

T 2517 EN

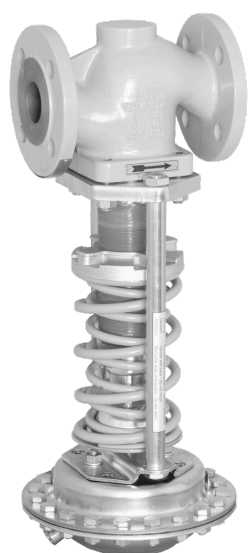
**Type 41-73 Universal Excess Pressure Valve**

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 <sup>1)</sup>

<sup>1)</sup> 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).

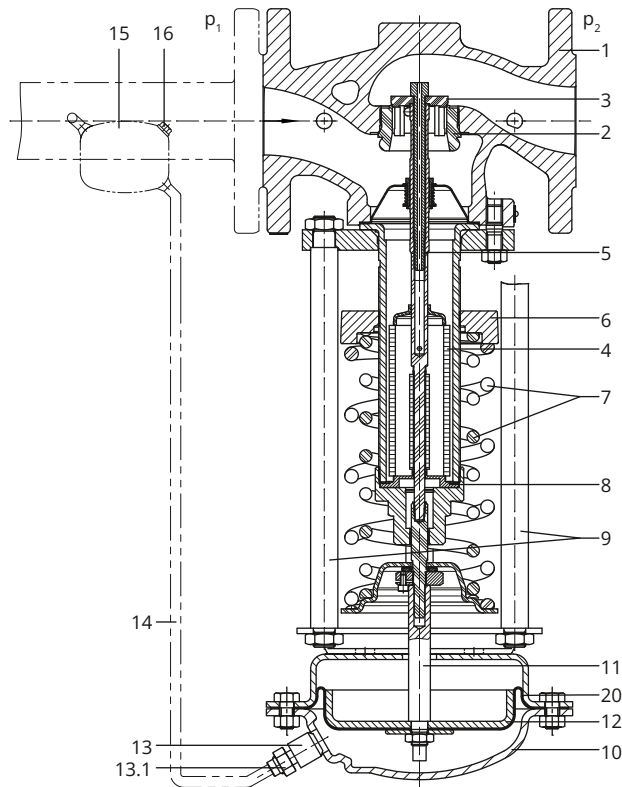
To control the pressure, the operating diaphragm (12) is tensioned by the set point springs (7) and the set point adjuster (6) so that the valve is closed by the force of the set point springs when it is relieved of pressure ( $p_1 = p_2$ ).

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.

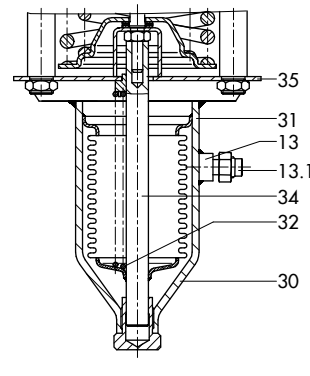
The fully balanced valve has a balancing bellows (4). The downstream pressure  $p_2$  acts on the inside of the bellows, whereas the upstream pressure  $p_1$  acts on the outside of the bellows. As a result, the forces produced by the upstream and downstream pressures acting on the plug are balanced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

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

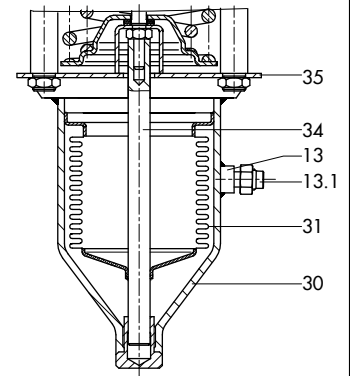
**Sectional drawing of Type 41-73  
Universal Excess Pressure Valve**



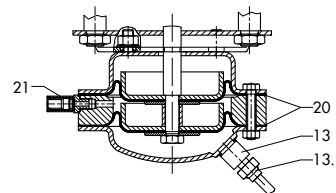
**Various versions of Type 2413 Actuator**



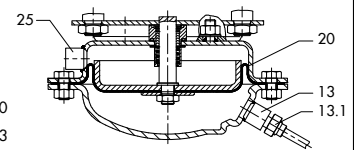
**Bellows actuator:**  
10 to 22 bar · 20 to 28 bar



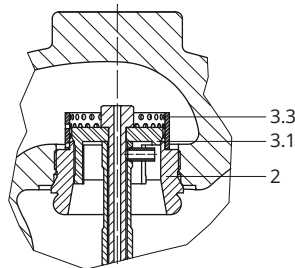
**Bellows actuator:**  
2 to 6 bar · 5 to 10 bar



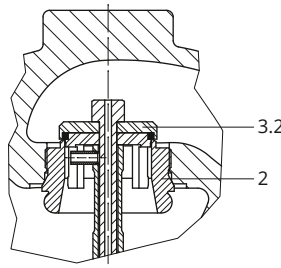
**Diaphragm actuator  
with two diaphragms  
for increased safety**



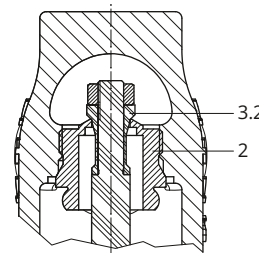
**Diaphragm actuator with  
leakage line connection**



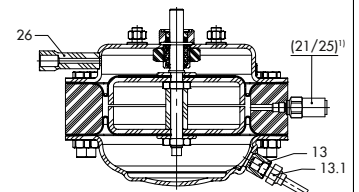
Plug with metal seal,  
with flow divider ST 1



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 $\Delta p$		16 bar <sup>2)</sup> · 25 bar	16 bar <sup>2)</sup> · 20 bar	16 bar
Max. perm. temperature <sup>1)</sup>	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 ( $\leq 0.05$ % of $K_{VS}$ ) Soft seal: leakage rate IV ( $\leq 0.01$ % of $K_{VS}$ )		
Conformity				

<sup>1)</sup> FDA version: Max. permissible temperature 60 °C

<sup>2)</sup> 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 <sup>2</sup>	320 cm <sup>2</sup>	160 cm <sup>2</sup>	80 cm <sup>2</sup>	40 cm <sup>2</sup>
Set point range		0.05 to 0.25 bar 0.1 to 0.6 bar <sup>1)</sup>	0.2 to 1.2 bar	0.8 to 2.5 bar <sup>2)</sup>	2 to 5 bar	4.5 to 10 bar 8 to 16 bar
Max. perm. temperature <sup>3)4)</sup>		Gases 220 °C, gases in the actuator 80 °C · Liquids 150 °C, liquids 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 <sup>2</sup>			62 cm <sup>2</sup>	
Set point range		10 to 22 bar 20 to 28 bar			2 to 6 bar <sup>1)</sup> 5 to 10 bar	
Max. perm. temperature <sup>3)</sup>		350 °C (limited by the maximum temperature of the valve)				
Set point spring		8000 N				

<sup>1)</sup> Set point spring 4400 N

<sup>2)</sup> Version with actuator with two diaphragms: 1 to 2.5 bar

<sup>3)</sup> FDA version: Max. permissible temperature 60 °C

<sup>4)</sup> Max. perm. temperatures depending on actuator diaphragm material and accessories (► T 2595)

**Table 3: Max. perm. pressure at actuator**

	Set point ranges	Max. perm. pressure above the set point adjusted at the actuator
<b>Diaphragm actuator</b>	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
<b>Bellows actuator</b>	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	4   8	32 <sup>2)</sup>		80
$x_{FZ}$	0.6		0.5	0.6	0.5	0.45	0.5	0.45	0.5   0.45
$K_{VS}^{-1)}$ (with flow divider ST 1)	3	5	6	12	15	25	38	42	66

<sup>1)</sup>  $K_{VS} \leq 4$ : valve without balancing bellows

<sup>2)</sup> Max. permissible  $\Delta p$ : 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 <sup>4)</sup>		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 <sup>1)</sup>	Forged stain- less steel 1.4401/1.4404 <sup>1)</sup>
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 <sup>2)</sup>				-	
Diaphragm		EPDM with fabric reinforcement <sup>3)</sup> · FKM, e.g. for mineral oils · NBR				-	
Bellows housing		-				1.0460/1.4301 (stain- less steel only)	
Bellows		-				CrNiMo steel	

<sup>1)</sup> DN 15, 25, 40, 50 and 80 only

<sup>2)</sup> In corrosion-resistant version (CrNi steel)

<sup>3)</sup> Standard version; see Special versions for others

<sup>4)</sup> FDA version: Max. permissible temperature 60 °C

**Table 7: Dimensions in mm and weights in kg**

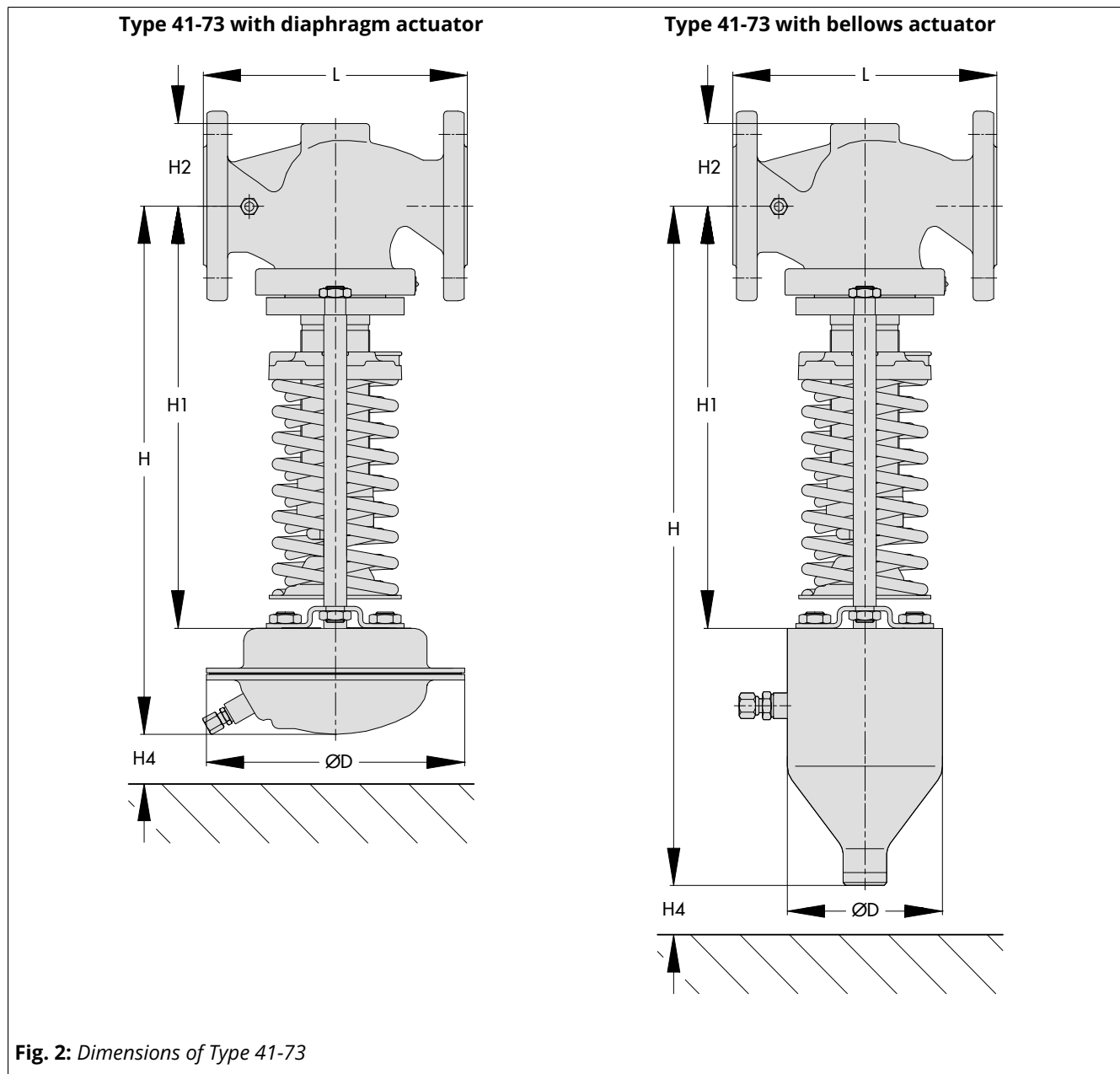
Type 41-73 Universal Excess Pressure Valve											
Nominal size		DN 15	DN 20	DN 25	DN 32	DN 40	DN 50	DN 65	DN 80	DN 100	
Length L		130	150	160	180	200	230	290	310	350	
Height H1		335			390			517		540	
Height H2	Forged steel	53	-	70	-	92	98	-	128	-	
	Other materials	44			72			98		118	
Height H4		100									
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 <sup>3)4)</sup>	445		500			627		650	
		Actuator	ØD = 380 mm, A = 640 cm <sup>2</sup>								
		Valve spring force F	1750 N								
	0.1 to 0.6 bar	Height H <sup>3)4)</sup>	445		500			627		650	
		Actuator	ØD = 380 mm, A = 640 cm <sup>2</sup>								
		Valve spring force F	4400 N								
	0.2 to 1.2 bar	Height H <sup>3)4)</sup>	430		480			607		635	
		Actuator	ØD = 285 mm, A = 320 cm <sup>2</sup>								
		Valve spring force F	4400 N								
	0.8 to 2.5 bar <sup>2)</sup>	Height H <sup>3)4)</sup>	430		485			612		635	
		Actuator	ØD = 225 mm, A = 160 cm <sup>2</sup>								
		Valve spring force F	4400 N								
	2 to 5 bar	Height H <sup>3)4)</sup>	410		465			592		615	
		Actuator	ØD = 170 mm, A = 80 cm <sup>2</sup>								
		Valve spring force F	4400 N								
	4.5 to 10 bar	Height H <sup>3)4)</sup>	410		465			592		615	
		Actuator	ØD = 170 mm, A = 40 cm <sup>2</sup>								
		Valve spring force F	4400 N								
	8 to 16 bar	Height H <sup>3)4)</sup>	410		465			592		615	
		Actuator	ØD = 170 mm, A = 40 cm <sup>2</sup>								
		Valve spring force F	8000 N								
	Weight for version with Type 2413 Diaphragm Actuator										
	Set point ranges	0.05 to 0.6 bar	Weight <sup>1)</sup> , 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 40  
 2) Actuator with two diaphragms: 1 to 2.5 bar  
 3) Actuator with two diaphragms for autoclave regulator: H = +50 mm  
 4) 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 cm <sup>2</sup>									
		Valve spring force F	4400 N									
	5 to 10 bar	Height H	550			605			732		755	
		Actuator	ØD = 120 mm, A = 62 cm <sup>2</sup>									
		Valve spring force F	8000 N									
	10 to 22 bar	Height H	535			590			717		740	
		Actuator	ØD = 90 mm, A = 33 cm <sup>2</sup>									
		Valve spring force F	8000 N									
	20 to 28 bar	Height H	535			590			717		740	
		Actuator	ØD = 90 mm, A = 33 cm <sup>2</sup>									
		Valve spring force F	8000 N									
Weight for version with bellows actuator												
Set point ranges	2 to 10 bar	Weight <sup>1)</sup> , 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	

<sup>1)</sup> Based on PN 16; +10 % for PN 25 and 40

## Dimensional drawings

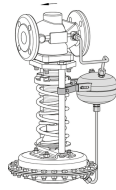


**Fig. 2:** Dimensions of Type 41-73

## 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.

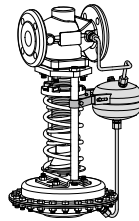
## Accessories

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  $\geq 0.8$  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

- $\Delta L_G$  for gases and vapors:

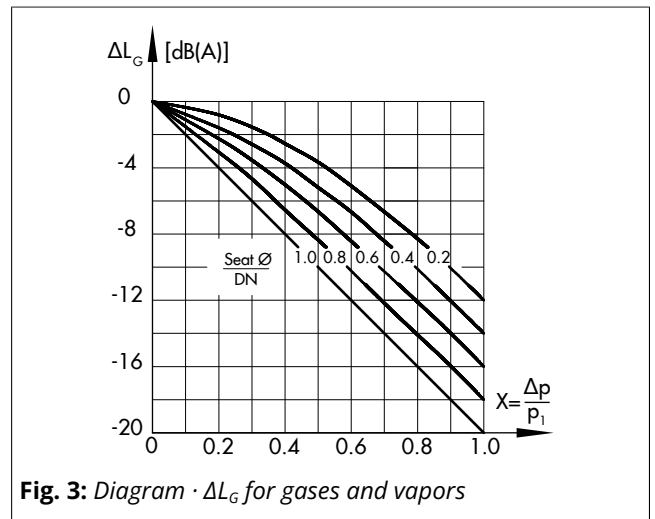


Fig. 3: Diagram  $\cdot \Delta L_G$  for gases and vapors

- $\Delta L_F$  · 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 ...

