# 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.

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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 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 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

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**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).

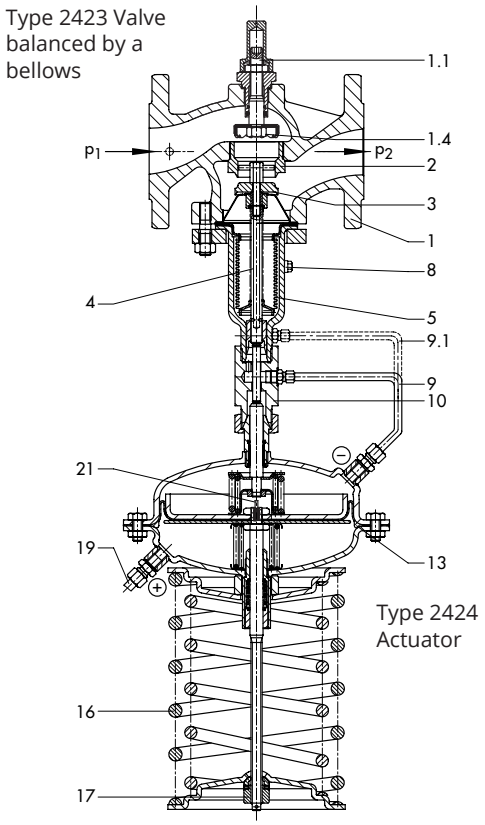
The flow set point adjustment is used to move the restriction (1.4) and set the maximum flow rate.

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).

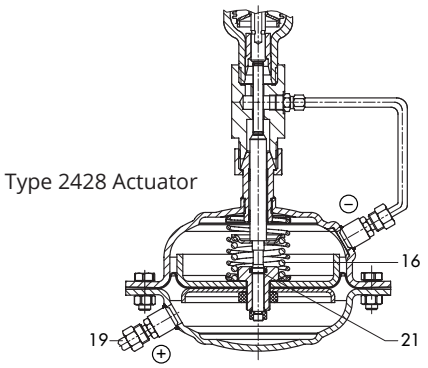
Type 2424 and Type 2428 Actuators are fitted with a force limiter (20) with an internal excess pressure limiter (21). It limits the force acting on the plug stem as well as protecting the seat and plug from overload. To protect the consumer, the internal excess pressure limiter opens when the pressure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

| | |
|---|---|
| 1 | Type 2423 Valve |
| 1.1 | Flow set point adjustment |
| 1.4 | Restriction |
| 2 | Seat |
| 3 | Plug |
| 4 | Plug stem |
| 5 | Balancing bellows |
| 5.1 | Balancing diaphragm |
| 8 | Venting (balanced by a bellows, DN 125 and larger) |
| 9 | Low-pressure control line (up to DN 100) |
| 9.1 | Low-pressure control line (DN 125 and larger) |
| 10 | Connecting piece (up to DN 100) |
| 13 | Operating diaphragm |
| 16 | Set point springs |
| 17 | Set point adjustment |
| 19 | High-pressure control line (connection) |
| 21 | Force limiter with internal excess pressure limiter (overload protection) |

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

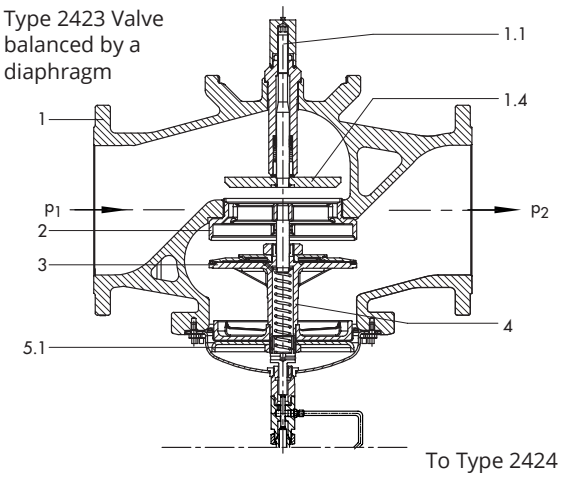



**Fig. 3:** *Functional diagram*

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

| **Type 2423 Valve · Balanced by a bellows** | | | |
|---|---|---|---|
| **Type** | | **42-34** | **42-38** |
| 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 cm² | 1.2 bar | 0.6 bar |
| | A = 320 cm² | 0.6 bar | 0.3 bar |
| | A = 640 cm² | 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<br>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 cm² | 1.2 bar | |
| | A = 320 cm² | 0.6 bar | |
| | A = 640 cm² | 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 according 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** |
| Valve travel | | 15 mm | | | | | | 35 mm | | | | | | |
| $K_{VS}$ 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** | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **$\Delta p_{set\ point}$** | **$\Delta p_{plant}$** | **$\Delta p_{restriction}$** | **DN** | **15** | **20** | **25** | **32** | **40** | **50** | **65** | **80** | **100** | **125** | **150** | **200** | **250** |
| 0.2 bar | 0.1 bar | 0.1 bar | $\dot{V}$ 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 |

| **Type 2423 Valve balanced by a diaphragm** | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Nominal size** | **DN** | **65** | **80** | **100** | **125** | **150** | **200** | **250** |
| Differential 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 rate 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 $\Delta p_{plant}$ 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 $\Delta p_{min}$ between the flow pipe and return pipe is calculated as follows:

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

| | |
|---|---|
| $\Delta p_{min}$ | 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 |
| $\Delta p_{plant}$ | 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 |

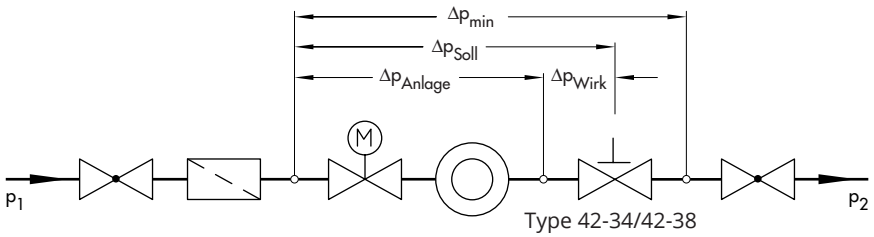


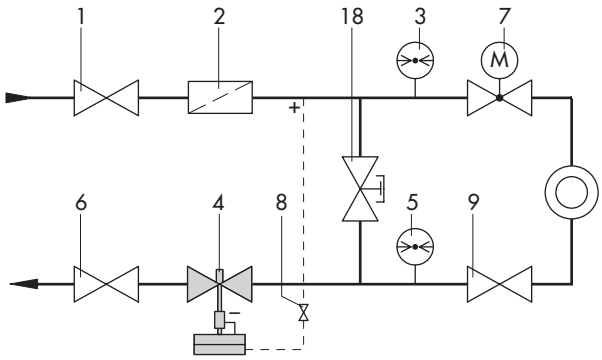

**Fig. 4:** *Pressure loss across the plant*

**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] | | |
| | 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 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 pipe*

### Installing the regulators

Installation in the return 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.



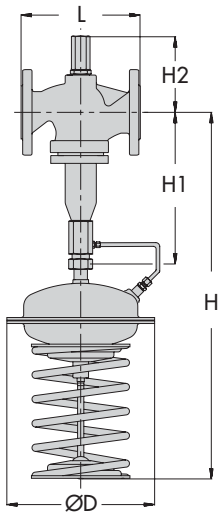
### Permissible mounting positions

- 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

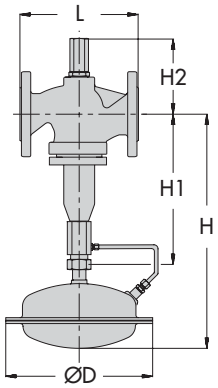
Refer to ▶ EB 3013 for details.

## Dimensions

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




Type 42-34




Type 42-38

**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** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Overall 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<br>0.3 bar<br>0.4 bar<br>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

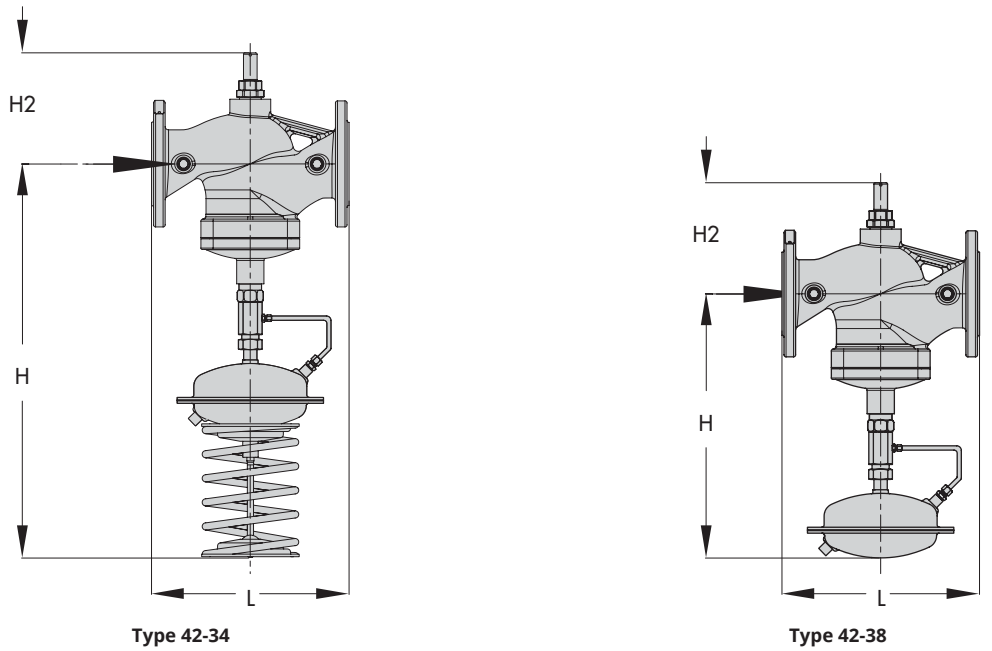



**Fig. 7:** *Regulator with Type 2423 Valve, balanced by a diaphragm*

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

| **Nominal size DN** | | **65** | **80** | **100** | **125** | **150** | **200** | **250** |
|---|---|---|---|---|---|---|---|---|
| Overall 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<br>0.3 bar<br>0.4 bar<br>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)