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.

For differential pressure set points (Δp) from **0.05** to **10 bar** Valves sizes **DN 15** to **DN 250** · Nominal pressure **PN 16** to **40** · Suitable for liquids and vapors from **5 °C** to **220 °C**, 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 24-20) or a set point adjustable over wide range (Type 24-25)
- Single-seated valve balanced by a stainless steel bellows
- 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 optionally available in cast iron, spheroidal graphite iron or stainless forged/cast steel

Versions

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

Type 42-20 (Fig. 1) · With Type 2422 Valve for DN 15 to DN 100 · Type 2420 Opening Actuator with fixed set point, adjusted to Δp = 0.2, 0.3, 0.4 or 0.5 bar

Type 42-25 (Fig. 2) · With Type 2422 Valve for DN 15 to DN 250 · Type 2425 Opening Actuator with adjustable set point

Special versions

ANSI versions · Actuator with two diaphragms · Actuator with FPM diaphragm for oils · Special K_{VS} (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

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.

Fig. 1 · Type 42-20 Differential Pressure Regulator

Fig. 2 · Type 42-25 Differential Pressure Regulator

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 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 (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 spring (14) in the actuator determines 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 regulator with an actuator with two diaphragms, which is especially suitable for applications with thin oils (e.g. heat transfer oil).

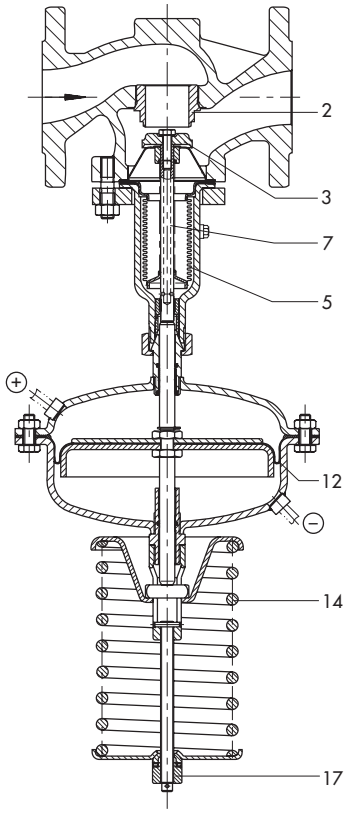
Type 42-25 Differential Pressure Regulator with an actuator with two diaphragms

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

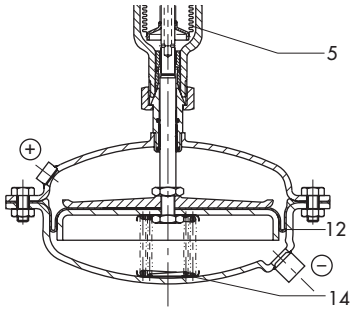
The operating diaphragm for the high pressure is connected to the valve inlet pressure and the operating diaphragm for the low pressure is connected to the valve outlet pressure. A bore hole located in the intermediate ring between the two diaphragms is fitted with a mechanical diaphragm rupture indicator (22), which responds at approx. 1.5 bar. In the event of a diaphragm rupture, the pressure in the space between the two operating 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.

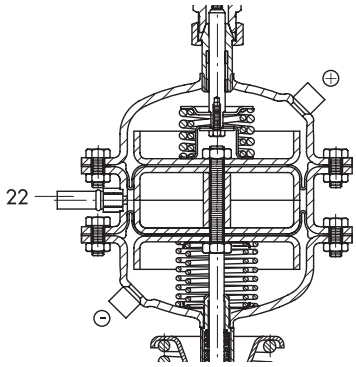
We recommend replacing both operating diaphragms when a rupture has been indicated.



Type 42-25 Differential Pressure Regulator with Type 2425 Actuator



Type 42-20 Differential Pressure Regulator with Type 2420 Actuator



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

2 Seat
3 Plug
5 Balancing bellows made of CrNiMo steel
7 Plug stem
12 Operating diaphragm
14 Set point spring
17 Set point adjustment
22 Diaphragm rupture indicator

Fig. 3 · Principle of operation

Table 1 · Technical data

Type		42-20	42-25
Nominal size	DN	15 to 100	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 220 °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 cm² | 160 cm² | 320 cm² | 640 cm² 20 bar 12 bar 10 bar 6 bar
Leakage rate		≤ 0.05 % of K_{VS}	

[1] Higher temperatures available 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 "Dimensions - Dimensions in mm and weights in kg - for assignment of valve and actuator

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 DIN EN

Type 2422 Valve					
Nominal pressure	PN 16	PN 25	PN 25/40		PN 40
Valve body	Cast iron EN-JL 1040	Sph. graphite iron EN-JS1049 [1]	Cast steel 1.0619 [1]	Stainless cast steel 1.4581[1, 2]	Stainless forged steel 1.4571[3]
Seat and plug	Stainless steel 1.4006 or 1.4104			Stainless steel 1.4571	
Plug stem	Stainless steel 1.4301				
Metal bellows	Stainless steel 1.4571 · DN 125 and larger: 1.4404				
Lower part of body	P265GH			1.4571	
Body gasket	Graphite on metal core				
Type 2420 and Type 2425 Actuator					
Diaphragm cases	Sheet steel DD11			1.4301	
Diaphragm	EPDM with fabric reinforcement [4]				

[1] PN 16 on request
[2] DN 65 to DN 150 only
[3] DN 15, 25, 40 and 50 only
[4] Special version for oils (ASTM I, II, III): FPM (FKM)

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

Nominal size	**DN**	**15**	**20**	**25**	**32**	**40**	**50**	**65**	**80**	**100**	**125**	**150**	**200**	**250**
Seat diameter	mm	22			40			65		89	103	125	207	
Travel	mm	10						16			22			
K_{VS}	Normal	4	6.3	8	16	20	32	50	80	125	190	280	420	500
	Reduced	1.0	2.5	4	6.3	8	16	20	32	50	–			
z value		0.65	0.6	0.55		0.45	0.4		0.35				0.3	
Max. permissible differential pressure Δp	bar	25						20		16		12	10	

Installation

The valve and actuator are delivered in separate packaging.

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

The following points need to be observed:

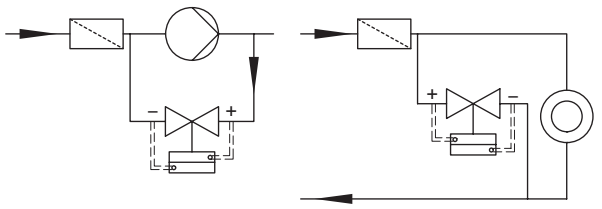
- Install valves in horizontal pipelines
- The medium must flow through the valve in the direction indicated by the arrow on the valve body.
- Install a strainer upstream of the valve (e.g. SAMSON Type 2 NI)

Permissible mounting positions

- All nominal sizes: Install the actuator suspended downwards (see photo)
- DN 15 to DN 80/Up to 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

Further details can be found in EB 3007 EN.

Typical application



Installation in bypass pipe Installation in short-circuit pipe

= = = = To be attached on installing the regulator in the pipeline

Fig. 4 · Typical application

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

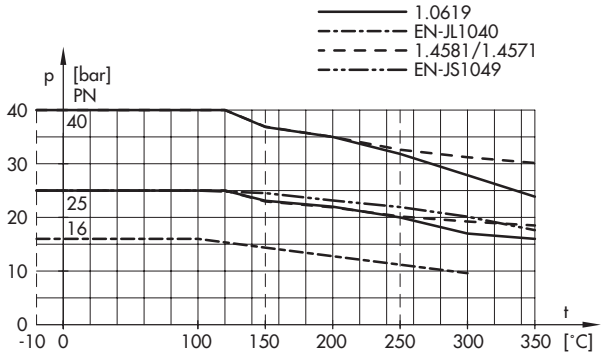
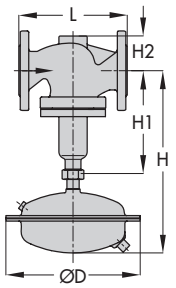


Fig. 5 · Pressure-temperature diagram

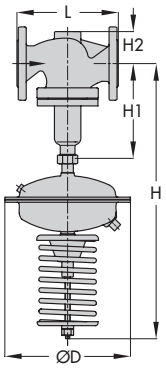
Ordering text

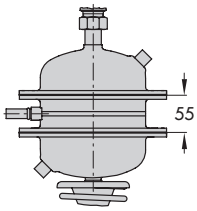
Differential Pressure Regulator **Type 42-20/42-25**
DN ...
Body material ..., PN ...
Set point / set point range ... bar
On option, accessories … (refer to T 3095 EN)
On option, special version …

Dimensions



Type 42-20





Special version
Type 42-25 with actuator with two diaphragms

Add 55 mm to height H

Type 42-25

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	–	–	–	–	–	–	–
Type 42-20 Differential Pressure Regulator														
Set point **0.2** · **0.3** **0.4** or **0.5 bar**	Height H	390						465		520	–			
	Actuator	Ø D = 225 mm, A = 160 cm² 3)						Ø D = 285 mm, A = 320 cm²						
	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	Ø D = 285 mm, A = 320 cm² 2)									Ø D = 390 mm, A = 640 cm²			
	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	Ø D = 225 mm, A = 160 cm² 3)						Ø D = 285 mm, A = 320 cm² 3)			Ø D = 390 mm, A = 640 cm² 3)			
	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	Ø D = 225 mm, A = 160 cm² 3)									Ø D = 390 mm, A = 640 cm²			
	Gewicht 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	Ø D = 225 mm, A = 160 cm² 3)									Ø D = 390 mm, A = 320 cm²			
	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	Ø D = 225 mm, A = 160 cm²												
	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	Ø D = 170 mm, A = 80 cm²									Ø D = 225 mm, A = 160 cm²			
	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	On request			
	Actuator	Ø D = 170 mm, A = 80 cm²												
	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
Type 24-25 with actuator **with two diaphragms**: Add **55 mm** to height **H**

Fig. 6 · Dimensions of Types 42-20/42-25

Specifications subject to change without notice.

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