DATA SHEET

T 3013 EN

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

CE

Application

Regulators for district heating supply networks with an indirect connection · Differential pressure set points from **0.1** to **2.5 bar** · Nominal 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

- Nominal size DN 125 to 250 with fixed plug guide as standard, e.g. installation in riser pipes.

- 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) · Nominal 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 · Nominal size DN 15 to 100 · Balanced by a diaphragm (DN 65 to 100) Type 2428 Actuator with a fixed set point, adjusted to Δp = 0.2, 0.3, 0.4 or 0.5 ba**r**
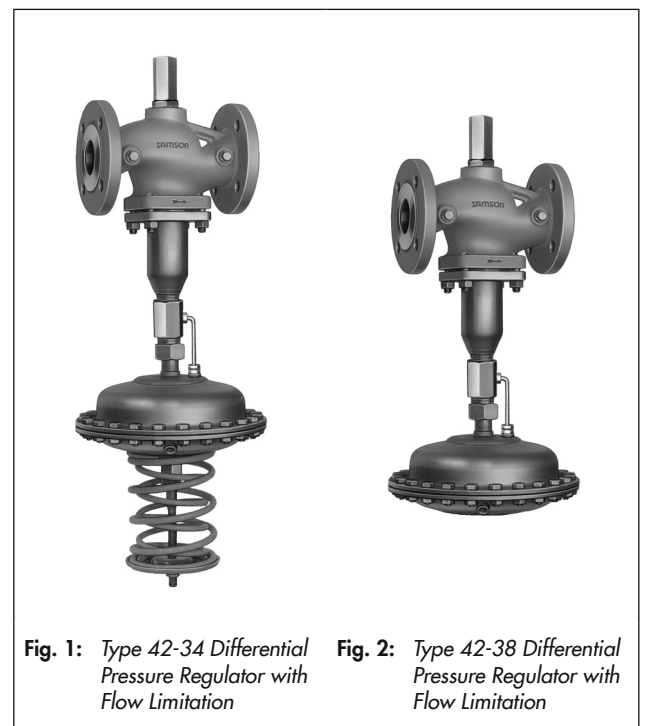

Fig. 1: *Type 42-34 Differential Pressure Regulator with Flow Limitation* **Fig. 2:** *Type 42-38 Differential Pressure Regulator with Flow Limitation*

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.

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[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	21	Force limiter with internal excess pressure limiter (overload protection)
5.1	Balancing diaphragm		
8	Venting (balanced by a 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 2423 Valve balanced by a bellows

Type 2424 Actuator

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

Type 2428 Actuator

Type 42-34 balanced by a diaphragm DN 65 to 250 · Type 42-38 balanced by a diaphragm DN 65 to 100

Type 2423 Valve, balanced by a diaphragm

To Type 2424 Actuator

Fig. 3: *Functional diagram*
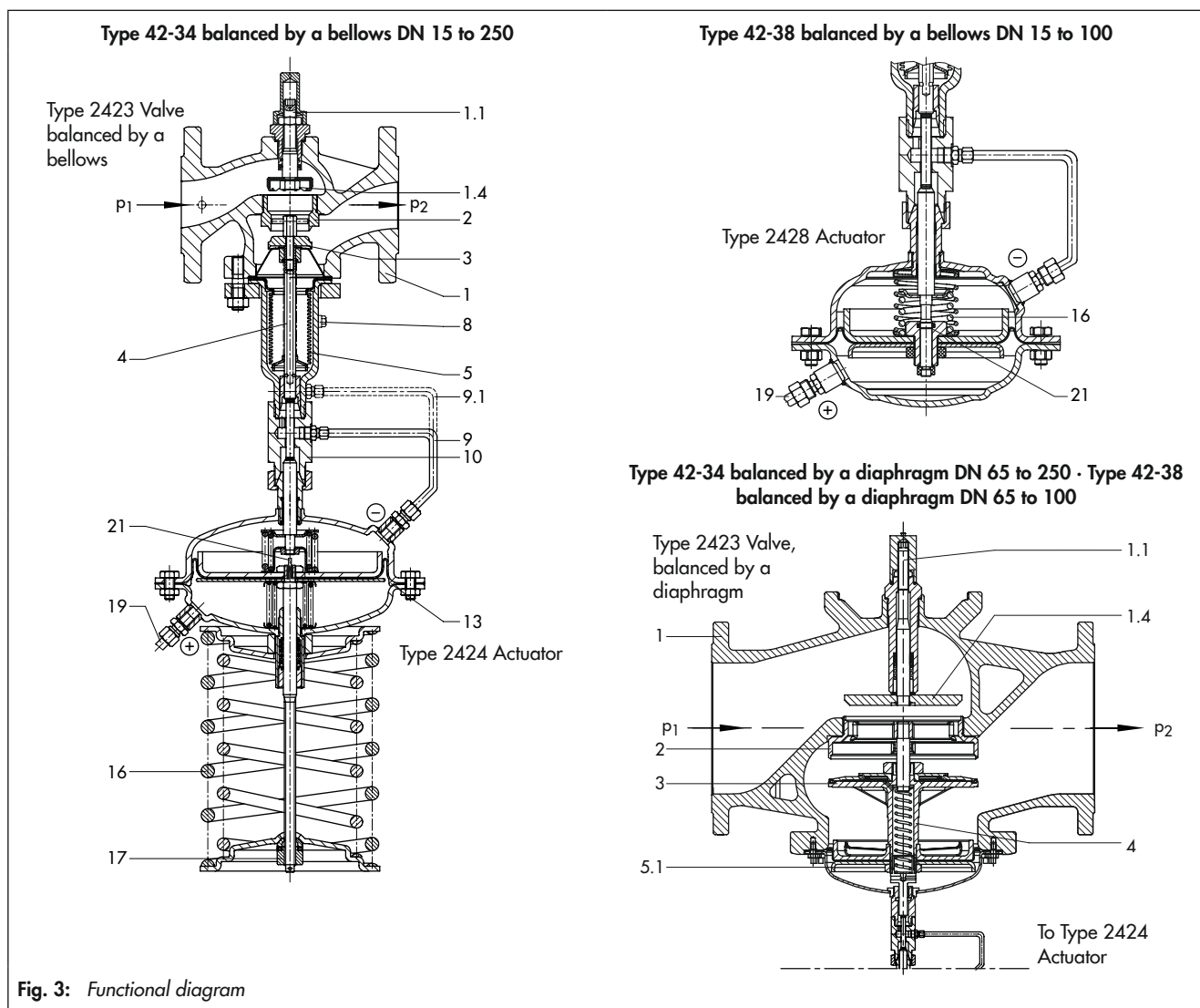
Table 1: *Technical data · Type 42-34 and Type 42-38*

Type 2423 Valve · Balanced by a bellows			
Type		42-34	42-38
Nominal 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	
Type 2423 Valve · Balanced by a diaphragm			
Type		42-34	
Nominal 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	

[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													
Nominal 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													
Nominal 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	12 bar				10 bar		12 bar				10 bar		

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

Type 2423 Valve balanced by a bellows																
$\Delta p_{set\ point}$	Δp_{plant}	$\Delta p_{restriction}$	DN	15	20	25	32	40	50	65	80	100	125	150	200	250
0.2 bar	0.1 bar	0.1 bar	V̇ 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	V̇ Max.	2	3	3.5	7	11	16	28	40	63	80	120	180	220
1.0 bar	0.5 bar	0.5 bar	V̇ Max.	3	4.5	5.3	9.5	16	24	40	58	90	120	180	260	300

Type 2423 Valve, balanced by a diaphragm							
Nominal size DN		65	80	100	125	150	200	250
Diff. pressure across restriction $\Delta p_{restriction}$	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 $\Delta p_{set\ point}$ is the sum of the pressure drop in the fully open plant Δp_{plant} and the pressure drop across the restriction $\Delta p_{restriction}$ (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.

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

Differential pressure across the valve

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

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

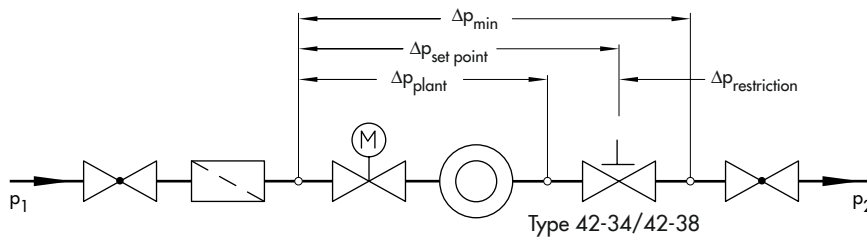|	
Δp_{min}	Minimum differential pressure across the valve in bar
$\Delta p_{restriction}$	Differential pressure created at the restriction for measuring the flow rate
$\Delta p_{set\ point}$	Differential pressure set point in bar
Δp_{plant}	Differential pressure (pressure loss) when the plant is completely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

Fig. 4: *Pressure 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]		
Plug — 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]		

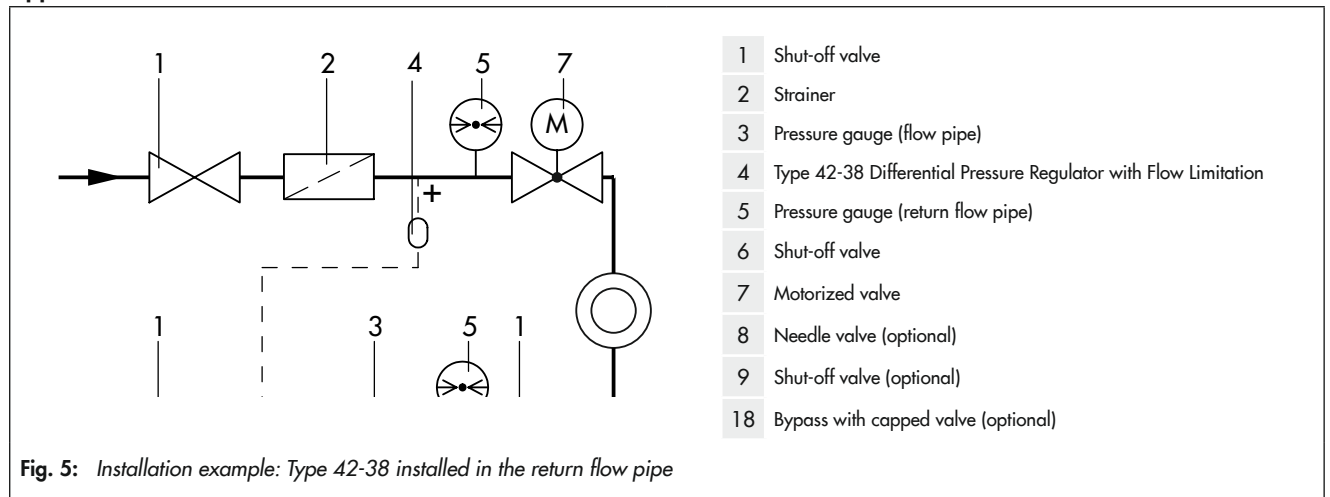[1] Optionally with soft seal with standard K_{VS} coefficients
[2] Special version 1.4409
[3] DN 65 to 100: 1.4006
[4] DN 65 to 80: 1.4104, DN 100: 1.4006, with metal seal
[5] Special version for mineral oils: FKM

Application

1	Shut-off valve
2	Strainer
3	Pressure gauge (flow pipe)
4	Type 42-38 Differential Pressure Regulator with Flow Limitation
5	Pressure gauge (return flow pipe)
6	Shut-off valve
7	Motorized valve
8	Needle valve (optional)
9	Shut-off valve (optional)
18	Bypass with capped valve (optional)

Fig. 5: *Installation example: Type 42-38 installed in the return flow pipe*

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 nominal sizes: install the actuator suspended downwards (see photo)

- DN 15 to 80 plus max. 80 °C: install the actuator either suspended or upright

- All nominal sizes with fixed plug guide plus max. 80 °C: any position possible

Refer to ▶ EB 3013 for details.

Dimensions

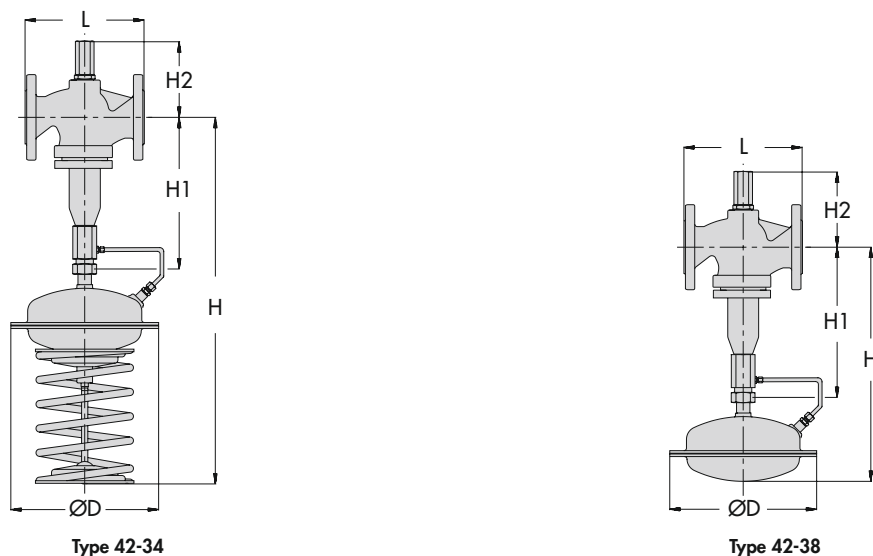**Dimensional drawing · Type 42-34 and Type 42-38 · Valve balanced by a bellows**

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**

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	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 cm² [1]					ØD = 285 mm · A = 320 cm²						
	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 cm² [1]					ØD = 285 mm, A = 320 cm²			ØD = 390 mm, A = 640 cm²			
	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 cm² [1]								ØD = 390 mm, A = 640 cm²			
	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 cm² [1]								ØD = 285 mm, A = 320 cm²			
	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 cm² [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

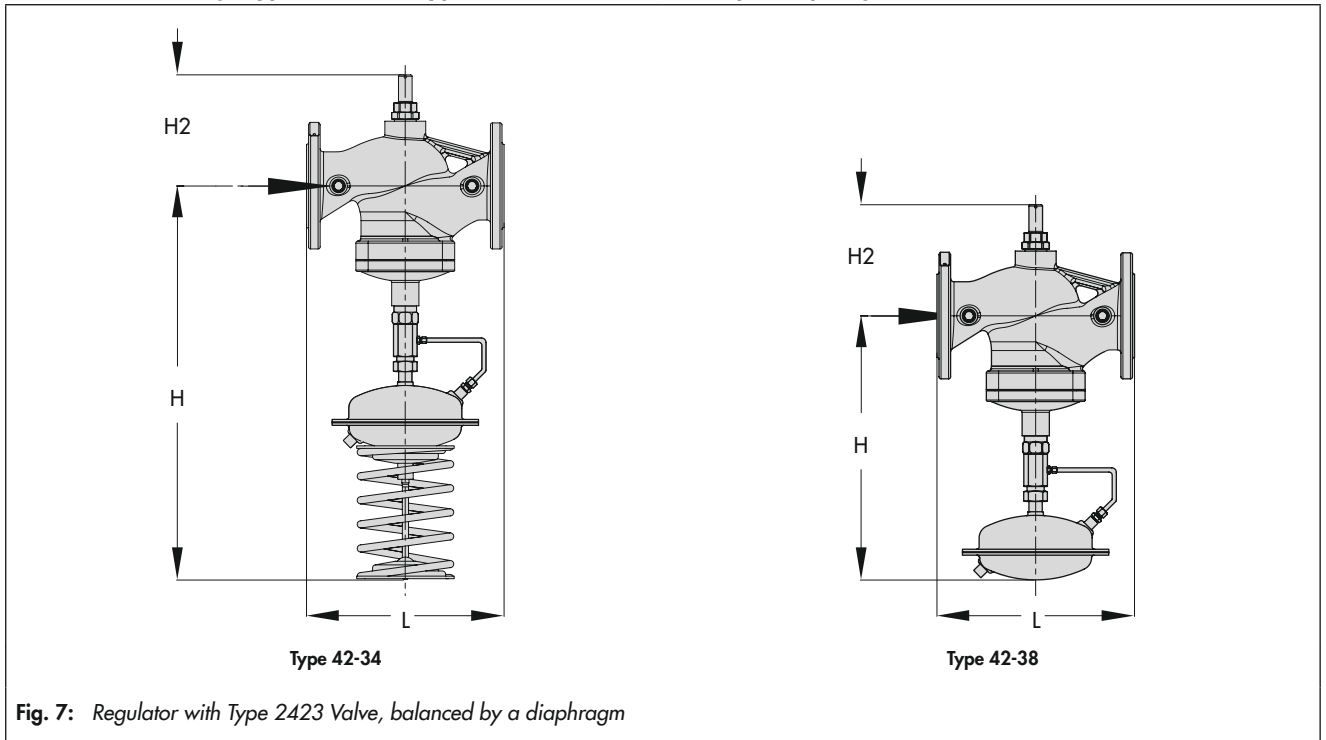**Dimensional drawing · Type 42-34 and Type 42-38 · Valve balanced by a diaphragm**

Fig. 7: *Regulator with Type 2423 Valve, balanced by a diaphragm*

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

Nominal 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 0.3 bar 0.4 bar 0.5 bar	Height H [4]	415		440				
	Actuator	ØD = 285 mm · A = 320 cm²			–			
	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 cm²			ØD = 390 mm · A = 640 cm²			
	Weight [1] in kg	47	52	62	95	115	290	305
0.2 to 1 bar	Height H [4]	635		655	780	805	1020	
	Actuator	ØD = 225 mm · A = 160 cm² [3]			ØD = 390 mm · A = 640 cm²			
	Weight [1] in kg	47	52	62	95	115	290	305
0.5 to 1.5 bar	Height H [4]	635		655	780	805	1020	
	Actuator	ØD = 225 mm · A = 160 cm² [3]			ØD = 285 mm · A = 320 cm² [2]			
	Weight [1] in kg	47	52	62	95	115	290	305
1 to 2.5 bar	Height H [4]	635		655	780	805	1020	
	Actuator	ØD = 225 mm · A = 160 cm² [3]						
	Weight [1] in kg	47	52	62	95	115	290	305

[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)