

Self-operated Regulators Series 42



Differential Pressure Regulator with opening actuator and balanced Type 2422 Valve Type 42-20 · Type 42-25

ANSI version

Application

Differential pressure regulators for large heating systems and industrial plants · Differential pressure set points (Δp) from **0.75 to 145 psi (0.05 to 10 bar)** · Valves sizes **NPS ½ to 10 (DN 15 to 250)** · Pressure rating **Class 125 to 300** · Suitable for liquids and vapors from **40 to 660 °F (5 to 350 °C)**, air and other non-flammable gases up to **175 °F (80 °C)**

The valve **opens** when the differential pressure rises

The differential pressure to be controlled is transmitted to the spring-loaded operating diaphragm in the actuator and converted into a positioning force to move the valve plug. The regulators control the differential pressure according to the adjusted set point.

Special features

- Low-noise, self-operated P-regulators requiring little maintenance
- Fixed set point (Type 42-20) or a set point adjustable over wide range (Type 42-25)
- Single-seated valve balanced by a stainless steel bellows or by a balancing diaphragm (NPS 6 to 10/DN 150 to 250)
- Suitable for circuit water, water/glycol mixtures, steam and air as well as other liquids, gases and vapors, provided these do not affect the characteristics of the operating diaphragm
- Valve body optionally available in cast iron A 126 B, carbon steel A 216 WCC or cast stainless steel A 351 CF8M

Versions

Differential pressure regulators for installation in a bypass pipe or short-circuit pipe (see Typical application) · Flange connections

Type 42-20 (Fig. 1) · Type 2422 Valve · Balanced by a bellows NPS ½ to 4 (DN 15 to 100) · Type 2420 Opening Actuator · Fixed set point, differential pressure adjusted to $\Delta p = 3, 4, 6$ or 7 psi (0.2, 0.3, 0.4 or 0.5 bar)

Type 42-25 (Fig. 2) · Type 2422 Valve · Balanced by a bellows NPS ½ to 10 (DN 15 to 250) · Balanced by a diaphragm NPS 6 to 10 (DN 150 to 250) · Type 2425 Opening Actuator · Adjustable set point in the range between 0.75 and 145 psi (0.05 to 10 bar)

Special versions

Actuator with two diaphragms · Actuator with FPM diaphragm for oils · Special C_v (K_{vs}) coefficients (reduced) · Valve entirely made of corrosion-resistant material (minimum grade 1.4301) Valves larger than NPS 10 (DN 250) · For temperatures above 430 °F (220 °C) · Backflow prevention (refer to T 3009 EN) Version for deionized water · Version free of non-ferrous metal

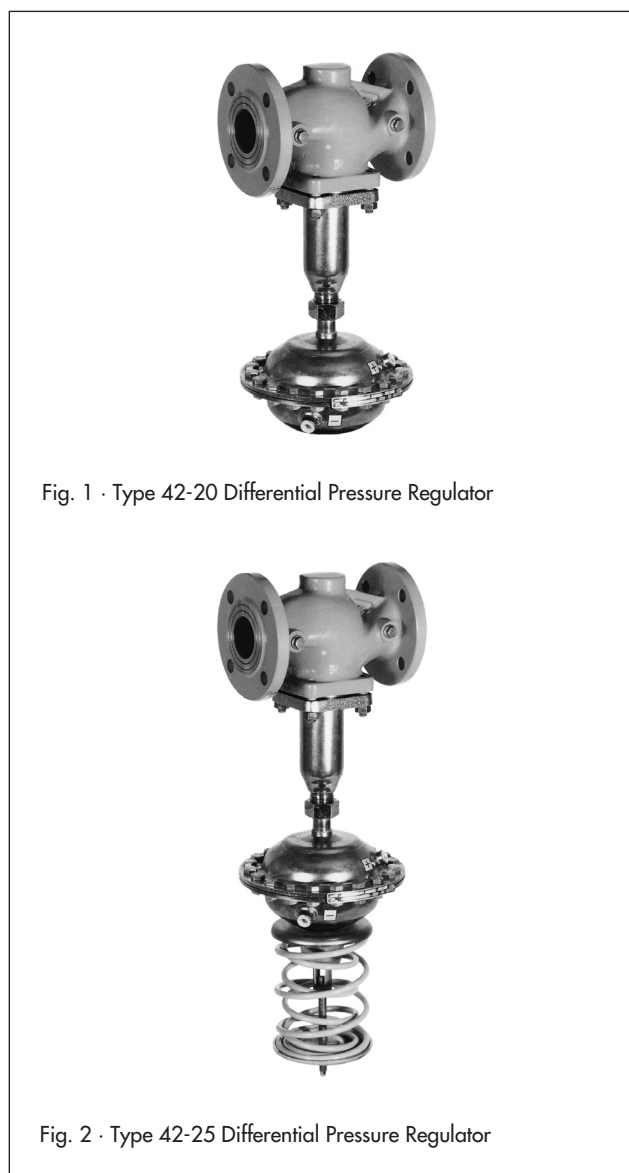


Fig. 1 · Type 42-20 Differential Pressure Regulator

Fig. 2 · Type 42-25 Differential Pressure Regulator

Accessories

Refer to the Data Sheet T 3095 EN for any required accessories, e.g. compression-type fittings, needle valves, equalizing tanks and control lines.

Principle of operation (Fig. 3)

The medium flows through the valve in the direction indicated by the arrow. The position of the valve plug (3) determines the differential pressure across the free area between the plug (3) and the seat (2).

The Type 2422 Valve is balanced. The forces acting on the valve plug created by the upstream and downstream pressures are balanced by a balancing bellows (5) or balancing diaphragm (5.1).

In valves balanced by a bellows, the upstream pressure p_1 acts on the outside of the bellows and the downstream pressure p_2 acts on the inside of the bellows (5). In valves balanced by a diaphragm, the upstream pressure p_1 acts on the top of the diaphragm and the downstream pressure p_2 acts on the bottom of the diaphragm (5.1). In this way, the forces acting on the valve plug created by the upstream and downstream pressures are balanced out.

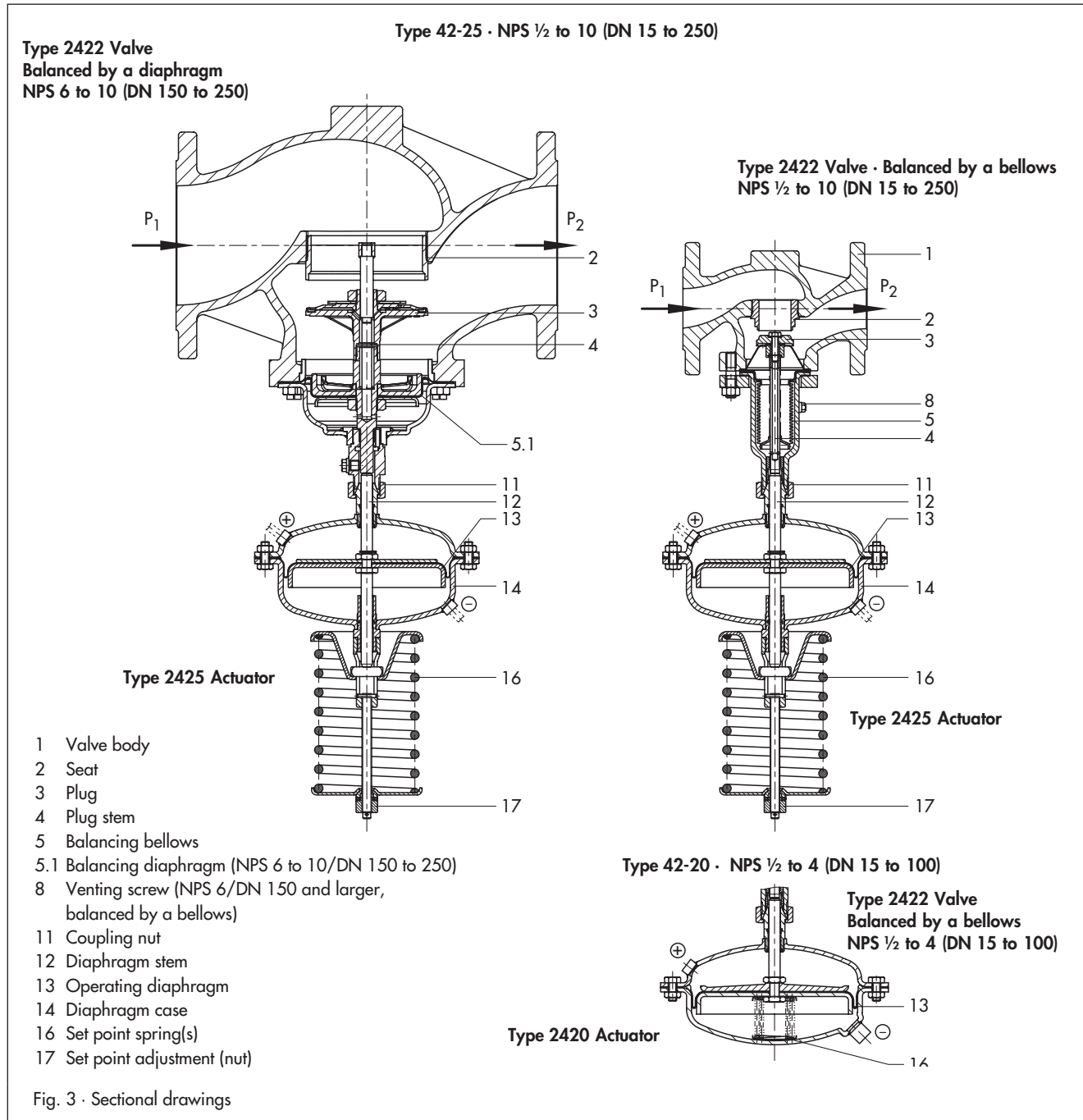
The differential pressure to be controlled is transmitted to the operating diaphragm (13) where it is converted into a positioning force. This force moves the plug (3) according to the force of the set point springs.

In **Type 42-25**, the set point can be adjusted at the set point adjustment (17).

In **Type 42-20**, the set point springs (16) in the actuator determine the set point.

The control lines in all versions transmit the low pressure and high pressure to the actuator.

SAMSON offers a special version of the Type 42-25 Regulator with an actuator with two diaphragms, which is especially suitable for applications with thin oils (e.g. heat transfer oil).



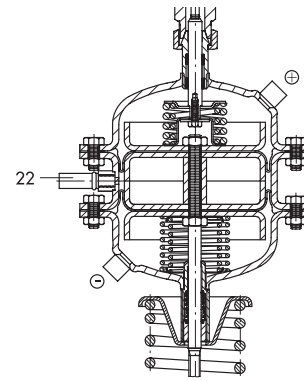
Type 42-25 Differential Pressure Regulator with an actuator with two diaphragms

The regulator with an actuator with two diaphragms provides increased functional safety.

The operating diaphragm for the high pressure is connected to the valve inlet pressure and the operating diaphragm for the low pressure is connected to the valve outlet pressure. A mechanical diaphragm rupture indicator (22) located in the intermediate ring between the two diaphragms responds at approx. 22 psi (1.5 bar). In the event of a diaphragm rupture, the pressure in the space between the two operating diaphragm starts to increase. This causes the pin in the diaphragm rupture indicator to be pushed outwards and a red ring appears, indicating the fault. The remaining operating diaphragm takes on the control task of the ruptured diaphragm.

An alarm can be triggered by attaching an optional pressure switch.

We recommend replacing both operating diaphragms when a rupture has been indicated.



Type 2425 Actuator with two diaphragms

22 Diaphragm rupture indicator

Fig. 4 · Type 2425 Actuator with two diaphragms

Table 1 · Technical data

Type	42-20		42-25			
Nominal size	NPS ½ to 4 · DN 15 to 100		NPS ½ to 10 · DN 15 to 250			
Pressure rating	Class 125, 150 and 300					
Max. permissible temperature	Valve body	See pressure-temperature diagram				
	Actuator ¹⁾	With equalizing tank: Steam and liquids up to 660 °F (350 °C) Without equalizing tank: Liquids up to 300 °F (150 °C) · Air and gases up to 175 °F (80 °C)				
Set point ranges	3 psi · 4 psi · 6 psi or 7 psi		0.75 to 3.5 psi · 1.5 to 8.5 psi · 3 to 15 psi 7 to 20 psi · 15 to 35 psi · 30 to 75 psi 65 to 145 psi			
	0.2 bar · 0.3 bar · 0.4 bar or 0.5 bar		0.05 to 0.25 bar · 0.1 to 0.6 bar · 0.2 to 1 bar 0.5 to 1.5 bar · 1 to 2.5 bar 2 to 5 bar · 4.5 to 10 bar			
Leakage rate	≤ 0.05 % of C _v (K _{vS})					
Diaphragm area A	25 in ² (160 cm ²)	50 in ² (320 cm ²)	12 in ² (80 cm ²)	25 in ² (160 cm ²)	50 in ² (320 cm ²)	100 in ² (640 cm ²)
Max. permissible operating pressure with actuator with two diaphragms	-		580 psi (40 bar)	580 psi (40 bar)	360 psi (25 bar)	360 psi (25 bar)

¹⁾ Higher temperatures available on request

Terms for valve sizing according to DIN EN 60534: F_L = 0.95; x_T = 0.75

Refer to the dimensional drawings in Fig. 7, 8 and 9 for assignment of valve and actuator

Table 2 · Materials · Material number acc. to ASTM and DIN EN

Type 2422 Valve · Balanced by a bellows			
Pressure rating	Class 125	Class 150/300	Class 150/300
Valve body	Cast iron A 126 B	Carbon steel A 216 WCC	Cast stainless steel A 351 CF8M
Seat and plug	1.4006 or 1.4104		1.4571/1.4404
Plug stem	Stainless steel 1.4301		
Metal bellows	Stainless steel 1.4571 · NPS 6 (DN 150) and larger: 1.4404		
Lower part of body	P265GH		1.4571
Body gasket	Graphite on metal core		
Type 2422 Valve · Balanced by a diaphragm			
Pressure rating	Class 125	Class 150/300	Class 150/300
Valve body	Cast iron A 126 B	Carbon steel A 216 WCC	Cast stainless steel A 351 CF8M
Valve seat	Red brass		
Plug	Standard version Red brass · With EPDM soft sealing, max. 300 °F (150 °C) or with PTFE soft sealing, max. 300 °F (150 °C)		
Pressure balancing	Balancing diaphragm case made of sheet steel DD11 · EPDM balancing diaphragm, max. 300 °F (150 °C) or NBR diaphragm, max. 140 °F (60 °C)		
Type 2420 and Type 2425 Actuator			
Diaphragm case	Sheet steel DD11		
Diaphragm	EPDM with fabric reinforcement ¹⁾		
Guide bushing	DU bushing		

¹⁾ Special version for oils (ASTM I, II, III): FPM (FKM)

Table 3 · Permissible C_V (K_{VS}) coefficients, z values and maximum permissible differential pressures
Type 2422 Valve balanced by a bellows

Nominal size	NPS	½	¾	1	1½	2	2½	3	4	6	8	10
	DN	15	20	25	40	50	65	80	100	150	200	250
Travel		0.4" (10 mm)					0.6" (16 mm)			0.9" (22 mm)		
C_V (K_{VS}) coefficient · Normal	C_V	5	7.5	9.4	23	37	60	94	145	330	490	590
	K_{VS}	4	6.3	8	20	32	50	80	125	280	420	500
Max. perm. differential pressure Δp		360 psi (25 bar)					290 psi (20 bar)		230 psi (16 bar)	175 psi (12 bar)	145 psi (10 bar)	
C_V (K_{VS}) coefficient · Reduced	C_V	–	–	5	9.4	20	32	50	60	145	330	
	K_{VS}	–	–	4	8	16	20	32	50	125	280	
Max. perm. differential pressure Δp		360 psi (25 bar)					290 psi (20 bar)		230 psi (16 bar)		175 psi (12 bar)	
z value		0.65	0.6	0.55	0.45	0.4		0.35			0.3	

Type 2422 Valve balanced by a diaphragm

Nominal size	NPS	6	8	10	
	DN	150	200	250	
C_V (K_{VS}) coefficient	0.9" travel (22 mm)	C_V	340	640	700
		K_{VS}	290	550	600
	1.4" travel (35 mm)	C_V	445	760	930
		K_{VS}	380	650	800
Max. perm. differential pressure Δp		175 psi (12 bar)	145 psi (10 bar)		
z value		0.35		0.3	

Installation

The valve and actuator are delivered in separate packaging. The actuator can be easily mounted before or after the valve is installed using a coupling nut.

The following points need to be observed:

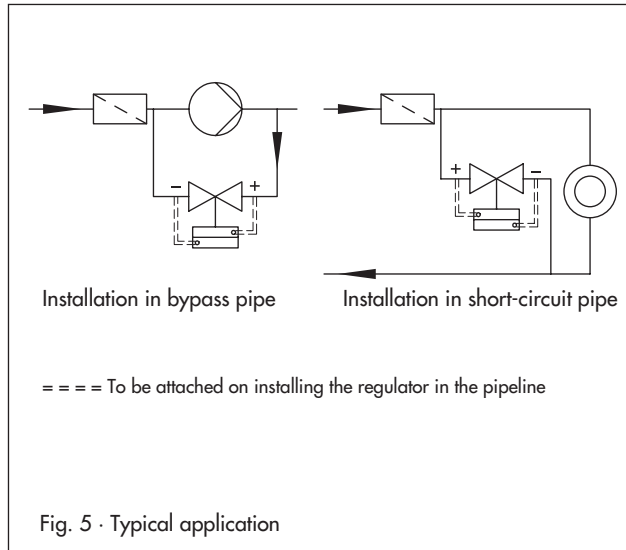
- Install valves in horizontal pipelines.
- The medium must flow through the valve in the direction indicated by the arrow on the valve body.
- Install a strainer upstream of the valve (e.g. SAMSON Type 2 NI).



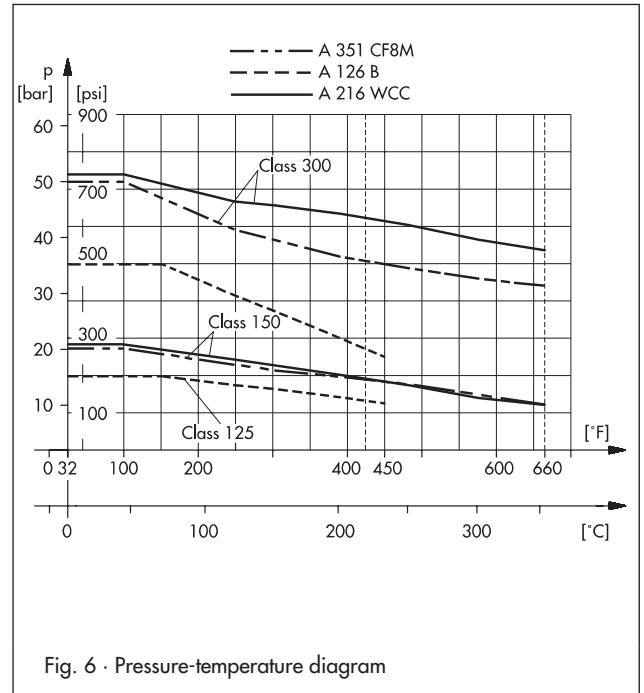
Permissible mounting positions

- Actuator suspended downwards (see photo): Standard installation for all versions above 175 °F (80 °C) and for applications with steam
 - Actuator upright: All versions in NPS ½ to 3 (DN 15 to 80) and max. 175 °F (80 °C)
 - Actuator sideways: Only versions with fixed plug guide
- Refer to **EB 3007 EN** for more details.

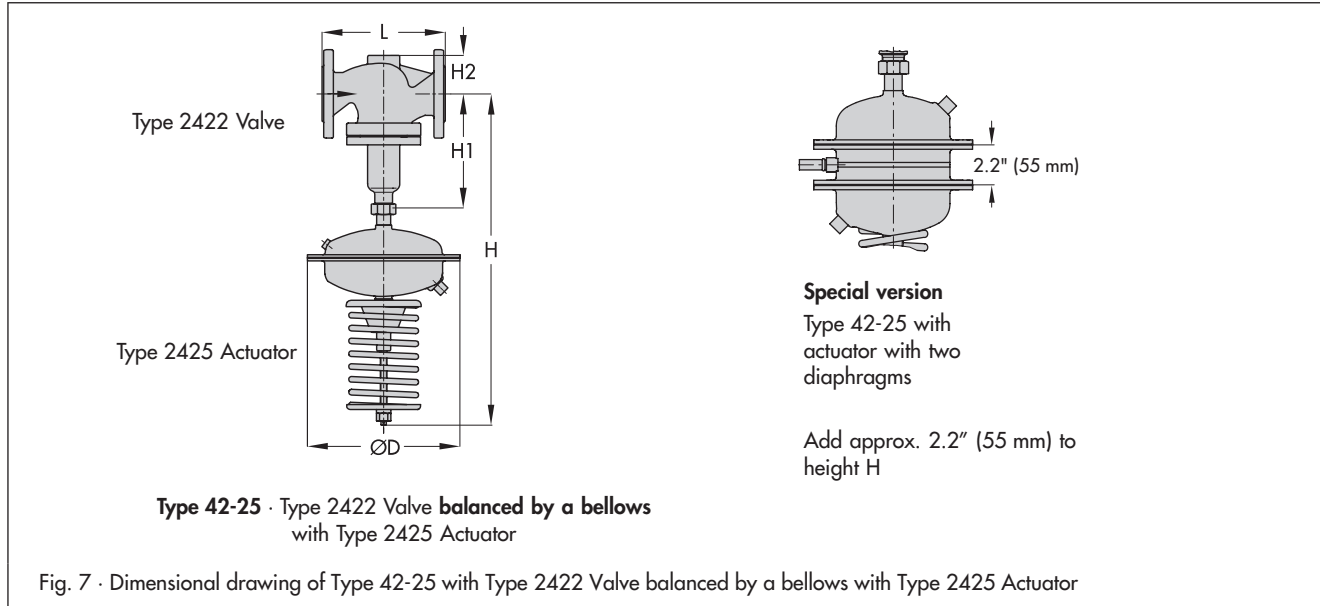
Typical application



Pressure-temperature diagram – ASTM materials –



Dimensional drawing of Type 42-25, balanced by a bellows – refer to Table 5 –



Dimensional drawing of Type 42-25, balanced by a diaphragm – refer to Table 4 –

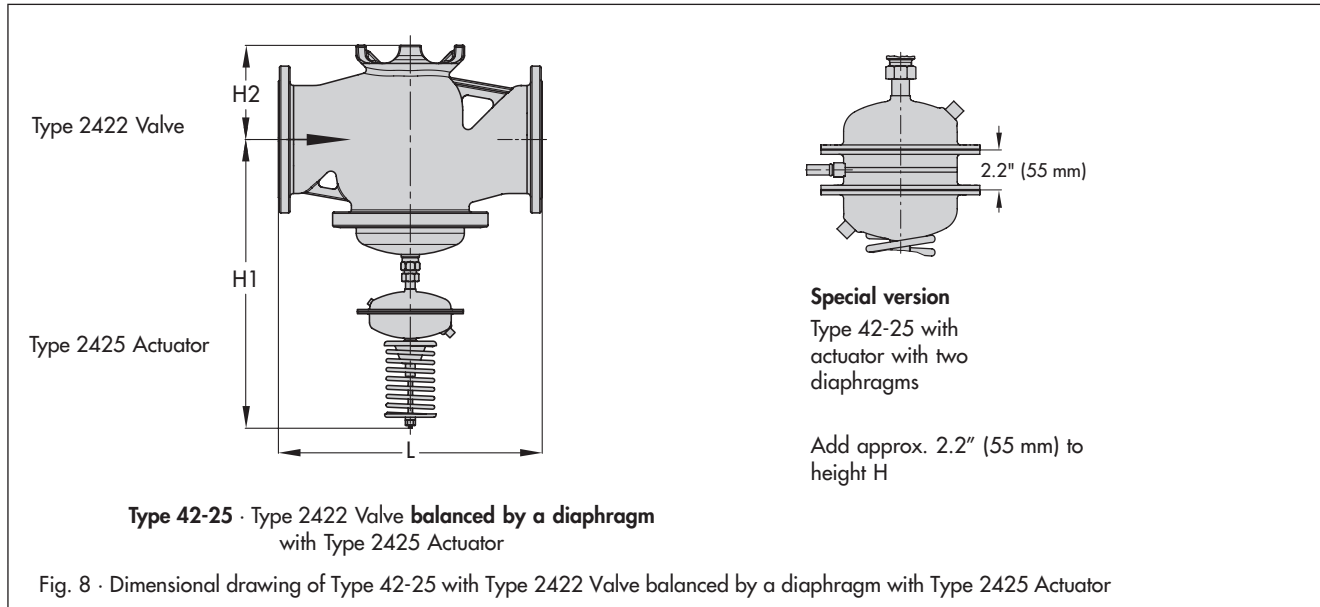


Table 4 · Dimensions and weights for Type 42-25, balanced by a diaphragm

Nominal size	NPS	6	8	10
	DN	150	200	250
Length L	Class 125/150	17.75" (451 mm)	21.4" (543 mm)	26.5" (673 mm)
	Class 300	18.6" (473 mm)	22.4" (568 mm)	27.9" (708 mm)
Height H1		29.3" (745 mm)	37.8" (960 mm)	
Height H2		6.9" (175 mm)	10.2" (260 mm)	
Weight ¹⁾ , approx.		209 lb (95 kg)	551 lb (250 kg)	

¹⁾ The weight applies to the version with material A126 B. Add 10 % for versions in other materials.

Type 42-25 with actuator with two diaphragms: Add approx. 2.2" (55 mm) to height H

Table 5 · Dimensions and weights for Type 42-25, balanced by a bellows

Nominal size		NPS	½	¾	1	1½	2	2½	3	4	6	8	10		
		DN	15	20	25	40	50	65	80	100	150	200	250		
Length L	Cl 125/ Cl 150	inch	7.25			8.75	10	10.9	11.75	13.9	17.75	21.4	26.5		
		mm	184			222	254	276	298	352	451	543	673		
	Cl 300	inch	7.5	7.6	7.75	9.25	10.5	11.5	12.5	14.5	18.6	22.4	27.9		
		mm	191	194	197	235	267	292	318	368	473	568	708		
Height H1	inch	8.9					11.8			14	23.2	28.7			
	mm	225					300			355	590	730			
Height H2	inch	1.8			2.8			3.9		4.5	6.9	10.2	10.2		
	mm	45			72			98		113	175	260	260		
Type 42-25 Differential Pressure Regulator															
Set points															
0.75 to 3.5 psi (0.05 to 0.25 bar)	Height H	24.6" (625 mm)					27.6" (700 mm)			29.7" (755 mm)	44.1" (1120 mm)	49.6" (1260 mm)			
	Actuator	∅ D = 11.2" (285 mm), A = 50 in ² (320 cm ²) ²⁾													
	Weight ¹⁾	lb	46	47	49.5	65	70.5	110.5	112.5	143	408	937	1069		
		kg	21	21.5	22.5	29.5	32	46	51	65	185	425	485		
1.5 to 8.5 psi (0.1 to 0.6 bar)	Height H	24.6" (625 mm)					27.6" (700 mm)			29.7" (755 mm)	44.1" (1120 mm)	49.6" (1260 mm)			
	Actuator	∅ D = 8.9" (225 mm), A = 25 in ² (160 cm ²) ³⁾					∅ D = 11.2" (285 mm), A = 50 in ² (320 cm ²)			∅ D = 15.4" (390 mm), A = 100 in ² (640 cm ²) ³⁾					
	Weight ¹⁾	lb	35.3	36.3	38.5	54	59.5	110.5	112.5	143	408	937	1069		
		kg	16	16.5	17.5	24.5	27	46	51	65	185	425	485		
3 to 15 psi (0.2 to 1 bar)	Height H	24.6" (625 mm)					27.6" (700 mm)			29.7" (755 mm)	44.1" (1120 mm)	49.6" (1260 mm)			
	Actuator	∅ D = 8.9" (225 mm), A = 25 in ² (160 cm ²) ³⁾													
	Weight ¹⁾	lb	35.3	36.3	38.5	54	59.5	92.6	103.6	134.5	408	937	1069		
		kg	16	16.5	17.5	24.5	27	42	47	61	185	425	485		
7 to 20 psi (0.5 to 1.5 bar)	Height H	24.6" (625 mm)					27.6" (700 mm)			29.7" (755 mm)	42.1" (1070 mm)	47.6" (1210 mm)			
	Actuator	∅ D = 8.9" (225 mm), A = 25 in ² (160 cm ²) ³⁾													
	Weight ¹⁾	lb	35.3	36.3	38.5	54	59.5	92.6	103.6	134.5	386	915	1047		
		kg	16	16.5	17.5	24.5	27	42	47	61	175	415	475		
15 to 35 psi (1 to 2.5 bar)	Height H	24.6" (625 mm)					27.6" (700 mm)			29.7" (755 mm)	42.1" (1070 mm)	47.6" (1210 mm)			
	Actuator	∅ D = 8.9" (225 mm), A = 25 in ² (160 cm ²)													
	Weight ¹⁾	lb	35.3	36.3	38.5	54	59.5	92.6	103.6	134.5	386	915	1047		
		kg	16	16.5	17.5	24.5	27	42	47	61	175	415	475		
30 to 75 psi (2 to 5 bar)	Height H	24.6" (625 mm)					27.6" (700 mm)			29.7" (755 mm)	42.1" (1070 mm)	47.6" (1210 mm)			
	Actuator	∅ D = 6.7" (170 mm), A = 12 in ² (80 cm ²)													
	Weight ¹⁾	lb	35.3	36.3	38.5	54	59.5	92.6	103.6	134.5	375	904	1036		
		kg	16	16.5	17.5	24.5	27	42	47	61	170	410	470		
65 to 145 psi (4.5 to 10 bar)	Height H	24.6" (625 mm)					27.6" (700 mm)			29.7" (755 mm)	On request				
	Actuator	∅ D = 6.7" (170 mm), A = 12 in ² (80 cm ²)													
	Weight ¹⁾	lb	35.3	36.3	38.5	54	59.5	92.6	103.6	134.5					
		kg	16	16.5	17.5	24.5	27	42	47	61					

¹⁾ The weight applies to the version with material A126 B. Add 10 % for versions in other materials. · ²⁾ Optionally with actuator A = 100 in² (640 cm²)

³⁾ Optionally with actuator A = 50 in² (320 cm²) · ⁴⁾ Optionally with actuator A = 25 in² (160 cm²)

Type 42-25 with actuator with two diaphragms: Add approx. 2.2" (55 mm) to height H.

Dimensional drawing of Type 42-20, balanced by a bellows – refer to Table 6 –

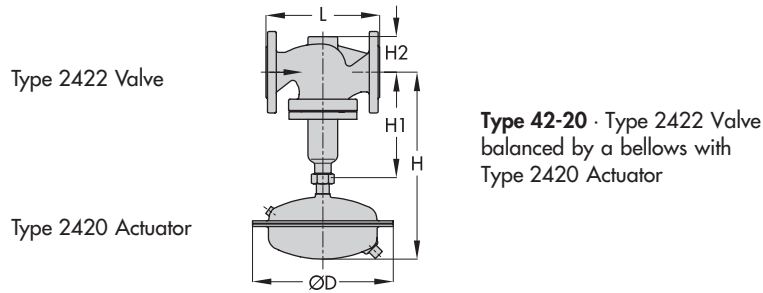


Fig. 9 · Dimensional drawing of Type 42-20

Table 6 · Dimensions and weights for Type 42-20, balanced by a bellows

Nominal size	NPS	½	¾	1	1½	2	2½	3	4	
	DN	15	20	25	40	50	65	80	100	
Baulänge L	Cl 125/ Cl 150	inch	7.25			8.75	10	10.9	11.75	13.9
		mm	184			222	254	276	298	352
	Cl 300	inch	7.5	7.6	7.75	9.25	10.5	11.5	12.5	14.5
		mm	191	194	197	235	267	292	318	368
Height H1		8.9" (225 mm)					11.8" (300 mm)		14" (355 mm)	
Height H2		1.8" (45 mm)			2.8 (72 mm)		3.9" (98 mm)		4.5" (113 mm)	
Height H		15.4" (390 mm)					18.3" (465 mm)		20.5" (520 mm)	
Actuator		Ø D = 8.9" (225 mm), A = 25 in ² (160 cm ²) ²⁾					Ø D = 11.2" (285 mm), A = 50 in ² (320 cm ²)			
Weight ¹⁾ , approx.	lb	25	26	29	44	50	84	85	126	
	kg	11.5	12	13	20	22.5	38	43	57	

1) The weight applies to the version with material A126 B. Add 10 % for versions in other materials.

2) Optionally with actuator A = 50 in² (320 cm²)

Ordering text

Differential Pressure Regulator **Type 42-20/42-25**

NPS ... (DN ...)

Body material ..., Class ...

Set point / set point range ... psi (bar)

On option, accessories ... (refer to T 3095 EN)

On option, special version ...

Specifications subject to change without notice.

