

# Series 42 Self-operated Regulators



## Differential Pressure Regulators with Type 2420/Type 2425 Actuator (opening)

and balanced Type 2422 Valve

### Type 42-20 · Type 42-25

#### Application

Differential pressure regulator for extended heating systems and industrial applications.

Differential pressure set points  $\Delta p$  from **0.05 to 10 bar** · Valves **DN 15 to 250**<sup>1)</sup> · Nominal pressure **PN 16 to 40** · Suitable for **liquids** and **vapors**<sup>2)</sup> from **5 to 350 °C** as well as for **air** and **non-flammable gases** up to **80 °C**

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



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

#### Special features

- **Type 42-25:** Set point adjustable in wide range
- **Type 42-20:** Fixed set point
- Low-noise, medium-controlled proportional regulator 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 a plug balanced by a stainless steel bellows or a diaphragm (DN 65 to 250)

#### Versions

**Differential pressure regulators** for installation in a **bypass pipe** or **short-circuit pipe** (see Fig. 5) · Flanged connections

**Type 42-20** (Fig. 1) · Type 2422 Valve · Balanced by a bellows DN 15 to 100 · Balanced by a diaphragm DN 65 to 100  
Type 2420 Actuator (opening) · Fixed set point, adjusted to  $\Delta p = 0.2, 0.3, 0.4$  or  $0.5$  bar

**Type 42-25** (Fig. 2) · Type 2422 Valve · Balanced by a bellows DN 15 to 250 · Balanced by a diaphragm DN 65 to 250  
Type 2425 Actuator (opening) · Set point adjustable within the range between  $0.05$  to  $10$  bar

#### Accessories

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

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

<sup>2)</sup> Version balanced by a bellows only

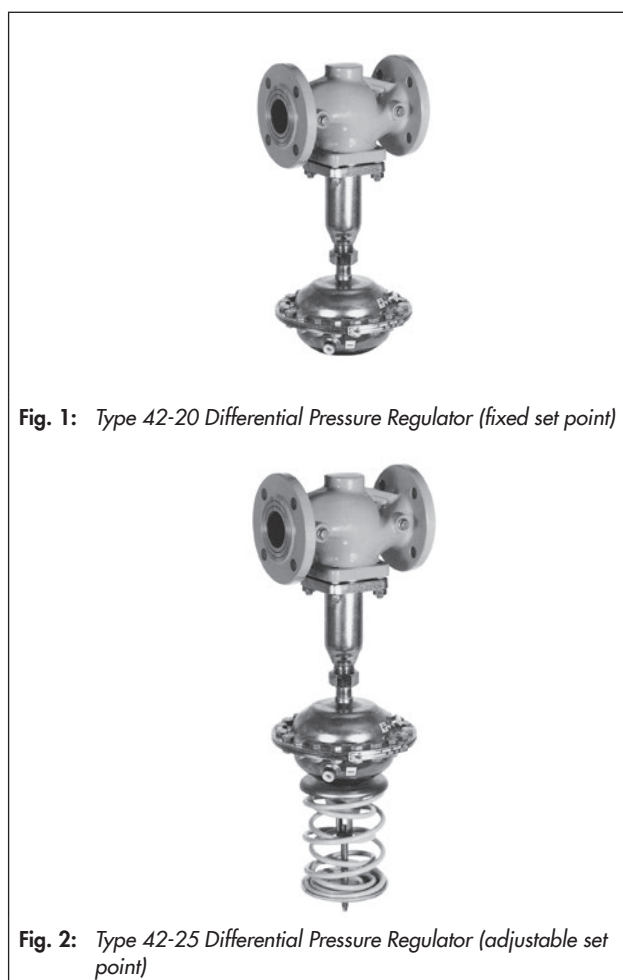


Fig. 1: Type 42-20 Differential Pressure Regulator (fixed set point)

Fig. 2: Type 42-25 Differential Pressure Regulator (adjustable set point)

#### Special versions

ANSI or JIS versions on request · Versions free of non-ferrous metal on request · Version with 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 FKM diaphragm. Other oils on request · Version for low flow rates (valve with micro-trim for  $K_{VS} 0.001$  to  $0.04$  or  $K_{VS} 0.1, 0.4$  and  $1$  without pressure balancing · Corrosion-resistant valve body (min. material grade 1.4301) · Backflow prevention (see ▶ T 3009)

### 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 over the cross-sectional area released between the 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 regulator balanced by a bellows or diaphragm only differs concerning the pressure balancing. Valves balanced by a diaphragm have a balancing diaphragm (5.1) instead of the balancing bellows (5). The downstream pressure  $p_2$  acts on the bottom of the diaphragm and the upstream pressure  $p_1$  on the top of the diaphragm. As a result, the forces created by the upstream and downstream pressures acting on the plug are balanced out.

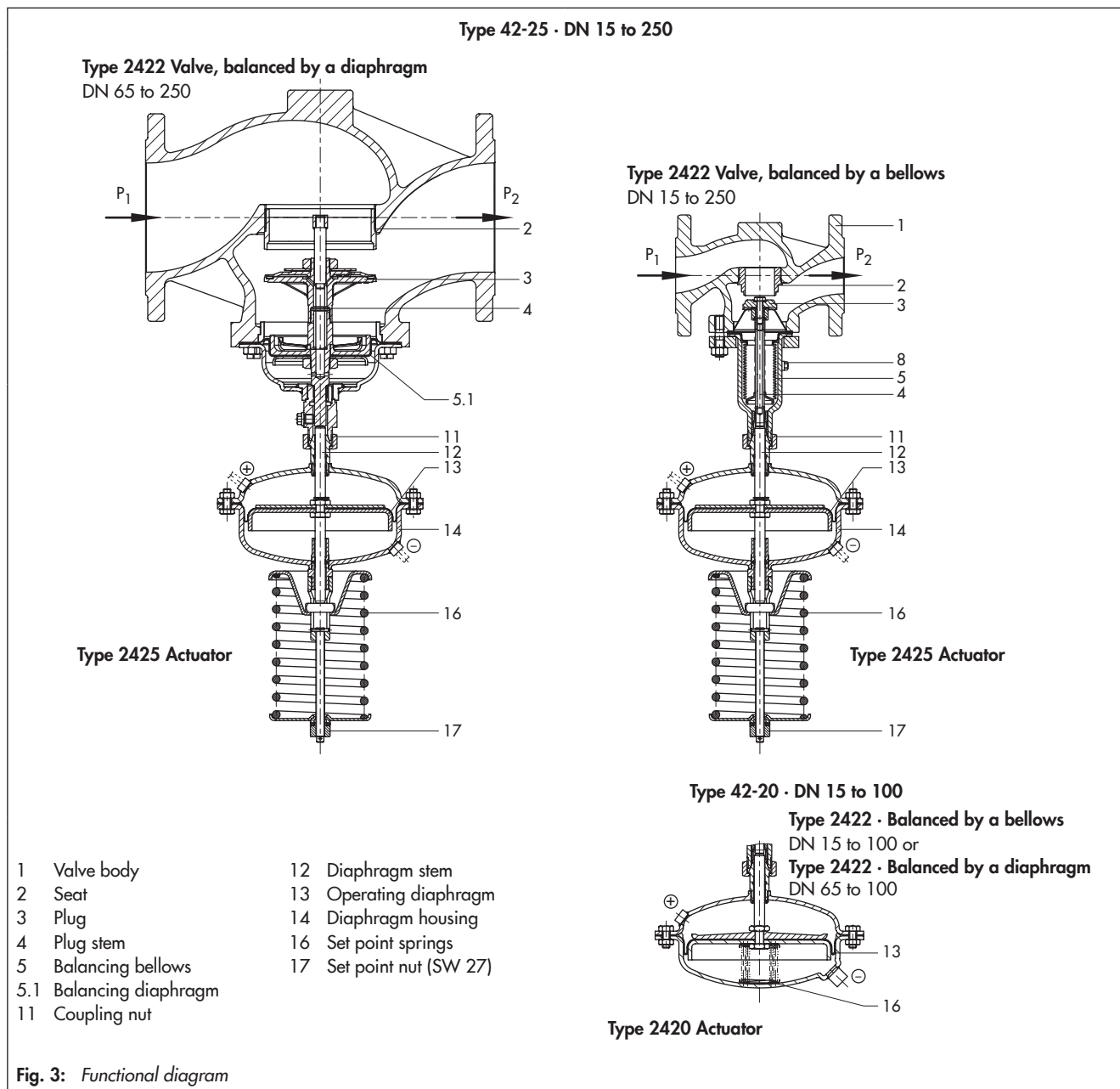
The differential pressure to be controlled is transferred to the operating diaphragm (13) where it is transformed into a positioning force. This force is used to move the plug (3) according to the force of the set point springs (16). The valve begins to open as soon as the differential pressure exceeds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

The set point of **Type 42-25** can be adjusted at the set point nut (SW 27, 17).

In **Type 42-20**, the set point springs (16) in the actuator determines the set point.

Control lines mounted on site transfer the high pressure (+) and low pressure (-) in both regulator versions.

SAMSON offers a special version of Type 24-25 Regulator with an actuator with two diaphragms.



### Type 42-25 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. 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.

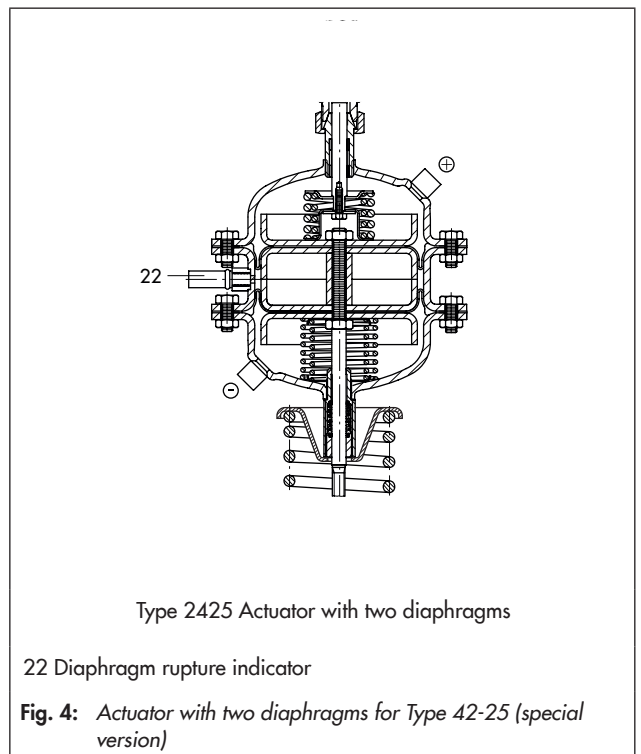
#### Installing the valve and mounting the actuator

Valve, actuator and control lines (accessories) 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:

- Install 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.



Type 2425 Actuator with two diaphragms

22 Diaphragm rupture indicator

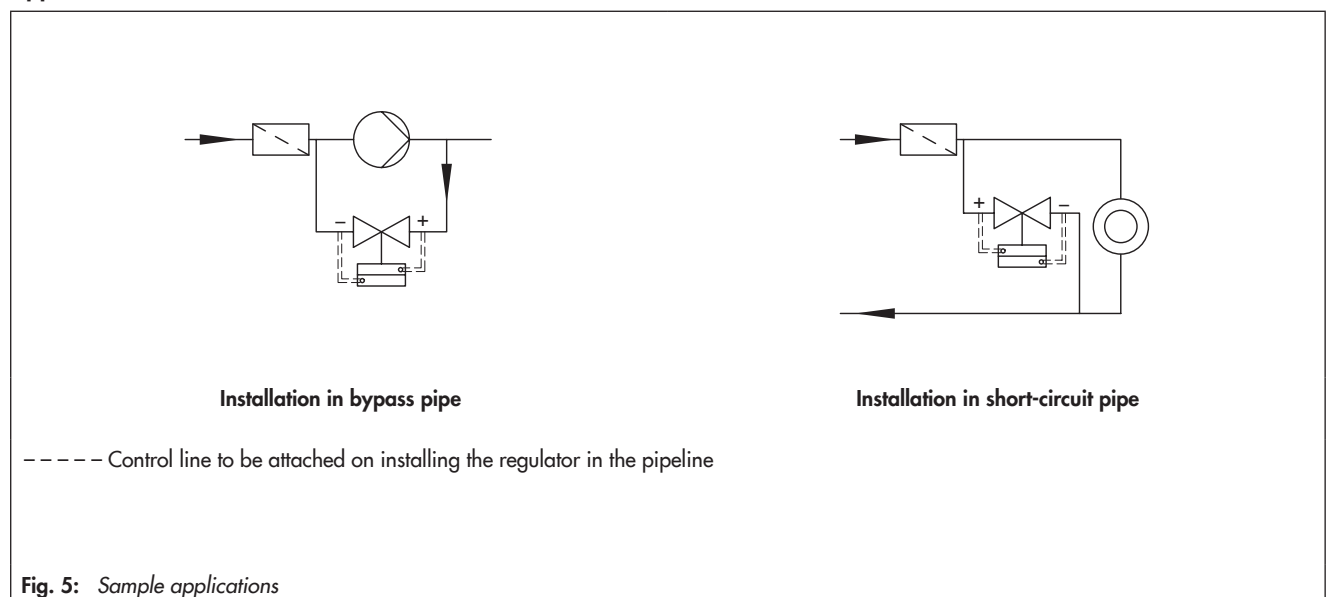
**Fig. 4:** Actuator with two diaphragms for Type 42-25 (special version)

#### Permissible mounting positions

- Actuator suspended (see photo): standard installation, all versions, above 80 °C and for applications with steam
- Actuator sideways: versions balanced by a bellows with fixed plug guide
- Actuator upright (actuator on top of the valve): all versions DN 15 to 80 and max. 80 °C

Refer to ► **EB 3007** for more details.

#### Application



**Fig. 5:** Sample applications

**Table 1: Technical data**

Type	42-25				42-20	
Valve size	DN 15 to 250				DN 15 to 100	
Nominal pressure	PN 16, 25, 40					
Max. permissible temperature	Valve	See pressure-temperature diagram in ► T 3000				
	Actuator <sup>1)</sup>	With compensation chamber: steam and liquids up to 350 °C <sup>2)</sup> Without compensation chamber: liquids up to 150 °C · Air and gases up to 80 °C				
Set point ranges	0.05 to 0.25 bar · 0.1 to 0.6 bar · 0.2 to 1 bar · 0.5 to 1.5 bar · 1 to 2.5 bar · 2 to 5 bar · 4.5 to 10 bar				0.2 bar · 0.3 bar · 0.4 bar · 0.5 bar	
Actuator 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>
Max. perm. operating pressure for actuator with two diaphragms	40 bar	40 bar	25 bar	25 bar	-	
Compliance	<b>CE EAC</b>					
Leakage class according to IEC 60534-4	≤ 0.05 % of K <sub>V5</sub> coefficient					

<sup>1)</sup> Higher temperatures on request

<sup>2)</sup> Steam version only with valves balanced by a bellows

Terms for control valve sizing according to IEC 60534, Parts 2-1 and 2-2:  $F_L = 0.95$ ,  $X_T = 0.75$

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

Type 2422 Valve, balanced by a bellows					
Nominal size	DN 15 to 250				
Nominal pressure	PN 16	PN 25	PN 16, 25 and 40		
Valve body	Cast iron EN-GJL-250	Spheroidal graphite iron EN-GJS-400-18-LT	Cast steel 1.0619	Forged stainless steel 1.4571 <sup>1)</sup>	Cast stainless steel 1.4408
Valve seat	Stainless steel 1.4104 or 1.4006			1.4404	
Plug	Up to DN 100	Stainless steel 1.4104, 1.4112 or 1.4006 <sup>2)</sup>			1.4404
	DN 125 to 250	1.4404, plug with PTFE seal			1.4404, with PTFE soft seal
Plug stem	1.4301				
Metal bellows	1.4571 · DN 125: 1.4404				
Bottom section	P265GH			1.4571	
Body gasket	Graphite on metal core				
Type 2422 Valve, balanced by a diaphragm					
Nominal size	DN 65 to 100				
Nominal pressure	PN 16		PN 25		
Valve body	Cast iron EN-GJL-250		Spheroidal graphite iron EN-GJS-400-18-LT		
Valve seat	1.4408				
Plug	CW617N				
Diaphragm cases	1.0619				
Pressure balancing	Diaphragm plate 1.4301 · EPDM balancing diaphragm, max. 150 °C or NBR diaphragm, max. 80 °C				
Nominal size	DN 125 to 250				
Nominal pressure	PN 16	PN 16/25	PN 16, 25 and 40	-	PN 16, 25 and 40
Valve body	Cast iron EN-GJL-250	Spheroidal graphite iron EN-GJS-400-18-LT	Cast steel 1.0619	-	Cast stainless steel 1.4408
Valve seat	CC499K <sup>3)</sup>				
Plug	CC499K <sup>3)</sup> · With EPDM soft seal, max. 150 °C or with PTFE soft seal, max. 150 °C				
Pressure balancing	Diaphragm plate EN-JS1030 · EPDM balancing diaphragm, max. 150 °C or NBR diaphragm, max. 80 °C				

<sup>1)</sup> DN 15, 25, 40 and 50 only

<sup>2)</sup> Optionally with soft seal with standard K<sub>V5</sub> coefficients

<sup>3)</sup> Special version 1.4409

**Table 2.2:** Materials · Type 2420/Type 2425 Actuator

Type 2420/Type 2425 Actuator		
Valve body	Cast iron, spheroidal graphite iron, cast steel 1.0619	Forged steel, cast stainless steel
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 oils: FKM using an actuator with two diaphragms

**Table 3:**  $K_{VS}$  coefficients,  $x_{FZ}$  values and max. permissible differential pressures  $\Delta p$ 

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
Valve travel		10 mm						16 mm			22 mm			
Standard $K_{VS}$ coefficient		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	
Reduced $K_{VS}$ coefficient		–	–	4	6.3	8	16	32		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 valve version with micro-trim:  $K_{VS}$  0.001 to 0.04 or  $K_{VS}$  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
Valve 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

Dimensional drawing · Type 42-25/42-20 balanced by a bellows · See Table 4

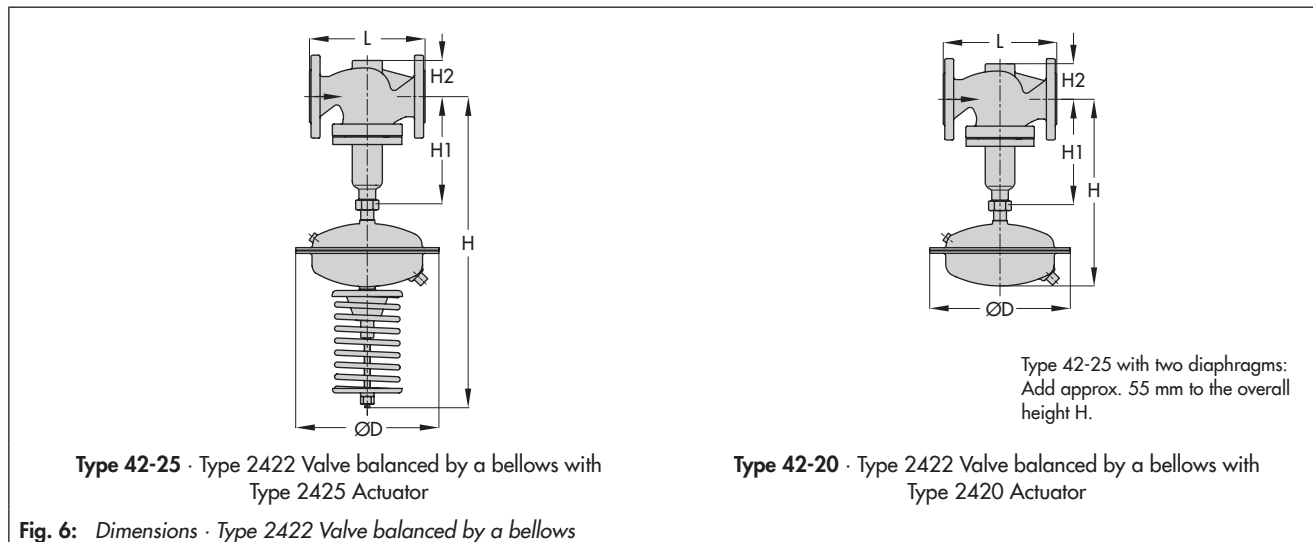


Fig. 6: Dimensions · Type 2422 Valve balanced by a bellows

## Dimensions and weights

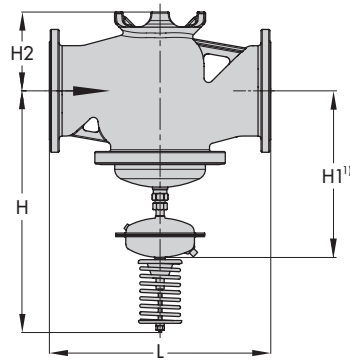
Table 4: Dimensions in mm and weights for Type 42-20 and Type 42-25 · Balanced by a bellows

Valve 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	Forged steel	53	–	70	–	92	98	–							
	Other materials	55			72			100	120	145	175	235	260		
<b>Type 42-20 Differential Pressure Regulator</b>															
Set points	Type 2420 Actuator														
0.2 · 0.3 · 0.4 · 0.5 bar	Height H	390						465		520		–			
	Actuator	ØD = 225 mm · A = 160 cm <sup>2</sup> 2)						ØD = 285 mm · A = 320 cm <sup>2</sup>							
	Weight <sup>3)</sup> in kg	11.5	12	13	19.5	20	22.5	38	43	57					
<b>Type 42-25 Differential Pressure Regulator</b>															
Set points	Type 2425 Actuator														
0.05 to 0.25 bar	Height H	625						700		755	990	1120	1260		
	Actuator	ØD = 285 mm · A = 320 cm <sup>2</sup> 1)						ØD = 285 mm · A = 640 cm <sup>2</sup>		ØD = 390 mm · A = 640 cm <sup>2</sup>					
	Weight <sup>3)</sup> in kg	21	21.5	22.5	29	29.5	32	46	51	65	135	185	425	485	
0.1 to 0.6 bar	Height H	625						685		740	990	1120	1260		
	Actuator	ØD = 225 mm · A = 160 cm <sup>2</sup> 2)						ØD = 285 mm A = 320 cm <sup>2</sup> 1)		ØD = 390 mm · A = 640 cm <sup>2</sup>					
	Weight <sup>3)</sup> in kg	16	16.5	17.5	24	24.5	27	46	51	65	135	185	425	485	
0.2 to 1 bar	Height H	625						700		755	990	1120	1260		
	Actuator	ØD = 225 mm · A = 160 cm <sup>2</sup> 2)						ØD = 390 mm · A = 640 cm <sup>2</sup>							
	Weight <sup>3)</sup> in kg	16	16.5	17.5	24	24.5	27	42	47	61	135	185	425	485	
0.5 to 1.5 bar	Height H	625						700		755	940	1070	1210		
	Actuator	ØD = 225 mm · A = 160 cm <sup>2</sup> 2)						ØD = 285 mm · A = 320 cm <sup>2</sup>							
	Weight <sup>3)</sup> in kg	16	16.5	17.5	24	24.5	27	42	47	61	125	175	415	475	
1 to 2.5 bar	Height H	625						700		755	940	1070	1210		
	Actuator	ØD = 225 mm · A = 160 cm <sup>2</sup>													
	Weight <sup>3)</sup> in kg	16	16.5	17.5	24	24.5	27	42	47	61	125	175	415	475	
2 to 5 bar	Height H	605						680		735	940	1070	1210		
	Actuator	ØD = 170 mm · A = 80 cm <sup>2</sup>						ØD = 225 mm · A = 160 cm <sup>2</sup>							
	Weight <sup>3)</sup> in kg	16	16.5	17.5	24	24.5	27	42	47	61	102	170	410	470	
4.5 to 10 bar	Height H	685						760		815	On request				
	Actuator	ØD = 170 mm · A = 80 cm <sup>2</sup>													
	Weight <sup>3)</sup> in kg	16	16.5	17.5	24	24.5	27	42	47	61					

1) Optionally with 640 cm<sup>2</sup> actuator

2) Optionally with 320 cm<sup>2</sup> actuator

3) The weight applies to the version with the material specifications EN-GJL-250. Add +10 % for all other materials.



Type 2422 Valve balanced by a diaphragm with Type 2425/2420 Actuator (Type 2425 in diagram)

Type 42-25 with two diaphragms: Add approx. 55 mm to the overall height H.

<sup>1)</sup> Type 42-20 only

**Fig. 7:** Dimensions · Type 2422 Valve balanced by a diaphragm

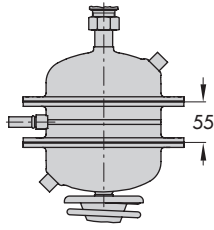
**Table 5:** Dimensions in mm and weights for Type 42-20 and Type 42-25 · Balanced by a diaphragm

Nominal size DN	65	80	100	125	150	200	250	
Length L	290	310	350	400	480	600	730	
Height H2	98		118	145	175	260		
<b>Type 42-20 Differential Pressure Regulator</b>								
<b>Set points</b>	<b>Type 2420 Actuator</b>							
0.2 · 0.3 · 0.4 · 0.5 bar	Height H1	355		375	-			
	Actuator	ØD = 285 mm · A = 320 cm <sup>2</sup>					-	
	Weight, approx. kg	38	43	51	-			
<b>Type 42-25 Differential Pressure Regulator</b>								
<b>Set points</b>	<b>Type 2425 Actuator</b>							
0.05 to 0.25 bar	Height H	590		610	815	840	910	
	Actuator	ØD = 390 mm · A = 640 cm <sup>2</sup>						
	Weight, approx. kg	42	47	55	75	95	250	270
0.1 to 0.6 bar	Height H	590		610	815	840	910	
	Actuator	ØD = 285 mm · A = 320 cm <sup>2</sup> <sup>1)</sup>			ØD = 390 mm · A = 640 cm <sup>2</sup>			
	Weight, approx. kg	42	47	55	75	95	250	270
0.2 to 1 bar	Height H	590		610	765	790	860	
	Actuator	ØD = 225 mm · A = 160 cm <sup>2</sup> <sup>2)</sup>			ØD = 285 mm · A = 320 cm <sup>2</sup> <sup>1)</sup>			
	Weight, approx. kg	42	47	55	75	95	250	270
0.5 to 1.5 bar	Height H	590		610	765	790	860	
	Actuator	ØD = 225 mm · A = 160 cm <sup>2</sup> <sup>2)</sup>			ØD = 285 mm · A = 320 cm <sup>2</sup> <sup>1)</sup>			
	Weight, approx. kg	42	47	55	75	95	250	270
1 to 2.5 bar	Height H	590		610	765	790	860	
	Actuator	ØD = 225 mm · A = 160 cm <sup>2</sup> <sup>2)</sup>						
	Weight, approx. kg	42	47	55	75	95	250	270
Set point range 2 to 5 bar	Height H	590		610	765	790	860	
	Actuator	ØD = 225 mm · A = 160 cm <sup>2</sup> <sup>2)</sup>						
	Weight, approx. kg	42	47	55	75	95	250	270

<sup>1)</sup> Optionally with 640 cm<sup>2</sup> actuator

<sup>2)</sup> Optionally with 320 cm<sup>2</sup> actuator

## Dimension drawing of actuator with two diaphragms



Type 42-25 with two diaphragms (special version). Add approx. 55 mm to the total height H.

**Fig. 8:** Dimensions in mm · Actuator with two diaphragms

### Ordering text

**Type 42-20 and Type 42-25** Differential Pressure Regulator

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

PN ..., body material ...

Set point or set point range ... bar

Optionally, accessories ...

Optionally, special version

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  
samson@samson.de · www.samson.de

**T 3007 EN**

2017-08-15 · English