

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 metal bellows
- 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 · Nominal size DN 15 to DN 250 · Type 2424 Actuator with adjustable set point

Type 42-38 (Fig. 2) · Type 2423 Valve · 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 (ASTM I, II, III) · 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) and the plug (3).

The valve plug is unaffected by pressure changes in the medium since the pressure downstream the restriction acts on the outer surface of the metal bellows (5) and the low pressure on the inner side of the bellows. In this way, the forces acting on the valve plug are equally balanced.

To control the differential pressure, the high pressure is transmitted over the control line (18) to the lower diaphragm chamber of the actuator. The pressure downstream of the restriction is transmitted through the hollow plug stem and the control line (19) to the upper diaphragm chamber of the actuator. The differential pressure is converted into a set point force at the operating diaphragm (12) and used to move the plug according to the force of the set point spring (14).

In Type 42-38, the set point springs (14) 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) 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 4).

Type 2424 and Type 2428 Actuators are fitted with a force limiter (15) 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 is reached specified in Table 1.

Valve

- 1.1 Restriction for flow rate set point adjustment
- 2 Seat (exchangeable)
- 3 Plug
- 5 Metal bellows
- 6 Venting (DN 125 and larger)
- 7 Plug stem
- 8 Type 42-34: Connection for low pressure control line (DN 125 to DN 250) - Connection piece is not required for these nominal sizes -
- 9 Connecting piece for low pressure control line (DN 15 to DN 100)

Actuator

- 11 Diaphragm stem
- 12 Operating diaphragm
- 14 Set point spring(s)
- 15 Force limiter
- 17 Set point adjustment
- 18 Control line (high pressure, attached on site)
- 19 Control line (low pressure)
- 21 Internal excess pressure limiter (overload protection)

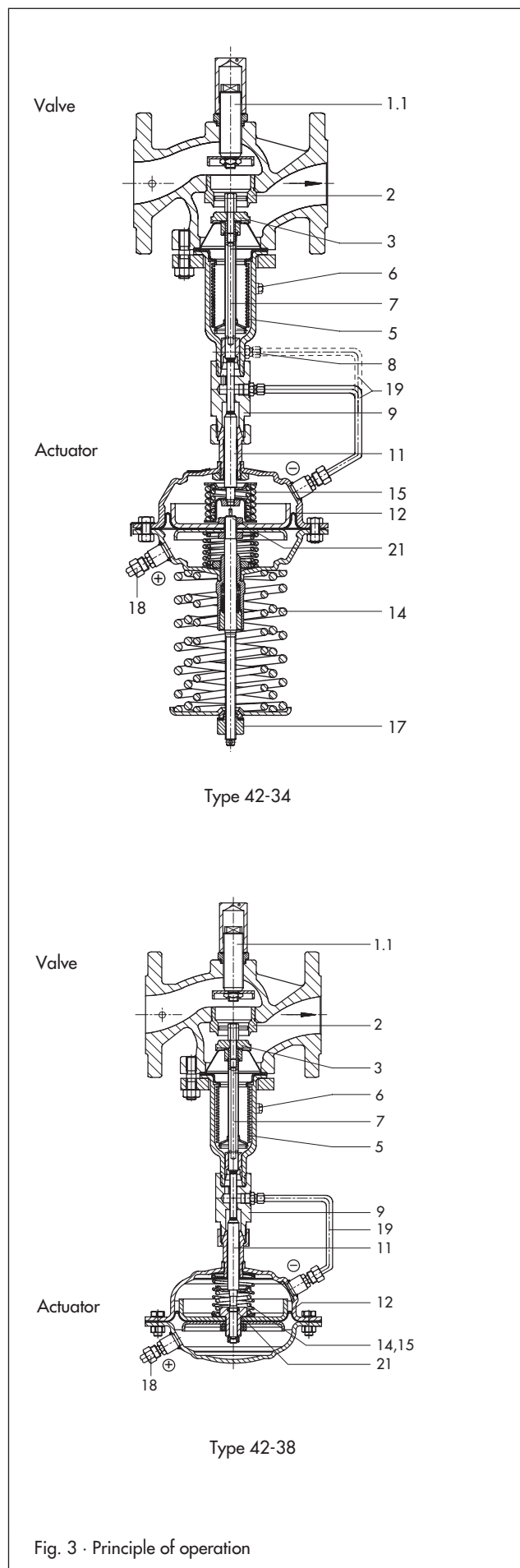


Fig. 3 · Principle of operation

Table 1 · Technical data

Type		42-34	42-38
Nominal size	DN	15 to 250	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	
Leakage rate		≤ 0.05 % of K _{VS}	

¹⁾ Higher temperatures on request

Refer to Data Sheet T 2650 EN for more details on the version of **Type 2423 Valve balanced by a diaphragm**

Table 2 · Materials · Material number acc. to DIN EN

Type 2423 Valve					
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	Stainless steel 1.4006 or 1.4104				
	Up to DN 100	1.4301 · Plug with PTFE sealing			1.4571
	DN 125 to 250				
Plug stem	1.4310				
Metal bellows	1.4571				
Lower part of body	P265GH (St 35.8)			1.4571	
Body gasket	Graphite on metal core				
Types 2424 and Type 2428 Actuator					
Diaphragm cases	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 (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} 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						20		16	12	10			

Table 4 · Flow rate set points for water in m³/h

$\Delta p_{\text{set point}}$	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

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 $\Delta p_{\text{restriction}}$

The flow rates in the table 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

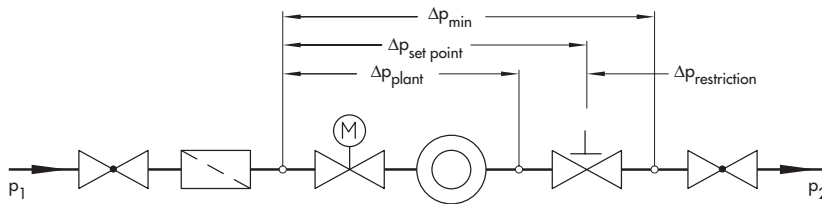


Fig. 4 · Pressure conditions

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

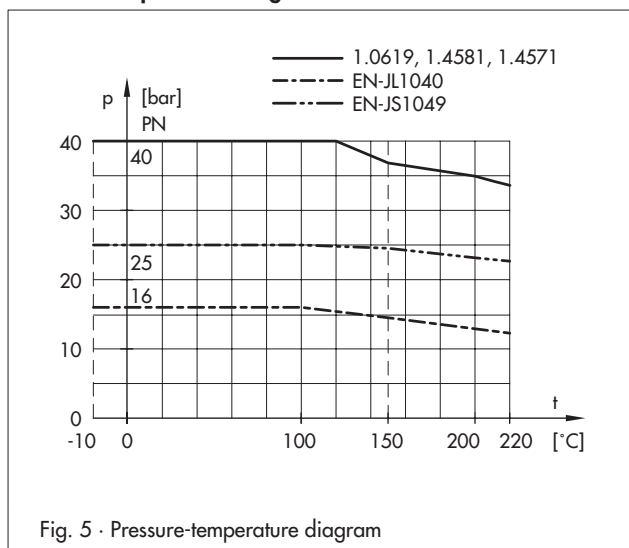


Fig. 5 · Pressure-temperature diagram

Installation

The regulators must be installed in return flow pipeline 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 adapter).



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

Refer to EB 3013 EN for more details

Ordering text

Differential Pressure Regulator with Flow Limitation

Type 42-34/42-38

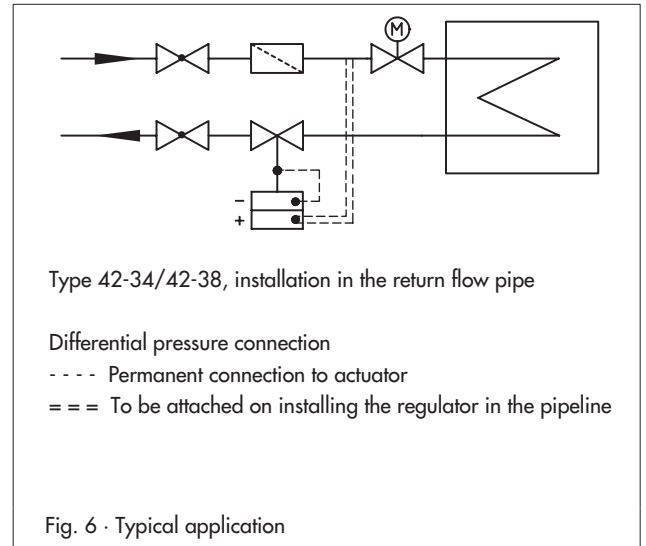
DN ..., PN ..., body material ...

Set point range for differential pressure ... bar (refer to section on principle of operation)

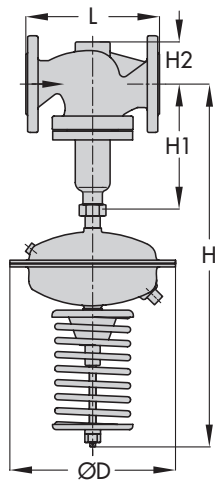
On option, accessories ...

On option, special version ...

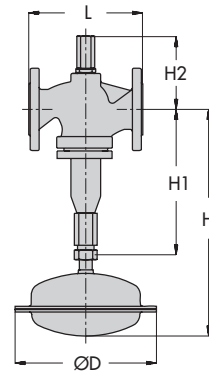
Application



Dimensions in mm



Type 42-34



Type 42-38

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 Differential Pressure Regulator with Flow Limitation

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 Differential Pressure Regulator with Flow Limitation

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/PN 16. Add 10 % for versions in other materials

²⁾ Optionally with actuator 320 cm²

Fig. 7 · Dimensions

Specifications subject to change without notice.



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