

Self-operated Regulators Series 42



Differential Pressure Regulator with Flow Limitation Type 42-34 · Type 42-38

Application

Regulators for district heating supply networks with an indirect connection · Differential pressure set points from **0.1 to 1.5 bar**
Valves sizes **DN 15 to DN 250** · **PN 16 to 40** · Suitable for liquids from **5 °C to 150 °C**¹⁾, air and other non-flammable gases up to **80 °C**

The valve **closes** when the differential pressure increases. The flow rate is limited

The regulators consist of an actuator and a valve with an adjustable restriction. They control the differential pressure according to the set point adjusted at the actuator and limit the flow according to the set point adjusted at the restriction.

Special features

- Low-noise, self-operated P-regulators requiring little maintenance
- 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
- Single-seated valve with a plug balanced by a stainless steel bellows or a balancing diaphragm (DN 125 to 250)
- Valve body optionally available in cast iron, spheroidal graphite iron, cast steel or stainless forged/cast steel

Versions

Differential pressure regulators with flow limitation for installation in the return flow pipe (see Fig. 6 · Typical application)

Type 42-34 (Fig. 1) · Type 2423 Valve · Balanced by a bellows or diaphragm (DN 125 to 250) · Nominal size DN 15 to DN 250 · Type 2424 Actuator with adjustable set point

Type 42-38 (Fig. 2) · Type 2423 Valve · Balanced by a bellows
Nominal size DN 15 to DN 100 · Type 2428 Actuator with fixed set point, adjusted to $\Delta p = 0.2, 0.3, 0.4$ or 0.5 bar

Special versions

ANSI versions · Actuator with FPM diaphragm for oils · Valve entirely made of corrosion-resistant material (minimum grade 1.4301) · Suitable for liquids and vapors max. 220 °C · Higher flow rate ranges with an upper differential pressure at the restriction of 0.5 bar

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.

¹⁾ Other temperature ranges on request



Fig. 1 · Type 42-34 Differential Pressure Regulator with Flow Limitation



Fig. 2 · Type 42-38 Differential Pressure Regulator with Flow Limitation

Principle of operation (Fig. 3)

The medium flows through the valve in the direction indicated by the arrow. The flow rate and the differential pressure Δp are determined by the free area between the restriction (1.1) with orifice (1.4) and the plug (3).

The principle of operation of the regulator with a valve balanced by a bellows or by a diaphragm only differ concerning their pressure balancing. The pressure directly downstream of the orifice (1.4) acts on the outer surface of the metal bellows or balancing diaphragm and the downstream pressure on the inside of the bellows or diaphragm. As a result, the forces created by the upstream and downstream pressures acting on the valve plug are equally balanced.

To control the differential pressure, the high pressure is transmitted over the control line (19) to the lower diaphragm chamber of the actuator. The pressure downstream of the orifice is transmitted through the hollow plug stem and the control line (9/9.1) to the upper diaphragm chamber of the actuator. The differential pressure is converted into a set point force at the operating diaphragm (13) and used to move the plug according to the force of the set point springs (16).

In Type 42-38, the set point springs (16) in the actuator determine the set point. While, in Type 42-34, the set point can be adjusted at the set point adjustment (17).

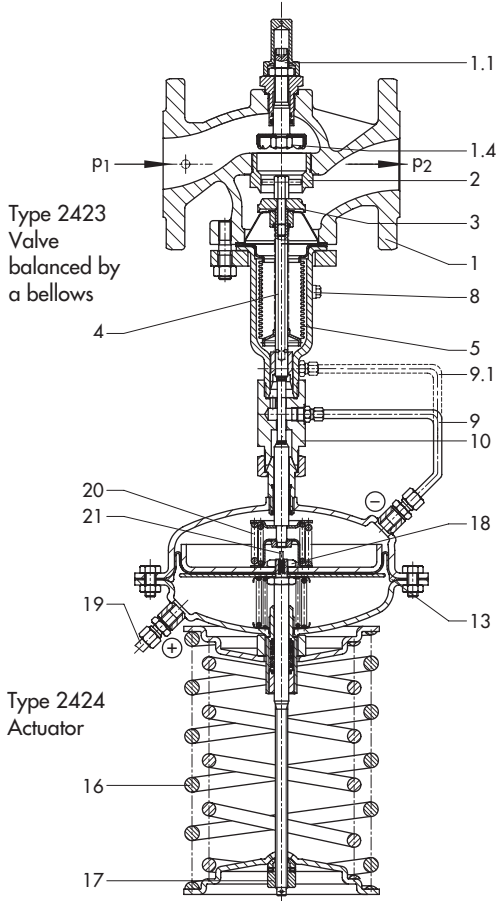
The restriction (1.1) with orifice (1.4) is used to set the maximum flow rate.

When selecting the differential pressure set point or set point range, make sure that the differential pressure Δp is the sum of the pressure drop in the fully open plant and the pressure drop across the restriction (see Table 3).

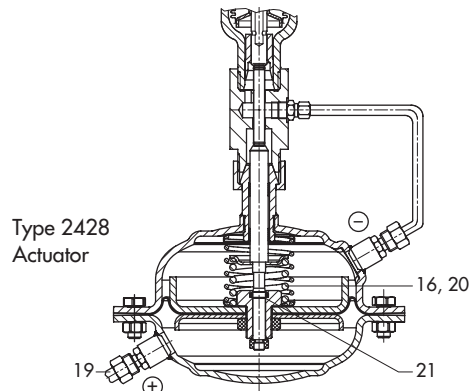
Type 2424 and Type 2428 Actuators are fitted with a force limiter (20) with an internal excess pressure limiter (21). It limits the force acting on the plug stem as well as protecting the seat and plug from overload. To protect the consumer, the internal excess pressure limiter opens when the pressure at which it responds is reached (see Table 1).

1	Valve	9.1	Low-pressure control line (DN 125 and larger)
1.1	Restriction for flow rate set point adjustment	10	Connecting piece (up to DN 100)
1.4	Orifice	13	Operating diaphragm
2	Seat	16	Set point springs
3	Plug	17	Set point adjustment
4	Plug stem	19	High-pressure control line (connection)
5	Balancing bellows	20	Force limiter
5.1	Balancing diaphragm	21	Internal excess pressure limiter
8	Venting (balanced by bellows, DN 125 and larger)		
9	Low-pressure control line (up to DN 100)		

Type 42-34 balanced by a bellows · DN 15 to 250



Type 42-38 balanced by a bellows · DN 15 to 100



Type 42-34 balanced by a diaphragm · DN 125 to 250

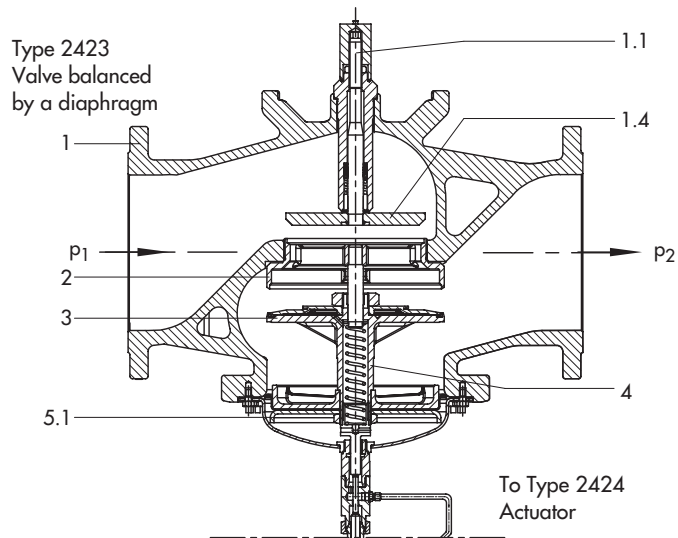


Fig. 3 · Schematic drawings

Table 1 · Technical data

Type 2423 Valve · Balanced by a bellows			
Type		42-34	42-38
Nominal size		DN 15 to 250	DN 15 to 100
Nominal pressure	PN	16, 25 or 40 (acc. to DIN EN 12516-1)	
	Body	See pressure-temperature diagram	
Max. perm. temperature	Actuator ¹⁾	With equalizing tank: Liquids up to 220 °C Without equalizing tank: Liquids up to 150 °C Air and gases up to 80 °C	
Pressure at which internal excess pressure limiter responds		160 cm ² = 1.2 bar 320 cm ² = 0.6 bar 640 cm ² = 0.3 bar	160 cm ² = 0.6 bar 320 cm ² = 0.3 bar
Set point ranges	bar	0.1 to 0.6 bar · 0.2 to 1 bar · 0.5 to 1.5 bar	0.2 · 0.3 · 0.4 · 0.5 bar
Leakage rate		≤ 0.05 % of K _{VS}	

Type 2423 Valve · Balanced by a diaphragm		
Type		42-34
Nominal size		DN 125 to 250
Nominal pressure	PN	16, 25 or 40 (acc. to DIN EN 12516-1)
	Body	See pressure-temperature diagram
Max. perm. temperature	Actuator ¹⁾	With equalizing tank: Liquids up to 220 °C Without equalizing tank: Liquids up to 150 °C Air and gases up to 80 °C
Pressure at which internal excess pressure limiter responds		160 cm ² = 1.2 bar 320 cm ² = 0.6 bar 640 cm ² = 0.3 bar
Set point ranges	bar	0.1 to 0.6 bar · 0.2 to 1 bar · 0.5 to 1.5 bar
Leakage rate		≤ 0.05 % of K _{VS}

1) Higher temperatures on request

Table 2 · Permissible K_{VS} coefficients, z values and maximum permissible differential pressures

Type 2423 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		4	6.3	8	16	20	32	50	80	125	190	280	420	500
z value		0.65	0.6	0.55		0.45	0.4		0.35				0.3	
Max. perm. differential pressure Δp		25 bar						20 bar		16 bar	12 bar	10 bar		

Type 2423 Valve · Balanced by a diaphragm					
Nominal size	DN	125	150	200	250
K _{VS} value m ³ /h	22 mm travel	190	290	550	600
	35 mm travel	250	380	650	800
Max. perm. differential pressure Δp		12 bar		10 bar	

Table 3 · Flow rate set points for water in m³/h

Valve balanced by a bellows																	
$\Delta p_{\text{set point}}$	Δp_{plant}	$\Delta p_{\text{restriction}}$	DN	15	20	25	32	40	50	65	80	100	125	150	200	250	
0.2 bar	0.1 bar	0.1 bar	\dot{V}	min	0.05	0.15	0.25	0.4	0.6	0.9	2	3.5	6.5	11	18	20	26
				max	1.4	2.1	2.4	4.9	7.7	11.2	19	28	44	56	84	126	154
0.5 bar	0.3 bar	0.2 bar	\dot{V}	max	2	3	3.5	7	11	16	28	40	63	80	120	180	220
1.0 bar	0.5 bar	0.5 bar	\dot{V}	max	3	4.5	5.3	9.5	16	24	40	58	90	120	180	260	300

Valve balanced by a diaphragm					
Nominal size	DN	125	150	200	250
Flow rate set point ranges in m ³ /h with $\Delta p_{\text{restriction}} = 0.2$ bar		11 to 120	18 to 180	20 to 320	26 to 350

Flow limitation

Differential pressure in the plant and across the valve

On selecting the differential pressure set point or set point range, note that the differential pressure set point $\Delta p_{\text{set point}}$ results from the know pressure drop of the completely open plant Δp_{plant} and the pressure drop across the restriction $\Delta p_{\text{restriction}}$ (Fig. 4).

The flow rates in the Table 3 are specified with an upper differential pressure of 0.1 bar, 0.2 bar and 0.5 bar.

$$\Delta p_{\text{set point}} = \Delta p_{\text{plant}} + \Delta p_{\text{restriction}}$$

The minimum required differential pressure Δp_{min} between the flow pipe and the return flow pipe is calculated as follows:

$$\Delta p_{\text{min}} = \Delta p_{\text{set point}} + \left(\frac{\dot{V}}{K_{VS}} \right)^2$$

- Δp_{min} Minimum differential pressure across the valve in bar
- $\Delta p_{\text{restriction}}$ Differential pressure especially created at the restriction to measure the flow rate in bar
- $\Delta p_{\text{set point}}$ Differential pressure set point in bar
- Δp_{plant} Differential pressure (pressure loss) when the plant is completely open in bar
- \dot{V} Adjusted flow rate in m³/h
- K_{VS} Valve flow coefficient in m³/h

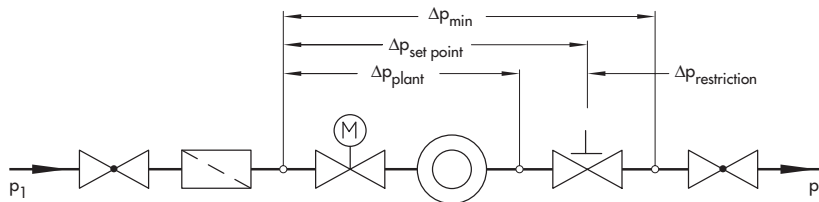


Fig. 4 · Pressure conditions in the plant

Installation

The regulators must be installed in return flow pipe of a plant.

The valve and actuator are delivered in separate packaging.

Mount the actuator preferably after the valve is installed in the pipeline. It is connected to the valve with a coupling nut (for DN 15 to DN 100, additionally with the connecting piece).

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 and max. 80 °C: Install the actuator either suspended or upright
- All nominal sizes with fixed plug guide and max. 80 °C: Any position possible

Refer to EB 3013 EN for more details.

Table 4 · Materials · Material number acc. to DIN EN

Type 2423 Valve · Balanced by a bellows					
Nominal pressure	PN 16	PN 25	PN 40		
Valve body	Cast iron EN-JL 1040	Sph. graphite iron EN-JS 1049	Cast steel 1.0619 ¹⁾	Stainless cast steel 1.4581 ^{1), 2)}	Stainless forged steel 1.4571 ³⁾
Seat and plug	Up to DN 100	Stainless steel 1.4006 or 1.4104			
	DN 125 to 250	1.4301 · Plug with PTFE sealing			1.4571
Plug stem	1.4310				
Metal bellows	1.4571				
Lower part of body	P265GH			1.4571	
Body gasket	Graphite on metal core				
Type 2423 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-JL1040	Spheroidal graphite iron EN-JS 1049	Cast steel 1.0619	Stainless cast steel 1.4581	
Seat	Red brass (CC491K)				
Plug Standard version	Red brass (CC491K) with EPDM soft sealing, max. 150 °C				
Pressure balancing	Balancing cases made of sheet steel DD11 · EPDM diaphragm, max. 150 °C or NBR diaphragm, max. 60 °C				
Types 2424 and Type 2428 Actuator					
Diaphragm cases	Sheet steel DD 11				
Diaphragm	EPDM ⁴⁾ with fabric reinforcement				
Guide bushing	DU bushing				

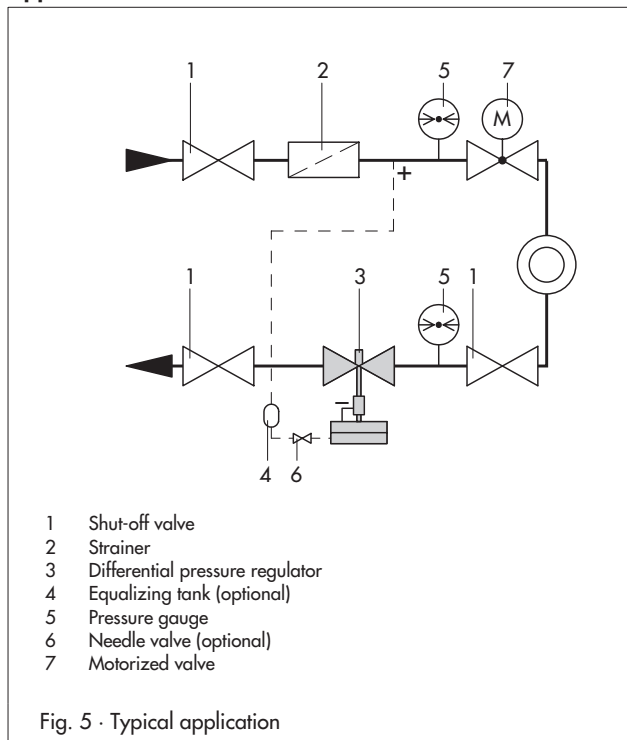
¹⁾ PN 16 and PN 25 available on request

²⁾ DN 65 to DN 150 only

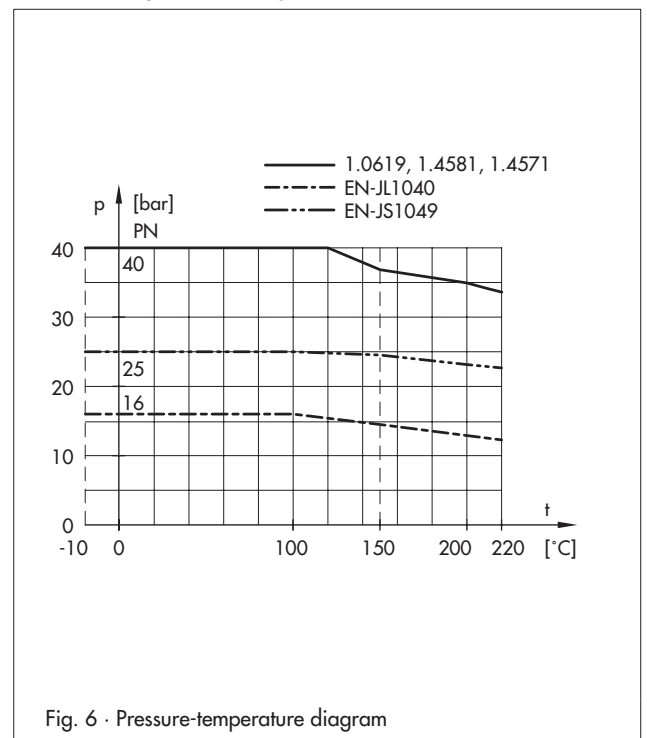
³⁾ DN 15, 25, 40 and 50 only

⁴⁾ Special version for oils: FPM (FKM)

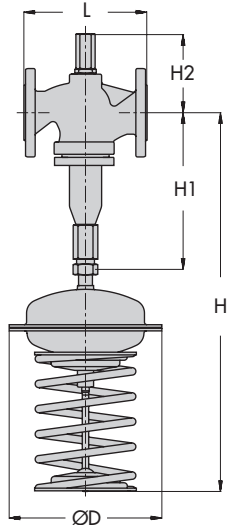
Application



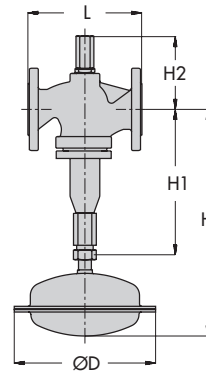
Pressure-temperature diagram – acc. to DIN EN 12516-1 –



Dimensions and weights · Type 42-34 and Type 42-38 · Balanced by a bellows



Type 42-34
Balanced by a bellows



Type 42-38
Balanced by a bellows

Table 5 · Dimensions and weights

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		285						360		415	460	590	730		
Height H2	Other materials	115			135			195		220	265	295	400		
	Forged steel	113	-	130	-	155	161	-	-	-	-	-	-	-	
Type 42-34 · Balanced by a bellows															
Set point range 0.1 to 0.6 bar	Height H	670						745		800	990	1120	1260		
	Actuator	Ø D = 225 mm · A = 160 cm ² 2)						Ø D = 285 mm A = 320 cm ²		Ø D = 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	670						745		800	990	1120	1260		
	Actuator	Ø D = 225 mm · A = 160 cm ² 2)						Ø D = 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	670						745		800	880	1040	1210		
	Actuator	Ø D = 225 mm · A = 160 cm ² 2)						Ø D = 285 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	
Type 42-38 · Balanced by a bellows															
Set point range 0.2 · 0.3 · 0.4 · 0.5 bar	Height H	450						525		585					
	Actuator	Ø D = 225 mm · A = 160 cm ²						Ø D = 285 mm A = 320 cm ²		-					
	Weight ¹⁾ in kg	11.5	12	13	19.5	20	22.5	38	43	57					

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

²⁾ Optionally with actuator 320 cm²

Fig. 7 · Dimensions

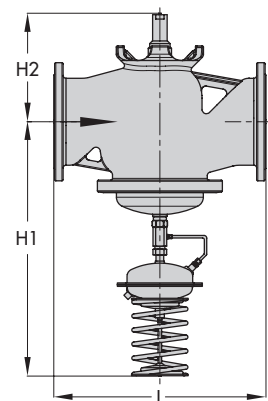
Dimensions and weights · Type 42-34 · Balanced by a diaphragm

Table 6 · Dimensions in mm and weights
Type 42-34 · Balanced by a diaphragm

Nominal size DN	125	150	200	250
Length L	400	480	600	730
Height H1	780	805	1020	
Height H2	295	325	345	375
Weight ¹⁾ , approx. kg	95	115 ²⁾	290 ²⁾	305 ²⁾

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

²⁾ With actuator 640 cm²



Type 42-34
Balanced by a diaphragm

Fig. 8 · Dimensions

Ordering text

Differential Pressure Regulator with Flow Limitation

Type 42-34/42-38

DN ..., PN ..., body material ...

Set point range for differential pressure ... bar

On option, accessories ...

On option, special version ...

Specifications subject to change without notice.



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