

Self-operated Regulators Series 42



Differential Pressure Regulator with Type 2424/Type 2428 Actuator and Type 2422 Valve Type 42-24 A · Type 42-24 B · Type 42-28 A · Type 42-28 B

ANSI version

Application

For differential pressure set points (Δp) from **0.75 to 145 psi (0.05 to 10 bar)** · Valves sizes **NPS ½ to 10**¹⁾ (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 **closes** when the differential pressure rises

Differential pressure regulators for district heating supply networks, large heating systems and industrial plants.

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
- Set point fixed (**Type 24-28 A/B**) or adjustable in wide ranges (**Type 24-24 A/B**)
- 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 available in cast iron A 126 B, carbon steel A 216 WCC and cast stainless steel A 351 CF8M.
- Single-seated valve with plug balanced by a stainless steel bellows or by a balancing diaphragm NPS 6 to 10 (DN 150 to 250)
- Especially suitable for district heating supply networks

Versions

Differential pressure regulators for installation in the return flow pipe (see Typical applications) · Flanged connections:

Type 42-24 A (Fig. 1) · Type 2422 Valve · Balanced by a bellows for NPS ½ to 10 (DN 15 to 250) · Balanced by a diaphragm for NPS 6 to 10 (DN 150 to 250) · Type 2424 Actuator with adjustable set point

Type 42-28 A (Fig. 2) · Type 2422 Valve · Balanced by a bellows for NPS ½ to 4 (DN 15 to 100) · Type 2428 Actuator with fixed set point, adjusted to $\Delta p = 3, 4, 6$ or 7 psi (0.2, 0.3, 0.4 or 0.5 bar)

Differential pressure regulators for installation in the flow pipe (see Typical applications) · Flanged connections:

Type 42-24 B · Type 2422 Valve · Balanced by a bellows for NPS ½ to 10 (DN 15 to 250) · Balanced by a diaphragm for NPS 6 to 10 (DN 150 to 250) · Distance piece and Type 2424 Actuator with adjustable set point

¹⁾ Valves in sizes larger than NPS 10 (DN 250) on request

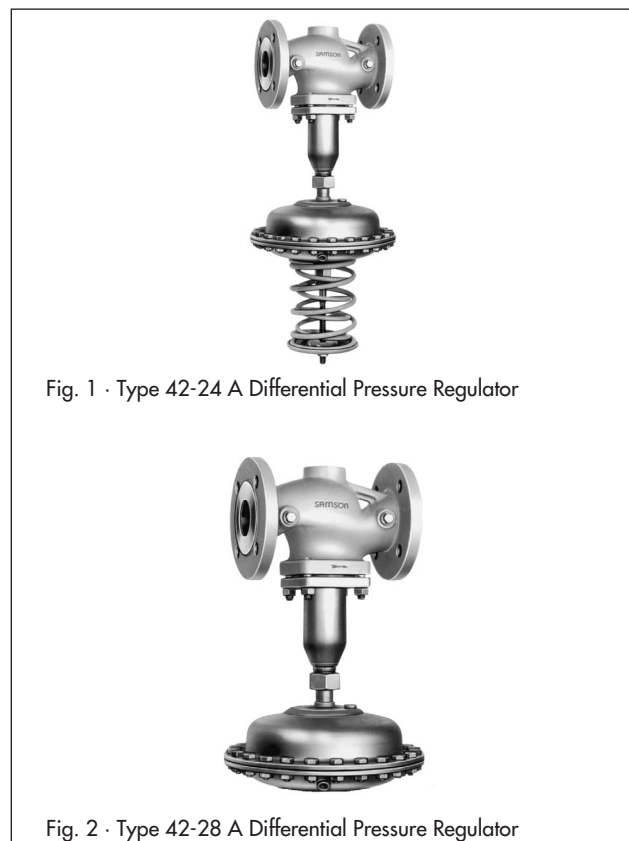


Fig. 1 · Type 42-24 A Differential Pressure Regulator

Fig. 2 · Type 42-28 A Differential Pressure Regulator

Type 42-28 B · Type 2422 Valve · Balanced by a bellows for NPS ½ to 4 (DN 15 to 100) · Distance piece and Type 2428 Actuator with fixed set point, adjusted to $\Delta p = 3, 4, 6$ or 7 psi (0.2, 0.3, 0.4 or 0.5 bar).

Special versions

JIS version available on request · Versions free of non-ferrous metal on request · Version with an actuator with two diaphragms · Version for temperatures above **430 °F (220 °C)** · Version for deionized water · Special version for oils

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 area released between the plug 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). The principle of operation of the regulators with valves balanced by a bellows or diaphragm only differ concerning the pressure balancing. The valves balanced by a diaphragm have a balancing diaphragm (5.1) instead of a bellows (5). The downstream pressure p_2 acts on the inside and the upstream pressure p_1 on the outside of the diaphragm. As a result, the forces acting on the valve plug are balanced out.

The differential pressure across the plant is transmitted to the operating diaphragm (13) where it is converted into a positioning force. This force moves the plug according to the force of the set point spring(s) (16).

The valve starts to close as soon as the differential pressure exceeds the set point.

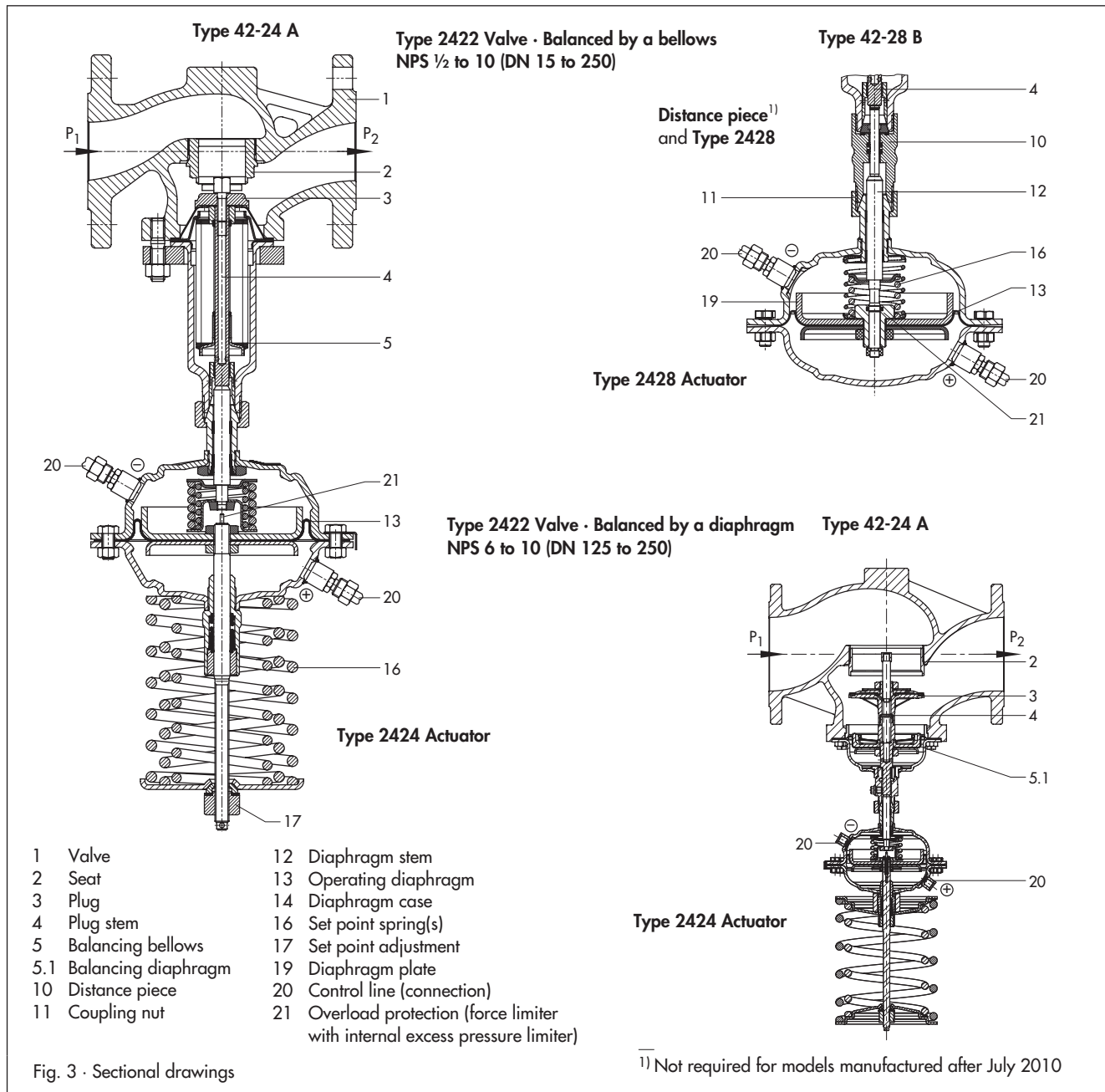
In Type 42-24 A and Type 42-24 B, the set point can be adjusted at the set point adjustment (17).

In Type 42-28 A and Type 42-28 B, the set point spring(s) (16) in the actuator determines the set point.

The Type 42-24 B and Type 42-28 B Regulators (manufactured before July 2010) are fitted with a distance piece (10), which ensures that the connection between the valve and actuator is sealed tightly and separates the pressure in the valve from the pressure in the actuator. The seal is integrated in the actuator in new versions without the distance piece.

All versions have control lines (20) to transfer the high pressure and low pressure. The control lines are mounted to the regulators at the site of installation.

Type 2424 and Type 2428 Actuators are equipped with an overload protection (21). It prevents a rise in differential pressure during extreme operating conditions (e.g. vacuum at the



heat exchanger) by opening an internal excess pressure limiter. As a result, plants and the regulator itself are protected against excessively high differential pressures.

Type 42-24 B Differential Pressure Regulator with an actuator with two diaphragms

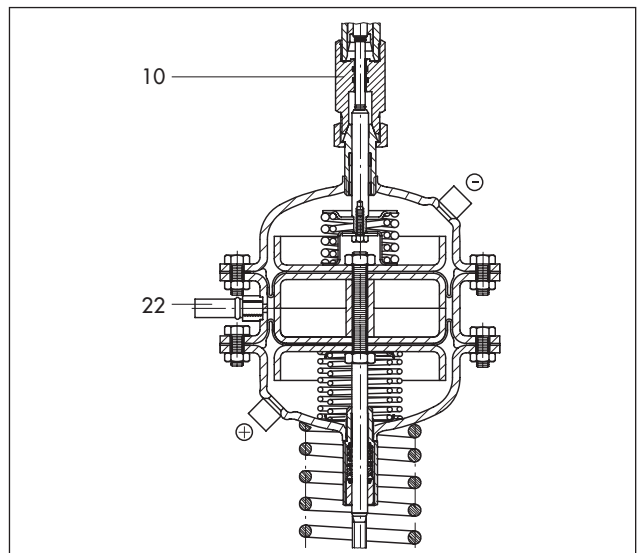
SAMSON offers a special version of Type 42-24 B Regulator with an actuator with two diaphragms, providing increased functional safety.

This actuator with two diaphragms is especially suitable for applications with thin oils (e.g. heat transfer oil).

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 hole located in the intermediate ring between the two diaphragms is fitted with a mechanical diaphragm rupture indicator (22), which responds at approx. 22 (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 42-24 B with actuator with two diaphragms
 10 Distance piece (for regulators manufactured before July 2010)
 22 Diaphragm rupture indicator

Fig. 4 · Type 42-24 B with two diaphragms (special version)

Installation

The valve and actuator are delivered in separate packaging.

The actuator can be easily mounted before or after the valve is installed. A coupling nut is used for attachment.



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, all versions, above 175 °F (80 °C) and for applications with steam
- Actuator upright: All versions 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 3003 EN** for more details.

Typical applications

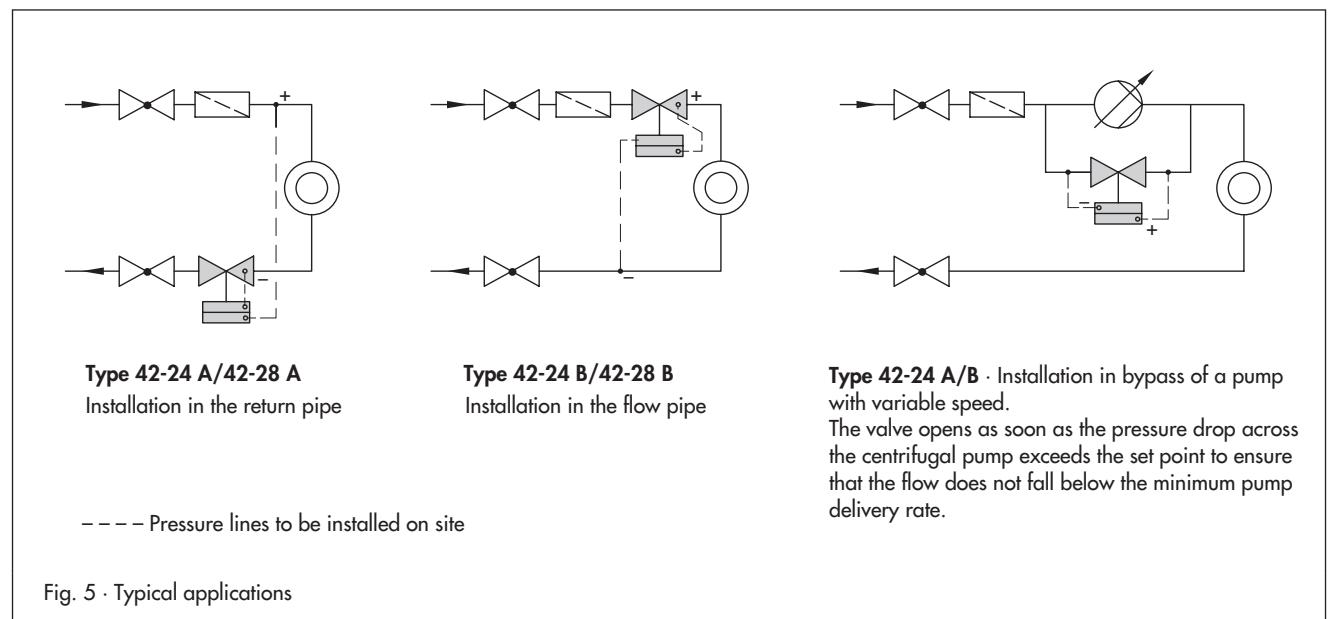


Fig. 5 · Typical applications

Table 1 · Technical data

Type		42-24 A · 42-24 B				42-28 A · 42-28 B	
Nominal size		NPS ½ to 10 · DN 15 to 250				NPS ½ to 4 · DN 15 to 100	
Pressure rating		Class 125, 150 and 300					
Max. permissible temperature	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	psi	0.7 to 3.6 · 1.5 to 9 · 3 to 14.5 · 7.5 to 22 14.5 to 36 · 29 to 72 · 65 to 145 ²⁾				3, 4, 6 or 7	
	bar	0.05 to 0.25 · 0.1 to 0.6 · 0.2 to 1 · 0.5 to 1.5 · 1 to 2.5 · 2 to 5 · 4.5 to 10 ²⁾				0.2 · 0.3 · 0.4 or 0.5	
Diaphragm area A		12 in ² (80 cm ²)	25 in ² (160 cm ²)	50 in ² (320 cm ²)	100 in ² (640 cm ²)	100 in ² (160 cm ²)	50 in ² (320 cm ²)
Pressure above adjusted set point at which internal excess pressure limiter responds		35 psi (2.4 bar)	17.5 psi (1.2 bar)	9 psi (0.6 bar)	4 psi (0.3 bar)	9 psi (0.6 bar)	4 psi (0.3 bar)
Max. permissible operating pressure for actuator with two diaphragms		580 psi (40 bar)	580 psi (40 bar)	360 psi (25 bar)	360 psi (25 bar)	-	
Leakage rate		≤ 0.05 % of C _v (K _{vS})					

¹⁾ Higher temperatures on request · ²⁾ NPS 6 to 10 (DN 150 to 250): 65 to 145 psi (4.5 to 10 bar) on request

Terms for valve sizing according to DIN EN 60534, Parts 2-1 and 2-2: $F_L = 0.95$; $x_T = 0.75$

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 A126B	Carbon steel A216 WCC	Cast stainless steel A 351 CF8M ¹⁾
Valve seat		CrNi steel		CrNiMo steel
Plug	Up to NPS 4 (DN 100)	CrNi steel		CrNiMo steel
	NPS 6 to 10 (DN 150 to 250)	1.4301, plug with PTFE seal		1.4571
Plug stem		1.4301		
Metal bellows		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 A126B	Carbon steel A216 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 cases made of sheet steel DD11 · EPDM balancing diaphragm, max. 300 °F (150 °C) or NBR diaphragm, max. 175 °F (80 °C)		
Type 2424 and Type 2428 Actuator				
Diaphragm cases		DD 11	1.4301	
Diaphragm		EPDM ²⁾ with fabric reinforcement		
Guide bushing		DU bushing	PTFE	
Distance piece				
Body		Brass CW617N, special version 1.4301	Stainless steel 1.4301	
Coupling pin		Stainless steel		
Seals		EPDM ²⁾		

¹⁾ NPS 3 to 6 (DN 80 to 150) only · ²⁾ Special version for oils: FPM (FKM)

Table 3 · Permissible Cv (KvS) coefficients, z values and maximum permissible differential pressures

Type 2422 Valve balanced by a bellows

Nominal size	NPS	1/2	3/4	1	1 1/2	2	2 1/2	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)		
Cv (KvS) coefficient · normal	Cv	5	7.5	9.4	23	37	60	94	145	330	490	590
	KvS	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)	
Cv (KvS) coefficient · reduced	Cv	–	–	5	9.4	20	32	50	60	145	330	
	KvS	–	–	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		
Cv (KvS) coefficient	0.9" travel (22 mm)	Cv	340		640		700	
		KvS	290		550		600	
	1.4" travel (35 mm)	Cv	445		760		930	
		KvS	380		650		800	
Max. perm. differential pressure Δp	175 psi (12 bar)				145 psi (10 bar)			
z value	0.35				0.3			

Pressure-temperature diagram – ASTM materials –

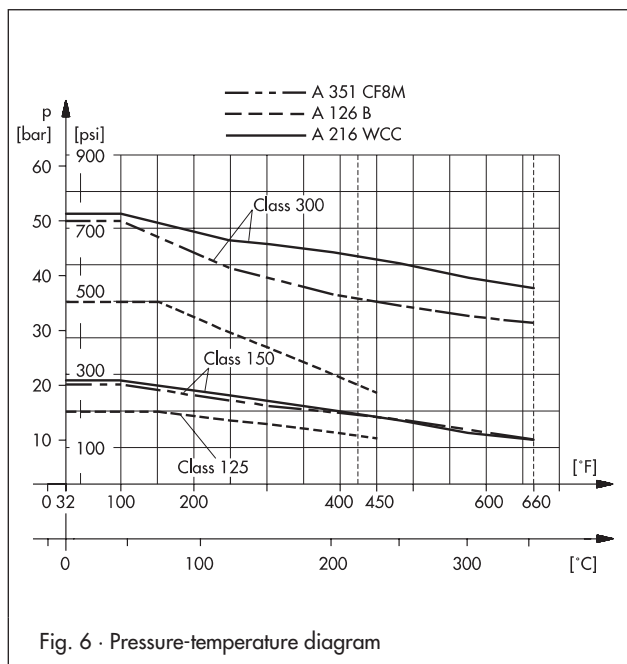
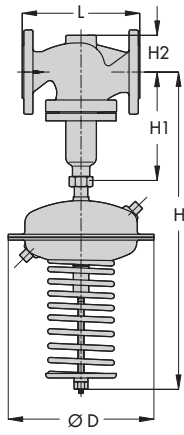
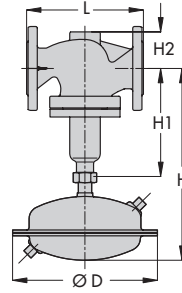


Fig. 6 · Pressure-temperature diagram

Dimensional drawings of Type 42-24 A/Type 42-28 A · Type 42-24 B/Type 42-28 B balanced by a bellows



Type 24-24 A
Type 2422 Valve
balanced by a bellows with
Type 2424 Actuator

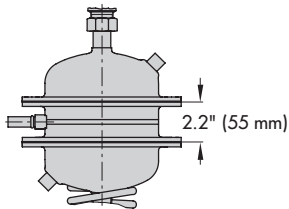


Type 24-28 A
Type 2422 Valve
balanced by a bellows with
Type 2428 Actuator

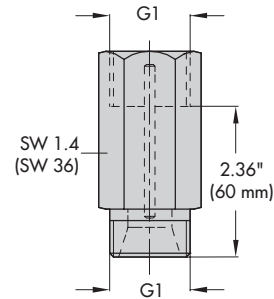
Type 42-24 B/42-28 B: The regulators are identical in construction to the versions shown, except for the distance piece.
Due to the distance piece installed between the bellows section and the actuator, add 2.2" (55 mm) to **H** and **H1**.
The distance piece is no longer required for regulators manufactured after July 2010.

Fig. 7 · Dimensions of Type 42-24 A/Type 42-28 A, Type 2422 Valve balanced by a bellows

Dimensional diagrams · Actuator with two diaphragms, distance piece



Type 42-24 B with actuator
with two diaphragms
Add approx. 2.2" (55 mm) to
total height H



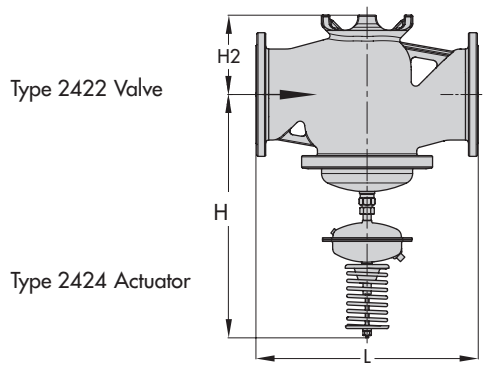
Distance piece for **Type 42-24 B**
and **Type 42-28 B**
(weight approx. 0.2 kg).
Add approx. 2.2" (55 mm) to **H1**
and **H** to these versions.
The distance piece is no longer
required for regulators
manufactured after July 2010.

Fig. 8 · Dimensions of actuator with two diaphragms and distance piece

Table 4 · Dimensions and weights

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	Class 125/150	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
	Class 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	2.2			2.8		3.9		4.7	6.9	9.3	10.2	
	mm	55			72		100		120	175	235	260	
Type 42-28 A/42-28 B Differential Pressure Regulator													
Set points		Type 2428 Actuator											
3, 4, 6, 7 psi (0.2 · 0.3 · 0.4 0.5 bar)	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 ⁶⁾	lb	25	27	29	44	50	84	95	126			
		kg	11.5	12	13	20	22.5	38	43	57			
Type 42-24 A/42-24 B Differential Pressure Regulator													
Set points		Type 2424 Actuator											
0.75 to 3.5 psi (0.05 to 0.25 bar)	Height H	24" (610 mm)					30" (685 mm)			29.1" (740 mm)	44" (1120 mm)	49.6" (1260 mm)	
	Actuator	Ø D = 11.2" (285 mm), A = 50 in ² (320 cm ²) ¹⁾					Ø D = 15.4" (390 mm) · A = 100 in ² (640 cm ²)						
	Weight ⁶⁾	lb	46	47	50	65	71	111	113	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" (610 mm)					30" (685 mm)			29.1" (740 mm)	44" (1120 mm)	49.6" (1260 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) ²⁾			Ø D = 15.4" (390 mm), A = 100 in ² (640 cm ²)			
	Weight ⁶⁾	lb	35.3	36.3	38.5	54	60	111	113	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" (610 mm)					30" (685 mm)			29.1" (740 mm)	44" (1120 mm)	49.6" (1260 mm)	
	Actuator	Ø D = 8.9" (225 mm) · A = 25 in ² (160 cm ²) ²⁾								Actuator ⁴⁾			
	Weight ⁶⁾	lb	35	36	39	54	60	93	104	135	408	937	1069
		kg	16	16.5	17.5	24.5	27	42	47	61	185	425	485
7.5 to 20 psi (0.5 to 1.5 bar)	Height H	24" (610 mm)					30" (685 mm)			29.1" (740 mm)	40.9" (1040 mm)	46.5" (1180 mm)	
	Actuator	Ø D = 8.9" (225 mm) · A = 25 in ² (160 cm ²) ²⁾								Actuator ²⁾			
	Weight ⁶⁾	lb	35	36	39	54	60	93	104	135	386	915	1047
		kg	16	16.5	17.5	24.5	27	42	47	61	175	415	475
15 to 36 psi (1 to 2.5 bar)	Height H	24" (610 mm)					30" (685 mm)			29.1" (740 mm)	40.9" (1040 mm)	47.6" (1210 mm)	
	Actuator	Ø D = 8.9" (225 mm) · A = 25 in ² (160 cm ²)											
	Weight ⁶⁾	lb	35	36	38	54	59	93	104	135	386	915	1047
		kg	16	16.5	17.5	24.5	27	42	47	61	175	415	475
30 to 75, 65 to 145 psi (2 to 5, 4.5 to 10 bar)	Height H	24" (610 mm)					30" (685 mm)			29.1" (740 mm)	40.9" (1040 mm)	46.5" (1180 mm)	
	Actuator	Ø D = 6.7" (170 mm) · A = 12 in ² (80 cm ²)								Actuator ⁵⁾			
	Weight ⁶⁾	lb	35	36	39	54	60	93	104	135	375	904	1036
		kg	16	16.5	17.5	24.5	27	42	47	61	170	410	470

¹⁾ Optionally with actuator 100 in² (640 cm²) · ²⁾ Optionally with actuator 50 in² (320 cm²) · ³⁾ For set point range 65 to 145 psi (4.5 to 10 bar): A = 12 in² (80 cm²) · ⁴⁾ Ø D = 15.4" (390 mm), A = 100 in² (640 cm²) · ⁵⁾ Ø D = 8.9" (225 mm), A = 25 in² (160 cm²), for set point range 65 to 145 psi: A = 12 in² (80 cm²) · ⁶⁾ Weight applies to the version with material specification A 126 B. Add 10 % for other materials.



Type 42-24 A · Type 42-24 B
Type 2422 Valve
balanced by a diaphragm
with Type 2424 Actuator

Type 42-24 B:

The regulators are identical in construction to the version shown, except for the distance piece.

Due to the distance piece installed between the diaphragm section and the actuator, add 2.2" (55 mm) to H.

The distance piece is no longer required for regulators manufactured after July 2010.

Fig. 9 · Dimensions of Type 42-24 A/B, Type 2422 Valve balanced by a diaphragm

Table 5 · Dimensions and weights for Type 42-24 A/B 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 H2		6.9" (175 mm)	10.2" (260 mm)	
Height H · Type 42-24 A		29.3" (745 mm)	37.8" (960 mm)	
Height H · Type 42-24 B		31.5" (800 mm)	40" (1015 mm)	
Weight ¹⁾ , approx.		209 lb (95 kg)	551 lb (250 kg)	

¹⁾ Weight applies to the version with material specification A 126 B. Add 10 % for other materials.

Ordering text

Differential Pressure Regulator **Type 42-24 A/Type 42-24 B/Type 42-28 A/Type 42-28 B**

NPS ... (DN ...), valve balanced by a bellows/diaphragm

Class ..., body material ...

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

On option, accessories ...

On option, special version

Specifications subject to change without notice

