### DATA SHEET



### T 2640 EN

# Type 2371-10 and Type 2371-11 Pressure Reducing Valves for the Food and Pharmaceutical Industries

Series 2371 Pressure Regulators with pneumatic or manual set point adjustment





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  $\cdot$  K<sub>VS</sub> 0.63 to 16/C<sub>V</sub> 0.75 to 20  $\cdot$  Nominal size DN 15 to 50/NPS ½ to 2  $\cdot$  Suitable for liquids and gases from 0 to +160 °C/32 to 320 °F  $\cdot$  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<sub>a</sub>
   ≤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 <sup>1)</sup>. 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

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



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 re-

Nominal size: DN 50 body with DN 65 connections

Plug seal: pure PEEK (Victrex® 450G)

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

 $R_{\alpha} \le 0.6$  (polished)

End connections: flanges DIN EN 1092-1 B2, ASME B16.5

Class 150, other end connections on request

### Principle of operation (see Fig. 5 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 Chapter Fig. 4)

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. 5)

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.

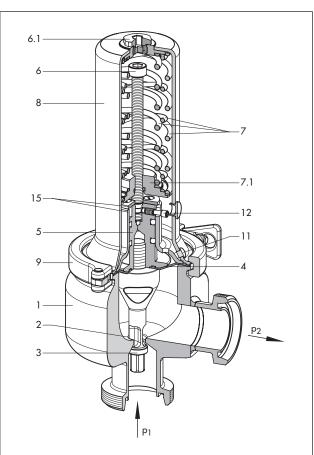


Fig. 4: Principle of operation: Type 2371-11 (manual set point adjustment)

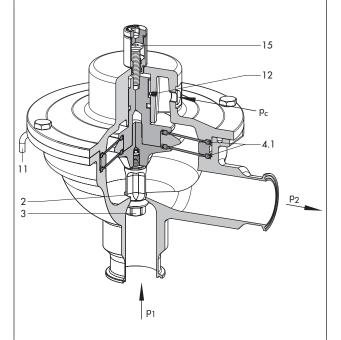


Fig. 5: Principle of operation: Type 2371-10 (pneumatic set point adjustment)

### Stem locking for CIP or SIP (see Fig. 3)

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  $360^{\circ}$ .

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. 3.1 and Fig. 3.2)

**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. 3.2).

**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. 3.2).

### Manual stem locking

Type 2371-11 only (see Fig. 3.3): 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).

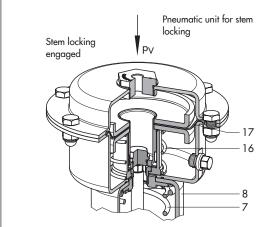


Fig. 3.1: Pneumatic stem locking: Type 2371-10/-11

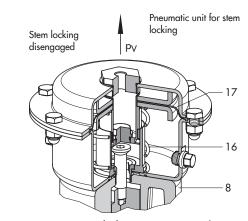


Fig. 3.2: Pneumatic stem locking: Type 2371-10/-11

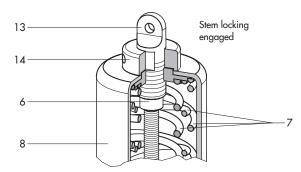


Fig. 3.3: Manual stem locking: Type 2371-11

P<sub>v</sub> Pressure for stem lockingP<sub>c</sub> Set point pressure, external

Fig. 3: Stem locking

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

Type 2371-10 or	-11 Pressure R	Reducing Valve	DIN						ANSI					
Nominal size			DN 15	DN 20	DN 25	DN 32	DN 40	DN 50	NPS 1/2	NPS ¾	NPS 1	NPS 11/4	NPS 11/2	NPS 2
		K <sub>VS</sub> 10/C <sub>V</sub> 12			C	0.5 to 6 bar					7	.5 to 90 p	si	
Set point ranges	Type 2371-10	0 K <sub>vs</sub> 16/C <sub>v</sub> 20		_		ı	2.5 to 6 bar <sup>2)</sup>	2.5 to 6 bar	-			-	37.5 to 90 psi <sup>2)</sup>	37.5 to 90 psi
	Type 2371-11		0.4 to 1	0.4 to 1.2 bar · 1 to 3 bar · 2.5 to 4.5 bar · 4 to 6 bar 6 to						psi · 15 t	o 45 psi ·	35 to 65	psi · 60 to	o 90 psi
Pneumatic control		Type 2371-10						G	1/4					
Pheumatic control	connection	CIP						G	1/8					
Maximum pressur	е				10	bar					150	) psi		
Max. perm. tem-	Operating te	mperature	0 to 160 °C					32 to 320 °F						
peratures	Sterilization t	temperature	180 °C for up to 30 minutes						356 °F for up to 30 minutes					
Leakage class	Metal seal						Class I (≤	0.05 % of	K <sub>VS</sub> /C <sub>V</sub> c	oefficient)				
DIN EN/ANSI	Soft seal					(	Class IV (≤	≤0.01 % c	f K <sub>VS</sub> /C <sub>V</sub>	coefficient	.)			
Peak-to-valley	,			Glass bead blasted 1) · Ra ≤0.6 µm, polished										
height and surface finish	height and surface finish Internal			Ra $\leq$ 0.8 µm, precision-lathed $^{1)}$ · Ra $\leq$ 0.6 µm, polished · Ra $\leq$ 0.4 µm, satin finish · Ra $\leq$ 0.4 µm, mirror finish										
Conformity								CE	ERE					

**Table 2:**  $K_{VS}$  and  $C_{V}$  coefficients

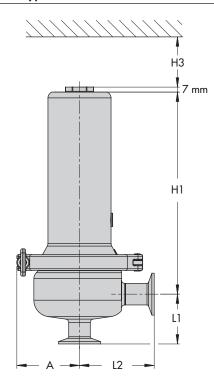
Table 2. Mysana Cy co	001110101110											
Nominal size	DN 15	DN 20	DN 25	DN 32	DN 40	DN 50	NPS 1/2	NPS ¾	NPS 1	NPS 11/4	NPS 11/2	NPS 2
Version		DIN ( $K_{VS}$ coefficient) ANSI ( $C_V$ coefficient)										
Туре 2371-10	371-10											
K <sub>VS</sub> /C <sub>V</sub>		-			10 10 16			_			12	
Туре 2371-11												
K <sub>VS</sub> /C <sub>V</sub>	0.6	3 <sup>1)</sup> · 1.0 ·	3.5		2 · 5.2		0.	75 <sup>1)</sup> · 1.2 ·	4		2.5 · 6	

<sup>1)</sup> Plug with soft seal

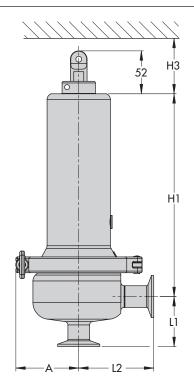
Table 3: Materials · Material numbers according to ASTM and DIN EN

Pressure reducing valve		Type 2	371-10	Туре 2371-11					
Version		DIN	ANSI	DIN	ANSI				
Body		1.4409	CF3M	1.4404	316L				
nl	Metal seal	1.4404	1.4404	316L					
Plug	Seal for soft-seated plug	EPDM							
Diaphro	agm	PTFE-coated EPDM							
Cover		1.4409 CF3M 1.4404 316L							
Springs	5	1.4310							

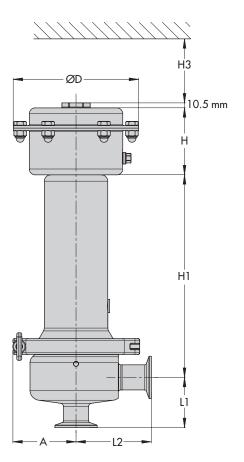
Standard version
The internal diameter of the inlet must be greater than Ø40 mm to allow correct installation of the plug



Type 2371-11 · Standard version



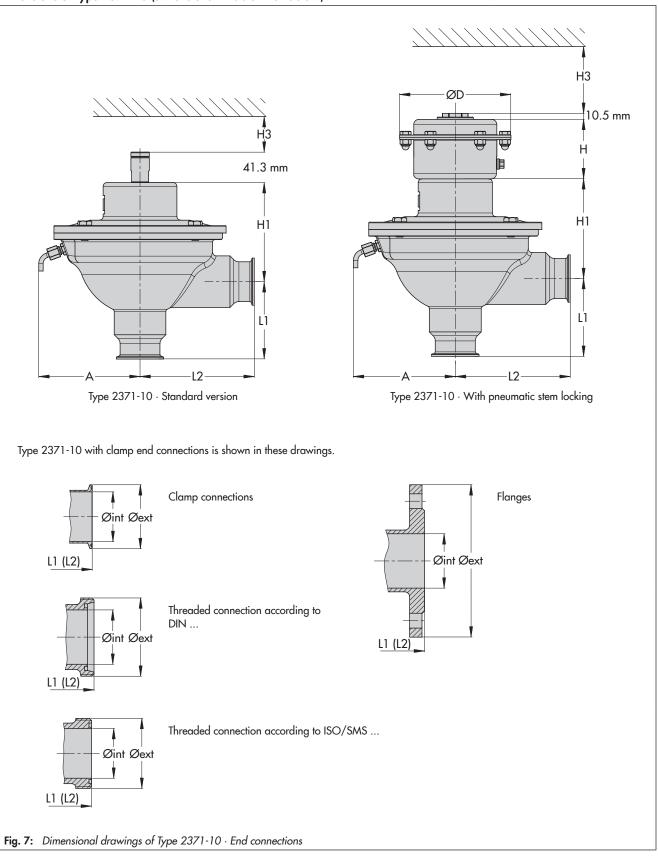
Type 2371-11 · With manual stem locking



Type 2371-11 · With pneumatic stem locking

Fig. 6: Dimensional drawings for Type 2371-11

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  $90^\circ$  in the drawing.



**Table 4:** Threaded connections · All dimensions in mm (see Fig. 6 und Fig. 7)

Pressure reduc valve	ing			Type 2	371-11				Туре 2371-10				
Nominal size		DN 15 NPS 1/2	DN 20 NPS 34	DN 25 NPS 1	DN 32 NPS 11/4	DN 40 NPS 11/2	DN 50 NPS 2	DN 32 NPS 11/4	DN 40 NPS 11/2	DN 50 NPS 2			
	p <sub>max</sub>					10 bar/150 psi							
DIN 11864-1 GS form A Series A	L1	5	55	6	0	65	70	105					
	L2			9	0	•			155				
	Øint	16	20	26	32	38	50	32 38		50			
	Øext	RD 34x1/8"	RD 44x1/6"	RD 52x1/6"	RD 58x1/6"	RD 65x1/6"	RD 78x1/6"	RD 58x1/6"	RD 65x1/6"	RD 78x1/6"			
	p <sub>max</sub>	10 bar/150 psi											
DIN 11864-1	L1	5	55	6	0	65	70		105				
GS form A Series B	L2			9	0				155				
	Øint	18.1	23.7	29.7	38.4	44.3	56.3	38.4	44.3	56.3			
	Øext	RD 44x1/6"	RD 52x1/6"	RD 58x1/6"	RD 65x1/6"	RD 78x1/4"	RD 95x1/6"	RD 65x1/6"	RD 78x1/6"	RD 95x1/6"			
	p <sub>max</sub>					10 bar/150 psi							
DIN 11864-1	L1	-	55	60	-	65	70	-	10	05			
GS form A	L2	-	9	0	0 –		0	-	1:	55			
Series C	Øint	-	15.75	22.1	-	34.8	47.5	-	34.8	47.5			
	Øext	-	RD 34x1/8"	RD 52x1/6"	-	RD 65x1/4"	RD 78x1//s"	-	RD 65x1/6"	RD 78x1/6"			
	p <sub>max</sub>	10 bar/150 psi											
	L1	5	55	6	0	65	70	105					
DIN 11887 A Series 1	L2			9	0			155					
OCITCS 1	Øint	16	20	26	32	38	50	32	38	50			
	Øext	RD 34x1/8"	RD 44x1/6"	RD 52x1/6"	RD 58x1/6"	RD 65x1/6"	RD 78x1/6"	RD 58x1/6"	RD 65x1/6"	RD 78x1/6"			
	P <sub>max</sub>		,			10 bar/150 psi	i						
	L1	-	-	6	0	65	70		105				
ISO 2853 = IDF	L2	-	-		9	90			155				
- 101	Øint	-	-	22.6	31.3	35.6	48.6	31.3	35.6	48.6			
	Øext	-	-	37x½"	45.9x1/8"	50.6x1/8"	64.1x1/8"	45.9x1/8"	50.6x1/8"	64.1x1/8"			
	P <sub>max</sub>					6 bar/87 psi							
	L1	-	-	6	0	65	70		105				
SMS 1146	L2	-	-		9	90			155				
	Øint	-	-	22.6	29.6	35.6	48.6	29.6	35.6	48.6			
	Øext	-	-	RD 40x1/6"	RD 48x1/6"	RD 60x1/6"	RD 70x1/4"	RD 48x1/6"	RD 60x1/6"	RD 70x1/6"			

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

Pressure reduce valve	ing			Type 2	371-11				Туре 2371-10		
Nominal size		DN 15 NPS 1/2	DN 20 NPS 34	DN 25 NPS 1	DN 32 NPS 11/4	DN 40 NPS 11/2	DN 50 NPS 2	DN 32 NPS 11/4	DN 40 NPS 11/2	DN 50 NPS 2	
	p <sub>max</sub>				•	10 bar/150 psi		•			
DIN 11864-3	L1	5	5	ć	50	65	65 70 105				
NKS form A	L2			9	90				155		
Series A	Øint	16	20	26	32	38	50	32	38	50	
	Øext	34		50.5		64	77.5	50.5	64	77.5	
	P <sub>max</sub>					10 bar/150 psi					
DIN 11864-3	L1	5	5	ć	60	65	70		105		
NKS form A	L2			9	90				155		
Series B	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	6	54	91	
	p <sub>max</sub>					10 bar/150 psi					
DIN 11864-3	L1	-	55	60	-	65	70	-	10	)5	
NKS form A	L2	-	9	0	-	90	0	-	15	55	
Series C	Øint	-	15.75	22.1	-	34.8	47.5	-	34.8	47.5	
	Øext	-	34	50.5	-	64	77.5	-	64	77.5	
	P <sub>max</sub>					10 bar/150 psi					
	L1	5	5	ć	50	65	70		105		
DIN 32676, Series A	L2			9	90				155		
oches A	Øint	16	20	26	32	38	50	32	38	50	
	Øext	3	4		50.5		64	50	0.5	64	
	P <sub>max</sub>										
	L1	5	5	ć	50	65	70	105			
DIN 32676 Series B	L2			9	90				155		
001103 D	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			
	p <sub>max</sub>					10 bar/150 psi					
	L1	-	55	60	-	65	70	-	10	)5	
DIN 32676 Series C	L2	-	9	0	-	90	0	-	15	55	
001103	Øint	-	15.75	22.1	-	34.8	47.5	-	34.8	47.5	
	Øext	-	25	50.5	-	50.5	64	-	50.5	64	
	p <sub>max</sub>					10 bar/150 psi					
	L1	-	_	ć	60	65	70		105		
ISO 2852	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	
	p <sub>max</sub>					10 bar/150 psi					
BS 4825	L1	-	55 <sup>1)</sup>	60	-	65	70	-	- 105		
Part 3 =	L2	-	90 1)	90	-	90	0	-	15	55	
ASME BPE	Øint	-	15.75 <sup>1)</sup>	22.2	-	34.9	47.6	-	34.9	47.6	
	Øext	-	25 1)	50.5	-	50.5	64	-	50.5	64	

<sup>1)</sup> Version according to ASME BPE only

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

Pressure reduc valve	ing			Туре 2	371-11				Туре 2371-10			
Nominal size		DN 15 NPS 1/2	DN 20 NPS 34	DN 25 NPS 1	DN 32 NPS 11/4	DN 40 NPS 11/2	DN 50 NPS 2	DN 32 NPS 11/4	DN 40 NPS 11/2	DN 50 NPS 2		
	$p_{\text{max}}$					10 bar/150 psi						
DIN 11864-2	L1	90	95	100	105	115	125	105				
Nominal size  DIN 11864-2 NF form A Series A  DIN 11864-2 NF form A Series B  DIN 11864-2 NF form A Series C	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		
	p <sub>max</sub>					10 bar/150 psi						
DIN 11864-2	L1	90	95	100	105	115	125	105				
NF form A	L2	90	95	100	105	115	125	155				
Series B	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	105 155 38 50 82 94 105 155	103		
	p <sub>max</sub>					10 bar/150 psi						
DIN 11864-2	L1	-	95	100	-	115	125	-	10	05		
NF form A	L2	-	95	100	-	115	125	-	1:	55		
Series C	Øint	-	15.75	22.1	-	34.8	47.5	-	34.8	47.5		
	Øext	-	59	66	-	79	92	-	79	92		
or	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 redu	cing valve			Туре 2	371-11				Туре 2371-10			
Nominal size		DN 15 NPS 1/2	DN 20 NPS 3/4	DN 25 NPS 1	DN 32 NPS 11/4	DN 40 NPS 11/2	DN 50 NPS 2	DN 32 NPS 11/4	DN 40 NPS 11/2	DN 50 NPS 2		
	Α			8	35				145			
	Н		80									
Common dimensions	H1		245 260									
	H3		200									
	ØD					150						
Weight, appro	ox. kg/lb											
Types 2371-1	0/-11		8.5/19			11/24.3		15/33				
Stem locking												
Pneumati	c unit		2.5/5.5									
Screw (pi	in)					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 ac-

cording to .../flanges according to ...

Stem locking: pneumatic/manual