

# 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

#### Application

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

For differential pressure set points ( $\Delta p$ ) from **0.05** to **10 bar** · Valves sizes **DN 15** to **250** · Nominal pressure **PN 16** to **40** · Suitable for liquids and vapors from **5 °C** to **350 °C**, air and other non-flammable gases up to **80 °C**

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

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

#### Special features

- **Type 24-24 A/B**: Set point **adjustable** in wide range
- **Type 24-28 A/B**: **Fixed** set point
- Low-noise, self-operated P-regulators requiring little maintenance
- 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, spheroidal graphite iron, cast steel, cast stainless steel or forged steel
- Single-seated valve with plug balanced by a stainless steel bellows or by a balancing diaphragm (DN 125 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 DN 15 to 250 <sup>1)</sup> · Balanced by a diaphragm DN 125 to 250 <sup>1)</sup> · Type 2424 Actuator with adjustable set point

**Type 42-28 A** (Fig. 2) · Type 2422 Valve · Balanced by a bellows DN 15 to 100 · Type 2428 Actuator with fixed set point, adjusted to  $\Delta p = 0.2, 0.3, 0.4$  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 DN 15 to 250 <sup>1)</sup> · Balanced by a diaphragm DN 125 to 250 <sup>1)</sup> · Type 2424 Actuator with adjustable set point · Sealed off between actuator and valve

**Type 42-28 B** · Type 2422 Valve · Balanced by a bellows DN 15 to 100 · Type 2428 Actuator with fixed set point, adjusted to  $\Delta p = 0.2, 0.3, 0.4$  or  $0.5$  bar · Sealed off between actuator and valve

#### 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.

<sup>1)</sup> Valves in sizes larger than DN 250 on request

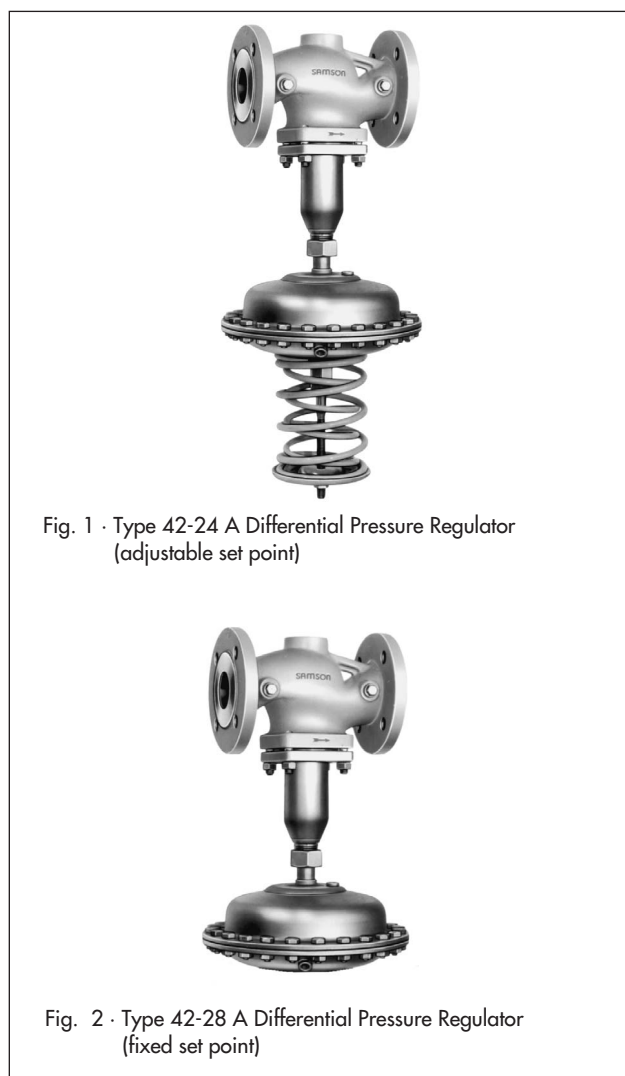


Fig. 1 · Type 42-24 A Differential Pressure Regulator (adjustable set point)

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

#### Special version

ANSI or JIS versions · Versions free of non-ferrous metal Actuator with two diaphragms · Version for temperatures above 220 °C · Version for deionized water · Version with FPM diaphragm for mineral oil (other oils on request) · Version for small flow rates: valve with micro trim with  $K_{VS} = 0.001$  to  $0.04$  or  $K_{VS} = 0.1, 0.4$  and  $1$  without pressure balancing

**Principle of operation (Fig. 3)**

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

In Type 42-28 A and Type 42-28 B, an integrated seal in the actuator ensures that the pressure in the valve is separated from the pressure in the actuator.

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.

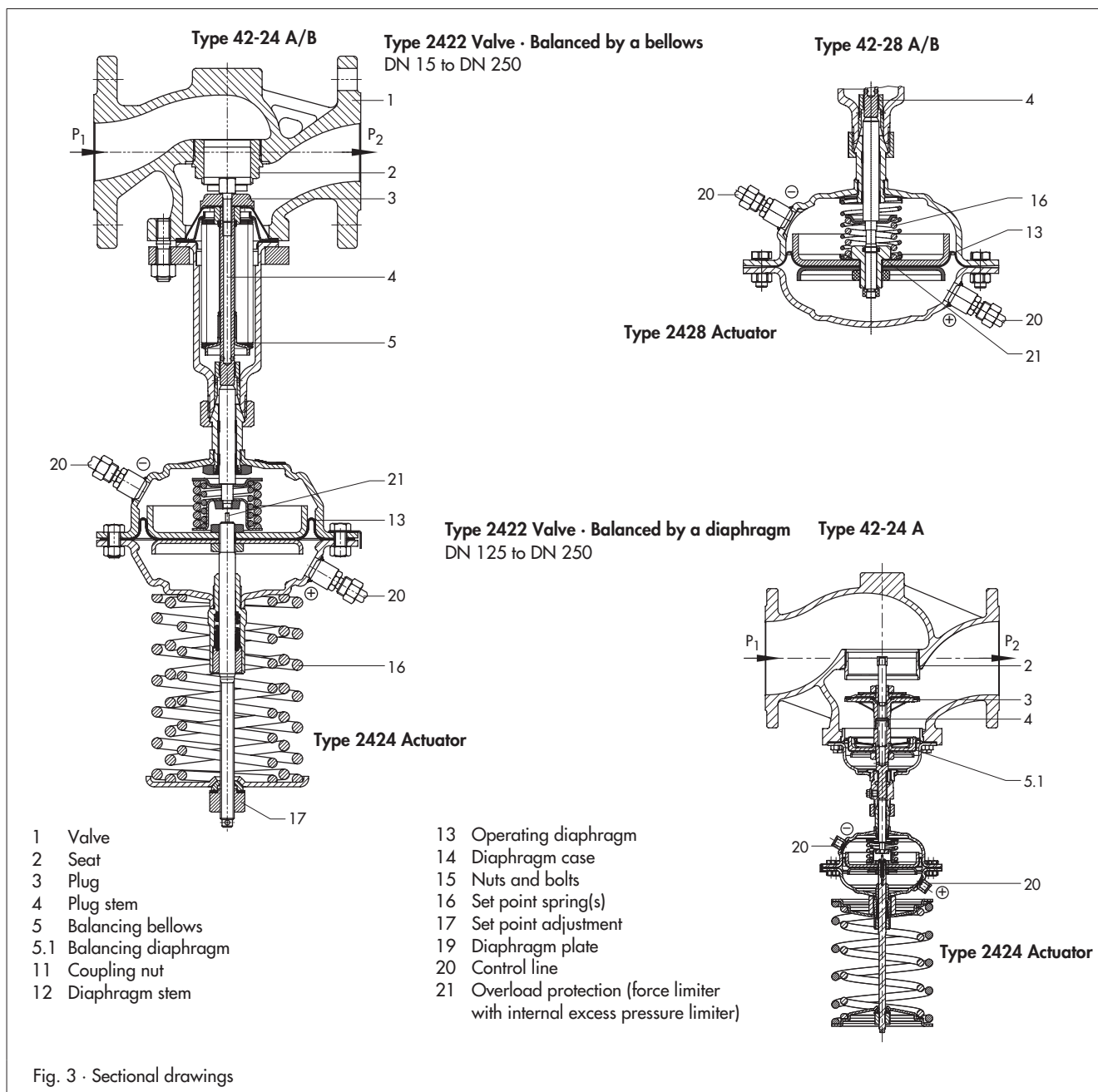


Fig. 3 · Sectional drawings

### 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. 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.

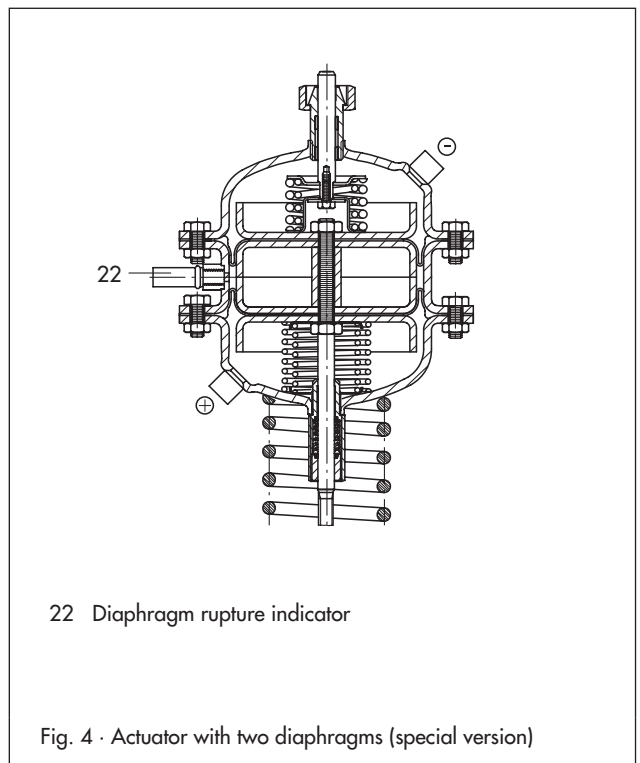
#### Installation

The valve, actuator and control lines (accessories) are delivered in separate packaging.

The actuator can be easily mounted before or preferably after the valve is installed in the pipeline. 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)

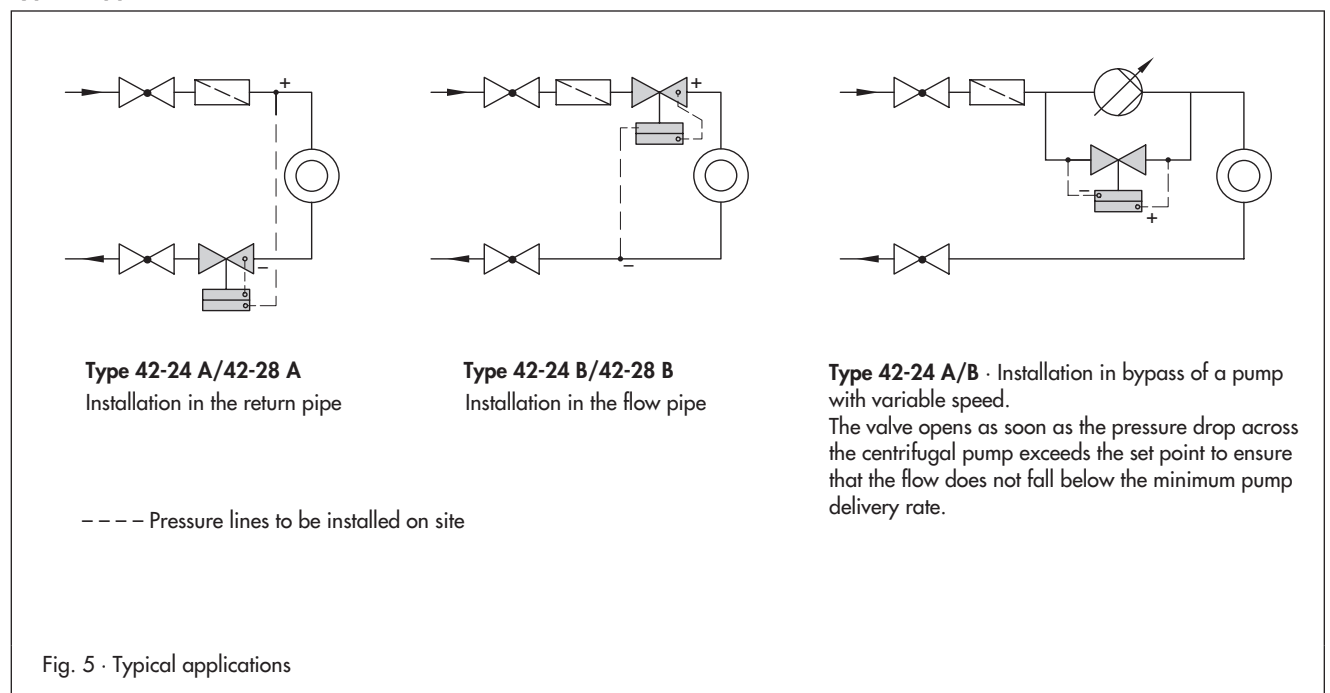


#### Permissible mounting positions

- Actuator suspended downwards (see photo): Standard installation, all versions, above 80 °C and for applications with steam
- Actuator upright: DN 15 to DN 80 and max. 80 °C
- Actuator sideways: Only versions with fixed plug guide

Refer to **EB 3003 EN** for more details.

#### Typical application



**Table 1 · Technical data**

Type	42-24 A · 42-24 B				42-28 A · 42-28 B	
Nominal size	DN 15 to DN 250				DN 15 to DN 100	
Nominal pressure	16, 25 or 40 (acc. to DIN EN 12516-1)					
Max. permissible temperature	Body	See pressure-temperature diagram				
	Actuator <sup>1)</sup>	With equalizing tank: Steam and liquids up to 350 °C Without equalizing tank: Liquids up to 150 °C · Air and gases up to 80 °C				
Set point ranges in 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 <sup>2)</sup>				0.2 · 0.3 · 0.4 · 0.5	
Diaphragm area A	80 cm <sup>2</sup>	160 cm <sup>2</sup>	320 cm <sup>2</sup>	640 cm <sup>2</sup>	160 cm <sup>2</sup>	320 cm <sup>2</sup>
Pressure above adjusted set point at which internal excess pressure limiter responds	2.4 bar	1.2 bar	0.6 bar	0.3 bar	0.6 bar	0.3 bar
Max. permissible operating pressure for actuator with two diaphragms	40 bar	40 bar	25 bar	25 bar	-	
Leakage rate	≤ 0.05 % of Kvs					

<sup>1)</sup> Higher temperatures on request · <sup>2)</sup> DN 125 to DN 250: 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 DIN EN**

Type 2422 Valve · Balanced by a bellows					
Nominal pressure	PN 16	PN 25	PN 16/25/40		
Valve body	Cast iron EN-JL 1040	Sph. graphite iron EN-JS 1049	Cast steel 1.0619	Stainless forged steel 1.4571 <sup>2)</sup>	Cast stainless steel 1.4581 <sup>1)</sup>
Seat	Stainless steel 1.4104 or 1.4006				
Plug	Up to DN 100	Stainless steel 1.4104, 1.4112 or 1.4006 <sup>3)</sup>			1.4571
	DN 125 to 250	1.4301, plug with PTFE sealing			1.4571, plug with PTFE sealing
Plug stem	1.4301				
Metal bellows	1.4571 · DN 125 and larger: 1.4404				
Lower part of body	P265GH			1.4571	
Body gasket	Graphite on metal core				
Type 2422 Valve · Balanced by a diaphragm					
Nominal pressure	PN 16	PN 16/25	PN 16/25/40	-	PN 16/25/40
Valve body	Cast iron EN-JL 1040	Sph. graphite iron EN-JS 1049	Cast steel 1.0619	-	Cast stainless steel 1.4581
Valve seat	Red brass				
Plug	Standard version · Red brass · With EPDM soft sealing, max. 150 °C or with PTFE soft sealing, max. 150 °C				
Pressure balancing	Balancing diaphragm case made of sheet steel DD11 · EPDM balancing diaphragm, max. 150 °C or NBR diaphragm, max. 80 °C				
Flat gasket	Graphite on metal core				
Type 2424 and Type 2428 Actuator					
Diaphragm cases	DD 11			1.4301	
Diaphragm	EPDM <sup>4)</sup> with fabric reinforcement				
Guide bushing	DU bushing			PTFE	
Seals	EPDM/PTFE <sup>4)</sup>				

<sup>1)</sup> DN 65 to DN 150 only · <sup>2)</sup> DN 15, 25, 40 and 50 only · <sup>3)</sup> Optionally with soft sealing with standard Kvs coefficients

<sup>4)</sup> Special version for mineral oil: FPM (FKM)

**Table 3 · Permissible  $K_{VS}$  coefficients, z values and maximum permissible differential pressures**

**Type 2422 Valve balanced by a bellows**

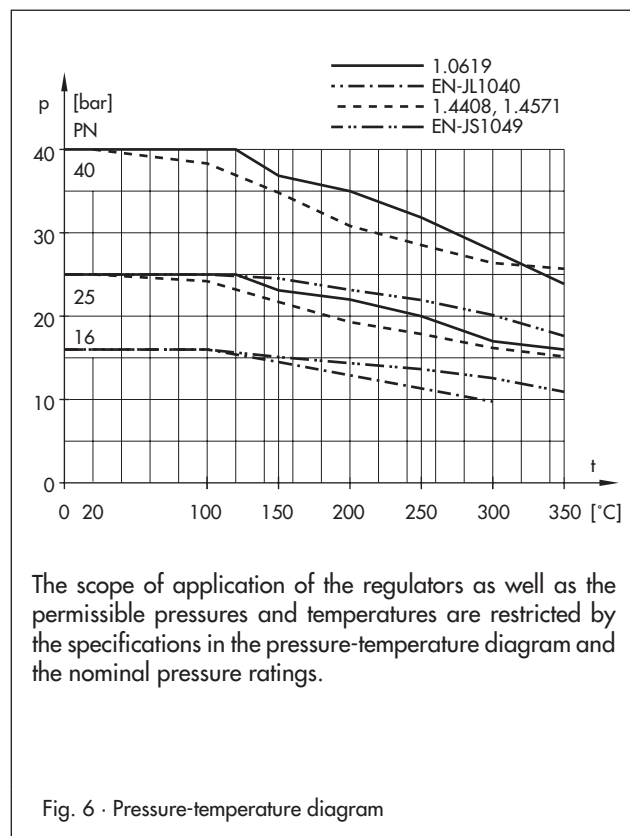
Nominal size	DN	15 <sup>1)</sup>	20 <sup>1)</sup>	25 <sup>1)</sup>	32	40	50	65	80	100	125	150	200	250	
Travel		10 mm						16 mm			22 mm				
$K_{VS}$ coefficient	Normal	4	6.3	8	16	20	32	50	80	125	190	280	420	500	
Max. perm. differential pressure $\Delta p$		25 bar						20 bar			16 bar		12 bar	10 bar	
$K_{VS}$ coefficient	Reduced	–	–	4	6.3	8	16	20	32	50	80	125	280		
Max. perm. differential pressure $\Delta p$		25 bar									20 bar		16 bar	12 bar	
z value		0.65	0.6	0.55		0.45	0.4		0.35				0.3		

<sup>1)</sup> Special version with  $K_{VS} = 0.001$  to  $0.04$  and  $K_{VS} = 0.1, 0.4$  and  $1$  without pressure balancing

**Type 2422 Valve balanced by a diaphragm**

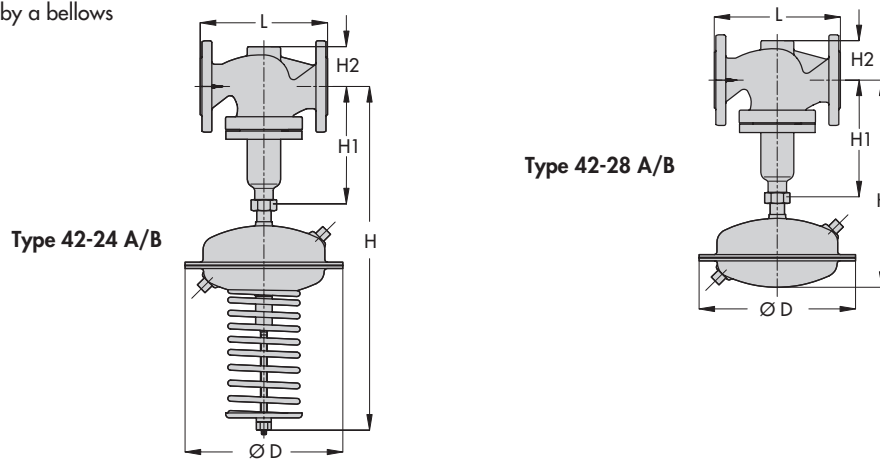
Nominal size	DN	125	150	200	250
$K_{VS}$ coefficient	35 mm travel	250	380	650	800
z value		0.35		0.3	
Max. perm. differential pressure $\Delta p$		12 bar		10 bar	

**Pressure-temperature diagram – acc. to DIN EN 12516-1 –**



## Dimensions and weights

Type 2422 Valve · Balanced by a bellows



### Dimensions in mm and weights in kg

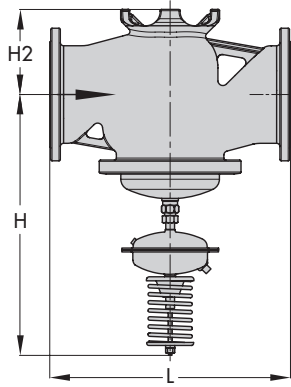
Nominal size DN	15	20	25	32	40	50	65	80	100	125	150	200	250	
Length L	130	150	160	180	200	230	290	310	350	400	480	600	730	
Height H1	225						300		355	460	590	730		
Height H2	Other materials		55		72		100		120	145	175	270		
	Forged steel		53	–	70	–	92	98	–	–	–	–	–	
<b>Type 42-28 A Differential Pressure Regulator</b>														
Set point 0.2 · 0.3 0.4 or 0.5 bar	Height H		390						465		520		–	
	Actuator		Ø D = 225 mm, A = 160 cm <sup>2</sup> 3)						Ø D = 285 mm, A = 320 cm <sup>2</sup>		–		–	
	Weight <sup>1)</sup> in kg		11.5	12	13	19.5	20	22.5	38	43	57	–		
<b>Type 42-24 A Differential Pressure Regulator</b>														
Set point range 0.05 to 0.25 bar	Height H		610						685		740	990	1120	1260
	Actuator		Ø D = 285 mm · A = 320 cm <sup>2</sup> 2)						Ø D = 390 mm · A = 640 cm <sup>2</sup>					
	Weight <sup>1)</sup> in kg		21	21.5	22.5	29	29.5	32	46	51	65	135	185	425
Set point range 0.1 to 0.6 bar	Height H		610						685		740	990	1120	1260
	Actuator		Ø D = 225 mm, A = 160 cm <sup>2</sup> 3)						Ø D = 285 mm, A = 320 cm <sup>2</sup> 2)		Ø D = 390 mm, A = 640 cm <sup>2</sup> 3)			
	Weight <sup>1)</sup> in kg		16	16.5	17.5	24	24.5	27	46	51	65	135	185	425
Set point range 0.2 to 1 bar	Height H		610						685		740	990	1120	1260
	Actuator		Ø D = 225 mm · A = 160 cm <sup>2</sup> 3)						Ø D = 390 mm · A = 640 cm <sup>2</sup>					
	Weight <sup>1)</sup> in kg		16	16.5	17.5	24	24.5	27	42	47	61	135	185	425
Set point range 0.5 to 1.5 bar	Height H		610						685		740	910	1040	1180
	Actuator		Ø D = 225 mm · A = 160 cm <sup>2</sup> 3)						Ø D = 390 mm · A = 320 cm <sup>2</sup>					
	Weight <sup>1)</sup> in kg		16	16.5	17.5	24	24.5	27	42	47	61	125	175	415
Set point range 1 to 2.5 bar	Height H		610						685		740	940	1070	1210
	Actuator		Ø D = 225 mm · A = 160 cm <sup>2</sup>						–					
	Weight <sup>1)</sup> in kg		16	16.5	17.5	24	24.5	27	42	47	61	125	175	415
Set point range 2 to 5 bar/ 4.5 to 10 bar 4)	Height H		610						685		740	910	1040	1180
	Actuator		Ø D = 170 mm · A = 80 cm <sup>2</sup>						Ø D = 225 mm · A = 160 cm <sup>2</sup>					
	Weight <sup>1)</sup> in kg		16	16.5	17.5	24	24.5	27	42	47	61	102	170	410

<sup>1)</sup> The weight applies to the version with material specifications EN-JL 1040/PN 16. Add +10 % for other materials

<sup>2)</sup> Optionally with actuator A = 640 cm<sup>2</sup> · <sup>3)</sup> Optionally with actuator A = 320 cm<sup>2</sup> · <sup>4)</sup> DN 125 to DN 250: 4.5 to 10 bar on request

Fig. 7 · Dimensional drawing of Type 2422 Valve balanced by a bellows with Type 2424 and Type 2428 Actuator

Type 2422 Valve · Balanced by a diaphragm



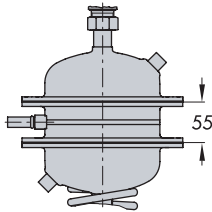
Type 42-24 A · Type 42-24 B

Dimensions in mm and weights · Type 42-24 A/B balanced by a diaphragm

Nominal size DN	125	150	200	250
Length L	400	480	600	730
Height H	720	745	960	
Height H2	145	175	260	
Weight in kg, approx.	75	95	250	270

Fig. 8 · Dimensional drawing of Type 2422 Valve balanced by a diaphragm with Type 2424 Actuator

Actuator with two diaphragms for Type 42-24 B



Add 55 mm to H1 and H of these versions.

Fig. 9 · Dimensional drawings of actuator with two diaphragms

### Ordering text

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

DN ..., valve balanced by a bellows/diaphragm

PN ..., body material ...

Set point/set point range ... bar

On option, special version ...

On option, accessories ...

Specifications subject to change without notice

---



SAMSON AG · MESS- UND REGELTECHNIK  
Weismüllerstraße 3 · 60314 Frankfurt am Main · Germany  
Phone: +49 69 4009-0 · Fax: +49 69 4009-1507  
Internet: <http://www.samson.de>

**T 3003 EN**

2011-08