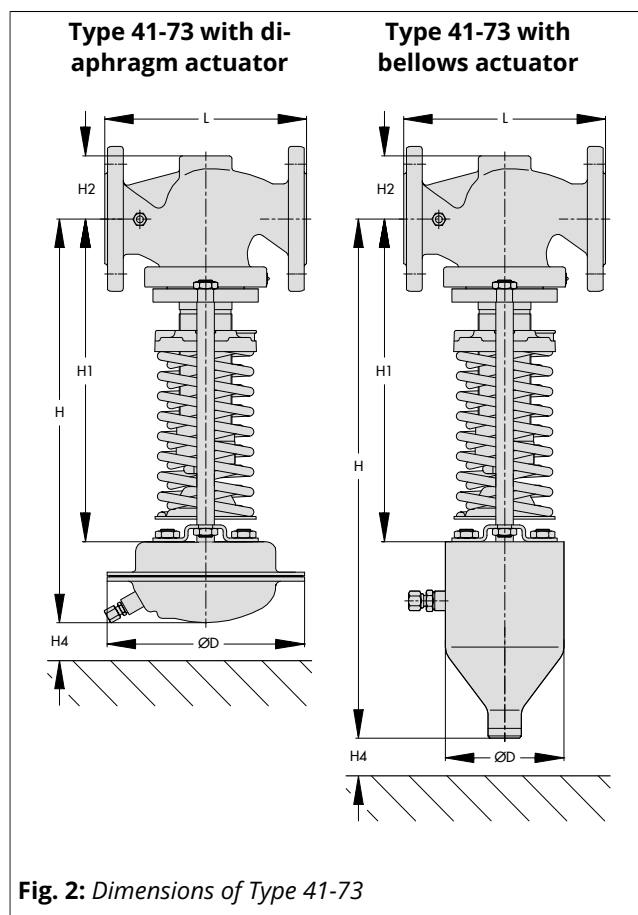
Type 41-73 Universal Excess Pressure Valve											
Nominal size			DN 15	DN 20	DN 25	DN 32	DN 40	DN 50	DN 65	DN 80	DN 100
Length L			130	150	160	180	200	230	290	310	350
Height H1			335			390			517		540
Height H2	Forged steel	53	–	70	–	92	98	–	128	–	
	Other materials	44			72			98		118	
Height H4			100								
Version with Type 2413 Diaphragm Actuator											
Nominal size			DN 15	DN 20	DN 25	DN 32	DN 40	DN 50	DN 65	DN 80	DN 100
Set point ranges	0.05 to 0.25 bar	Height H ³⁾⁴⁾	445			500			627		650
		Actuator	ØD = 380 mm, A = 640 cm ²								
		Valve spring force F	1750 N								
	0.1 to 0.6 bar	Height H ³⁾⁴⁾	445			500			627		650
		Actuator	ØD = 380 mm, A = 640 cm ²								
		Valve spring force F	4400 N								
	0.2 to 1.2 bar	Height H ³⁾⁴⁾	430			480			607		635
		Actuator	ØD = 285 mm, A = 320 cm ²								
		Valve spring force F	4400 N								
	0.8 to 2.5 bar ²⁾	Height H ³⁾⁴⁾	430			485			612		635
		Actuator	ØD = 225 mm, A = 160 cm ²								
		Valve spring force F	4400 N								
	2 to 5 bar	Height H ³⁾⁴⁾	410			465			592		615
		Actuator	ØD = 170 mm, A = 80 cm ²								
		Valve spring force F	4400 N								
	4.5 to 10 bar	Height H ³⁾⁴⁾	410			465			592		615
		Actuator	ØD = 170 mm, A = 40 cm ²								
		Valve spring force F	4400 N								
	8 to 16 bar	Height H ³⁾⁴⁾	410			465			592		615
		Actuator	ØD = 170 mm, A = 40 cm ²								
		Valve spring force F	8000 N								
Weight for version with Type 2413 Diaphragm Actuator											
Set point ranges	0.05 to 0.6 bar	Weight ¹⁾ , approx. kg	24.8	25.9	32.5	34.7	38.5	56.1	63.8	73.7	
	0.2 to 2.5 bar		20.6	22.8	28.9	31.1	34.9	52.5	60.2	70.1	
	2 to 16 bar		13.2	14.3	20.4	23.1	26.4	44.0	51.7	61.6	

¹⁾ Based on PN 16; +10 % for PN 25 and 40²⁾ Actuator with two diaphragms: 1 to 2.5 bar³⁾ Actuator with two diaphragms for autoclave regulator: H = +50 mm⁴⁾ Actuator with two diaphragms for increased safety: H = +32 mm

Version with Type 2413 Bellows Actuator											
Nominal size			DN 15	DN 20	DN 25	DN 32	DN 40	DN 50	DN 65	DN 80	DN 100
Set point ranges	2 to 6 bar	Height H	550			605			732		755
		Actuator	ØD = 120 mm, A = 62 cm²								
		Valve spring force F	4400 N								
	5 to 10 bar	Height H	550			605			732		755
		Actuator	ØD = 120 mm, A = 62 cm²								
		Valve spring force F	8000 N								
	10 to 22 bar	Height H	535			590			717		740
		Actuator	ØD = 90 mm, A = 33 cm²								
		Valve spring force F	8000 N								
	20 to 28 bar	Height H	535			590			717		740
		Actuator	ØD = 90 mm, A = 33 cm²								
		Valve spring force F	8000 N								
Weight for version with bellows actuator											
Set point ranges	2 to 10 bar	Weight ¹⁾ , approx. kg	22.6	23.7	24.2	30.3	32.5	36.3	60.5	68.2	78.1
	10 to 28 bar		18.2	19.3	19.8	25.9	28.1	31.9	48.4	61.6	71.5

¹⁾ Based on PN 16; +10 % for PN 25 and 40

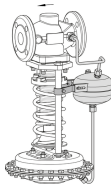
Dimensional drawings



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.

- The direction of flow must match the arrow on the valve body.
- Adapt the control line to the conditions on site. The control line is not included in the scope of delivery. A control line kit is available for tapping the pressure directly at the valve body (see section Accessories).



i Note

For further details on installation in ► EB 2517.

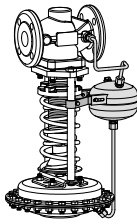
Accessories

Included in the scope of delivery:

- Screw joint with restriction for control line with 6 mm diameter

To be ordered separately:

- **Compression-type fittings** for e.g. 8 mm or 10 mm pipe
- **Control line kit** optionally with or without compensation chamber. For direct attachment to the valve and actuator (pressure tapped directly at the valve body, for set points ≥ 0.8 bar).
- **Compensation chamber** for condensation and to protect the operating diaphragm against extreme temperatures. A compensation chamber is required for liquids above 150 °C as well as for steam.



i Note

For further details on accessories in ► T 2595.

Valve-specific correction terms

- ΔL_G for gases and vapors:

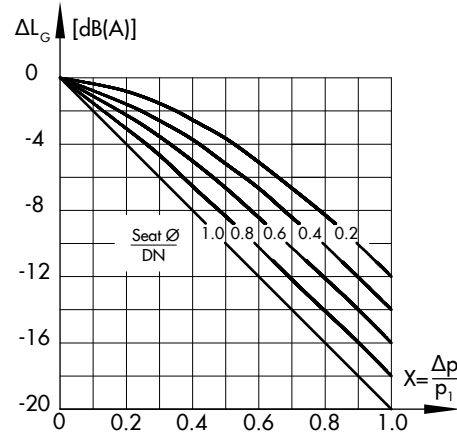


Fig. 3: Diagram · ΔL_G for gases and vapors

- ΔL_F · For liquids:

$$\Delta L_F = -10 \cdot (x_F - x_{FZ}) \cdot y$$

$$\text{with } x_F = \frac{\Delta p}{p_1 - p_v} \quad \text{and} \quad y = \frac{K_v}{K_{vs}}$$

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

- $F_L = 0.95$; $x_T = 0.75$
- x_{FZ} · Acoustical valve coefficient
- K_{vs-1} · When a flow divider ST 1 is installed 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.

Ordering text

Type 41-73 Universal Excess Pressure Valve

Additional features ...

DN ...

Body material ...

PN ...

K_{vs} coefficient ...

Set point range ... bar

Optionally, accessories ... (► T 2595)

Optionally, special version ...