

Series 42 Self-operated Pressure Regulators

Differential Pressure Regulators with Type 2424/Type 2428 Actuator (closing)

and balanced Type 2422 Valve



Type 42-24 · Type 42-28

ANSI version

Application

Differential pressure set points Δp from **0.75 to 145 psi** (0.05 to 10 bar) · Valves **NPS ½ to 10¹⁾** (DN 15 to 250) · Pressure rating **Class 125 to 300** · Suitable for **liquids and vapors²⁾** from **40 to 660 °F** (5 to 350 °C), for **air and non-flammable gases** up to **175 °F** (80 °C)

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



Differential pressure regulators for district heating systems, extended heating systems and industrial applications

The regulators control the differential pressure according to the adjusted set point.

Special features

- Low-noise, medium-controlled proportional regulator requiring little maintenance
- **Type 42-24**: Set point adjustable in wide range
Type 42-28: Fixed set point
- Single-seated valve with a plug balanced by a stainless steel bellows or a diaphragm NPS 2½ to 10 (DN 65 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 made of cast iron A126B, cast steel A216 WCC or cast stainless steel A351 CF8M
- Particularly suitable for district heating supply networks

Versions

Differential pressure regulators for installation in the flow pipe and return flow pipe (see Application) · Flanged connections

Type 42-24 (Fig. 1) · Type 2422 Valve · Balanced by a bellows NPS ½ to 10 (DN 15 to 250) · Balanced by a diaphragm NPS 2½ to 10 (DN 65 to 250) · Type 2424 Actuator · Adjustable set point

Type 42-28 (Fig. 2) · Type 2422 Valve · Balanced by a bellows NPS ½ to 4 (DN 15 to 100) · Balanced by a diaphragm NPS 2½ to 4 (DN 65 to 100) · Type 2428 Actuator · Fixed set point, adjusted to $\Delta p = 3, 4, 6$ or 7 psi (0.2, 0.3, 0.4 or 0.5 bar)

Accessories

Required accessories, such as compression-type fittings, needle valves, equalizing tanks and control lines, are listed in Data Sheet ▶ T 3095.

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

²⁾ Version balanced by a bellows only

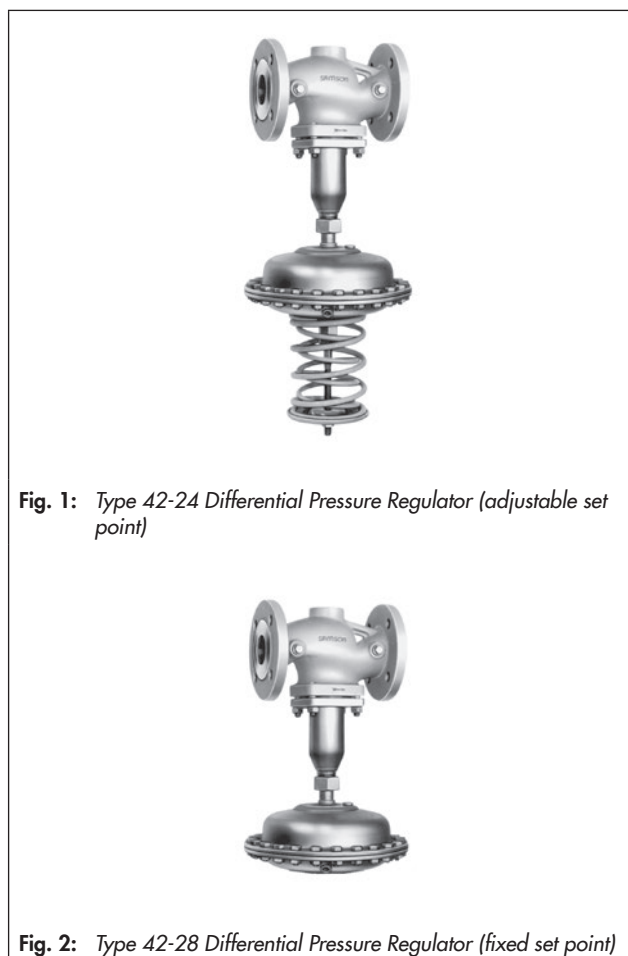


Fig. 1: Type 42-24 Differential Pressure Regulator (adjustable set point)

Fig. 2: Type 42-28 Differential Pressure Regulator (fixed set point)

Special versions

Actuator with two diaphragms (Type 42-24) · Version with FKM diaphragm, e.g. for mineral oil · Special reduced C_v (K_{VS}) coefficient · Valve in corrosion-resistant version (min. material grade 1.4301) · Valves larger than NPS 10 (DN 250) · Version for temperatures above 430 °F (220 °C) · Version for deionized water · Version free of non-ferrous metal · Version for small flow rates · Valve with micro trim with C_v 0.0012 to 0.05 (K_{VS} 0.001 to 0.04) or C_v 0.12, 0.5 and 1.2 (K_{VS} 0.1, 0.4 and 1) without pressure balancing · NPT thread connections for NPS ½ to 2 (Class 250)

Principle of operation (see 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 over the cross-sectional area released between the plug (3) and 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 metal bellows (5), while the downstream pressure p_2 acts on the inside of the bellows.

In a valve balanced by a diaphragm, the downstream pressure p_2 acts on the inside and the upstream pressure p_1 on the outside of the balancing diaphragm (5.1). In both cases, the forces created by the upstream and downstream pressures acting on the valve plug are balanced out.

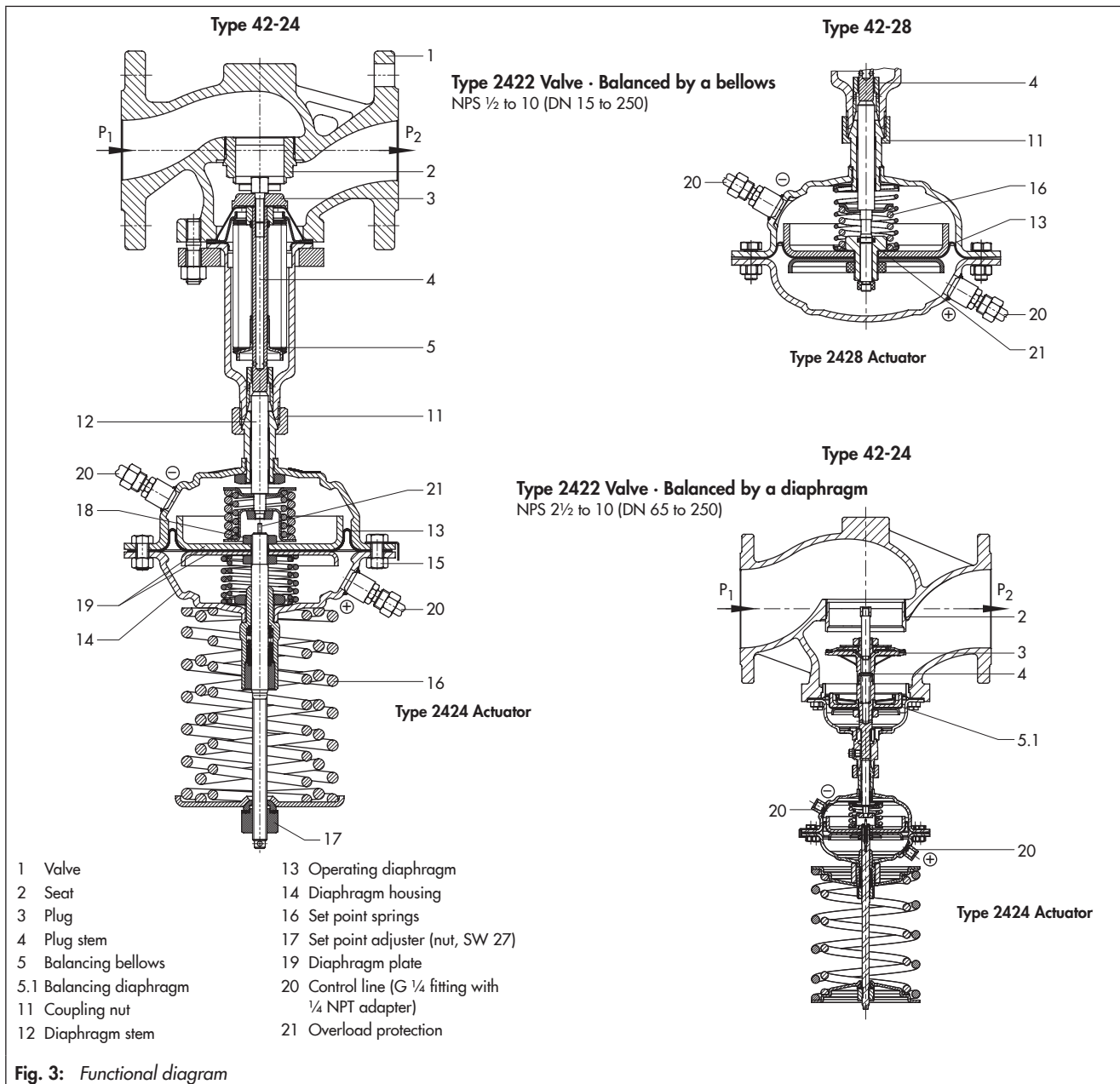
The differential pressure to be controlled is transferred to the operating diaphragm (13) where it is transformed into a positioning force. This force is used to move the plug (3) according to the force of the set point springs (16).

In Type 42-24, the set point can be adjusted at the set point adjuster (17).

In Type 42-28, the set point springs (16) in the actuator determines the set point.

All versions have control lines (20) to transfer the high pressure and low pressure to the actuator.

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 Differential Pressure Regulator with two diaphragms

SAMSON offers a special version of Type 42-24 with an actuator with two diaphragms. The actuator with two diaphragms provides increased functional reliability.

An actuator with two diaphragms is always required when an FKM diaphragm. It is especially suitable for applications with thin oils (e.g. heat transfer oil).

The two diaphragms separate both diaphragm chambers connected to the high-pressure and low-pressure connections. They generate a positioning force from the differential pressure. A mechanical diaphragm rupture indicator (22) is located between the two diaphragms, which 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 diaphragm rupture. The intact operating diaphragm takes on the control task of the ruptured diaphragm.

A pressure switch can be optionally mounted to the actuator to trigger an alarm.

If a diaphragm rupture is indicated, we recommend replacing both diaphragms.

Installing the valve and mounting the actuator

Valve and actuator are delivered unattached.

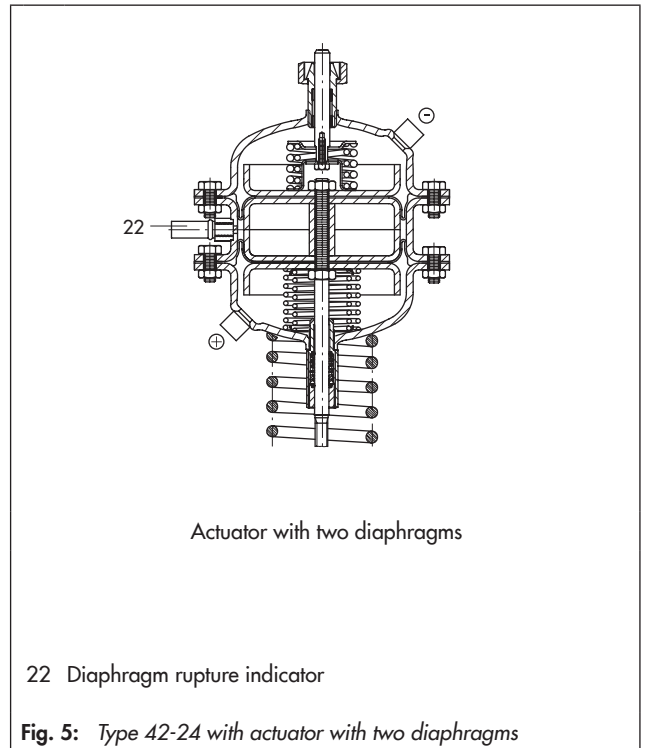
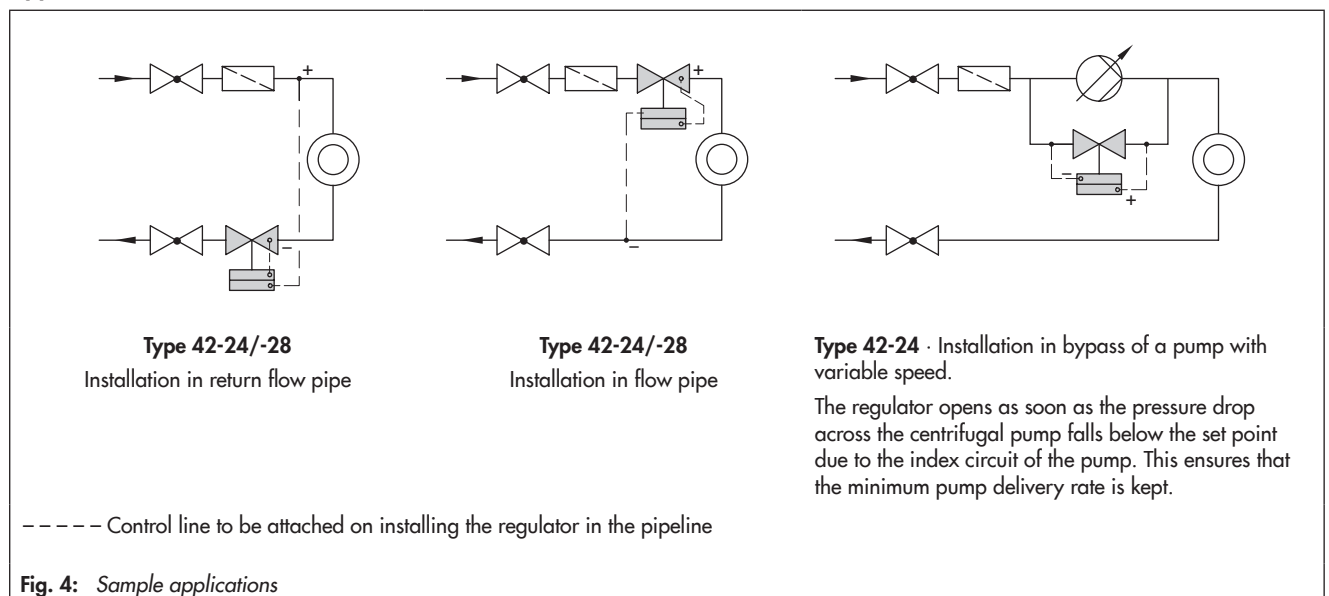
A coupling nut is used to attach the actuator to the valve. The actuator is to be mounted preferably after the valve is installed in the pipeline.



The following points must be observed:

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

Application



Permissible mounting positions

- Actuator suspended (see photo): standard installation, all versions, above 175 °F (80 °C) and for applications with steam
 - Actuator upright (actuator on top of the valve): all versions NPS ½ to 3 (DN 15 to 80) and max. 175 °F (80 °C)
 - Actuator sideways: versions with fixed plug guide only
- Refer to ► EB 3003 for details.

Table 1: Technical data

Type	42-24				42-28	
Valve 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	Valve	See pressure-temperature diagram in ► T 3000				
	Actuator ¹⁾	With compensation chamber: Steam and liquids up to 660 °F (350 °C) ²⁾ Without compensation chamber: Liquids up to 300 °F (150 °C) · Air and gases up to 175 °F (80 °C)				
Set point ranges	psi	0.75 to 3.5 · 1.5 to 8.5 · 3 to 14.5 · 7 to 20 · 14.5 to 35 · 30 to 75 · 65 to 145 ³⁾			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 ³⁾			0.2 · 0.3 · 0.4 or 0.5	
Actuator 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)	25 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. perm. operating pressure for actuator with two diaphragms	580 psi (40 bar)	580 psi (40 bar)	360 psi (25 bar)	360 psi (25 bar)	-	
Compliance	CE · ENEC					
Leakage class according to ANSI/FCI 70-2	≤0.05 % of C _v (K _{vS}) coefficient					

¹⁾ Higher temperatures on request

²⁾ Steam version only with valves balanced by a bellows

³⁾ NPS 6 to 10 (DN 150 to 250): 65 to 145 psi (4.5 to 10 bar) on request

Table 2: Materials · Material numbers according to ASTM and DIN EN
Table 2.1: Materials · Type 2422 Valve

Type 2422 Valve, balanced by a bellows			
Valve size	NPS ½ to 10 · DN 15 to 250		
Pressure rating	Class 125	Class 150/300	Class 150/300
Valve body	Cast iron A126B	Cast steel A216 WCC	Cast stainless steel A351 CF8M
Valve seat	Stainless steel 1.4104 or 1.4006		1.4404
Plug	Up to NPS 4 (DN 100)	Stainless steel 1.4104, 1.4112 or 1.4006 ¹⁾	
	NPS 6 to 10 (DN 150 to 250)	1.4404, with PTFE soft seal	
Plug stem	1.4301		
Metal bellows	1.4571 · NPS 6 (DN 150) and larger: 1.4404		
Bottom section	P265GH		1.4571
Body gasket	Graphite on metal core		
Type 2422 Valve, balanced by a diaphragm			
Valve size	NPS 2½ to 4 · DN 65 to 100		
Pressure rating	Class 125	Class 150	
Valve body	Cast iron A126B	Cast steel A216 WCC	
Valve seat	1.4408		
Plug	CW617N		
Pressure balancing	Diaphragm plate EN-JS1030 · EPDM balancing diaphragm, max. 300 °F (150 °C) or NBR diaphragm, max. 175 °F (80 °C)		
Valve size	NPS 6 to 10 · DN 150 to 250		
Pressure rating	Class 125	Class 150/300	Class 150/300
Valve body	Cast iron A126B	Cast steel A216 WCC	Cast stainless steel A351 CF8M
Valve seat	CC499K ²⁾		
Plug	CC499K ²⁾ · With EPDM soft seal, max. 300 °F (150 °C) or with PTFE soft seal, max. 300 °F (150 °C)		
Pressure balancing	Diaphragm plate EN-JS1030 · EPDM balancing diaphragm, max. 300 °F (150 °C) or NBR diaphragm, max. 175 °F (80 °C)		

¹⁾ Optionally with soft seal with standard C_v (K_{vS}) coefficients

²⁾ Special version 1.4409

Table 2.2: Materials · Type 2424/Type 2428 Actuator

Type 2424/Type 2428 Actuator			
Valve body	Cast iron A126B	Cast steel A216 WCC	Cast stainless steel A351 CF8M
Diaphragm cases	DD 11		1.4301
Diaphragm	EPDM ¹⁾ with fabric reinforcement		
Guide bushing	DU bushing		PTFE
Seals	EPDM/PTFE ¹⁾		

¹⁾ Special version, e.g. for mineral oils: FKM

Table 3: C_V (K_{VS}) coefficients, x_{FZ} values, and max. permissible differential pressures

Type 2422 Valve, balanced by a bellows												
Valve size	NPS	½ ¹⁾	¾ ¹⁾	1 ¹⁾	1½	2	2½	3	4	6	8	10
	DN	15	20	25	40	50	65	80	100	150	200	250
Valve travel	0.4" (10 mm)						0.6" (16 mm)			0.9" (22 mm)		
Standard C_V (K_{VS}) coefficient	$\frac{C_V}{K_{VS}}$	5	7.5	9.4	23	37	60	94	145	330	490	590
		4	6.3	8	20	32	50	80	125	280	420	500
Max. permissible differential pressure Δp	360 psi (25 bar)						290 psi (20 bar)		230 psi (16 bar)	175 psi (12 bar)	145 psi (10 bar)	
Reduced C_V (K_{VS}) coefficient	$\frac{C_V}{K_{VS}}$	–	–	5	9.4	20	37		94	145	330	
		–	–	4	8	16	32		80	125	280	
Max. permissible differential pressure Δp	360 psi (25 bar)								290 psi (20 bar)	230 psi (16 bar)	175 psi (12 bar)	
x_{FZ} value	0.65	0.6	0.55	0.45	0.4			0.35			0.3	

¹⁾ Special valve version with micro-trim: C_V 0.0012 to 0.05 (K_{VS} 0.001 to 0.04) or C_V 0.12, 0.5 and 1,2 (K_{VS} 0.1, 0.4 and 1) without pressure balancing

Type 2422 Valve, balanced by a diaphragm							
Valve size	NPS	2½	3	4	6	8	10
	DN	65	80	100	150	200	250
Valve travel	0.6" (15 mm)				1.4" (35 mm)		
C_V (K_{VS}) coefficient	$\frac{C_V}{K_{VS}}$	60	95	150	445	760	930
		50	80	125	380	650	800
Max. permissible differential pressure Δp	145 psi (10 bar)				175 psi (12 bar)		145 psi (10 bar)
x_{FZ} value	0.4	0.35			0.3		

Dimensions

Dimensional drawing · Type 42-24 and Type 42-28 balanced by a bellows · See Table 4



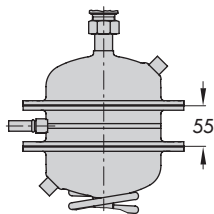
Type 42-24 · Type 2422 Valve balanced by a bellows
with Type 2424 Actuator

Type 42-28 · Type 2422 Valve balanced by a bellows
with Type 2428 Actuator

Type 2422 Valve, balanced by a bellows

Fig. 6: Dimensions · Valve balanced by a bellows

Dimensional drawing of actuator with two diaphragms



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

Fig. 7: Dimensions · Actuator with two diaphragms

Table 4: Dimensions and weights for Type 42-24 and Type 42-28 · Balanced by a bellows

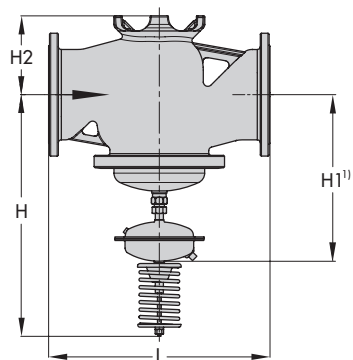
Valve size	NPS	½	¾	1	1½	2	2½	3	4	6	8	10	
	DN	15	20	25	40	50	65	80	100	150	200	250	
Length L	Class 125/ 150	inch	7.25			8.75	10	10.9	11.75	13.9	17.75	21.4	26.5
		mm	184			222	254	276	298	352	451	543	673
	Class 300	inch	7.5	7.6	7.75	9.25	10.5	11.5	12.5	14.5	18.6	22.4	27.9
		mm	191	194	197	235	267	292	318	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 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	ØD = 8.9" (225 mm) · A = 25 in ² (160 cm ²) ²⁾					ØD = 11.2" (285 mm) · A = 50 in ² (320 cm ²)						
	Weight ³⁾	lb	25	27	29	44	50	84	95	126	-		
		kg	11.5	12	13	20	22.5	38	43	57	-		
Type 42-24 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	ØD = 11.2" (285 mm) · A = 50 in ² (320 cm ²) ¹⁾					ØD = 15.4" (390 mm) · A = 100 in ² (640 cm ²)						
	Weight ³⁾	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	24.6" (625 mm)					30" (685 mm)		29.1" (740 mm)	44.1" (1120 mm)	49.6" (1260 mm)		
	Actuator	ØD = 8.9" (225 mm) · A = 25 in ² (160 cm ²) ²⁾					ØD = 11.2" (285 mm) A = 50 in ² (320 cm ²)		ØD = 15.4" (390 mm) A = 100 in ² (640 cm ²) ²⁾				
	Weight ³⁾	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 14.5 psi (0.2 to 1 bar)	Height H	24" (610 mm)					30" (685 mm)		29.1" (740 mm)	44.1" (1120 mm)	49.6" (1260 mm)		
	Actuator	ØD = 8.9" (225 mm) · A = 25 in ² (160 cm ²) ²⁾					ØD = 15.4" (390 mm) A = 100 in ² (640 cm ²)						
	Weight ³⁾	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 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	ØD = 8.9" (225 mm) · A = 25 in ² (160 cm ²) ²⁾					ØD = 11.2" (285 mm) A = 50 in ² (320 cm ²)						
	Weight ³⁾	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
14.5 to 35 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	ØD = 8.9" (225 mm) · A = 25 in ² (160 cm ²)					ØD = 11.2" (285 mm) A = 50 in ² (320 cm ²)						
	Weight ³⁾	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 psi (2 to 5 bar), 65 to 145 psi ⁴⁾ (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	ØD = 6.7" (170 mm) · A = 12 in ² (80 cm ²)					ØD = 8.9" (225 mm) A = 25 in ² (160 cm ²)						
	Weight ³⁾	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⁾ The weight applies to the version with the material specifications A126B. Add +10 % for all other materials.

⁴⁾ NPS 6 to 10 (DN 150 to 250): 65 to 145 psi (4.5 to 10 bar) on request



Type 2422 Valve balanced by a diaphragm with Type 2424/2428 Actuator

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

¹⁾ Type 42-28 only

Fig. 8: Dimensions · Valve balanced by a diaphragm

Table 5: Dimensions and weights for Type 42-24 and Type 42-28 · Balanced by a diaphragm

Valve size		NPS	2½	3	4	6	8	10
		DN	65	80	100	150	200	250
Length L	Class 125/150	inch	10.9	11.75	13.9	17.75	21.4	26.5
		mm	276	298	352	451	543	673
	Class 300	inch	11.5	12.5	14.5	18.6	22.4	27.9
		mm	292	318	368	473	568	708
Height H2	inch	3.9			4.6	6.9	10.2	
	mm	98			118	175	260	
Type 42-28 Differential Pressure Regulator								
Set points		Type 2428 Actuator						
3, 4, 6, 7 psi (0.2, 0.3, 0.4, 0.5 bar)	Height H1	14" (355 mm)			14.8" (375 mm)		-	
	Actuator	ØD = 11.2" (285 mm) · A = 50 in ² (320 cm ²)					-	
	Weight ³⁾	lb	84	95	112		-	
		kg	38	43	51		-	
Type 42-24 Differential Pressure Regulator								
Set points		Type 2424 Actuator						
0.75 to 3.5 psi (0.05 to 0.25 bar)	Height H	28.3" (720 mm)			29.1" (740 mm)	33.1" (840 mm)	35.8" (910 mm)	
	Actuator	ØD = 15.4" (390 mm) · A = 100 in ² (640 cm ²)					-	
	Weight ³⁾	lb	93	104	121	210	561	595
		kg	42	47	55	95	250	270
1.5 to 8.5 psi (0.1 to 0.6 bar)	Height H	22.6" (575 mm)			23.4" (595 mm)	33.1" (840 mm)	35.8" (910 mm)	
	Actuator	ØD = 11.2" (285 mm) · A = 50 in ² (320 cm ²) ¹⁾			ØD = 15.4" (390 mm) · A = 100 in ² (640 cm ²) ²⁾			
	Weight ³⁾	lb	93	104	121	210	561	595
		kg	42	47	55	95	250	270
3 to 14.5 psi (0.2 to 1 bar)	Height H	22.6" (575 mm)			23.4" (595 mm)	29.9" (760 mm)	32.7" (830 mm)	
	Actuator	ØD = 8.9" (225 mm) · A = 25 in ² (160 cm ²) ²⁾			ØD = 11.2" (285 mm) · A = 50 in ² (320 cm ²) ¹⁾			
	Weight ³⁾	lb	93	104	121	210	561	595
		kg	42	47	55	95	250	270
7 to 20 psi (0.5 to 1.5 bar)	Height H	22.6" (575 mm)			23.4" (595 mm)	29.9" (760 mm)	32.7" (830 mm)	
	Actuator	ØD = 8.9" (225 mm) · A = 25 in ² (160 cm ²) ²⁾			ØD = 11.2" (285 mm) · A = 50 in ² (320 cm ²) ¹⁾			
	Weight ³⁾	lb	93	104	121	210	561	595
		kg	42	47	55	95	250	270
14.5 to 35 psi (1 to 2.5 bar)	Height H	22.6" (575 mm)			23.4" (595 mm)	29.9" (760 mm)	32.7" (830 mm)	
	Actuator	ØD = 8.9" (225 mm) · A = 25 in ² (160 cm ²) ²⁾					-	
	Weight ³⁾	lb	93	104	121	210	561	595
		kg	42	47	55	95	250	270
30 to 75 psi (2 to 5 bar)	Height H	22.6" (575 mm)			23.4" (595 mm)	29.9" (760 mm)	32.7" (830 mm)	
	Actuator	ØD = 8.9" (225 mm) · A = 25 in ² (160 cm ²) ²⁾					-	
	Weight ³⁾	lb	93	104	121	210	561	595
		kg	42	47	55	95	250	270

¹⁾ Optionally with actuator 100 in² (640 cm²)

²⁾ Optionally with actuator 50 in² (320 cm²)

³⁾ The weight applies to the version with the material specifications A126B. Add +10 % for all other materials.

Ordering text

Type 42-24 and Type 42-28 Differential Pressure Regulator

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

Class ..., body material ...

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

Optionally, accessories ...

Optionally, special version

Specifications subject to change without notice



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