DATA SHEET

T 2518 EN

Type 41-73 Universal Excess Pressure Valve

Self-operated Pressure Regulators · ANSI version

Application

Pressure regulators for set points from **0.75** to **400 psi/0.05** to **28 bar** · Valves in **NPS** ½ to **4**/DN 15 to **100** · Pressure rating **Class 125** to **300/PN 16** to **40** · Suitable for water, gases and vapors up to **660 °F/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 convenient set point adjustment using a nut
- Exchangeable set point springs and actuator
- Spring-loaded, single-seated valve with upstream and downstream pressure balancing 1) by a stainless steel bellows
- Soft-seated plug for high shut-off requirements
- Low-noise plug (standard)
- All wetted parts free of non-ferrous metal

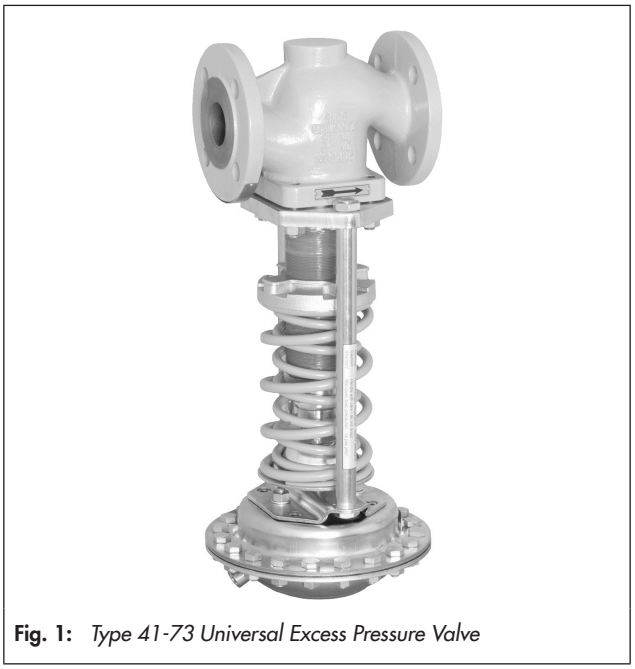

Fig. 1: *Type 41-73 Universal Excess Pressure Valve*

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 NPS ½ to 4/DN 15 to 100 · Plug with metal seal · Body made of either cast iron A126B, cast steel A216 WCC or cast stainless steel A351 CF8M · 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 (autoclave control)
– Bellows actuator for valves NPS ½ to 4/DN 15 to 100 · Set point ranges 30 to 85 psi, 75 to 145 psi, 145 to 320 psi, 300 to 400 psi/2 to 6 bar, 5 to 10 bar, 10 to 22 bar, 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. 440 °F/220 °C) or with EPDM soft seal (max. 300 °F/150 °C)

1) With C_V ≤5/K_{VS} ≤4: without balancing bellows

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Edition February 2025

– Version for industrial gases
– Free of oil and grease for high-purity applications
– Stellite®-faced seat and plug for low-wear operation
– Wetted plastic parts conforming to FDA regulations (max. 140 °F/60 °C)
– FDA version [1]

Principle of operation (Fig. 2)

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 opened 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 spring (7).

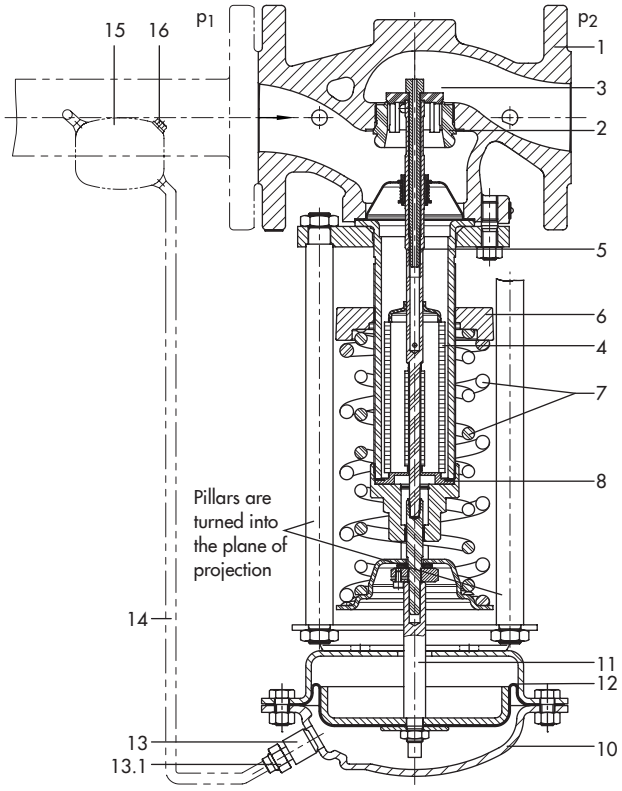
The spring force is adjustable at the set point adjuster (6).

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.

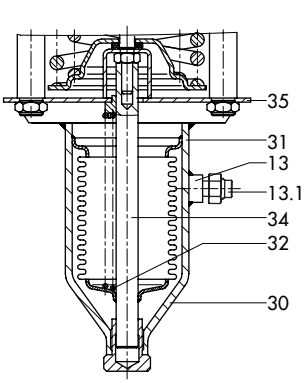
The fully balanced valve has a balancing bellows (4). The downstream pressure p_2 acts on the inside of the bellows, whereas the upstream pressure p_1 acts on the outside of the bellows. As a result, the forces produced by the upstream and downstream pressures acting on the plug are balanced out.

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

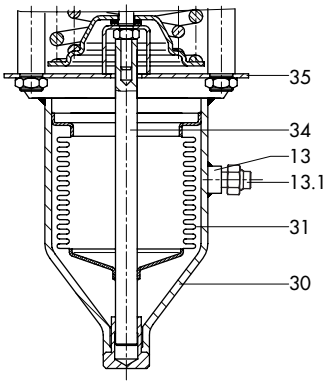
[1] This version is not suitable for direct contact with products manufactured in the food and pharmaceutical industries. It can only be used close to the product.



Sectional drawing of Type 41-73 Universal Excess Pressure Valve

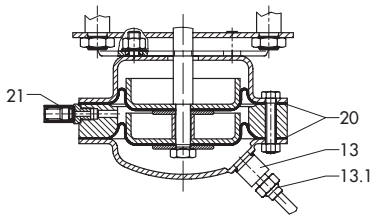


For 145 to 320 psi/10 to 22 bar
For 300 to 400 psi/20 to 28 bar

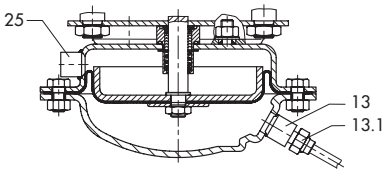


For 30 to 85 psi/2 to 6 bar
For 75 to 145 psi/5 to 10 bar

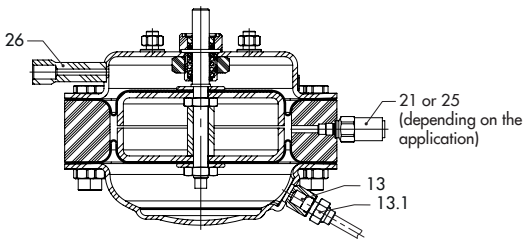
Different versions of Type 2413 Actuator



Actuator with two diaphragms and diaphragm rupture indicator



Actuator with leakage line connection



Actuator for autoclave regulator

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

Fig. 2: *Functional diagram of Type 41-73 Universal Excess Pressure Valve*

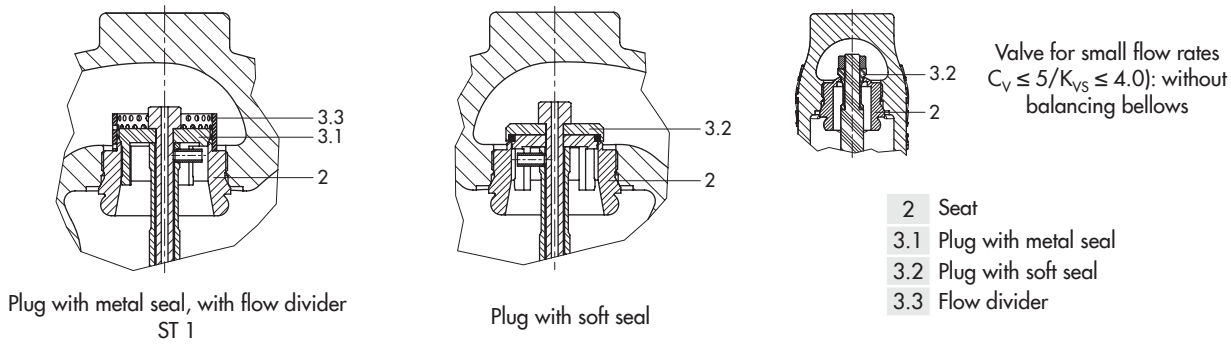


Fig. 3: *Additional features for Type 41-73 Universal Excess Pressure Valve*

Table 1: *Technical data · All pressures in psi and bar (gauge)*

Valve		**Type 2417**		
Pressure rating	Class	125, 150 or 300		
	PN	16, 25 or 40		
Nominal size	NPS	½ to 2	2½ and 3	4
	DN	15 to 50	65 to 80	100
Max. perm. differential pressure Δp	psi	200 [2] · 280 [3] · 360	200 [2] · 280 [3] · 290	200 [2] · 230
	bar	16 [2] · 25	16 [2] · 20	16
Max. permissible temperature [4]		See pressure-temperature diagram in ▶ T 2500		
	Valve plug	Metal seal: max. 660 °F/350 °C · PTFE soft seal: max. 430 °F/220 °C · EPDM, FPM soft seal: max. 300 °F/150 °C · NBR soft seal: max. 175 °F/80 °C		
Leakage class according to ANSI/FCI 70-2		Metal seal: leakage rate I (≤0.05 % of C_V/K_{VS}) Soft seal: leakage rate IV (≤0.01 % of C_V/K_{VS})		
Conformity		CE · EAC		
Diaphragm actuator		**Type 2413**		
Set point ranges		0.75 to 3.5 psi · 1.5 to 8.5 psi · 3 to 17 psi · 10 to 35 psi [1] 30 to 75 psi · 65 to 145 psi · 115 to 230 psi		
		0.05 to 0.25 bar · 0.1 to 0.6 bar · 0.2 to 1.2 bar · 0.8 to 2.5 bar [1] · 2 to 5 bar · 4.5 to 10 bar · 8 to 16 bar		
Max. permissible temperature [4]		Gases 660 °F/350 °C, however, max. 175 °F/80 °C at the actuator · Liquids 300 °F/150 °C, with compensation chamber max. 660 °F/350 °C · Steam with compensation chamber max. 660 °F/350 °C		
Bellows actuator		**Type 2413**		
Actuator area		5.1 sq. in/33 cm²	9.6 sq. in/62 cm²	
Set point ranges		145 to 320 psi/10 to 22 bar 300 to 400 psi/20 to 28 bar	30 to 85 psi/2 to 6 bar 75 to 145 psi/5 to 10 bar	

1) Actuator with two diaphragms: 14.5 to 35 psi/1 to 2.5 bar
2) For Class 125/PN 16 only
3) For Class 150 only
4) FDA version: Max. permissible temperature 140°F/60 °C

Table 2: *Max. perm. pressure at actuator*

Set point ranges · Actuator with rolling diaphragm						
0.75 to 3.5 psi/ 0.05 to 0.25 bar	1.5 to 8.5 psi/ 0.1 to 0.6 bar	3 to 17 psi/ 0.2 to 1.2 bar	10 to 35 psi/ 0.8 to 2.5 bar	30 to 75 psi/ 2 to 5 bar	65 to 145 psi/ 4.5 to 10 bar	115 to 230 psi/ 8 to 16 bar
Max. perm. pressure above the set point adjusted at the actuator						
9 psi/0.6 bar	9 psi/0.6 bar	19 psi/1.3 bar	36 psi/2.5 bar	73 psi/5 bar	145 psi/10 bar	145 psi/10 bar
Set point ranges · Bellows actuator						
30 to 85 psi/2 to 6 bar		75 to 145 psi/5 to 10 bar		145 to 320 psi/10 to 22 bar		300 to 400 psi/20 to 28 bar
Max. perm. pressure above the set point adjusted at the actuator						
94 psi/6.5 bar		94 psi/6.5 bar		116 psi/8 bar		29 psi/2 bar

Table 3: *Materials*

Valve	**Type 2417**		
Pressure rating	Class 125/PN 16	Class 150/PN 25 · Class 300/PN 40	Class 150/PN 25 · Class 300/PN 40
Max. permissible temperature [3]	570 °F/300 °C	660 °F/350 °C	660 °F/350 °C
Body	Cast iron A126B	Cast steel A216 WCC	Cast stainless steel A351 CF8M
Seat	CrNi steel		CrNiMo steel
Plug	CrNi steel		CrNiMo steel
Seal for soft-seated plug	PTFE with 15 % glass fiber · EPDM · NBR · FKM		
Guide bushing	CrNi steel		
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 (st. steel only)
Bellows	–		CrNiMo steel

[1] In corrosion-resistant version (CrNi steel) [2] Standard version; see Special versions for others [3] FDA version: Max. perm. temperature 140°F/60 °C

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 Accessories).

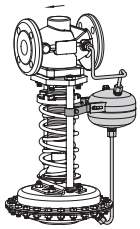
For further details on installation refer to Mounting and Operating Instructions ▶ EB 2517.

Accessories

Included in the scope of delivery:

Screw joint with restriction for ⅜" control line.

To be ordered separately:



- Adapter G ¼ to ¼ NPT, various screw fittings
- **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 ≥12 psi/0.8 bar).
- **Compensation chamber** for condensation and to protect the operating diaphragm against extreme temperatures. A compensation chamber is required for liquids above 300 °F/150 °C as well as for steam.

For detailed information on accessories refer to Data Sheet ▶ T 2595

Ordering text

Type 41-73 Universal Excess Pressure Valve

Additional features …

Nominal size NPS/DN …

Body material …

Class/PN …

K_{VS}/C_V coefficient …

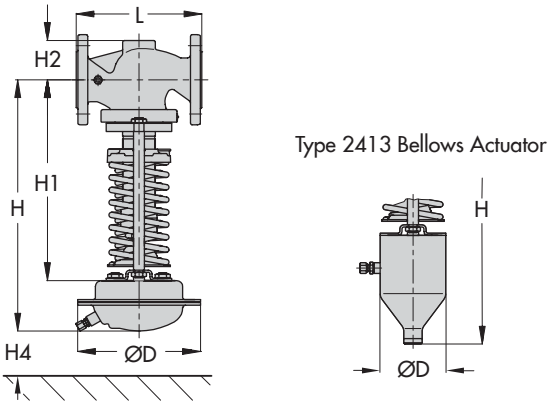
Set point range … psi/bar

Optionally, accessories … (▶ T 2595)

Optionally, special version …

Dimensional drawings

Type 41-73 Universal Excess Pressure Valve



Actuator with two diaphragms: Height H + 2"/50 mm

Fig. 4: *Dimensions (see Table 5)*

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

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

Table 5: *Dimensions and weights*

Type 41-73 Universal Excess Pressure Valve										
Nominal size NPS/DN				**½/15**	**¾/20**	**1/25**	**1½/40**	**2/50**	**2½/65**	**3/80**	**4/100**
Length L	Class 125	Inch		–	–	7.25	8.75	10.0	10.87	11.75	13.87
		mm		–	–	184	222	254	276	298	352
	Class 150	Inch		7.25	7.25	7.25	8.75	10.0	10.87	11.73	13.88
		mm		184	184	184	222	254	276	298	352
	Class 300	Inch		7.50	7.63	7.75	9.25	10.50	11.50	12.50	14.50
		mm		190	194	197	235	267	292	318	368
Height H1		Inch		13.19			15.35		20.35		21.26
		mm		335			390		517		540
Height H2	Cast steel	Inch		1.7			2.83		3.86		4.65
		mm		44			72		98		118
	Forged steel	Inch		2.1	–	2.76	3.62	3.86	–	5.05	–
		mm		53	–	70	92	98	–	128	–
Height H4		Inch		3.94							
		mm		100							
Set point ranges psi	**bar**	**Dimension**		**Dimensions**							
0.75 to 3.5	0.05 to 0.25	Height H		17.52"/445 mm			19.69"/500 mm		24.69"/627 mm		25.59"/650 mm
		Actuator		Ø D = 15.0"/380 mm, A = 100 in²/640 cm²							
		Valve spring force		1750 N							
1.5 to 8.5	0.1 to 0.6	Height H		17.52"/445 mm			19.69"/500 mm		24.69"/627 mm		25.59"/650 mm
		Actuator		Ø D = 15.0"/380 mm, A = 100 in²/640 cm²							
		Valve spring force		4400 N							
3.0 to 17	0.2 to 1.2	Height H		16.93"/430 mm			18.90"/480 mm		23.9"/607 mm		25.0"/635 mm
		Actuator		Ø D = 11.2"/285 mm, A = 50 in²/320 cm²							
		Valve spring force		4400 N							
10 to 35 [2]	0.8 to 2.5 [2]	Height H		16.93"/430 mm			19.09"/485 mm		24.1"/612 mm		25.0"/635 mm
		Actuator		Ø D = 8.86"/225 mm, A = 25 in²/160 cm²							
		Valve spring force		4400 N							
30 to 75	2.0 to 5.0	Height H		16.10"/410 mm			18.31"/465 mm		23.31"/592 mm		24.21"/615 mm
		Actuator		Ø D = 6.69"/170 mm, A = 12 in²/80 cm²							
		Valve spring force		4400 N							
65 to 145	4.5 to 10	Height H		16.10"/410 mm			18.31"/465 mm		23.31"/592 mm		24.21"/615 mm
		Actuator		Ø D = 6.69"/170 mm, A = 6 in²/40 cm²							
		Valve spring force		4400 N							
115 to 230	8.0 to 16	Height H		16.10"/410 mm			18.31"/465 mm		23.31"/592 mm		24.21"/615 mm
		Actuator		Ø D = 6.69"/170 mm, A = 6 in²/40 cm²							
		Valve spring force		8000 N							
0.75 to 8.5	0.05 to 0.6	Weight [1], approx.	lb	54.7	57.1	76.5	84.9	123.7	140.7	162.5	158
			kg	24.8	25.9	34.7	38.5	56.1	63.8	73.7	72
3.0 to 35	0.2 to 2.5		lb	45.5	50.3	68.6	77	115.8	132.8	154.6	146
			kg	20.6	22.8	31.1	34.9	52.5	60.2	70.1	66
30 to 230	2.0 to 16		lb	29.1	31.6	51	58.2	97	114	135.8	136
			kg	13.2	14.3	23.1	26.4	44	51.7	61.6	62
Bellows actuator											
30 to 85	2.0 to 6.0	Height H		21.65"/550 mm			23.82"/605 mm		28.82"/732 mm		29.72"/755 mm
		Actuator		Ø D = 4.72"/120 mm, A = 9.6 in²/62 cm²							
		Valve spring force		4400 N							
75 to 145	5.0 to 10	Height H		21.65"/550 mm			23.82"/605 mm		28.82"/732 mm		29.72"/755 mm
		Actuator		Ø D = 4.72"/120 mm, A = 9.6 in²/62 cm²							
		Valve spring force		8000 N							
145 to 320	10 to 22	Height H		21.06"/535 mm			23.23"/590 mm		28.23"/717 mm		29.13"/740 mm
		Actuator		Ø D = 3.54"/90 mm, A = 5.1 in²/33 cm²							
		Valve spring force		8000 N							
300 to 400	20 to 28	Height H		21.06"/535 mm			23.23"/590 mm		28.23"/717 mm		29.13"/740 mm
		Actuator		Ø D = 3.54"/90 mm, A = 5.1 in²/33 cm²							
		Valve spring force		8000 N							
A = 5.1 in²/33 cm²		Weight [1], approx.	lb	40.2	42.6	43.7	62	70.4	106.8	135.8	157.7	146
			kg	18.2	19.3	19.8	28.1	31.9	48.4	61.6	71.5	66
A = 9.6 in²/62 cm²		Weight [1], approx.	lb	49.9	52.3	53.4	71.7	80	133.4	150.4	172.2	165
			kg	22.6	23.7	24.2	32.5	36.3	60.5	68.2	78.1	75

[1] Based on Class 150: +10 % for Class 300

[2] Actuator with two diaphragms: 15 to 35 psi/1 to 2.5 bar

Table 6: *C_V/K_{VS} coefficients and x_{FZ} values · Terms for noise level calculation according to VDMA 24422, edition 1.89*

Nominal size		Standard		x_{FZ}	Special version		x_{FZ}	With flow divider	
NPS	DN	C_V [1]	K_{VS} [1]		C_V [1]	K_{VS} [1]		C_V ST 1	K_{VS}-ST 1
½	15				1.2	1.0	0.6		
		5.0	4.0	0.5				3.5	3.0
¾	20				1.2	1.0	0.6		
					5.0	4.0	0.5		
		7.5	6.3	0.45				6.0	5.0
1	25				1.2	1.0	0.6		
		9.4	8.0	0.4	5.0	4.0	0.5	7.0	6.0
1½	40				5.0 · 9.4	4.0 · 8.0	0.5 · 0.4		
		23	20	0.4				17	15
2	50				5.0 · 9.4	4.0 · 8.0	0.5 · 0.4		
		37	32	0.4				30	25
2½	65				37 [2]	32 [2]	0.4		
		60	50	0.4				45	38
3	80				37 [2]	32 [2]	0.4		
		94	80	0.35				49	42
4	100				94	80	0.4		
		145	125	0.35				77	66

[1] With $C_V \leq 5/K_{VS} \leq 4$: valve without balancing bellows

[2] Max. permissible differential pressure 360 psi/25 bar

Valve-specific correction terms

– **ΔL_G** · For gases and vapors: values according to Fig. 5

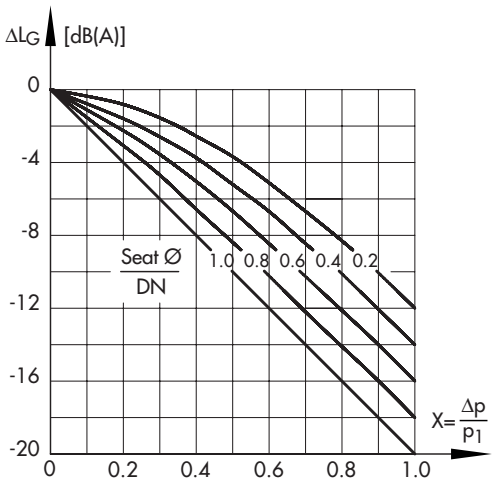


Fig. 5: *Diagram · ΔL_G for gases and vapors*

– **ΔL_F** · For liquids:

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

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

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/K_{VS}-ST 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.