

Self-operated Regulators Series 42



Differential Pressure Regulator with opening actuator and balanced Type 2422 Valve

Type 42-20 · Type 42-25

Application

Differential pressure regulators for large heating systems and industrial plants.

Differential pressure set points (Δp) 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** to **350 °C**, for air and other non-flammable gases up to **80 °C**

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

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
- Fixed set point (Type 42-20) or a set point adjustable over wide range (Type 42-25)
- Single-seated valve with a plug balanced by a stainless steel bellows or by a balancing diaphragm (DN 125 to DN 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 available in cast iron, spheroidal graphite iron or forged/cast stainless steel

Versions

Differential pressure regulators for installation in a bypass pipe or short-circuit pipe (see Typical application) · Flanged connections

Type 42-20 (Fig. 1) · Type 2422 Valve · Balanced by a bellows DN 15 to DN 100 · Type 2420 Opening Actuator with 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 DN 250 · Balanced by a diaphragm DN 125 to DN 250 · Type 2425 Opening Actuator · Adjustable set point in the range between 0.05 and 10 bar

Special versions

ANSI versions · Actuator with two diaphragms · Actuator with FPM diaphragm for mineral oil (version for other oils on request) · Version for low 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) · Special K_{VS} coefficient (reduced) · Valve entirely made of corrosion-resistant material (minimum grade 1.4301) Valves larger than DN 250 · For temperatures above 220 °C Backflow prevention (refer to T 3009 EN) · Version for deionized water · Version free of non-ferrous metal



Fig. 1 · Type 42-20 Differential Pressure Regulator



Fig. 2 · Type 42-25 Differential Pressure Regulator

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 free area between the plug (3) and the 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 bellows and the downstream pressure p_2 acts on the inside of the bellows (5). In valves balanced by a diaphragm, the upstream pressure p_1 acts on the outside of the diaphragm and the downstream pressure p_2 acts on the inside of the diaphragm (5.1). As a result, the forces acting on the valve plug are balanced out.

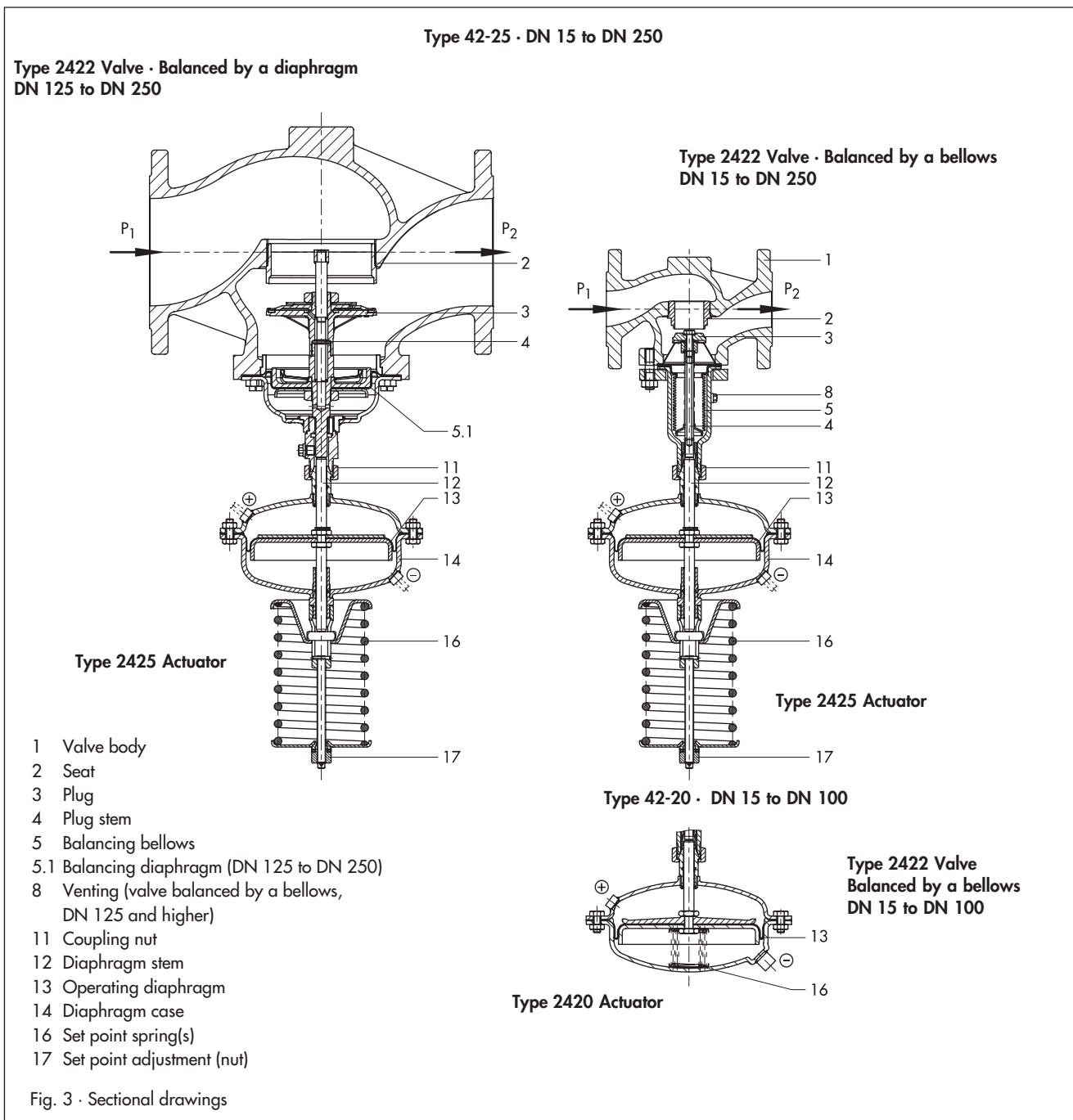
The differential pressure to be controlled is transmitted to the operating diaphragm (13) where it is converted into a positioning force. This force moves the plug (3) according to the force of the set point springs.

In **Type 42-25**, the set point can be adjusted at the set point adjustment (17).

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

The control lines in all versions transmit the low pressure and high pressure to the actuator.

SAMSON offers a special version of the Type 42-25 Regulator with an actuator with two diaphragms, which is especially suitable for applications with thin oils (e.g. heat transfer oil).



Type 42-25 Differential Pressure Regulator with an actuator with two diaphragms

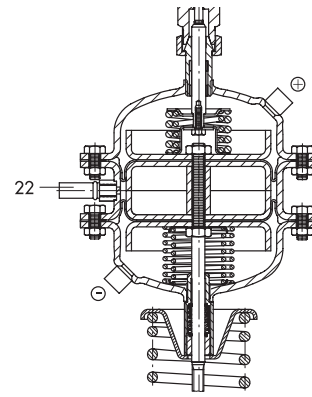
The regulator with an actuator with two diaphragms provides increased functional safety.

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 mechanical diaphragm rupture indicator (22) located in the intermediate ring between the two diaphragms 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 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.



Type 2425 Actuator with two diaphragms

22 Diaphragm rupture indicator

Fig. 4 · Type 2425 Actuator with two diaphragms

Table 1 · Technical data

Type		42-20	42-25
Nominal size		DN 15 to 100	DN 15 to 250
Nominal pressure		PN 16, 25 or 40 (acc. to DIN EN 12516-1)	
Max. permissible temperature	Body	See pressure-temperature diagram	
	Actuator ¹⁾	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	bar	0.2 · 0.3 · 0.4 · 0.5	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
Max. permissible operating pressure for actuator with two diaphragms		–	80 cm ² 160 cm ² 320 cm ² 640 cm ² 40 bar 40 bar 25 bar 25 bar
Leakage rate acc. to IEC 60534-4		≤ 0.05 % of K _{VS}	

¹⁾ Higher temperatures available on request

Terms for valve sizing according to IEC 60534: $F_L = 0.95$; $x_T = 0.75$

Refer to the dimensional drawings for assignment of valve and actuator

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	Forged stainless steel 1.4571 ²⁾	Cast stainless steel 1.4408 ¹⁾
Seat	Stainless steel 1.4104 or 1.4006				
Plug	Up to DN 100	Stainless steel 1.4104, 1.4112 or 1.4006 ³⁾			1.4571
	DN 125 to 250	1.4301, plug with PTFE seal			1.4571
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 1.4408
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				
Type 2424 and Type 2428 Actuator					
Diaphragm cases	DD 11			1.4301	
Diaphragm	EPDM ⁴⁾ with fabric reinforcement				
Guide bushing	DU bushing			PTFE	
Seals	EPDM/PTFE ⁴⁾				

1) DN 65 to DN 150 only

2) DN 15, 25, 40 and 50 only

3) Optional with soft sealing with standard K_{VS} coefficients

4) 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	20	25	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 Δp		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 Δp		25 bar								20 bar		16 bar	12 bar	
z value		0.65	0.6	0.55		0.45	0.4		0.35			0.3		

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 Δp		12 bar		10 bar	

Installation

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

The actuator can be easily mounted preferably after the valve is installed using a coupling nut.

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)

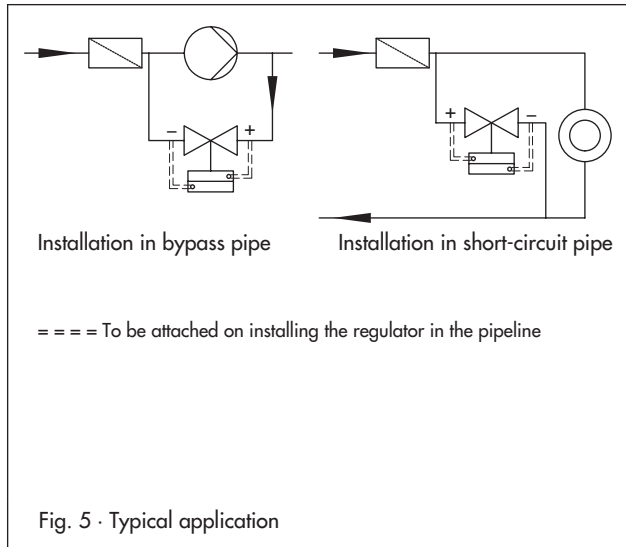


Permissible mounting positions

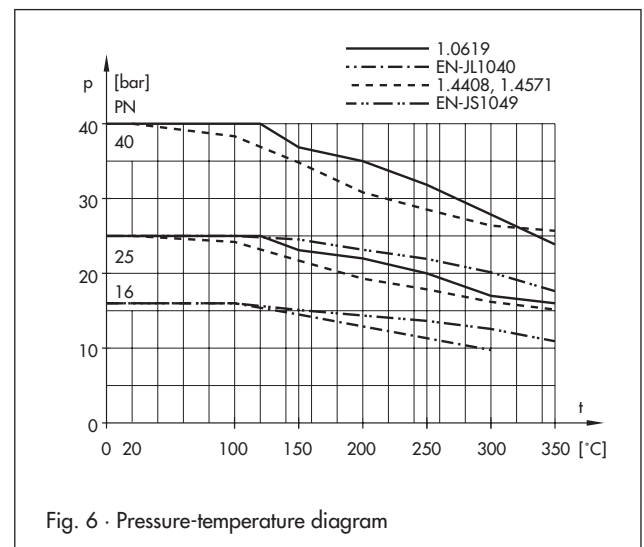
- Actuator suspended downwards (see photo): Standard installation for all versions above 80 °C and for applications with steam
- Actuator upright: All versions in DN 15 to DN 80 and max. 80 °C
- Actuator sideways: Only versions with fixed plug guide

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

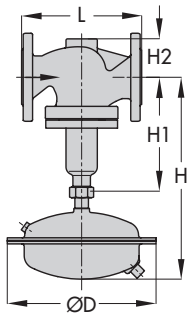
Typical application



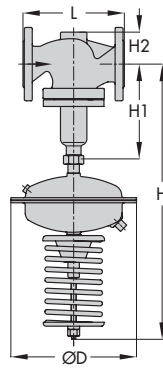
Pressure-temperature diagram – acc. to DIN EN 12516-1 –



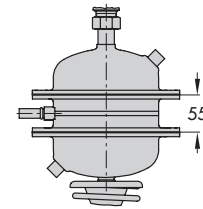
Dimensions



Type 42-20
Type 2422 Valve
balanced by a
bellows
with Type 2420
Actuator



Type 42-25
Type 2422 Valve
balanced by a
bellows
with Type 2425
Actuator



Special version
Type 42-25 with
actuator with two
diaphragms
Add approx. 55 mm to
height H

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

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

²⁾ Optionally with actuator A = 640 cm² · ³⁾ Optionally with actuator A = 320 cm²

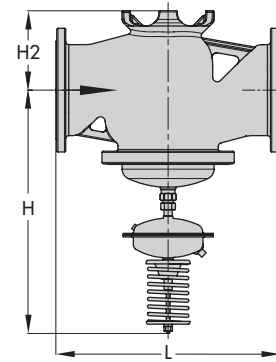
Fig. 7: Dimensions of Types 42-20/42-25, Type 2422 Valve balanced by a bellows with Type 2420/2425 Actuator

Dimensions in mm and weights in kg

Nominal size DN	125	150	200	250
Length L	400	480	600	730
Height H2	145	175	260	
Height H	720	745	960	
Weight for PN 16¹⁾				
Type 42-25 approx. kg	75	95	250	

1) For valve in PN 25/PN 40: +10 %

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



Type 42-25 · Type 2422 Valve balanced by a diaphragm with Type 2425 Actuator

Fig. 8 · Dimensional drawing of Type 2422 Valve balanced by a diaphragm with Type 2425 Actuator

Ordering text

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

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

Body material ..., PN ...

Set point / set point range ... bar

On option, accessories ... (refer to T 3095 EN)

On option, special version ...

Specifications subject to change without notice.



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