

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 (DN 15 to 250)** · Pressure rating **Class 125 to 300** · Suitable for liquids and vapors from **40 °F to 660 °F (5 °C 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) or adjustable in wide ranges (Type 24-24 A)
- Suitable for circuit water, water/glycol mixtures up to 30 %, 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
- Especially suitable for district heating supply networks

Versions

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

Type 42-24 A (Fig. 1) · With Type 2422 Valve for NPS ½ to 10 (DN 15 to 250) ¹⁾ and Type 2424 Actuator with adjustable set point

Type 42-28 A (Fig. 2) · With Type 2422 Valve for NPS ½ to 4 (DN 15 to 100) 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)

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

Type 42-24 B · With Type 2422 Valve for NPS ½ to 10 (DN 15 to 250), distance piece and Type 2424 Actuator with adjustable set point

Type 42-28 B · With Type 2422 Valve 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).

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

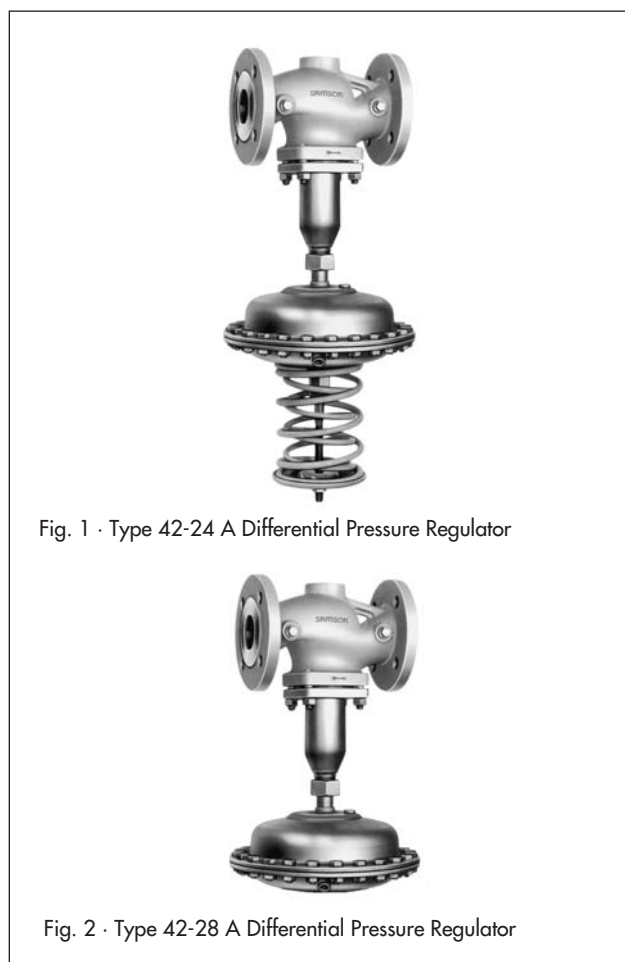


Fig. 1 · Type 42-24 A Differential Pressure Regulator

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

Special version

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 valve is fully balanced. The upstream pressure acts on the outer surface of the metal bellows (5) and the downstream pressure on the inside of the bellows. 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 (12) where it is converted into a positioning force. This force moves the plug according to the force of the set point springs (14).

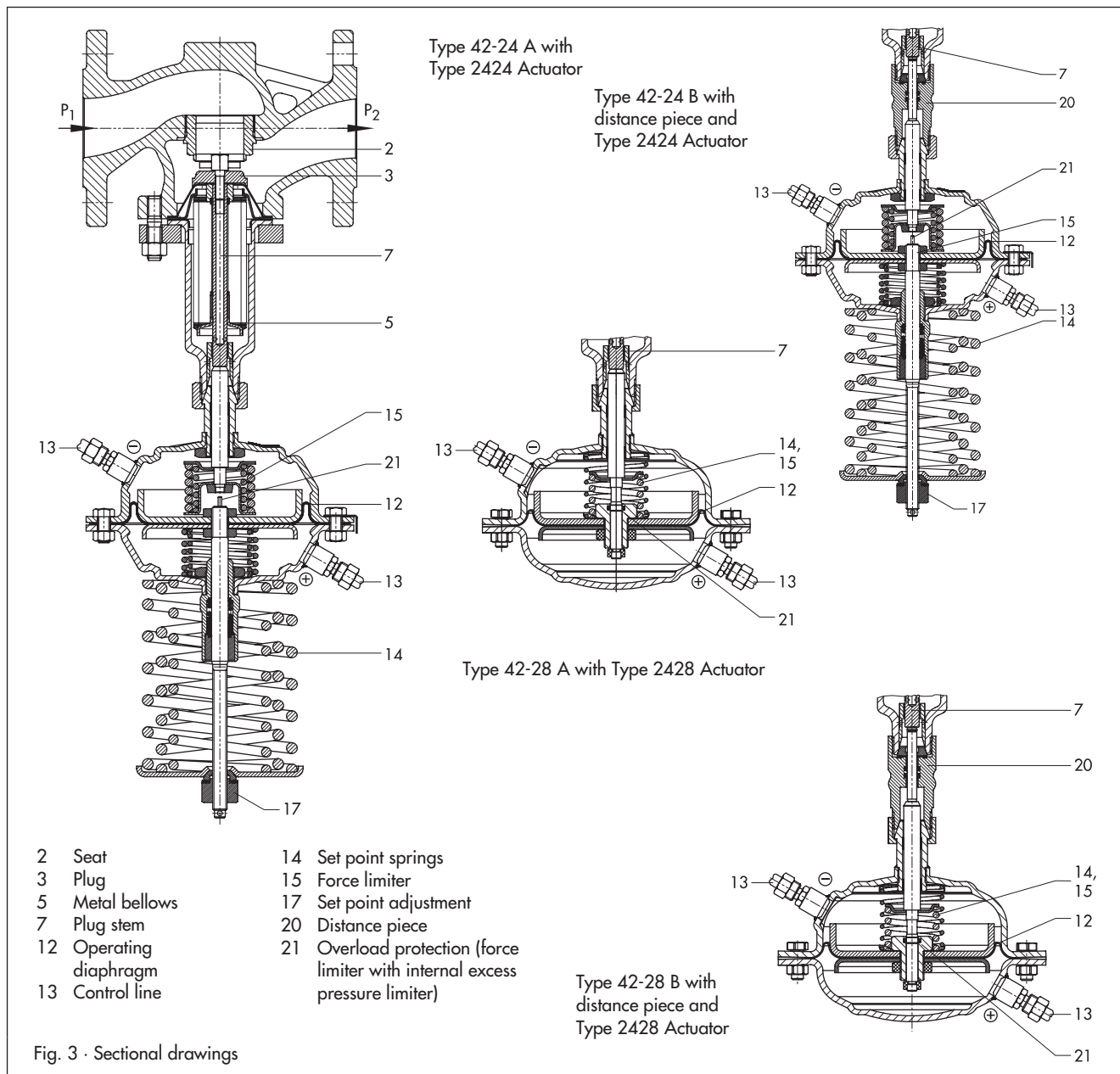
In Type 42-24 A and Type 42-24 B, the set point can be adjusted at the set point adjustment (17).

In Type 42-28 A and Type 42-28 B, the set point springs (14) in the actuator determine the set point.

The Type 42-24 B and Type 42-28 B Regulators are fitted with a distance piece (20), 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.

All versions have control lines (13) 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 (15, 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 bore hole located in the intermediate ring between the two diaphragms is fitted with a mechanical diaphragm rupture indicator (22), 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 diaphragms 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.

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).

Pressure-temperature diagram – ASTM materials –

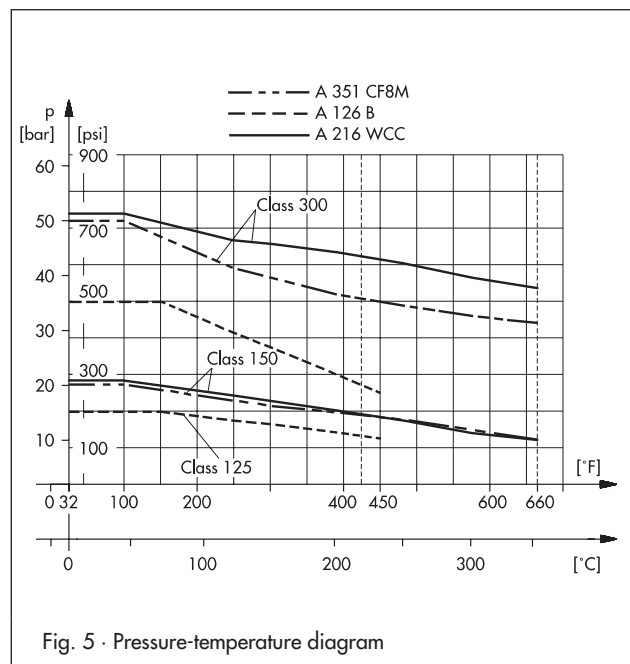
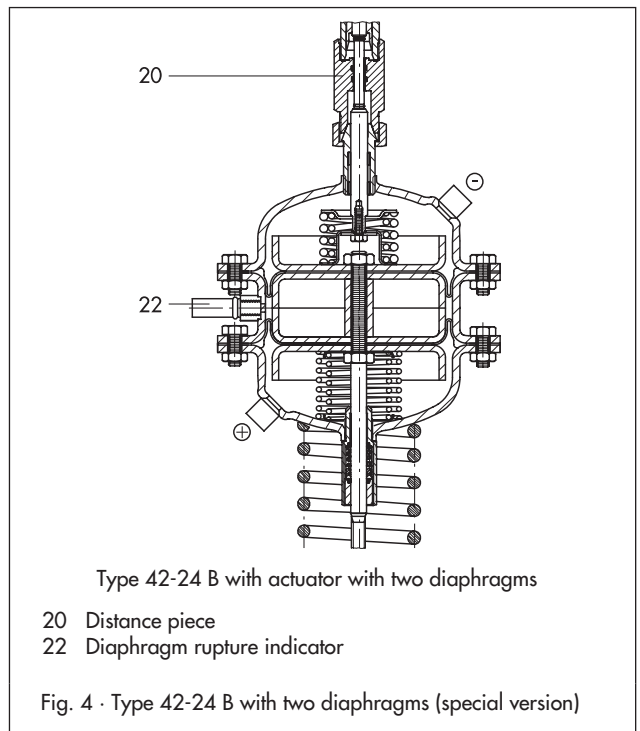


Fig. 5 · Pressure-temperature diagram



Type 42-24 B with actuator with two diaphragms

- 20 Distance piece
- 22 Diaphragm rupture indicator

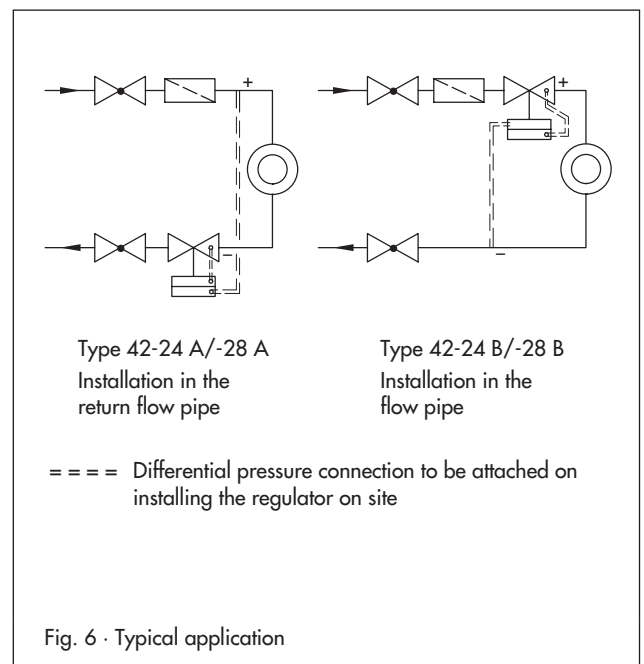
Fig. 4 · Type 42-24 B with two diaphragms (special version)

Permissible mounting positions

- All nominal sizes: Install the actuator suspended downwards (see photo)
- NPS ½ to 3 (DN 15 to DN 80)/Up to 250 °F (120 °C): Install the actuator either suspended or upright
- All nominal sizes with fixed plug guide/up to 120 °C: Any position possible
- Steam applications: Always install actuator suspended downwards

Refer to EB 3003 EN for more details.

Typical application



Type 42-24 A/-28 A
Installation in the return flow pipe

Type 42-24 B/-28 B
Installation in the flow pipe

==== Differential pressure connection to be attached on installing the regulator on site

Fig. 6 · Typical application

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		290 psi (20 bar)	175 psi (12 bar)	145 psi (10 bar)	90 psi (6 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

Refer to Data Sheet T 2650 EN for more details on the version of **Type 2422 Valve balanced by a diaphragm**

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

Type 2422 Valve			
Pressure rating	Cl 125		Cl 150
Valve body	Cast iron A 126 B		Carbon steel A 216 WCC
Seat and plug	Stainless steel 1.4006 or 1.4104		1.4571
Plug stem	Stainless steel 1.4301		
Metal bellows	Stainless steel 1.4571 · NPS 6 (DN 150) and larger: 1.4404		
Lower part of body	1.0305		1.4571
Body gasket	Graphite on metal core		
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 (Type 42-24 B/42-28 B)			
Body	Brass CW617N, special version 1.4301		Stainless steel 1.4301
Coupling pin	Stainless steel 1.4301		
Seals	EPDM ²⁾		

¹⁾ NPS 2½ to 6 (DN 65 to 150) only · ²⁾ 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

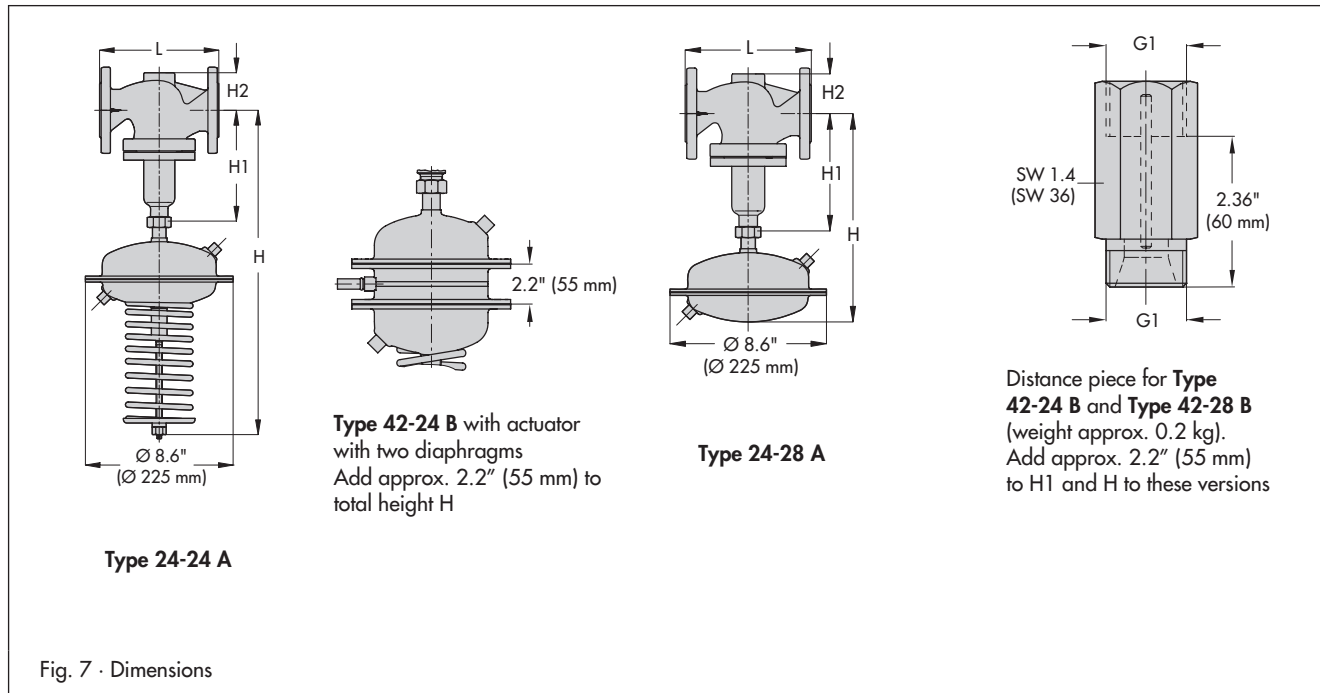
Nominal size	NPS	½	¾	1	1½	2	2½	3	4	6	8	10	
	DN	15	20	25	40	50	65	80	100	150	200	250	
Seat Ø		0.9" (22 mm)		1.6" (40 mm)		2.6" (65 mm)		3.5" (89 mm)	6" (125 mm)	8.1" (207 mm)			
Travel		0.4" (10 mm)				0.6" (16 mm)			0.9" (22 mm)				
C _v and K _{vS} coefficients	Normal	C _v	5	7.5	9.4	23	37	60	94	145	330	490	590
		K _{vS}	4	6.3	8	20	32	50	80	125	280	420	500
	Reduced	C _v	1.2	3	5	9.4	20	32	37	60	245	370	440
		K _{vS}	1	2.5	4	8	16	20	32	50	210	315	375
z value		0.65	0.6	0.55	0.45	0.4				0.35	0.3		
Max. permissible differential pressure Δp in bar		360 psi (25 bar)					290 psi (20 bar)		230 psi (16 bar)	175 psi (12 bar)	145 psi (10 bar)		

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	1.8			2.8			3.9	4.5	6.9	9.25	10.2	
	mm	45			72			98	113	175	235	260	
Type 42-28 A 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) 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 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⁾											
	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⁾			Actuator ⁴⁾			
	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⁾											
	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)	47.6" (1210 mm)	
	Actuator	Ø D = 8.9" (225 mm) · A = 25 in ² (160 cm ²) 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) 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) ³⁾											
	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 = 15.35" (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 specifications A 126 B. Add 10 % for other materials.

Dimensions



Ordering text

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

Type 42-28 A/Type 42-28 B

NPS ... (DN ...)

Class ..., body material ...

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

On option, accessories ...

On option, special version

Specifications subject to change without notice



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