DATA SHEET

T 2640 EN

Type 2371-10 and Type 2371-11 Pressure Reducing Valves

Series 2371 Pressure Regulators with pneumatic or manual set point adjustment

Application

Pressure reducing valves with USP-VI diaphragm for the food and pharmaceutical industries

Set point ranges from **0.4 to 6 bar/6 to 90 psi** · **K_{VS} 0.63 to 16/C_V 0.75 to 20** · Nominal size **DN 15 to 50/NPS ½ to 2** · Suitable for liquids and gases from **0 to +160 °C/32 to 320 °F** · Max. operating pressure (inlet pressure) **10 bar/150 psi**

The valve closes when the output pressure **rises**.

Special features

- Proportional pressure regulators for use in the food processing and pharmaceutical industries
- Wetted inside surfaces with a surface roughness R_a ≤0.8 µm; outside surface glass bead blasted
- Stainless steel 1.4404/316L or 1.4409/CF3M
- FDA-compliant materials
- Angle body
- USP Class VI-121 °C compliance
- Body free of dead cavities
- Leakage monitoring of the diaphragm

Version

Pressure reducing valve with diaphragm to control the outlet pressure to the adjustable set point. The set point adjustment in Type 2371-10 is pneumatic [1]. The set point of Type 2371-11 is adjusted manually by tensioning the set point spring. Angle valve · Bar stock version · DN 15 to 50/NPS ½ to 2 · Standard with metal-seated plug or optionally with soft-seated special plug · Maximum pressure 10 bar/150 psi. The regulator can be fitted with a stem locking facility to keep the plug open during CIP (Cleaning in Place) or SIP (Sterilization in Place) · Diaphragm leakage monitoring using a test connection · Body free of cavities allows the valve to be cleaned inside properly.

Connections

Threaded connections:
DIN 11864-1 GS form A, Series A, B, C/DIN 11887 A Series 1/ISO 2853 = IDF/SMS 1146

Clamp connections:
DIN 11864-3 NKS form A, Series A, B, C/DIN 32676 Series A, B, C/ISO 2852/BS 4825 Part 3 = ASME BPE

Flanges:
DIN 11864-2 NF Form A, Series A, B, C



Fig. 1: *Type 2371-10 Pressure Reducing Valve, with pneumatic set point adjustment*

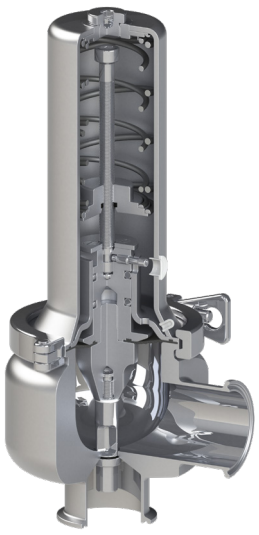


Fig. 2: *Type 2371-11 Pressure Reducing Valve, with manual set point adjustment*

Special versions

Material: body and plug in 1.4435, other materials on request

Nominal size: DN 50 body with DN 65 connections

Plug seal: pure PEEK (Victrex® 450G)

Surface finish: inside roughness: R_a ≤ 0.6 (polished) or R_a ≤ 0.4 (satin finish or mirror finish); external roughness: R_a ≤ 0.6 (polished)

End connections: flanges DIN EN 1092-1 B2, ASME B16.5 Class 150, other end connections on request

1) External supply air (e.g. compressed air) required.

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Principle of operation (see Fig. 3 and Fig. 4)

The medium flows through the valve body (1) in the direction 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 valve closes when the downstream pressure (p_2) rises above the adjusted set point. The resulting output pressure p_2 depends on the flow rate.

Any medium escaping from the test connection (11) indicates that the operating diaphragm (4) may be leaking or the diaphragm has ruptured. The test connection of Type 2371-10 is connected to a flexible pipe elbow to discharge any medium escaping.

Type 2371-11: version with manual set point adjustment (see Fig. 3)

In the idle state, the valve is kept open by the set point springs (7). The valve closes when the output pressure p_2 acting on the diaphragm (4) and the resulting force exceed the force of the springs.

The set point is adjusted using an Allen key (8 mm), which is inserted through the adjustment opening (6.1) on top of the housing onto the set point screw (6). The blanking plug must first be removed. If necessary, the set point screw can be secured by the locking screw (12) in the upper plug section to prevent the set point screw from loosening due to vibrations, causing the set point to change.

The washer (15) serves as a bottom end stop to protect the diaphragm from overload and to prevent parts from falling apart inadvertently while the regulator is being dismantled.

Turning the set point screw clockwise causes the spring plate (7.1) to move upwards and increases the spring force and the set point. Turning the set point screw counterclockwise relieves the spring tension and reduces the set point.

Type 2371-10: version with pneumatic set point adjustment (see Fig. 4)

In the idle state, the valve is kept open by the set point pressure p_c (compressed air) ($p_{c\,max}$ = 8 bar). When the force created by the output pressure p_2 acting on the diaphragm exceeds the force resulting from the set point pressure p_c, the plug (3) moves towards the seat (2), closing the passage. In this case, the ratio between p_1 and p_C is not necessarily 1:1. As the output pressure p_2 drops, the resulting force reduces again. The valve is opened again when the pressure falls below the set point pressure p_c.

The two diaphragms (4.1) provide a certain amount of safety when one of the diaphragms ruptures and prevents the process medium and external pressure medium from mixing.

The screw (12) prevents parts from falling apart inadvertently while the regulator is being dismantled.

The screw (15) serves as a bottom end stop to protect the diaphragm from overload and to prevent parts from falling apart inadvertently while the regulator is being dismantled.

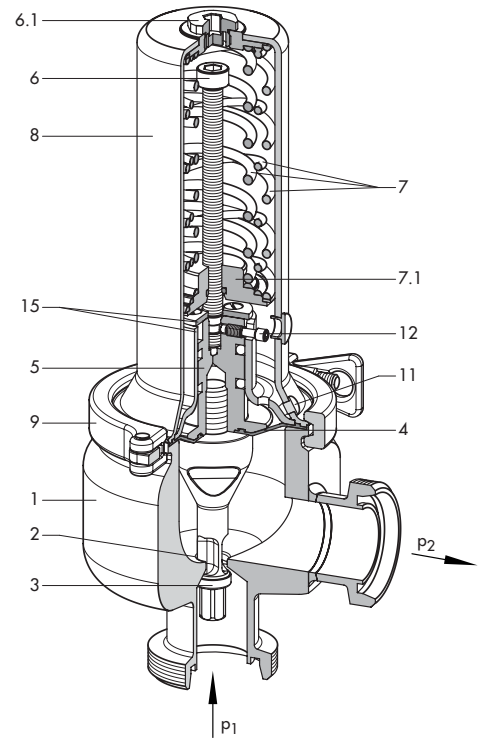


Fig. 3: *Functional diagram: Type 2371-11 (manual set point adjustment)*

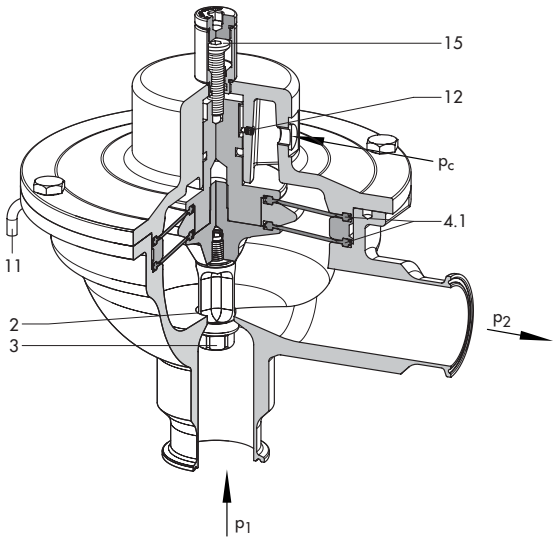


Fig. 4: *Functional diagram: Type 2371-10 (pneumatic set point adjustment)*

Legend for Fig. 3 to Fig. 5

1	Valve body
2	Seat
3	Plug
4	Operating diaphragm
4.1	Two diaphragms
5	Upper plug section
6	Set point screw
6.1	Adjustment opening with blanking plug
7	Set point springs
7.1	Spring plate
8	Actuator housing
9	Clamp fitting
11	Test bore to monitor the diaphragm for leakage
12	Locking screw
13	Pin
14	Lock nut
15	Mechanical stop
16	Spring
17	Diaphragm (pressure unit)

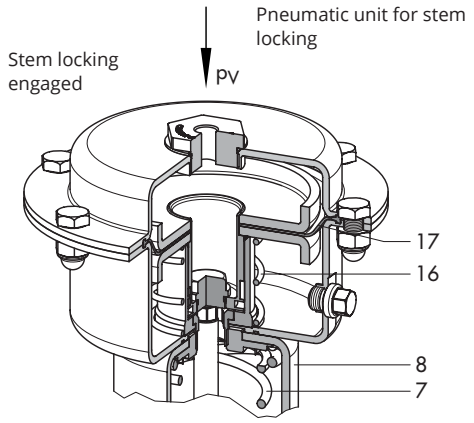


Fig. 5.1: Pneumatic stem locking: Type 2371-10/-11

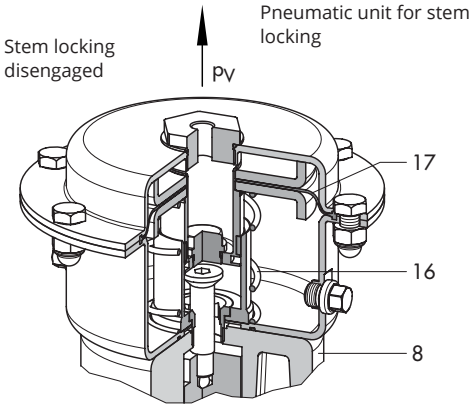


Fig. 5.2: Pneumatic stem locking: Type 2371-10/-11

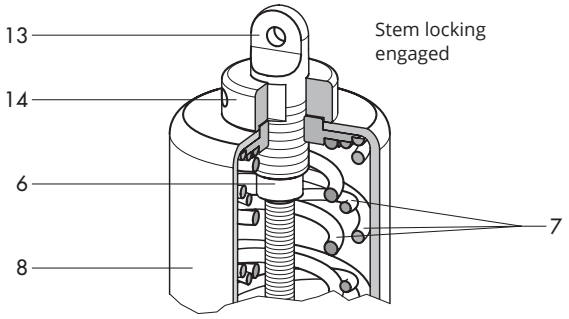


Fig. 5.3: Manual stem locking: Type 2371-11

p_v	Pressure for stem locking
p_c	Set point pressure, external

Fig. 5: *Stem locking*

Stem locking for CIP or SIP (see Fig. 5)

The Type 2371-10 and Type 2371-11 Regulators can be fitted with a stem locking to keep the plug in the open position. In this version, the plug can be locked in the open position to allow the valve to be cleaned (CIP = Cleaning In Place or SIP = Sterilization In Place) while it is open.

The stem can be locked in place pneumatically by an additional pneumatic unit with compressed air connection (for Types 2371-10 and 2371-11) or manually using a special pin (for Type 2371-11 only).

The pneumatic and manual stem locking do not affect the control function of the valve, provided the stem locking is not engaged.

The pneumatic unit for the pneumatic stem locking is located on the top of the regulator. The unit can be mounted in any position since the axial fixture of the unit allows it to turn 360°.

The pin (13) of the manual stem locking is screwed into the adjustment opening in place of the blanking plug (6.1).

Pneumatic stem locking (see Fig. 5.1 and Fig. 4.2)

Type 2371-10: to open the valve, apply a pressure p_V = 1 bar to the pneumatic unit. This causes the plug stem to move together with the plug out of the valve seat. A set point pressure p_C must not be applied to the regulator in this case.

To switch the valve back to its control function, remove the pressure p_V (= 1 bar). The spring (16) pulls the actuating unit back, allowing the plug stem to move again for the control task (see Fig. 5.2).

Type 2371-11: to open the valve, apply a pressure p_V (= 6 bar) to the pneumatic unit. This causes the plug stem to move together with the plug out of the valve seat and opens the valve.

To switch the valve back to its control function, remove the pressure p_V (= 6 bar). The spring (16) pulls the actuating unit back, allowing the plug stem to move again for the control task (see Fig. 5.2).

Manual stem locking

Type 2371-11 only (see Fig. 5.3): to lock the stem into place, screw the pin (13) into the opening on top of the actuator housing in place of the blanking plug (6.1). The end of the pin comes to rest on the head of the set point screw (6). As the pin is screwed into the valve, it pushes the plug into the open position over the set point screw (6) and upper plug section (5). A mechanical stop (15) prevents it from being screwed in any further, protecting the diaphragm from overstretching or rupturing.

Use the lock nut (14) to keep this position. When the groove of the pin is completely concealed, the stem locking is active, whereas a visible groove means it is disengaged.

Installation

The regulator has an angle-style valve body. Install the valve free of stress into the pipeline. Observe the following:

- The valve axis must be vertical (actuator housing on top) and, as a result, the outlet must face to the side in the installed position.
- The direction of flow must match the direction indicated by the arrow on the body (inlet at the bottom and outlet at the side).

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

Type 2371-10 or -11 Pressure Reducing Valve			**DIN**						**ANSI**					
Nominal size			DN 15	DN 20	DN 25	DN 32	DN 40	DN 50	NPS ½	NPS ¾	NPS 1	NPS 1¼	NPS 1½	NPS 2
Set point ranges	Type 2371-10	K_{VS} 10/C_V 12	–			0.5 to 6 bar			–			7.5 to 90 psi		
		K_{VS} 16/C_V 20				–	2.5 to 6 bar [2]	2.5 to 6 bar				–	37.5 to 90 psi [2]	37.5 to 90 psi
	Type 2371-11		0.4 to 1.2 bar · 1 to 3 bar · 2.5 to 4.5 bar · 4 to 6 bar						6 to 18 psi · 15 to 45 psi · 35 to 65 psi · 60 to 90 psi					
Pneumatic control connection		Type 2371-10	G ¼											
		CIP	G ⅛											
Maximum pressure			10 bar						150 psi					
Max. perm. temperatures	Operating temperature		0 to 160 °C						32 to 320 °F					
	Sterilization temperature		180 °C for up to 30 minutes						356 °F for up to 30 minutes					
Leakage class DIN EN/ANSI	Metal seal		Class I (≤0.05 % of K_{VS}/C_V coefficient)											
	Soft seal		Class IV (≤0.01 % of K_{VS}/C_V coefficient)											
Peak-to-valley height and surface finish	External		Glass bead blasted [1] · Ra ≤0.6 µm, polished											
	Internal		Ra ≤0.8 µm, precision-lathed [1] · Ra ≤0.6 µm, polished · Ra ≤0.4 µm, satin finish · Ra ≤0.4 µm, mirror finish											
Conformity			CE · EAC											

[1] Standard version
[2] The internal diameter of the inlet must be greater than Ø40 mm to allow correct installation of the plug

Table 2: *K_{VS} and C_V coefficients*

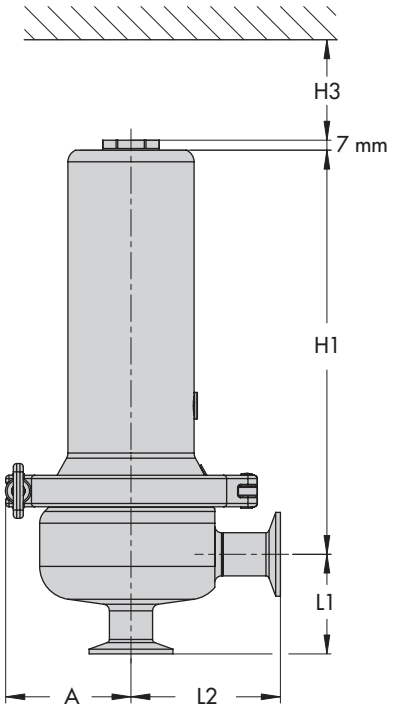
Nominal size	**DN 15**	**DN 20**	**DN 25**	**DN 32**	**DN 40**	**DN 50**	**NPS ½**	**NPS ¾**	**NPS 1**	**NPS 1¼**	**NPS 1½**	**NPS 2**
Version	DIN (K_{VS} coefficient)						ANSI (C_V coefficient)					
Type 2371-10												
K_{VS}/C_V coefficient	–			10		10 · 16	–			12		12 · 20
Type 2371-11												
K_{VS}/C_V coefficient	0.63 [1] · 1.0 · 3.5			2 · 5.2			0.75 [1] · 1.2 · 4			2.5 · 6		

[1] Plug with soft seal

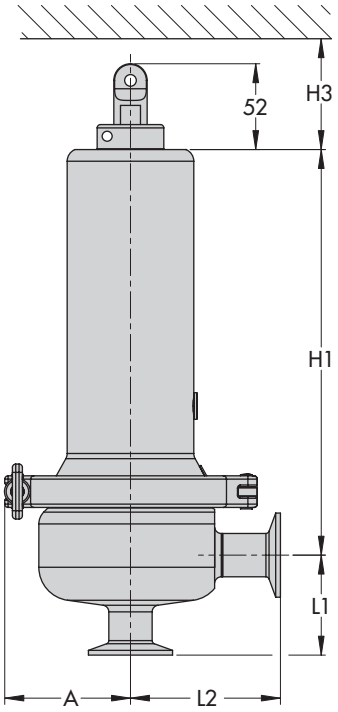
Table 3: *Materials · Material numbers according to ASTM and DIN EN*

Pressure reducing valve		**Type 2371-10**		**Type 2371-11**	
Version		DIN	ANSI	DIN	ANSI
Body		1.4409	CF3M	1.4404	316L
Plug	Metal seal	1.4404	316L	1.4404	316L
	Seal for soft-seated plug	EPDM			
Diaphragm		PTFE-coated EPDM			
Cover		1.4409	CF3M	1.4404	316L
Springs		1.4310			

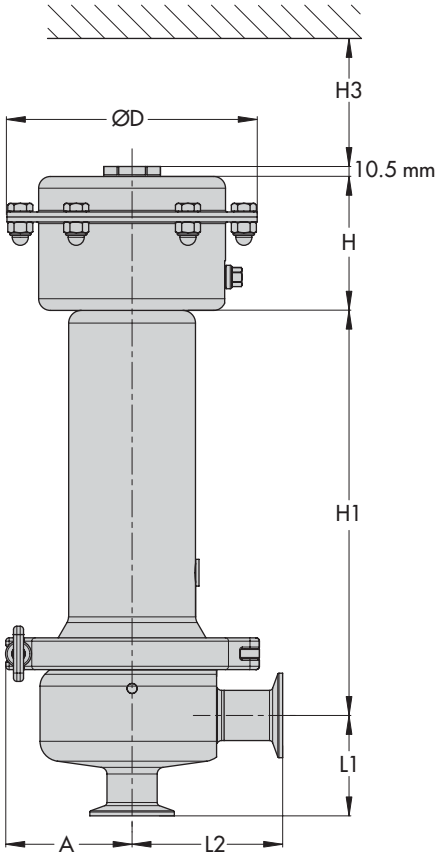
Dimensions of Type 2371-11 (dimensions in Table 7 to Table 4)



Type 2371-11 · Standard version



Type 2371-11 · With manual stem locking

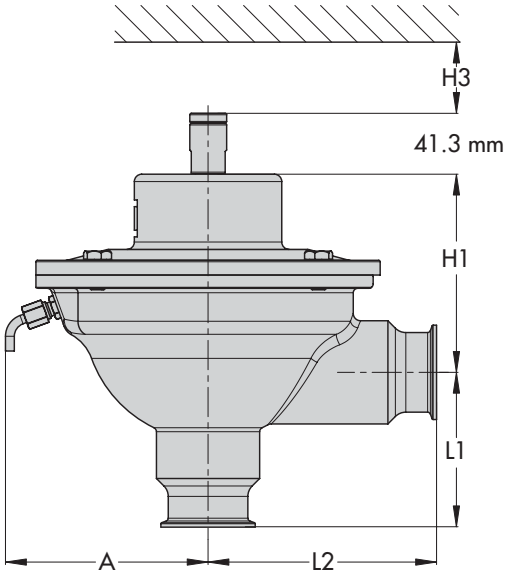


Type 2371-11 · With pneumatic stem locking

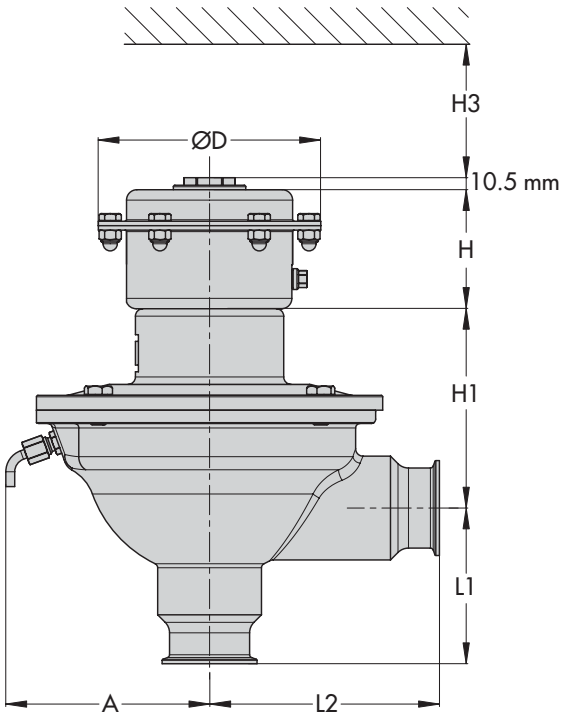
Type 2371-11 with clamp end connections is shown in these drawings. Upon delivery, the clamp fitting (connection between the actuator housing and valve) is turned 90° in the drawing.

Fig. 6: *Dimensional drawings for Type 2371-11*

Dimensions of Type 2371-10 (dimensions in Table 7 to Table 4)

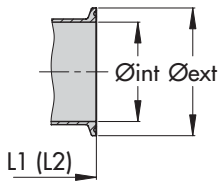


Type 2371-10 · Standard version

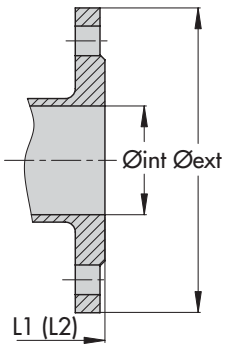


Type 2371-10 · With pneumatic stem locking

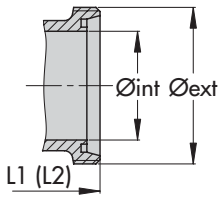
Type 2371-10 with clamp end connections is shown in these drawings.



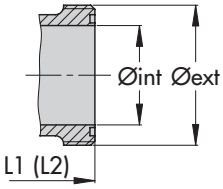
Clamp connections



Flanges



Threaded connection according to DIN ...



Threaded connection according to ISO/SMS ...

Fig. 7: *Dimensional drawings of Type 2371-10 · End connections*

Table 4: *Threaded connections · All dimensions in mm (see and Fig. 6)*

Pressure reducing valve		Type 2371-11						Type 2371-10		
Nominal size		DN 15 NPS ½	DN 20 NPS ¾	DN 25 NPS 1	DN 32 NPS 1¼	DN 40 NPS 1½	DN 50 NPS 2	DN 32 NPS 1¼	DN 40 NPS 1½	DN 50 NPS 2
DIN 11864-1 GS form A Series A	p_{max}	10 bar/150 psi								
	L1	55		60		65	70	105		
	L2	90						155		
	Øint	16	20	26	32	38	50	32	38	50
	Øext	RD 34x⅛″	RD 44x⅙″	RD 52x⅙″	RD 58x⅙″	RD 65x⅙″	RD 78x⅙″	RD 58x⅙″	RD 65x⅙″	RD 78x⅙″
DIN 11864-1 GS form A Series B	p_{max}	10 bar/150 psi								
	L1	55		60		65	70	105		
	L2	90						155		
	Øint	18.1	23.7	29.7	38.4	44.3	56.3	38.4	44.3	56.3
	Øext	RD 44x⅙″	RD 52x⅙″	RD 58x⅙″	RD 65x⅙″	RD 78x⅙″	RD 95x⅙″	RD 65x⅙″	RD 78x⅙″	RD 95x⅙″
DIN 11864-1 GS form A Series C	p_{max}	10 bar/150 psi								
	L1	–	55	60	–	65	70	–	105	
	L2	–	90		–	90		–	155	
	Øint	–	15.75	22.1	–	34.8	47.5	–	34.8	47.5
	Øext	–	RD 34x⅛″	RD 52x⅙″	–	RD 65x⅙″	RD 78x⅙″	–	RD 65x⅙″	RD 78x⅙″
DIN 11887 A Series 1	p_{max}	10 bar/150 psi								
	L1	55		60		65	70	105		
	L2	90						155		
	Øint	16	20	26	32	38	50	32	38	50
	Øext	RD 34x⅛″	RD 44x⅙″	RD 52x⅙″	RD 58x⅙″	RD 65x⅙″	RD 78x⅙″	RD 58x⅙″	RD 65x⅙″	RD 78x⅙″
ISO 2853 = IDF	p_{max}	10 bar/150 psi								
	L1	–	–	60		65	70	105		
	L2	–	–	90				155		
	Øint	–	–	22.6	31.3	35.6	48.6	31.3	35.6	48.6
	Øext	–	–	37x⅛″	45.9x⅛″	50.6x⅛″	64.1x⅛″	45.9x⅛″	50.6x⅛″	64.1x⅛″
SMS 1146	p_{max}	6 bar/87 psi								
	L1	–	–	60		65	70	105		
	L2	–	–	90				155		
	Øint	–	–	22.6	29.6	35.6	48.6	29.6	35.6	48.6
	Øext	–	–	RD 40x⅙″	RD 48x⅙″	RD 60x⅙″	RD 70x⅙″	RD 48x⅙″	RD 60x⅙″	RD 70x⅙″

Table 5: *Clamp connections · All dimensions in mm (see Fig. 6 and Fig. 7)*

Pressure reducing valve		Type 2371-11						Type 2371-10		
Nominal size		DN 15 NPS ½	DN 20 NPS ¾	DN 25 NPS 1	DN 32 NPS 1¼	DN 40 NPS 1½	DN 50 NPS 2	DN 32 NPS 1¼	DN 40 NPS 1½	DN 50 NPS 2
DIN 11864-3 NKS form A Series A	p_{max}	10 bar/150 psi								
	L1	55		60		65	70	105		
	L2	90						155		
	Øint	16	20	26	32	38	50	32	38	50
	Øext	34	50.5			64	77.5	50.5	64	77.5
DIN 11864-3 NKS form A Series B	p_{max}	10 bar/150 psi								
	L1	55		60		65	70	105		
	L2	90						155		
	Øint	18.1	23.7	29.7	38.4	44.3	56.3	38.4	44.3	56.3
	Øext	34	50.5		64		91	64		91
DIN 11864-3 NKS form A Series C	p_{max}	10 bar/150 psi								
	L1	–	55	60	–	65	70	–	105	
	L2	–	90		–	90		–	155	
	Øint	–	15.75	22.1	–	34.8	47.5	–	34.8	47.5
	Øext	–	34	50.5	–	64	77.5	–	64	77.5
DIN 32676, Series A	p_{max}	10 bar/150 psi								
	L1	55		60		65	70	105		
	L2	90						155		
	Øint	16	20	26	32	38	50	32	38	50
	Øext	34		50.5			64	50.5		64
DIN 32676 Series B	p_{max}	10 bar/150 psi								
	L1	55		60		65	70	105		
	L2	90						155		
	Øint	18.1	23.7	29.7	38.4	44.3	56.3	38.4	44.3	56.3
	Øext	50.5			64		77.5	64		77.5
DIN 32676 Series C	p_{max}	10 bar/150 psi								
	L1	–	55	60	–	65	70	–	105	
	L2	–	90		–	90		–	155	
	Øint	–	15.75	22.1	–	34.8	47.5	–	34.8	47.5
	Øext	–	25	50.5	–	50.5	64	–	50.5	64
ISO 2852	p_{max}	10 bar/150 psi								
	L1	–	–	60		65	70	105		
	L2	–	–	90				155		
	Øint	–	–	22.6	31.3	35.6	48.6	31.3	35.6	48.6
	Øext	–	–	50.5			64	50.5		64
BS 4825 Part 3 = ASME BPE	p_{max}	10 bar/150 psi								
	L1	–	55 [1)]	60	–	65	70	–	105	
	L2	–	90 [1)]	90	–	90		–	155	
	Øint	–	15.75 [1)]	22.2	–	34.9	47.6	–	34.9	47.6
	Øext	–	25 [1)]	50.5	–	50.5	64	–	50.5	64

[1)] Version according to ASME BPE only

Table 6: *Flanges · All dimensions in mm (see Fig. 6 and Fig. 7)*

Pressure reducing valve		Type 2371-11						Type 2371-10		
Nominal size		DN 15 NPS ½	DN 20 NPS ¾	DN 25 NPS 1	DN 32 NPS 1¼	DN 40 NPS 1½	DN 50 NPS 2	DN 32 NPS 1¼	DN 40 NPS 1½	DN 50 NPS 2
DIN 11864-2 NF form A Series A	p_{max}	10 bar/150 psi								
	L1	90	95	100	105	115	125	105		
	L2	90	95	100	105	115	125	155		
	Øint	16	20	26	32	38	50	32	38	50
	Øext	59	64	70	76	82	94	76	82	94
DIN 11864-2 NF form A Series B	p_{max}	10 bar/150 psi								
	L1	90	95	100	105	115	125	105		
	L2	90	95	100	105	115	125	155		
	Øint	18.1	23.7	29.7	38.4	44.3	56.3	38.4	44.3	56.3
	Øext	62	69	74	82	88	103	82	88	103
DIN 11864-2 NF form A Series C	p_{max}	10 bar/150 psi								
	L1	–	95	100	–	115	125	–	105	
	L2	–	95	100	–	115	125	–	155	
	Øint	–	15.75	22.1	–	34.8	47.5	–	34.8	47.5
	Øext	–	59	66	–	79	92	–	79	92
DIN EN 1092-1 B2 or ASME B16.5 Cl 150		On request								

Table 7: *General · All dimensions in mm (see Fig. 6 and Fig. 7)*

Pressure reducing valve		Type 2371-11						Type 2371-10		
Nominal size		DN 15 NPS ½	DN 20 NPS ¾	DN 25 NPS 1	DN 32 NPS 1¼	DN 40 NPS 1½	DN 50 NPS 2	DN 32 NPS 1¼	DN 40 NPS 1½	DN 50 NPS 2
Common dimensions	A	85						145		
	H	80								
	H1	245			260			180		
	H3	200								
	ØD	150								
Weight, approx. kg/lb										
Types 2371-10/-11		8.5/19			11/24.3			15/33		
Stem locking										
Pneumatic unit		2.5/5.5								
Screw (pin)		0.1/0.25								

Ordering text

Type 2371-10 and Type 2371-11 Pressure Reducing Valves

Type 2371-10 · Pneumatic set point adjustment

Set point range …
depending on K_{VS}/C_V

Type 2371-11 · Manual set point adjustment

Set point range …
K_{VS} coefficient/C_V coefficient …

Nominal size DN …/NPS …

Plug with metal/soft seal

Type of connection:
Threaded connections according to …/clamp connections according to …/flanges according to …

Stem locking: pneumatic/manual