

# Series 42 Self-operated Regulators



## Differential Pressure Regulators 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** <sup>1)</sup> · Nominal pressure **PN 16 to 40** · Suitable for liquids and vapors <sup>2)</sup> from **5 °C to 350 °C**, air and 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 42-24 A/B**: Set point **adjustable** in wide range
- **Type 42-28 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 65 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 · Balanced by a diaphragm DN 65 to 250 · Type 2424 Actuator with adjustable set point

**Type 42-28 A** (Fig. 2) · Type 2422 Valve · Balanced by a bellows DN 15 to 100 · Balanced by a diaphragm DN 65 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 · Balanced by a diaphragm DN 65 to 250 · 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 · Balanced by a diaphragm DN 65 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, condensation chambers and control lines.

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

<sup>2)</sup> Only Type 2422 in version balanced by a bellows

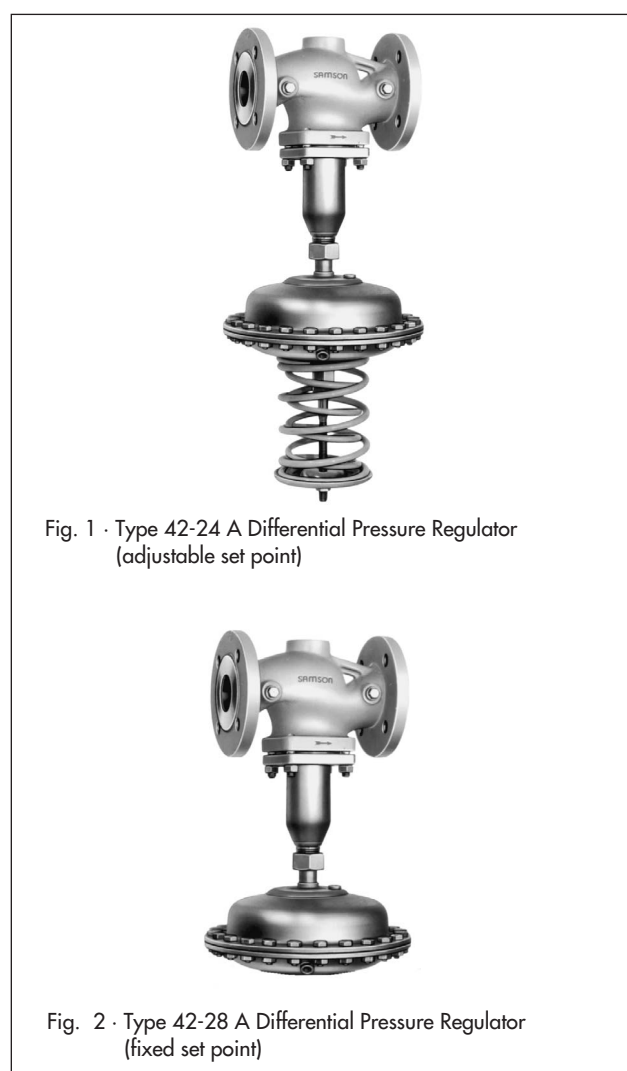


Fig. 1 · Type 42-24 A Differential Pressure Regulator (adjustable set point)

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 for mineral oils that do not affect the properties of the FPM diaphragm (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)<sup>1)</sup>. 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 plug 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).

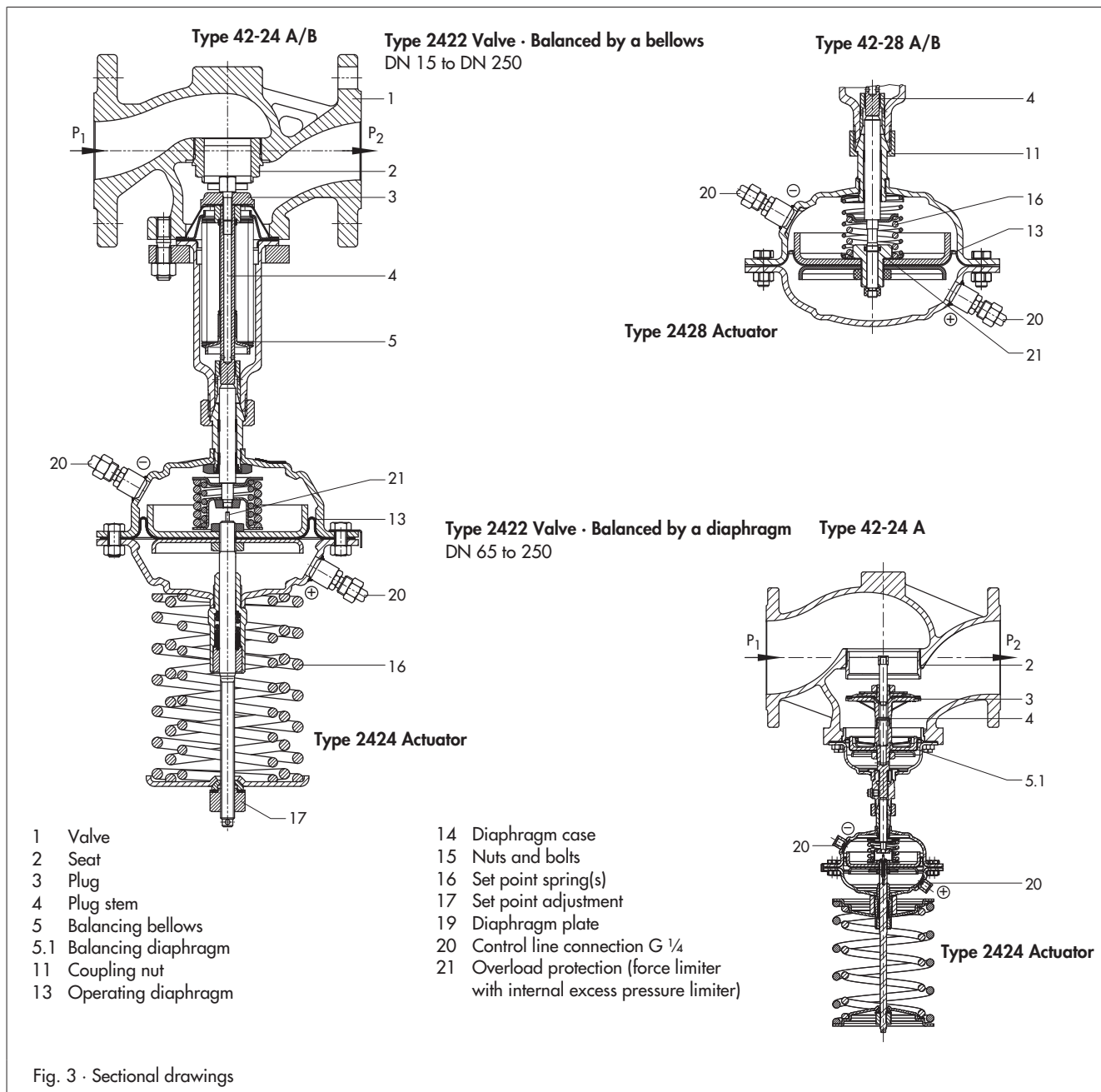
In Type 42-28 A and Type 42-28 B, the set point spring(s) (16) in the actuator determines the set point.

In Type 42-28 B 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.

<sup>1)</sup> Only Type 2422 in version balanced by a diaphragm



### 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 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. 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 intact 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.

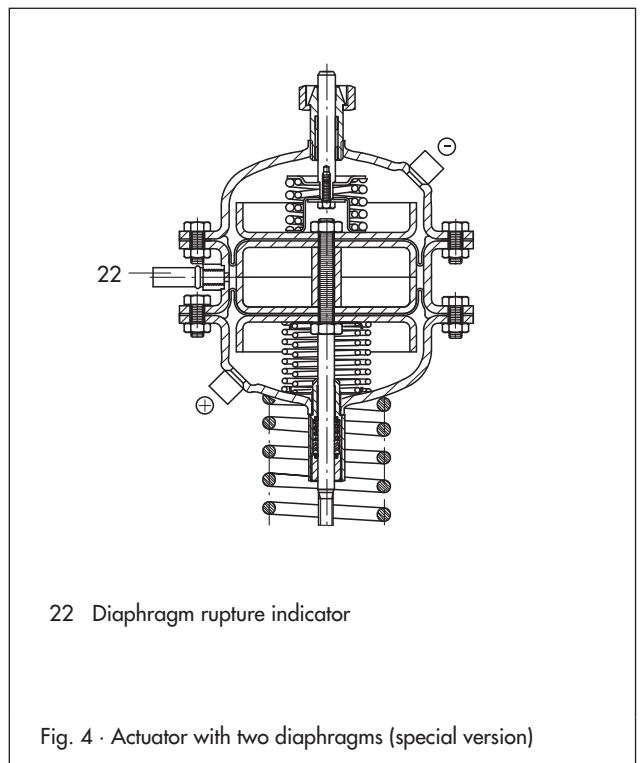
### Installation

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)



22 Diaphragm rupture indicator

Fig. 4 · Actuator with two diaphragms (special version)

### Permissible mounting positions

- Actuator suspended downwards (see photo): standard installation, all versions, above 80 °C and for applications with steam
- Actuator upright: all versions in DN 15 to 80 and max. 80 °C
- Actuator sideways: only version balanced by a bellows with fixed plug guide

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

### Typical application

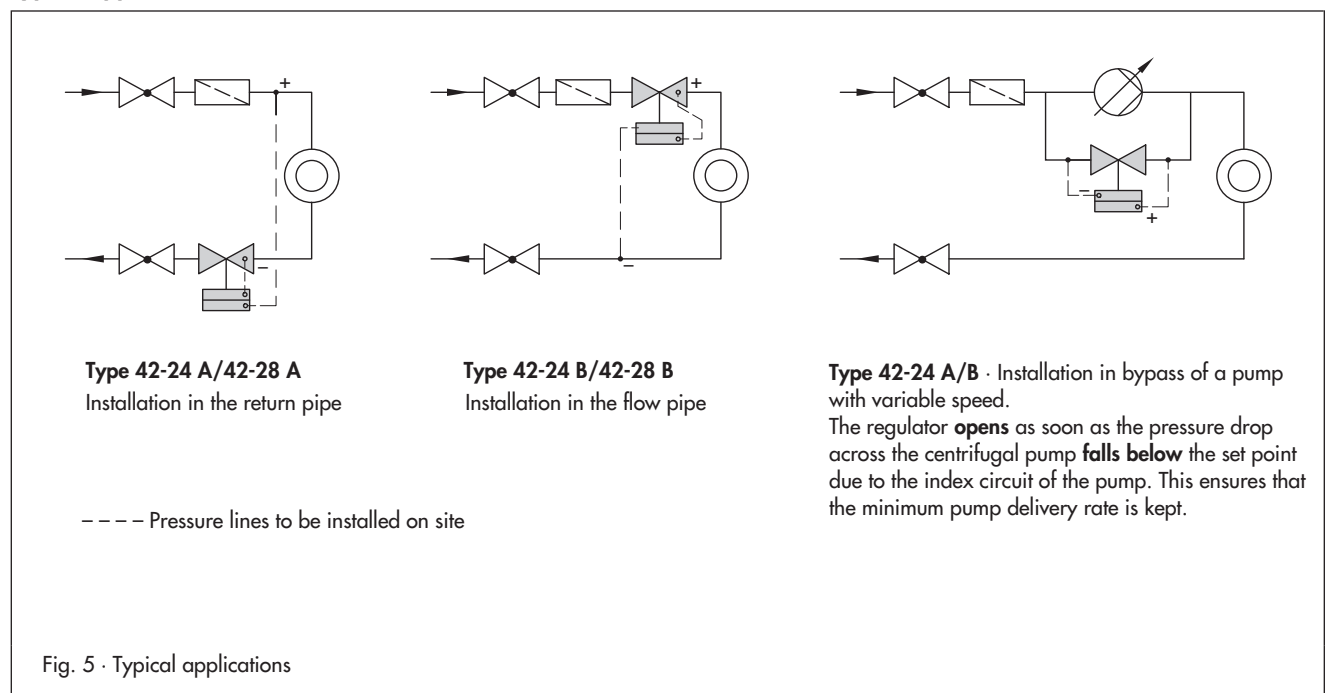


Fig. 5 · Typical applications

**Table 1 · Technical data**

Type	42-24 A · 42-24 B				42-28 A · 42-28 B	
Nominal size	DN 15 to 250				DN 15 to 100	
Nominal pressure	PN 16, 25 or 40					
Max. permissible temperature	Valve	See pressure-temperature diagram in T 3000 EN				
	Actuator <sup>1)</sup>	With condensation chamber: steam and liquids up to 350 °C <sup>2)</sup> Without condensation chamber: 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>3)</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 acc. to IEC 60534-4	≤ 0.05 % of K <sub>V5</sub>					

<sup>1)</sup> Higher temperatures on request · <sup>2)</sup> Version for steam only for valves balanced by a bellows · <sup>3)</sup> DN 125 to 250: 4.5 to 10 bar on request  
Terms for valve sizing according to IEC 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-JL1040	Sph. graphite iron EN-JS1049	Cast steel 1.0619	Stainless forged steel 1.4571 <sup>1)</sup>	Cast stainless steel 1.4408
Seat	Stainless steel 1.4104 or 1.4006			1.4571, 1.4404	
Plug	Up to DN 100	Stainless steel 1.4104, 1.4112 or 1.4006 <sup>2)</sup>			1.4571
	DN 125 to 250	1.4301, plug with PTFE seal			1.4571, plug with PTFE seal
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				

<sup>1)</sup> DN 15, 25, 40 and 50 only · <sup>2)</sup> Optionally with soft seal with standard K<sub>V5</sub> coefficients

Type 2422 Valve · Balanced by a diaphragm					
Nominal size	DN 65 to 100				
Nominal pressure	PN 16	PN 25			
Valve body	Cast iron EN-JL1040	Spheroidal graphite iron EN-JS1049			
Valve seat	1.4408				
Plug	CW 617N				
Diaphragm cases	1.0619				
Pressure balancing	Diaphragm plate 1.4301 · EPDM balancing diaphragm, max. 150 °C or NBR diaphragm, max. 80 °C				
Nominal pressure	PN 16	PN 16/25	PN 16/25/40	-	PN 16/25/40
Valve body	Cast iron EN-JL1040	Sph. graphite iron EN-JS1049	Cast steel 1.0619	-	Cast stainless steel 1.4408
Valve seat	CC491K/CC499K <sup>1)</sup>				
Plug	CC491K/CC499K <sup>1)</sup> · With EPDM soft seal, max. 150 °C or with PTFE soft seal, max. 150 °C				
Diaphragm cases	1.0566				
Pressure balancing	Diaphragm plate EN-JS1030 · EPDM balancing diaphragm, max. 150 °C or NBR diaphragm, max. 80 °C				

<sup>1)</sup> Special version: 1.4409

Type 2424 and Type 2428 Actuator		
Diaphragm cases	DD 11	1.4301
Diaphragm	EPDM <sup>1)</sup> with fabric reinforcement	
Guide bushing	DU bushing	PTFE
Seals	EPDM/PTFE <sup>1)</sup>	

<sup>1)</sup> Special version, e.g. for mineral oil: FPM (FKM)

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

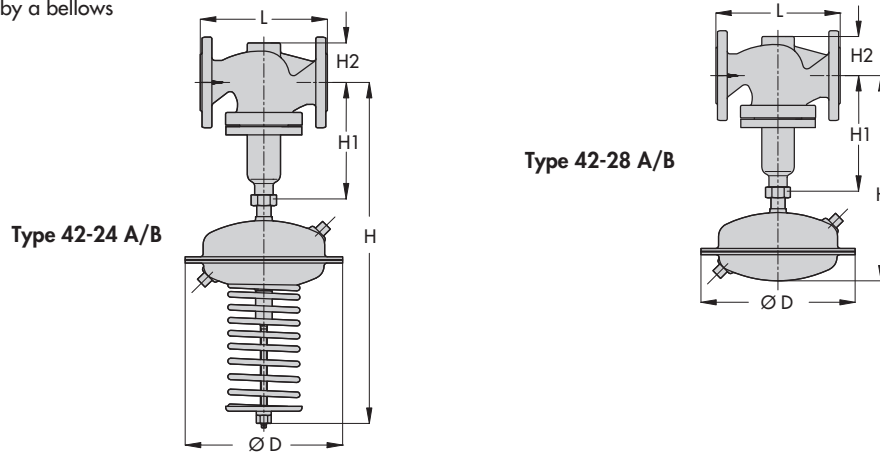
Type 2422 Valve · Balanced by a bellows														
Nominal size	DN	15 <sup>1)</sup>	20 <sup>1)</sup>	25 <sup>1)</sup>	32	40	50	65	80	100	125	150	200	250
Travel		10 mm						16 mm			22 mm			
$K_{VS}$ coefficient	Normal	4	6.3	8	16	20	32	50	80	125	190	280	420	500
Max. perm. differential pressure $\Delta p$		25 bar						20 bar		16 bar		12 bar	10 bar	
$K_{VS}$ coefficient	Reduced	–	–	4	6.3	8	16	32		50	80	125	280	
Max. perm. differential pressure $\Delta p$		25 bar								20 bar		16 bar	12 bar	
$x_{fZ}$ 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	65	80	100	125	150	200	250	
Travel		15 mm				35 mm			
$K_{VS}$ coefficient		50	80	125	250	380	650	800	
Max. perm. differential pressure $\Delta p$		10 bar			12 bar		10 bar		
$x_{fZ}$ value		0.4		0.35				0.3	

## Dimensions and weights

Type 2422 Valve · Balanced by a bellows



### Dimensions in mm and weights in kg

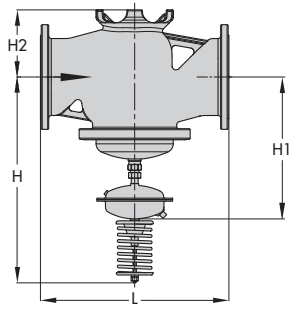
Nominal size DN	15	20	25	32	40	50	65	80	100	125	150	200	250	
Length L	130	150	160	180	200	230	290	310	350	400	480	600	730	
Height H1	225						300		355	460	590	730		
Height H2	Other materials		55		72		100		120	145	175	270		
	Forged steel		53	–	70	–	92	98	–	–	–	–	–	
<b>Type 42-28 A Differential Pressure 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 <sup>4)</sup>	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-JL1040/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. 6 · Dimensional drawing of Type 2422 Valve balanced by a bellows with Type 2424 and Type 2428 Actuator

Type 2422 Valve · Balanced by a diaphragm



Dimensions in mm and weights · Type 42-24 A/B · Type 42-2 A/B balanced by a diaphragm

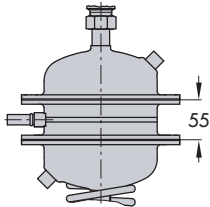
Nominal size DN	65	80	100	125	150	200	250
Length L	290	310	350	400	480	600	730
Height H	575		595	720	745	960	
Height H1 <sup>1)</sup>	355		375	-			
Height H2	98		118	145	175	260	
Weight in kg, approx.	42	47	55	75	95	250	270
	38 <sup>1)</sup>	43 <sup>1)</sup>	51 <sup>1)</sup>	-			

<sup>1)</sup> Type 42-28 A/B

Type 42-24 A · Type 42-24 B

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

Actuator with two diaphragms for Type 42-24 B



Add approx. 55 mm to the overall height H

Fig. 8 · Dimensional drawing of actuator with two diaphragms

### Ordering text

**Type 42-24 A/Type 42-24 B/Type 42-28 A/Type 42-28 B**

Differential Pressure Regulator

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

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