

Type 42-36 E Pressure-independent Control Valve (PICV)

Application

Self-operated regulators for flow rate control in district heating systems or large heating or cooling networks. Combined with an electric actuator used to transmit the control signal of an electric controller.



Valves in nominal sizes **DN 15 to 250** · Nominal pressure **PN 16 to 40** · Suitable for liquids from **5 to 150 °C**

The valve closes when the flow rate or the output signal of the electric controller increases. The largest signal closes the valve.

The combined regulators consist of:

- A valve with flanged body
- A diaphragm actuator
- An adapter to adjust the flow rate set point and to attach the electric actuator
- An electric actuator

The electric actuator is available with or without fail-safe action and changes the flow rate set point depending on the output signal issued by the electric controller.

The regulators are equipped with the following electric actuators:

- Valves in **DN 15 to 50** · **Type 5824** Electric Actuator without fail-safe action or **Type 5825** Actuator with fail-safe action Refer to Data Sheet ▶ **T 5824**
- Valves in **DN 65 to 100** · **Type 3374-11** Electric Actuator without fail-safe action, **Type 3374-21** Actuator with fail-safe action or **Type 5824-30** Electric Actuator without fail-safe action · Refer to Data Sheet ▶ **T 8331**
- Valves in **DN 125 to 250** · **Type 3274-11** Electrohydraulic Actuator without fail-safe action or **Type 3274-21** Electrohydraulic Actuator with fail-safe action · Refer to Data Sheet ▶ **T 8340**
Type 3374-15 Electric Actuator without fail-safe action Refer to Data Sheet ▶ **T 8331**

Special features

- Low-maintenance, medium-controlled proportional regulators requiring no auxiliary energy
- Compact design
- Single-seated valve with a balanced valve plug provides high accuracy of the adjusted maximum flow rate
- Control quality independent of the network differential pressure, for example for temperature control with weather-compensated control equipment
- Suitable for water and other liquids, provided these do not

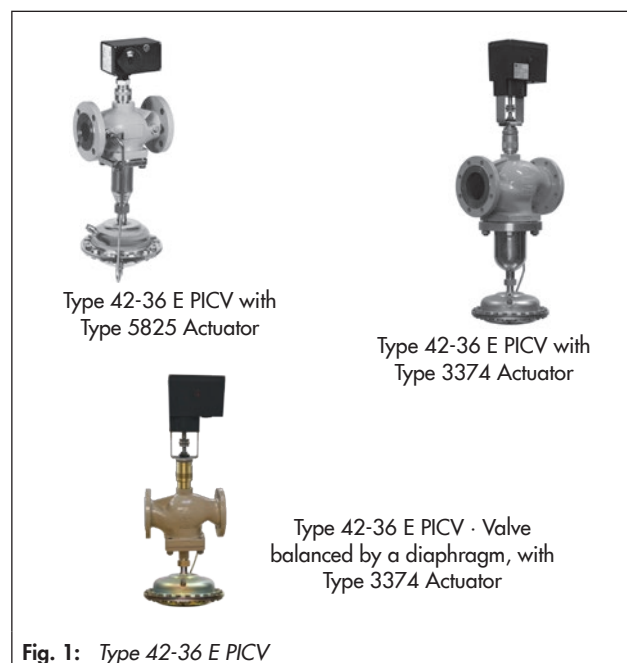


Fig. 1: Type 42-36 E PICV

cause the materials used to corrode

Versions

Type 42-36 E (Fig. 1) · Pressure-independent control valve in **DN 15 to 250**, consisting of a **Type 2426** Diaphragm Actuator and a **Type 2423 E** Valve with a restriction to adjust the flow rate set point · Installation in the flow or return flow pipe
The set point ranges for the flow rate based on water listed in Table 3 apply to a differential pressure at the restriction of 0.2 or 0.5 bar.




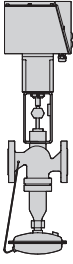

Control equipment tested according to DIN EN 14597 are available. The register number is available on request.

Special versions

With internal parts made of FPM (FKM), e.g. for use with mineral oils · For temperatures up to 220 °C

ANSI version on request

Table 1: Device combinations

| Regulator | | Type 42-36 E | | | | |
|---|------------------|---|---|---|--|---|
| Basic unit | | Type 42-36 E | | | | |
| See Data Sheet | | ► T 3015 | | | | |
| Application for flow rate control \dot{V} | |  |  |  |  |  |
| | | Type 42-36 E with Type 5824 or Type 5825 Electric Actuator | Type 42-36 E with Type 3374 Electric Actuator | Type 42-36 E with Type 5824-30 Electric Actuator | Type 42-36 E with Type 3274 Electrohydraulic Actuator or Type 3374 Electric Actuator | |
| Installation in | Flow pipe | • | • | • | • | |
| | Return flow pipe | • | • | • | • | |
| Adjustable set point \dot{V} | | • | • | • | • | |
| Electric actuator | | | | | | |
| Nominal size | | Type I | Fail-safe action | | | |
| ≤ DN 50 | Type 5824-... | No | • | | | |
| | Type 5825-... | Yes | • | | | |
| DN 65 to 100 | Type 5824-30 | No | | • | | |
| | Type 3374-11 | No | | • | | |
| | Type 3374-21 | Yes | | • | | |
| ≥ DN 125 | Type 3274-11 | No | | | • | |
| | Type 3274-21 | Yes | | | • | |
| | Type 3374-15 | No | | | | • |

The table gives an overview of the different versions of the combined regulators and their typical applications. Refer to Data Sheet ► T 3015 for details on the basic regulator.

Sample applications

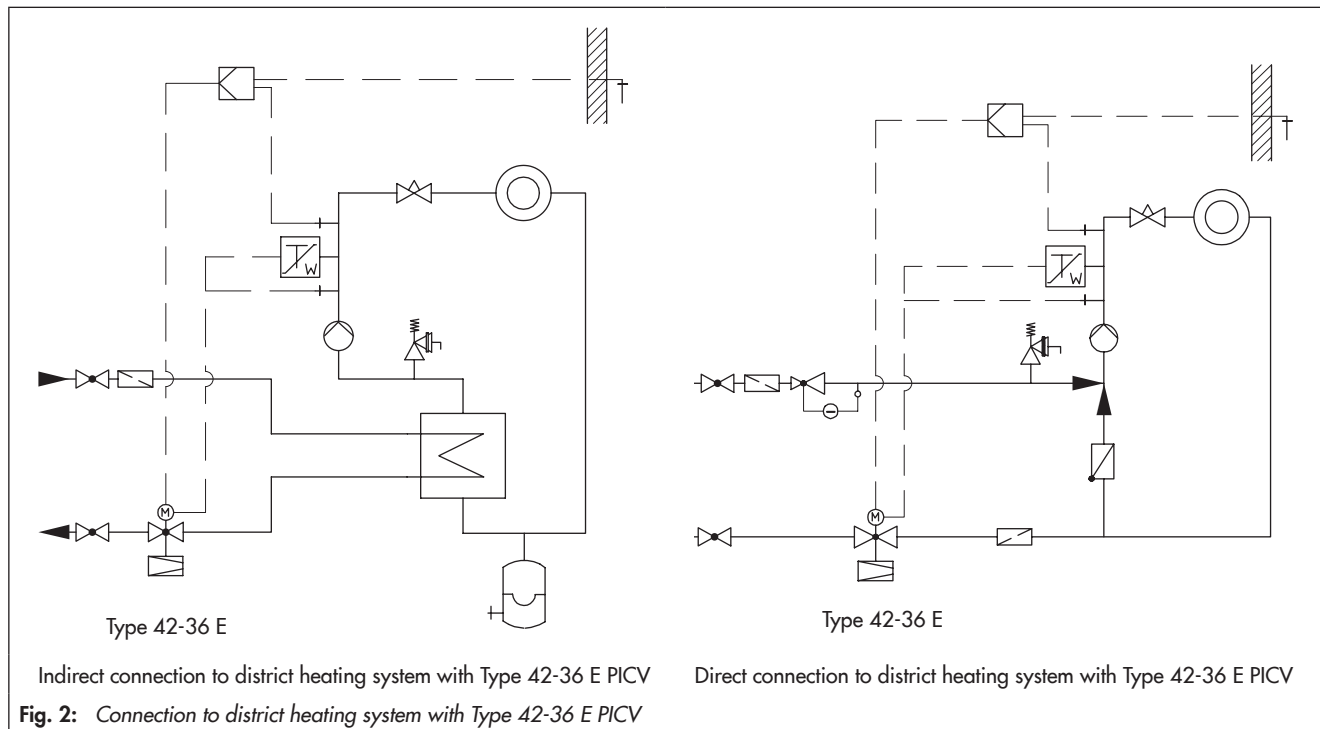


Table 2: Technical data · Valves · All pressures in bar

| Type 2423 E Valve | Balanced by a bellows | Balanced by a diaphragm |
|--------------------------|-----------------------|-------------------------|
| Nominal size | DN 15 to 250 | DN 65 to 250 |
| Nominal pressure | PN 16, 25 and 40 | |
| Max. medium temperature | 150 °C | |
| Max. ambient temperature | 50 °C | |
| Compliance | CE · ENEC | |

Table 3: K_{VS} coefficients, x_{FZ} values, flow rate set point ranges for water and max. permissible differential pressures

| Type 2423 E 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. differential pressure Δp | | 25 bar | | | | | | 20 bar | | 16 bar | | 12 bar | | 10 bar | |
| Flow rate set point ranges for water in m ³ /h | | | | | | | | | | | | | | | |
| For differential pressure of | $\Delta p_{restriction} = 0.2$ bar | 0.5 to 2 | 0.5 to 3 | 0.8 to 3.5 | 2 to 7 | 3 to 11 | 3 to 16 | 5 to 28 | 7 to 35 ¹⁾ | 10 to 63 | 40 to 80 | 50 to 120 | 70 to 180 | 90 to 220 | |
| | $\Delta p_{restriction} = 0.5$ bar | 0.8 to 3 | 0.8 to 4.5 | 1.2 to 5.3 | 3 to 9.5 | 4.5 to 16 | 4.5 to 24 | 7.5 to 40 | 10 to 55 | 15 to 90 | 60 to 120 | 75 to 180 | 100 to 260 | 120 to 300 | |
| Type 2423 E Valve, balanced by a diaphragm | | | | | | | | | | | | | | | |
| Valve size | DN | 65 | 80 | 100 | 125 | 150 | 200 | 250 | | | | | | | |
| K_{VS} coefficients in m ³ /h | | 50 | 80 | 125 | 250 | 380 | 650 | 800 | | | | | | | |
| x_{FZ} value | | 0.4 | | 0.35 | | | | 0.3 | | | | | | | |
| Max. permissible differential pressure Δp | | 10 | | | | | | 12 bar | | | 10 bar | | | | |
| Flow rate set point ranges for water in m ³ /h | | | | | | | | | | | | | | | |
| For differential pressure of | $\Delta p_{restriction} = 0.2$ bar | 5 to 28 | | 7 to 35 ¹⁾ | | 10 to 63 | | 40 to 90 | | 50 to 140 | | 70 to 220 | | 90 to 260 | |
| | $\Delta p_{restriction} = 0.5$ bar | 7.5 to 40 | | 10 to 55 | | 15 to 90 | | 60 to 130 | | 75 to 200 | | 100 to 310 | | 120 to 360 | |

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

Differential pressure across the valve

The minimum required differential pressure Δp_{min} across the valve is calculated as follows:

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

- Δp_{min} Minimum differential pressure across the valve in bar
- $\Delta p_{restriction}$ Differential pressure created at the restriction for measuring the flow rate in the regulator
- \dot{V} Adjusted flow rate in m³/h
- K_{VS} Valve flow coefficient in m³/h

Sample application

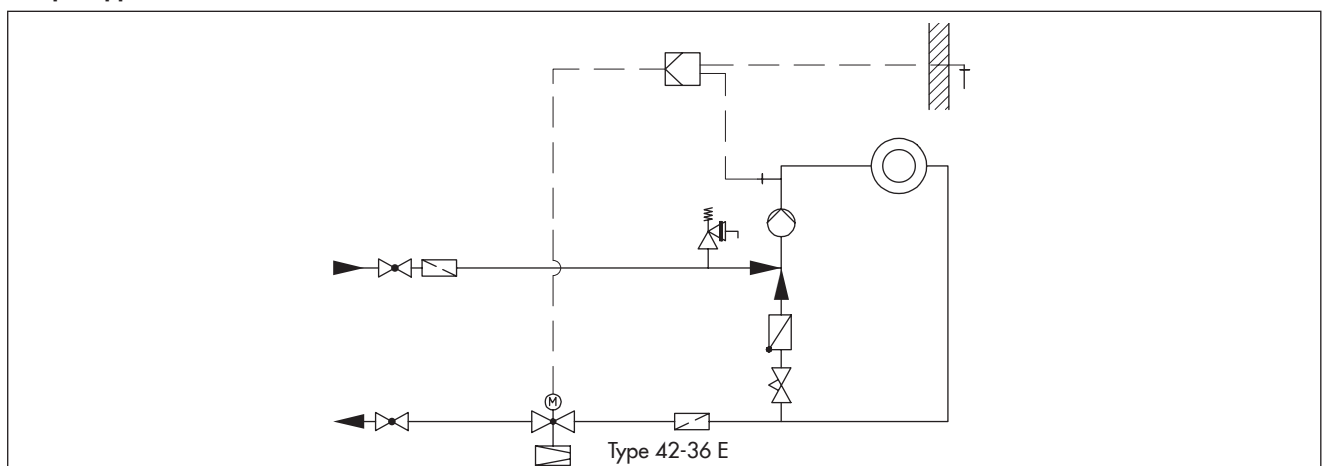


Fig. 3: Injection mixing system with Type 42-36 E Pressure-independent Control Valve

Table 4: Technical data · Actuators

| Type 5824-10, Type 5825-10, Type 5824-20, Type 5824-30, Type 5825-20, Type 3374-11 and Type 3374-21 Electric Actuators | | | | | | | |
|--|--|---------|-------------|---------|--|-----------------------|--|
| Nominal size | DN 15 to 25 | | DN 32 to 50 | | DN 65 to 100 | | |
| Type ... | 5824-10 | 5825-10 | 5824-20 | 5825-20 | 3374-11 | 3374-21 | 5824-30 |
| Fail-safe action | Without | With | Without | With | Without | With | Without |
| Rated travel | 6 mm | | 12 mm | | 15 mm | | 15 mm |
| Transit time for rated travel | 45 s | | 70 s | | 120 s | | 90 s |
| Transit time for fail-safe action | – | 4 s | – | 6 s | – | 12 s | – |
| Positioning force | 700 N | – | 700 N | – | 2500 N | 500 N · Stem retracts | 700 N |
| Nominal closing force of spring | – | 500 N | – | 500 N | | 2000 N · Stem extends | |
| Electrical connection | 24 V, 50 Hz 230 V, 50/60 Hz 120 V, 60 Hz | | | | 230 V, 50/60 Hz 24 V, 50/60 Hz · 120 V, 60 Hz 24 V (DC) 85 to 264 V, 50/60 Hz ²⁾ | | 24 V, 50 Hz 230 V, 50/60 Hz 120 V, 60 Hz |
| Power consumption | 5 VA | 7 VA | 5 VA | 7 VA | Max. 18 VA | | 3 VA |
| Permissible ambient temperature | 0 to 50 °C | | | | 5 to 60 °C | | 0 to 50 °C |
| Perm. temperature at the connecting stem | 0 to 130 °C | | | | – | | – |
| Refer to Data Sheet | ▶ T 5824 | | | | ▶ T 8331 | | ▶ T 5824 |

| Type 3274-11 and Type 3274-21 Electrohydraulic Actuators · Type 3374-15 Electric Actuator | | | |
|---|---|---------|------------|
| Nominal size | DN 125 to 250 | | |
| Type ... | 3274-11 | 3274-21 | 3374-15 |
| Fail-safe action | Without | | Without |
| Rated travel | 30 mm | | |
| Transit time for rated travel | 120 s | | |
| Transit time for fail-safe action | – | 30 s | – |
| Positioning force | 2100 N · Stem retracts 1800 N · Stem extends | | 2500 N |
| Nominal closing force of spring | | | |
| Electrical connection | 230 V, 50/60 Hz 24 V, 50/60 Hz 120 V, 60 Hz | | |
| Power consumption | 80 VA | | Max. 18 VA |
| Permissible ambient temperature | –35 to 60 °C ¹⁾ | | 5 to 60 °C |
| Perm. temperature at the connecting stem | – | | – |
| Refer to Data Sheet | ▶ T 8340 | | ▶ T 8331 |

¹⁾ With heating

²⁾ With positioner

Table 5: Materials · Material numbers according to DIN EN

| Type 2423 E Valve, balanced by a bellows | | | | | |
|---|---|--|-------------------|--------------------------------|--|
| Nominal pressure | PN 16 | PN 25 | PN 16, 25 and 40 | | |
| Valve body | Cast iron EN-JL1040 | Spheroidal graphite iron EN-JS1049 | Cast steel 1.0619 | Cast stainless steel 1.4408 | Forged stainless steel 1.4571 ¹⁾ |
| Seat | 1.4104, 1.4006 | | | 1.4404 | |
| Plug | Up to DN 100 | 1.4104, 1.4006 ²⁾ | | 1.4404 | |
| | DN 125 to 250 | 1.4301, 1.4404 with PTFE seal | | | |
| Plug stem | 1.4301 | | | | |
| Metal bellows | 1.4571 · DN 125 and higher: 1.4404 | | | | |
| Bottom section | P265GH | | | 1.4571 | |
| Body gasket | Graphite on metal core | | | | |
| Type 2423 E Valve, balanced by a diaphragm | | | | | |
| Nominal pressure | PN 16 | PN 25 | PN 16, 25 and 40 | | |
| Valve body | Cast iron EN-JL1040 | Spheroidal graphite iron EN-JS1049 | Cast steel 1.0619 | Cast stainless steel 1.4408 | – |
| Valve seat | Red brass ^{3) 4)} | | | | |
| Plug (standard version) | Red brass ^{3) 5)} 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 2426 Actuator | | | | | |
| Diaphragm cases | Sheet steel DD11 | | | 1.4301 | |
| Diaphragm | EPDM with fabric reinforcement · Special version for mineral oils: FPM (FKM) | | | | |
| Guide bushing | DU bushing | | | PTFE | |
| Type 5824 and Type 5825 Electric Actuators | | | | | |
| Housing, housing cover | Plastic (PPO with glass fiber reinforcement) | | | | |
| Coupling nut | Brass | | | | |
| Type 3274 Electrohydraulic Actuator | | | | | |
| Housing, housing cover | Die-cast aluminum | | | | |
| Cylinder | Hydraulic cylinder tube | | | | |
| Piston | Steel/NBR combination | | | | |
| Piston rod | C45, hard chrome-plated | | | | |
| Actuator stem | 1.4104 | | | | |
| Hydraulic oil | Special HLP, silicone-free | | | | |
| Type 3374 Electric Actuator | | | | | |
| Housing and cover | PPO with glass fiber reinforcement | | | | |
| Central attachment and yoke | Flange: aluminum, connecting thread M30x1.5 · Formed sheet: 1.4301H injected into housing, 30 mm hole | | | | |
| Actuator stem | 1.4305 | | | | |

¹⁾ DN 15, 25, 40 and 50 only

²⁾ Optionally with soft seal with standard K_{vs} coefficients

³⁾ Special version 1.4409

⁴⁾ DN 65 to 100: 1.4006

⁵⁾ DN 65 to 100: 1.4104/1.4006

Principle of operation (see Fig. 4)

The regulators consist of a basic regulator for flow rate control and an electric or electrohydraulic actuator. The principle of operation for the basic regulator is described in the Data Sheet ▶ T 3015.

The set point for the flow rate is adjusted at the adapter (9). The adapter is also used to attach the electric actuator. The actuator is operated by control signals (mostly temperature signals) issued by an electric controller. As a result, the electric actuator adjusts the orifice (restriction) and the flow rate as a result.

The flow regulation is ultimately performed by the diaphragm actuator. The largest signal is always used to control the regulator.

A differential pressure $\Delta p_{\text{restriction}}$ is created at the restriction (orifice) by the medium flow. This differential pressure is transmitted over the control line (18) and the hole in the valve plug to the operating diaphragm (12) where it is converted into a positioning force. The diaphragm actuator controls the $\Delta p_{\text{restriction}}$ at the restriction (orifice) as well as the flow rate determined by the restriction setting by ensuring that the forces between the plug spring force and the actuator force remain in equilibrium. The maximum flow rate is adjusted at the set point adjuster (12), which adjusts the maximum orifice opening. If a slower flow rate is needed in the plant than the maximum flow rate adjusted, the electric actuator positions the orifice accordingly.

As the differential pressure across the orifice (restriction) has to be kept constant even when the network pressure drop changes, the valve (based on the electrically operated orifice) has a valve authority of 1. As a result, for example, the control quality of weather-compensated temperature control equipment is not affected by the pressure drop across the network.

Additional temperature control or safety equipment

The regulators in DN 150 and smaller can additionally be equipped with a double adapter (see Data Sheet ▶ T 3019) and a Type 2231 or Type 2232 Control Thermostat (see Information Sheet ▶ T 2010). In this case, they can perform additional temperature control. Similarly, the regulators can also be equipped with safety equipment, such as Type 2213 Safety Thermostat, Type 2212 Safety Temperature Limiter or Type 2401 Safety Pressure Limiter.

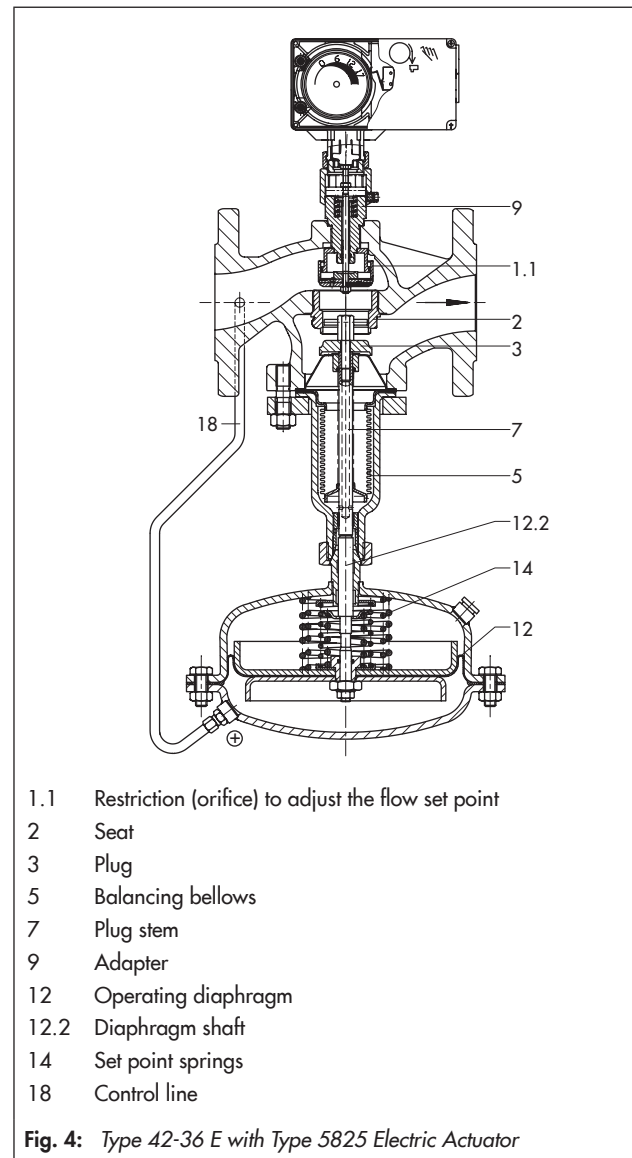
Installation

Choose a place of installation that allows you to freely access the regulator even after the entire plant is completed.

Install the valves in horizontal pipelines with the diaphragm actuator suspended downward. The direction of flow must correspond with the arrow on the valve body.

Valve and actuator are delivered unattached. The electric or electrohydraulic actuator can be easily mounted before or after the valve is installed. A coupling nut is used for attachment.

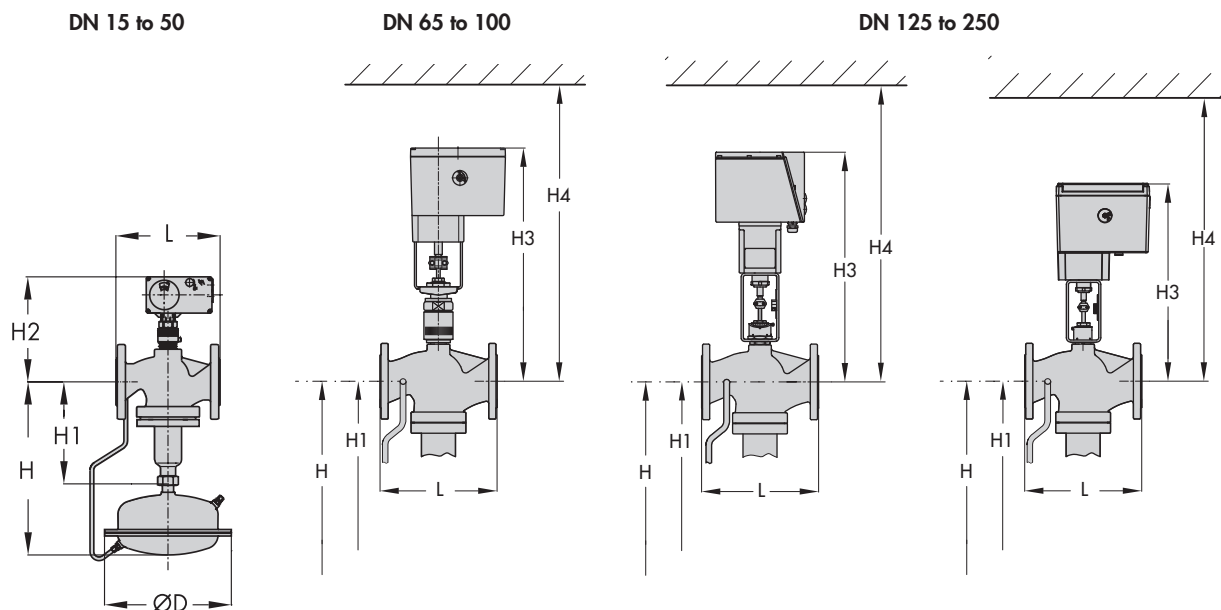
If the regulator is to be insulated, do not insulate actuator and coupling nut. Make sure the permissible ambient temperature is not exceeded. If necessary, install an extension piece to protect the actuator. The insulating limit is in this case approx. 25 mm above the top of the valve body.



Accessories

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

Dimensional drawings · Type 2423 E Valve balanced by a bellows · DN 15 to 250



Type 42-36 E with actuator

Types 5824-10/-20
Types 5825-10/-20

Types 3374-11/-21

Types 3274-11/-21

Type 3374-15

Dimensions in mm and weights

| Nominal size | DN | With Types 5824-10/-20 or Types 5825-10/-20 Actuator | | | | | | With Types 3374-11/-21 | | |
|--|--|--|-----|-----|------|-----|------|------------------------|-----|-----|
| | | 15 | 20 | 25 | 32 | 40 | 50 | 65 | 80 | 100 |
| Length L | | 130 | 150 | 160 | 180 | 200 | 230 | 290 | 310 | 350 |
| Height H1 | | 225 | | | | | | 300 | | 355 |
| Height H2 | Forged steel 1.4571 Other materials | 218 | - | 240 | - | 260 | 266 | - | | |
| Height H3 | | - | | | | | | 520 | | 540 |
| Height H4 | | - | | | | | | 820 | | 890 |
| Type 42-36 E PICV | | | | | | | | | | |
| Height H | | 390 | | | | | | 465 | | 520 |
| Diaphragm actuator | | ØD = 225 mm, A = 160 cm ² ²⁾ | | | | | | | | |
| Weight for PN 16 ¹⁾ in kg (approx.) | | 13.5 | 14 | 15 | 21.5 | 22 | 24.5 | 51 | 56 | 71 |

| Nominal size | DN | With Types 3374-11/-21 Actuator | | | | With Type 3374-15 Actuator | | | | |
|--|----|--|-----|-----|-----|----------------------------|-----|------|-----|--|
| | | 125 | 150 | 200 | 250 | 125 | 150 | 200 | 250 | |
| Length L | | 400 | 480 | 600 | 730 | 400 | 480 | 600 | 730 | |
| Height H1 | | 460 | 590 | 730 | 730 | 460 | 590 | 730 | 730 | |
| Height H3 | | 680 | 710 | 825 | 825 | 510 | 595 | 660 | 690 | |
| Height H4 | | 830 | 860 | 975 | 975 | 860 | 950 | 1010 | 940 | |
| Type 42-36 E PICV | | | | | | | | | | |
| Height H | | 625 | 765 | 895 | 895 | 625 | 765 | 895 | 895 | |
| Diaphragm actuator | | ØD = 285 mm, A = 320 cm ² ³⁾ | | | | | | | | |
| Weight for PN 16 ¹⁾ in kg (approx.) | | 135 | 185 | 440 | 500 | 125 | 170 | 425 | 485 | |

¹⁾ +10 % for cast steel PN 40 and spheroidal graphite iron PN 25

²⁾ Optionally with 320 cm² actuator for DN 65 to 100. For regulators with double adapter (see ▶ T 3019) for DN 65 to 100: 320 cm² actuator recommended.

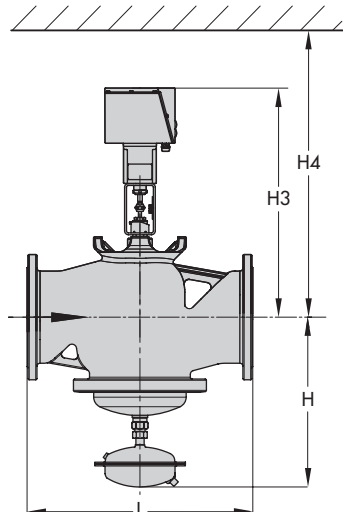
³⁾ Optionally with 640 cm² actuator and ØD = 390 mm

Fig. 5: Dimensions of the regulators with a valve balanced by a bellows

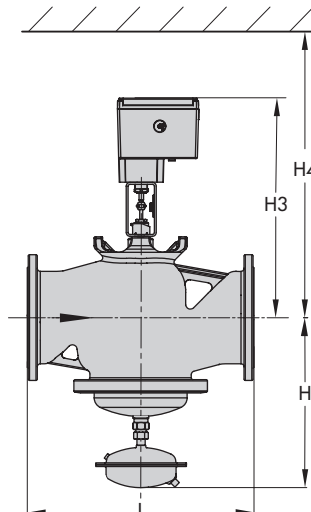
Dimensions and weights · Type 42-36 E with Type 2423 E Valve balanced by a diaphragm

Dimensional drawings · Type 2423 E Valve balanced by a diaphragm · DN 65 to 250

Type 42-36 E with Type 3274 Electrohydraulic Actuator



Type 42-36 E with Type 3374 Electric Actuator



Dimensions in mm and weights in kg

| With Types 3274-11/-21 Actuator | | | | |
|---------------------------------|-----|-----|-----|-----|
| Nominal size DN | 125 | 150 | 200 | 250 |
| Length L | 400 | 480 | 600 | 730 |
| Height H | 450 | 475 | 545 | 545 |
| Height H3 | 680 | 710 | 825 | 825 |
| Height H4 | 830 | 860 | 975 | 975 |
| Weight ¹⁾ (approx.) | 100 | 120 | 300 | 320 |

¹⁾ Based on cast iron (EN-JL1040), other materials +10 %

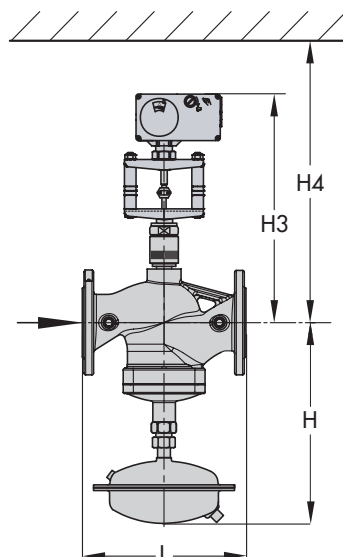
Dimensions in mm and weights in kg

| With Types 3374-11/-21 Actuator | | | | Type 3374-15 | | | |
|---------------------------------|-----|-----|-----|--------------|-----|------|-----|
| Nominal size DN | 65 | 80 | 100 | 125 | 150 | 200 | 250 |
| Length L | 290 | 310 | 350 | 400 | 480 | 600 | 730 |
| Height H | 355 | 355 | 380 | 450 | 475 | 545 | 545 |
| Height H3 | 520 | 520 | 540 | 510 | 595 | 660 | 690 |
| Height H4 | 820 | 820 | 890 | 860 | 950 | 1010 | 940 |
| Weight ¹⁾ (approx.) | 46 | 51 | 68 | 90 | 110 | 290 | 310 |

¹⁾ Based on cast iron (EN-JL1040), other materials +10 %

Dimensional drawing · Type 2423 E Valve balanced by a diaphragm · DN 65 to 100

Type 42-36 E with Type 5824-30 Electric Actuator



Dimensions in mm and weights in kg

| With Type 5824-30 Actuator | | | |
|--------------------------------|-----|-----|-----|
| Nominal size DN | 65 | 80 | 100 |
| Length L | 290 | 310 | 350 |
| Height H | 355 | 355 | 380 |
| Height H3 | 430 | 430 | 450 |
| Height H4 | 730 | 730 | 800 |
| Weight ¹⁾ (approx.) | 43 | 48 | 65 |

¹⁾ Based on cast iron (EN-JL1040), other materials +10 %

Fig. 6: Dimensions of the regulators with a valve balanced by a diaphragm

Ordering text

Type 42-36 E Pressure-independent Control Valve (PICV)

Valve balanced by a bellows/diaphragm DN ..., PN ..., K_{VS} ...

Differential pressure at the restriction ... bar,

Specifications subject to change without notice

With Type ... Electric Actuator

Power supply ... V, ... Hz

With Type ... Control Thermostat, set point range ... °C

Optionally, accessories, special version



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