DATA SHEET

T 2518-1 EN

Type 41-73 Universal Excess Pressure Valve

Self-operated Pressure Regulators · JIS version

Application

Pressure regulators for set points from **5** to **2800 kPa** · Nominal sizes **½B|15A** to **4B|100A** · Pressure rating **JIS 10K** and **JIS 20K** · 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 (C_V ≤5: 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 in ½B|15A to 4B|100A · Plug with metal seal · Body made of cast iron FC250, cast steel SCPH2 or cast stainless steel SCS14A · **Type 2413 Actuator** with EPDM rolling diaphragm

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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 (autoclave control)
– Bellows actuator for valves ½B | 15A to 4B | 100A · Set point ranges 200 to 600 kPa, 500 to 1000 kPa, 1000 to 2200 kPa, 2000 to 2800 kPa
– 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).

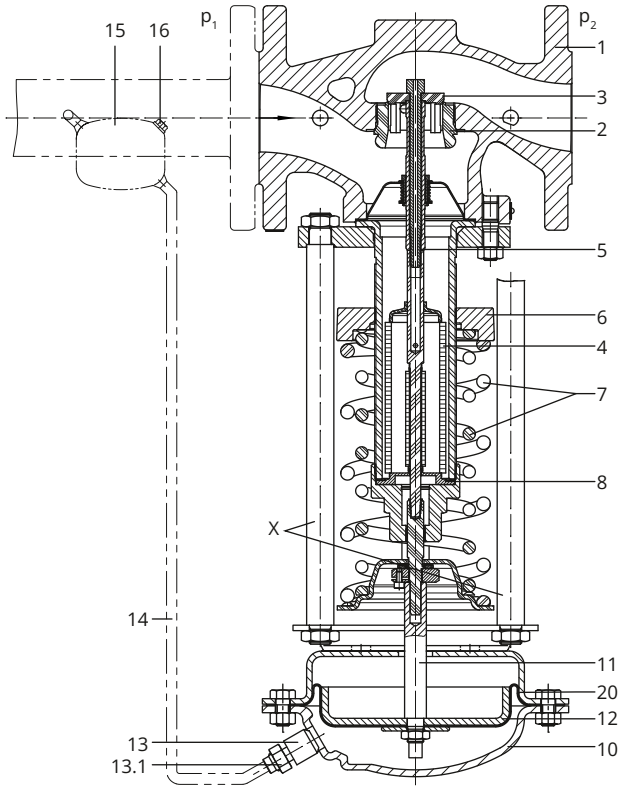
To control the pressure, the operating diaphragm (12) is tensioned by the set point springs (7) and the set point adjuster (6) so that the valve is closed by the force of the set point springs when it is relieved of pressure ($p_1 = p_2$).

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.

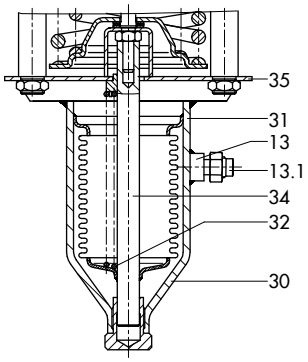
The fully balanced valve has a balancing bellows (4). The downstream pressure p_2 acts on the inside of the bellows, whereas the upstream pressure p_1 acts on the outside of the bellows. As a result, the forces produced by the upstream and downstream pressures acting on the plug are balanced out.

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

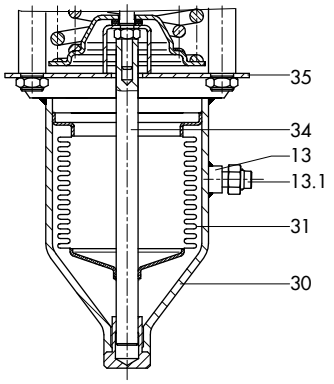
Sectional drawing of Type 41-73 Universal Excess Pressure Valve



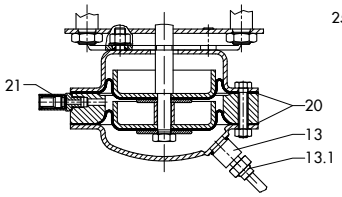
Various versions of Type 2413 Actuator



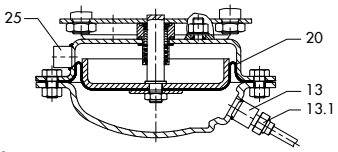
Bellows actuator:
1000 to 2200 kPa
· 2000 to 2800 kPa



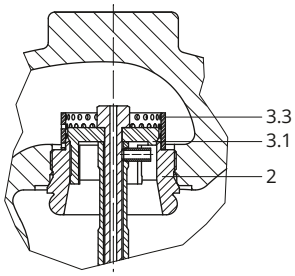
Bellows actuator:
200 to 600 kPa ·
500 to 1000 kPa



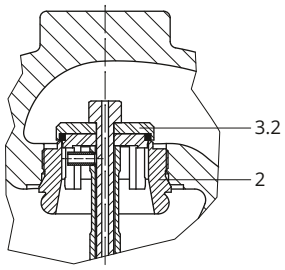
Diaphragm actuator with two diaphragms for increased safety



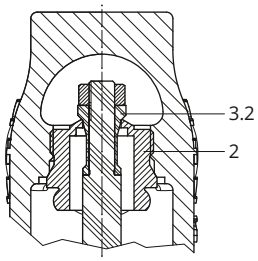
Diaphragm actuator with leakage line connection



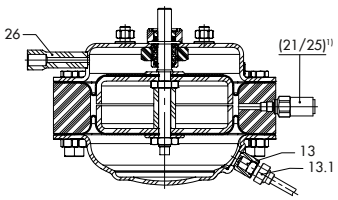
Plug with metal seal, with flow divider ST 1



Plug with soft seal



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

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

Valve		**Type 2417**		
Nominal size		½B|15A to 2B|50A	2½B|65A to 3B|80A	4B|100A
Pressure rating		JIS 10K or JIS 20K		
Max. perm. differential pressure Δp		2500 kPa	2000 kPa	1600 kPa
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		CE		

[1] FDA version: Max. permissible temperature 60 °C

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

Diaphragm actuator	**Type 2413**				
Actuator area	640 cm²	320 cm²	160 cm²	80 cm²	40 cm²
Set point range	5 to 25 kPa 10 to 60 kPa	20 to 120 kPa	80 to 250 kPa [2]	200 to 500 kPa	450 to 1000 kPa 800 to 1600 kPa
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 cm²		62 cm²		
Set point range	1000 to 2200 kPa 2000 to 2800 kPa		200 to 600 kPa [1] 500 to 1000 kPa		
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: 100 to 250 kPa

[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	5 to 25 kPa · 10 to 60 kPa	60 kPa
	20 to 120 kPa	130 kPa
	80 to 250 kPa	250 kPa
	200 to 500 kPa	500 kPa
	450 to 1000 kPa · 800 to 1600 kPa	1000 kPa
Bellows actuator	200 to 600 kPa · 500 to 1000 kPa	650 kPa
	1000 to 2200 kPa	800 kPa
	2000 to 2800 kPa	200 kPa

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

Nominal size	½B|15A	¾B|20A		1B|25A		1½B| 40A	2B|50A		2½B| 65A	3B|80A	4B|100A
C_V[1] (standard version)	5	7.5		9.4		23	37		60	94	145	
x_{FZ}	0.5	0.45		0.4						0.35		
C_V[1] (special version)	1.2	1.2	5	1.2	5	5	9.4	5	9.4	37[2]	37[2]	94
x_{FZ}	0.6		0.5	0.6	0.5		0.4	0.5	0.4			
C_V-1[1] with flow divider ST 1	3.5	6		7		17	30		45	49	77	

[1] C_V ≤5: valve without balancing bellows

[2] Max. permissible Δp: 360 psi

Table 6: *Materials · Material numbers according to ASTM/JIS and DIN EN*

Valve		Type 2417		
Pressure rating		JIS 10K	JIS 10K · JIS 20K	
Max. permissible temperature [3]		300 °C	350 °C	
Body		Cast iron FC250	Cast steel SCPH2	Cast stainless steel SCS14A
Seat		CrNi steel		CrNiMo steel
Plug	Material	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 [1]	–	
Diaphragm		EPDM with fabric reinforcement [2] · FKM, e.g. for mineral oils · NBR	–	
Bellows housing		–	1.0460/1.4301 (stainless steel only)	
Bellows		–	CrNiMo steel	

[1] In corrosion-resistant version (CrNi steel)

[2] Standard version; see Special versions for others

[3] 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			**½B|15A**	**¾B|20A**	**1B|25A**	**1½B|40A**	**2B|50A**	**2½B|65A**	**3B|80A**	**4B|100A**
Length L	JIS 10K		184			222	254	276	298	352
	JIS 20K		191	194	197	235	267	292	318	368
Height H1			335			390		517		540
Height H2			55			72		100		120
Height H4			100							

Version with Type 2413 Diaphragm Actuator										
Nominal size			**½B|15A**	**¾B|20A**	**1B|25A**	**1½B|40A**	**2B|50A**	**2½B|65A**	**3B|80A**	**4B|100A**
Set point ranges	5 to 25 kPa	Height H [3)4)]	445			500		627		650
		Actuator	ØD = 380 mm, A = 640 cm²							
		Valve spring force F	1750 N							
	10 to 60 kPa	Height H [3)4)]	445			500		627		650
		Actuator	ØD = 380 mm, A = 640 cm²							
		Valve spring force F	4400 N							
	20 to 120 bar	Height H [3)4)]	430			480		607		635
		Actuator	ØD = 285 mm, A = 320 cm²							
		Valve spring force F	4400 N							
	80 to 250 kPa [2)]	Height H [3)4)]	430			485		612		635
		Actuator	ØD = 225 mm, A = 160 cm²							
		Valve spring force F	4400 N							
	200 to 500 kPa	Height H [3)4)]	410			465		592		615
		Actuator	ØD = 170 mm, A = 80 cm²							
		Valve spring force F	4400 N							
	450 to 1000 kPa	Height H [3)4)]	410			465		592		615
		Actuator	ØD = 170 mm, A = 40 cm²							
		Valve spring force F	4400 N							
	800 to 1600 kPa	Height H [3)4)]	410			465		592		615
		Actuator	ØD = 170 mm, A = 40 cm²							
		Valve spring force F	8000 N							

Weight for version with Type 2413 Diaphragm Actuator								
Set point ranges	5 to 60 kPa	Weight [1)], approx. kg	24.8	25.9	34.7	38.5	56.1	63.8	73.7
	20 to 250 kPa		20.6	22.8	31.1	34.9	52.5	60.2	70.1
	200 to 1600 kPa		13.2	14.3	23.1	26.4	44.0	51.7	61.6

1) Based on JIS 10K; +10 % for JIS 20K

2) Actuator with two diaphragms: 100 to 250 kPa

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			**½B | 15A**	**¾B | 20A**	**1B | 25A**	**1½B | 40A**	**2B | 50A**	**2½B | 65A**	**3B | 80A**	**4B | 100A**
Set point ranges	200 to 600 kPa	Height H	550			605		732		755
		Actuator	ØD = 120 mm, A = 62 cm²							
		Valve spring force F	4400 N							
	500 to 1000 kPa	Height H	550			605		732		755
		Actuator	ØD = 120 mm, A = 62 cm²							
		Valve spring force F	8000 N							
	1000 to 2200 kPa	Height H	535			590		717		740
		Actuator	ØD = 90 mm, A = 33 cm²							
		Valve spring force F	8000 N							
	2000 to 2800 kPa	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	200 to 1000 kPa	Weight [1], approx. kg	22.6	23.7	24.2	32.5	36.3	60.5	68.2	78.1
	1000 to 2800 kPa		18.2	19.3	19.8	28.1	31.9	48.4	61.6	71.5

[1] Based on JIS 10K; +10 % for JIS 20K

Dimensional drawings

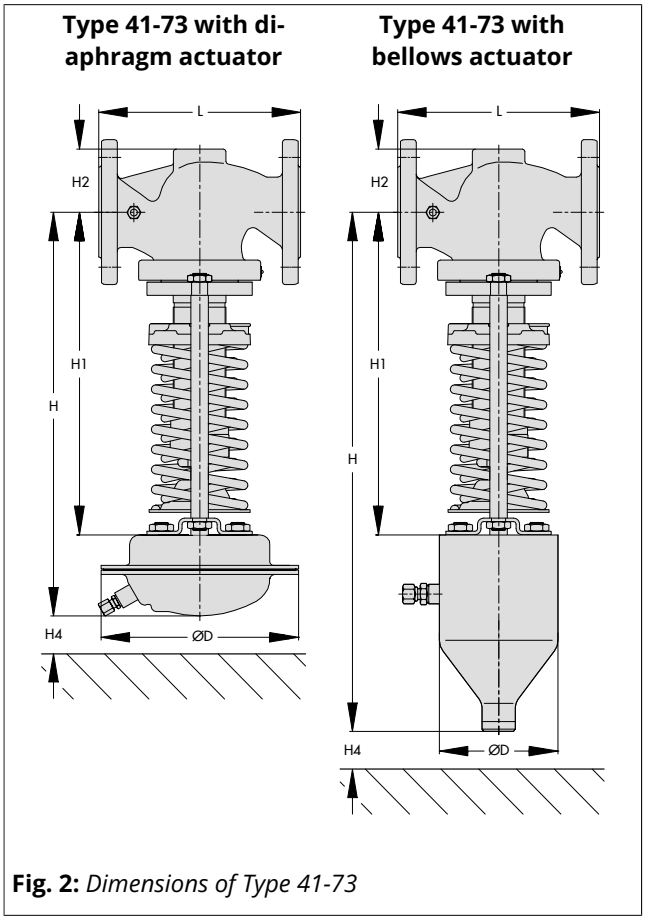
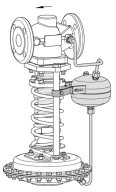


Fig. 2: *Dimensions of Type 41-73*

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

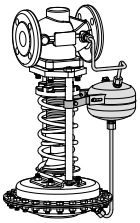
For further details on installation in ▶ EB 2517.

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 ≥80 kPa).
- **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:

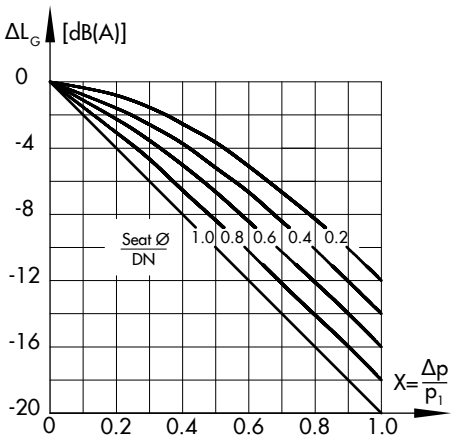


Fig. 3: *Diagram · ΔL_G for gases and vapors*

- **ΔL_F** · For liquids:
  $\Delta L_F = -10 \cdot (x_F - x_{FZ}) \cdot y$

  with $x_F = \frac{\Delta p}{p_1 - p_V}$ and $y = \frac{K_V}{K_{VS}}$

  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

- **C_V-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 …

… B | … A

Body material …

JIS …

C_V coefficient …

Set point range … kPa

Optionally, accessories … (▶ T 2595)

Optionally, special version …

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