

T 3013 EN

Type 42-34 and Type 42-38 Differential Pressure Regulators with Flow Limitation Series 42 Self-operated Regulators



Application

Regulators for district heating supply networks with an indirect connection · Differential pressure set points from **0.1 to 2.5 bar** · Valve sizes **DN 15 to 250** · **PN 16 to 40** · Suitable for liquids from **5 to 150 °C** ¹⁾

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

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

Special features

- Low-noise, medium-controlled proportional regulator requiring little maintenance
- Suitable for circuit water, water/glycol mixtures 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.
- Valve body made of cast iron, spheroidal graphite iron or cast steel.

Versions

Differential pressure regulator with flow limitation for installation in the return flow pipe (see Fig. 6)

Type 42-34 (Fig. 1) · Type 2423 Valve · Balanced by a bellows or diaphragm (DN 65 to 250) · Valve size DN 15 to 250 · Type 2424 Actuator with an adjustable set point

Type 42-38 (Fig. 2) · Type 2423 Valve · Balanced by a bellows · Valve size DN 15 to 100 · Balanced by a diaphragm (DN 65 to 100) Type 2428 Actuator with a fixed set point, adjusted to $\Delta p = 0.2, 0.3, 0.4$ or 0.5 bar

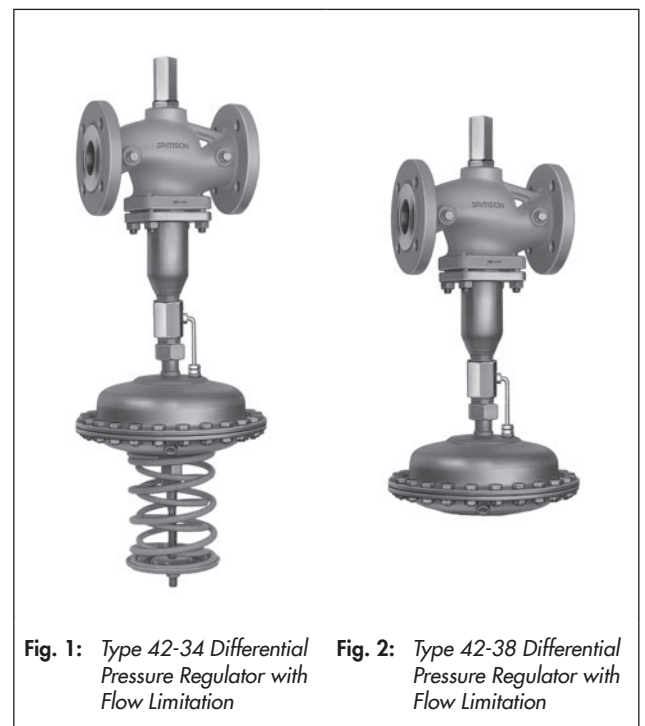


Fig. 1: Type 42-34 Differential Pressure Regulator with Flow Limitation

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

Special version

ANSI version · Max. 220 °C for liquids · Higher flow ranges at 0.5 bar differential pressure across the restriction

Accessories

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

¹⁾ Other temperature ranges on request

Principle of operation (see Fig. 3)

The medium flows through the valve in the direction indicated by the arrow. The areas released by the restriction (1.4) and the valve plug (3) determine the flow rate and the differential pressure Δp .

Regulators balanced by a bellows or a diaphragm only differ in the pressure balancing principle applied. Valves balanced by a bellows have a balancing bellows (5), whereas the valves balanced by a diaphragm (DN 65 to 250) have a balancing diaphragm (5.1). The upstream pressure p_1 directly downstream of the restriction (1.4) acts on the outside of the metal bellows or balancing diaphragm, while the downstream pressure p_2 acts on the inside of the bellows or balancing diaphragm. In both cases, the forces created by the upstream and downstream pressures that act on the valve plug are balanced out.

To control the differential pressure, the high pressure transmitted through the high-pressure control line (19) mounted on site to the bottom diaphragm chamber of the actuator. The pressure downstream of the restriction is transmitted through the hollow plug stem and the control line (9/9.1) to the top diaphragm chamber of the actuator. The resulting differential pressure is converted into a positioning force by the operating diaphragm (13). This force is 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 determines the set point. The set point of Type 42-34 is adjustable at the set point adjustment (17). The flow set point adjustment is used to move the restriction (1.4) and 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 Fig. 4).

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	Type 2423 Valve	9.1	Low-pressure control line (DN 125 and larger)
1.1	Flow set point adjustment	10	Connecting piece (up to DN 100)
1.4	Restriction	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		Force limiter with internal excess pressure limiter (overload protection)
5.1	Balancing diaphragm	21	
8	Venting (balanced by a bellows, DN 125 and larger)		
9	Low-pressure control line (up to DN 100)		

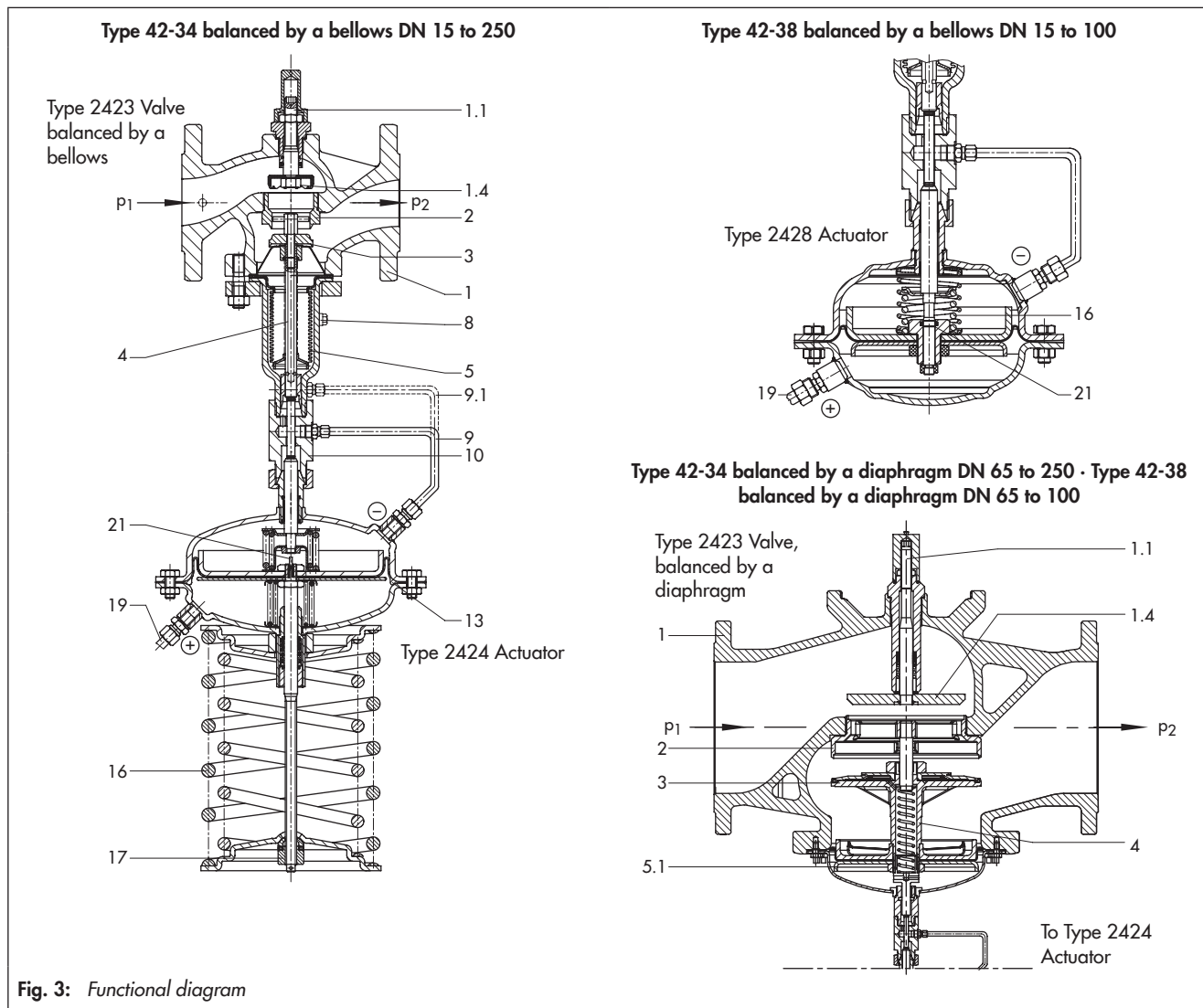


Fig. 3: Functional diagram

Table 1: Technical data · Type 42-34 and Type 42-38

Type 2423 Valve · Balanced by a bellows			
Type	42-34		42-38
Valve size	DN 15 to 250		DN 15 to 100
Pressure rating	PN 16, 25 or 40		
Pressure at which internal excess pressure limiter responds	A = 160 cm ²	1.2 bar	0.6 bar
	A = 320 cm ²	0.6 bar	0.3 bar
	A = 640 cm ²	0.3 bar	–
Max. permissible temperature	Valve body	See pressure-temperature diagram in ► T 3000	
	Actuator ¹⁾	With compensation chamber: liquids up to 220 °C · Without compensation chamber: 150 °C	
Set point ranges	0.1 to 0.6 bar · 0.2 to 1 bar · 0.5 to 1.5 bar · 1 to 2.5 bar		0.2 bar · 0.3 bar · 0.4 bar · 0.5 bar
Leakage class according to IEC 60534-4	≤0.05 % of K _{VS} coefficient		
Conformity	CE ENEC		
Type 2423 Valve · Balanced by a diaphragm			
Type	42-34		
Valve size	DN 65 to 250		
Pressure rating	PN 16, 25 or 40		
Pressure at which internal excess pressure limiter responds	A = 160 cm ²	1.2 bar	
	A = 320 cm ²	0.6 bar	
	A = 640 cm ²	0.3 bar	
Max. permissible temperature	Valve body	150 °C	
	Actuator ¹⁾	Liquids 150 °C	
Set point ranges	0.1 to 0.6 bar · 0.2 to 1 bar · 0.5 to 1.5 bar · 1 to 2.5 bar		
Leakage class acc. to IEC 60534-4	≤0.05 % of K _{VS} coefficient		
Conformity	CE ENEC		

¹⁾ Higher temperatures on request

Table 2: K_{VS} coefficients, x_{FZ} values and max. permissible differential pressures Δp

Type 2423 Valve balanced by a bellows														
Valve size	DN	15	20	25	32	40	50	65	80	100	125	150	200	250
Valve travel		10 mm						16 mm			22 mm			
K _{VS} coefficient		4	6.3	8	16	20	32	50	80	125	190	280	420	500
x _{FZ} value		0.65	0.6	0.55		0.45	0.4		0.35				0.3	
Max. perm. diff. pressure Δp		25 bar						20 bar		16 bar	12 bar	10 bar		
Type 2423 Valve, balanced by a diaphragm														
Valve size	DN	65	80	100	125	150	200	250						
K _{VS} coefficient		50	80	125	250	380	650	800						
x _{FZ} value		0.4	0.35						0.3					
Max. perm. diff. pressure Δp		10 bar				12 bar			10 bar					

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

Type 2423 Valve balanced by a bellows																
Δp _{set point}	Δp _{plant}	Δp _{restriction}	DN	15	20	25	32	40	50	65	80	100	125	150	200	250
			Ṃ Min.	0.05	0.15	0.25	0.4	0.6	0.9	2	3.5	6.5	11	18	20	26
0.2 bar	0.1 bar	0.1 bar	Ṃ 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	Ṃ Max.	2	3	3.5	7	11	16	28	40	63	80	120	180	220
1.0 bar	0.5 bar	0.5 bar	Ṃ Max.	3	4.5	5.3	9.5	16	24	40	58	90	120	180	260	300
Type 2423 Valve, balanced by a diaphragm																
Valve size	DN	65	80	100	125	150	200	250								
Diff. pressure across restriction Δp _{restriction}	0.2 bar	2 to 28	3.5 to 35 ¹⁾	6.5 to 63	11 to 120	18 to 180	20 to 320	26 to 350								
	0.5 bar	3.5 to 40	6.5 to 55	11 to 90	18 to 180	20 to 260	26 to 450	30 to 520								

¹⁾ 7 to 35 m³/h (160 cm² actuator), 7 to 40 m³/h (320 cm² actuator)

Flow limitation

Pressure conditions in the plant and across the valve

When selecting the differential pressure set point or set point range, make sure that the differential pressure $\Delta p_{\text{set point}}$ is the sum of the pressure drop in the fully open plant Δp_{plant} and the pressure drop across the restriction $\Delta p_{\text{restriction}}$ (see Fig. 4).

The flow rates at a differential pressure across the restriction of 0.1 bar, 0.2 bar and 0.5 bar are specified in Table 3.

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

Differential pressure across the valve

The minimum required differential pressure Δp_{min} between the flow pipe and 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 created at the restriction for measuring the flow rate
$\Delta p_{\text{set point}}$	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 m ³ /h
K_{VS}	Valve flow coefficient in m ³ /h

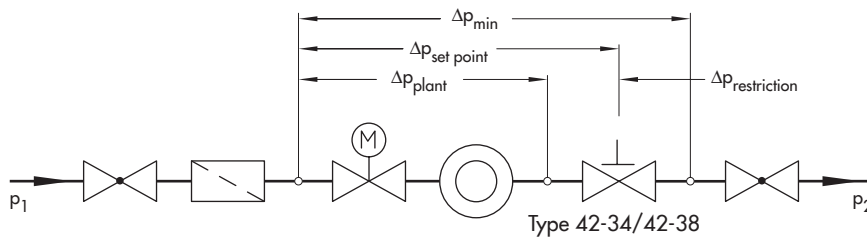


Fig. 4: Pressure loss across the plant

Table 4: Materials · Material numbers according to DIN EN

Type 2423 Valve · Balanced by a bellows			
Pressure rating	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
Seat	1.4104, 1.4006		
Plug	Up to DN 100	1.4104, 1.4006 ¹⁾	
	DN 125 to 250	1.4301, 1.4404 with PTFE seal	
Plug stem	1.4301		
Metal bellows	1.4571 · DN 125 and larger: 1.4404		
Bottom section	P265GH		
Body gasket	Graphite on metal core		
Type 2423 · Balanced by a diaphragm			
Pressure rating	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
Valve seat	Red brass ^{2) 3)}		
Plug (standard version)	Red brass ^{2) 4)} with EPDM soft seal, max. 150 °C or with PTFE soft seal, max. 150 °C		
Pressure balancing	Balancing cases made of sheet steel DD11 · EPDM balancing diaphragm, max. 150 °C or NBR diaphragm, max. 80 °C		
Type 2424 and Type 2428 Actuators			
Diaphragm cases	1.0332		
Diaphragm	EPDM ⁵⁾ with fabric reinforcement · Special version for mineral oils: FKM		
Guide bushing	DU bushing		
Seals	EPDM/PTFE ⁵⁾		

¹⁾ Optionally with soft seal with standard K_{VS} coefficients

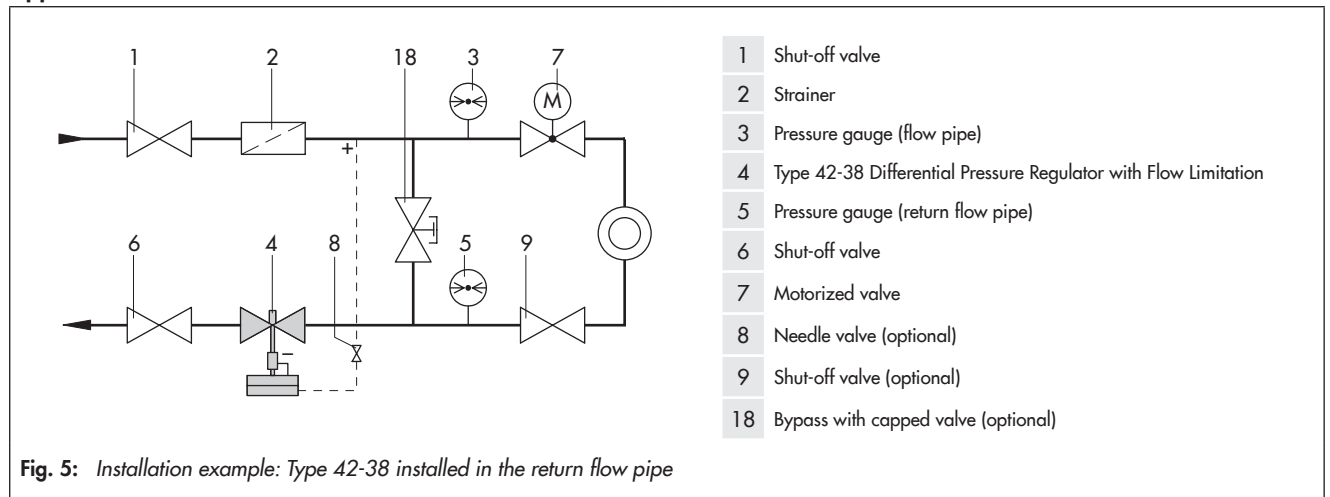
²⁾ Special version 1.4409

³⁾ DN 65 to 100: 1.4006

⁴⁾ DN 65 to 80: 1.4104, DN 100: 1.4006, with metal seal

⁵⁾ Special version for mineral oils: FKM

Application



Installation of the regulators

Installation in the return flow pipe of the plant

Valve, actuator and control lines are delivered unattached.

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 100, additionally with the connecting piece).

The following points must be observed:

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



Permissible mounting positions

- All valve sizes: install the actuator suspended downwards (see photo)
- DN 15 to 80 plus max. 80 °C: install the actuator either suspended or upright
- All valve sizes with fixed plug guide plus max. 80 °C: any position possible

Refer to ► EB 3013 for details.

Dimensions

Dimensional drawing · Type 42-34 and Type 42-38 · Valve balanced by a bellows

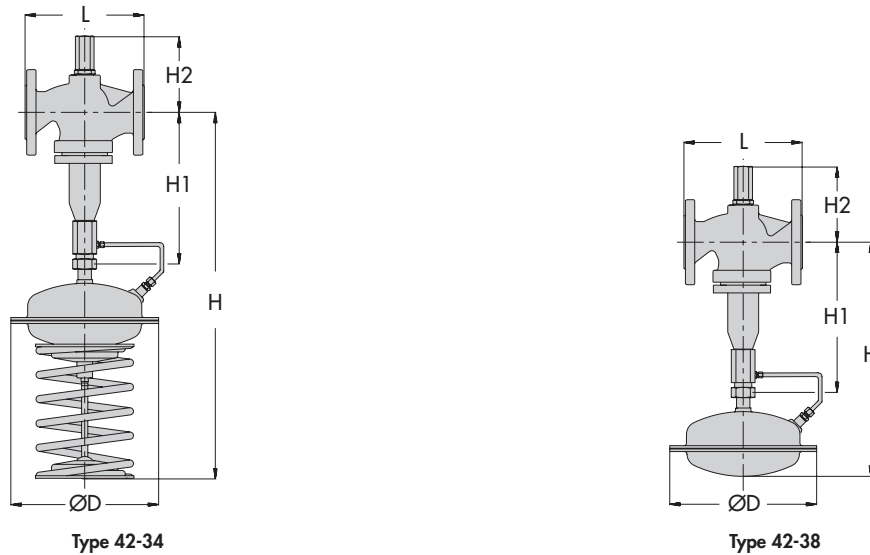


Fig. 6: Regulator with Type 2423 Valve balanced by a bellows

Table 5: Dimensions in mm and weights · Type 2423 Valve 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		285						360		415	460	590	730		
Height H2		115			135			195		220	265	295	400		
Type 42-38 Differential Pressure Regulator with Flow Limitation															
Set points		Type 2428 Actuator													
0.2 bar 0.3 bar 0.4 bar 0.5 bar	Height H ³⁾	450						525		585					
	Actuator	ØD = 225 mm, A = 160 cm ^{2 1)}						ØD = 285 mm · A = 320 cm ²		-					
	Weight ²⁾ in kg	11.5	12	13	19.5	20	22.5	45	50	58					
Type 42-34 Differential Pressure Regulator with Flow Limitation															
Set points		Type 2424 Actuator													
0.1 to 0.6 bar	Height H ³⁾	670						745		800	990	1120	1260		
	Actuator	ØD = 225 mm, A = 160 cm ^{2 1)}						ØD = 285 mm, A = 320 cm ²		ØD = 390 mm, A = 640 cm ²					
	Weight ²⁾ in kg	16	16.5	17.5	24	24.5	27	46	51	59	135	185	425	485	
0.2 to 1 bar	Height H ³⁾	670						745		800	990	1120	1260		
	Actuator	ØD = 225 mm, A = 160 cm ^{2 1)}								ØD = 390 mm, A = 640 cm ²					
	Weight ²⁾ in kg	16	16.5	17.5	24	24.5	27	42	47	55	135	185	425	485	
0.5 to 1.5 bar	Height H ³⁾	610						685		740	990	1120	1260		
	Actuator	ØD = 225 mm, A = 160 cm ^{2 1)}								ØD = 285 mm, A = 320 cm ²					
	Weight ²⁾ in kg	16	16.5	17.5	24	24.5	27	42	47	55	125	175	425	475	
1 to 2.5 bar	Height H ³⁾	610						685		740	990	1120	1260		
	Actuator	ØD = 225 mm, A = 160 cm ^{2 1)}													
	Weight ²⁾ in kg	16	16.5	17.5	24	24.5	27	42	47	55	125	175	425	475	

¹⁾ Optionally with 320 cm² actuator

²⁾ The weight applies to the version with the material specifications EN-GJL-250. Add +10 % for all other materials.

³⁾ Minimum clearance required to remove the actuator: +100 mm

Dimensions

Dimensional drawing · Type 42-34 and Type 42-38 · Valve balanced by a diaphragm

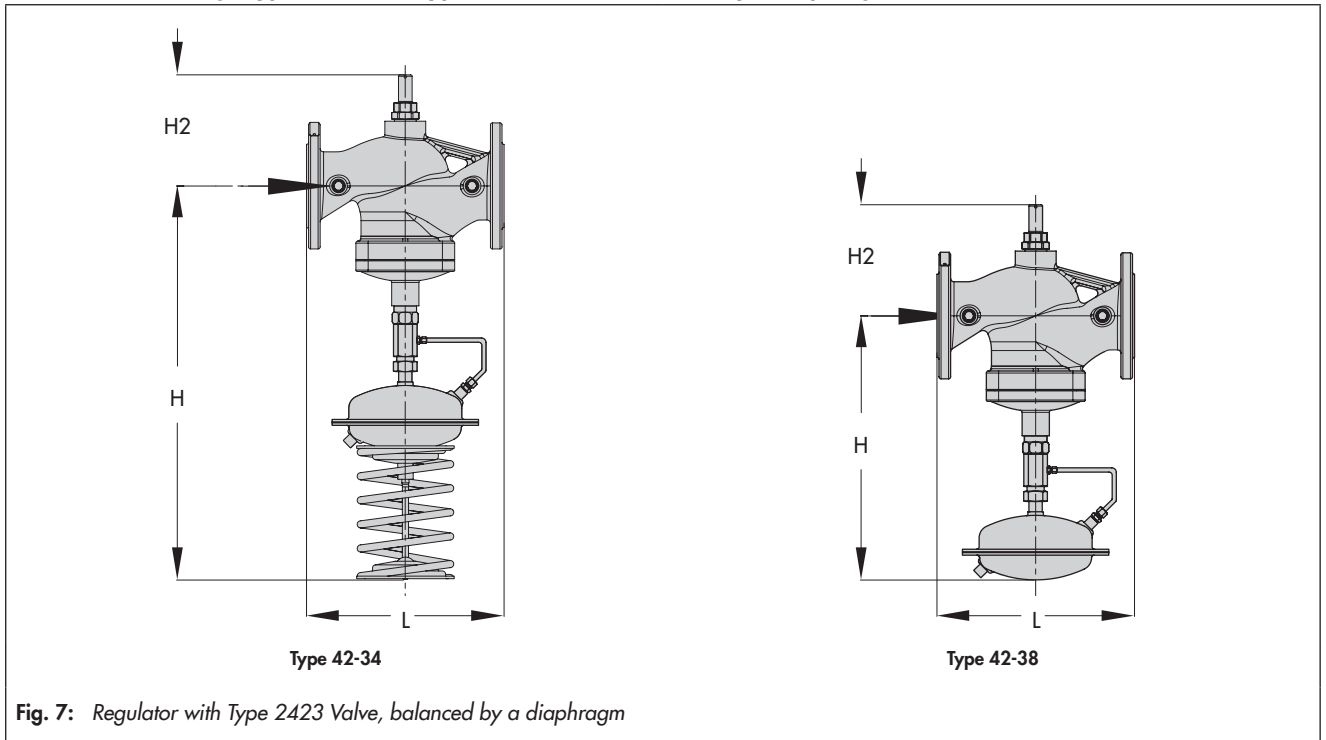


Table 6: Dimensions in mm and weights · Type 2423 Valve balanced by a diaphragm

Valve size DN	65	80	100	125	150	200	250
Length L	290	310	350	400	480	600	730
Height H1	250		270	285	310	380	
Height H2	195		220	290	325	335	380
Type 42-38 Differential Pressure Regulator with Flow Limitation							
Set points		Type 2428 Actuator					
0.2 bar	Height H ⁴⁾	415		440	-		
0.3 bar	Actuator	ØD = 285 mm · A = 320 cm ²					
0.4 bar							
0.5 bar	Weight ¹⁾ in kg	40	45	55			
Type 42-34 Differential Pressure Regulator with Flow Limitation							
Set points		Type 2424 Actuator					
0.1 to 0.6 bar	Height H ⁴⁾	635		655	780	805	1020
	Actuator	ØD = 285 mm · A = 320 cm ²			ØD = 390 mm · A = 640 cm ²		
	Weight ¹⁾ in kg	47	52	62	95	115	290
0.2 to 1 bar	Height H ⁴⁾	635		655	780	805	1020
	Actuator	ØD = 225 mm · A = 160 cm ^{2 3)}			ØD = 390 mm · A = 640 cm ²		
	Weight ¹⁾ in kg	47	52	62	95	115	290
0.5 to 1.5 bar	Height H ⁴⁾	635		655	780	805	1020
	Actuator	ØD = 225 mm · A = 160 cm ^{2 3)}			ØD = 285 mm · A = 320 cm ^{2 2)}		
	Weight ¹⁾ in kg	47	52	62	95	115	290
1 to 2.5 bar	Height H ⁴⁾	635		655	780	805	1020
	Actuator	ØD = 225 mm · A = 160 cm ^{2 3)}					
	Weight ¹⁾ in kg	47	52	62	95	115	290

¹⁾ The weight applies to the version with the material specifications EN-GJL-250. Add +10 % for all other materials.

²⁾ Optionally with 640 cm² actuator

³⁾ Optionally with 320 cm² actuator

⁴⁾ Minimum clearance required to remove the actuator: +100 mm

Ordering text

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

DN ...

Valve balanced by a bellows/diaphragm

Body material ...

PN ...

Differential pressure set point range ... bar

Optionally, special version ...

Optionally, accessories ... (► T 3095)