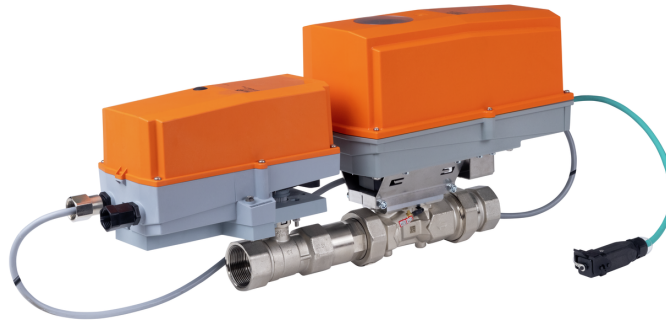


- Nominal voltage AC/DC 24 V
- Control Modulating, Communicative, Hybrid, Cloud
- Measures Energy
- Controls Power
- Manages Delta T



5-year warranty



## Technical data

|                        |  |  |  |
|------------------------|--|--|--|
| <b>Electrical data</b> | Nominal voltage  | AC/DC 24 V   |  |
|                        | Nominal voltage frequency  | 50/60 Hz   |  |
|                        | Nominal voltage range  | AC 19.2...28.8 V / DC 21.6...28.8 V  |  |
|                        | Power consumption in operation   | 14 W   |  |
|                        | Transformer sizing   | 23 VA  |  |
|                        | Connection Ethernet  | RJ45 socket  |  |
|                        | Conductors, cables   | AC/DC 24 V, cable length <100 m, no shielding or twisting required<br>Shielded cables are recommended for supply via PoE |  |
|                        | <b>Data bus communication</b>  | Communicative control  | BACnet/IP, BACnet MS/TP<br>Modbus TCP, Modbus RTU<br>MP-Bus<br>Cloud |
| <b>Functional data</b> |  | Valve size [mm]  | 1" [25]  |
|                        |  | Operating range Y  | 2...10 V   |
|                        |  | Operating range Y note   | 4...20 mA w/ ZG-R01 (500 Ω, 1/4 W resistor)                          |
|                        | Input impedance  | 100 kΩ (0.1 mA), 500 Ω   |  |
|                        | Operating modes optional   | VDC variable   |  |
|                        | Position feedback U  | 2...10 V   |  |
|                        | Position feedback U variable   | VDC variable   |  |
|                        | Running Time (Motor)   | 90 s   |  |
|                        | Running time fail-safe   | <35 s  |  |
|                        | Noise level Motor  | 45 dB(A)   |  |
| Noise level, fail-safe | 61 dB(A)   |  |  |
| Control accuracy       | ±5%  |  |  |
| Min. controllable flow | 1% of V <sub>nom</sub>   |  |  |
| Fluid                  | chilled or hot water, up to 60% glycol max (open loop/steam not allowed) |  |  |
| Fluid temperature      | 14...250°F [-10...120°C]   |  |  |

**Technical data**

|                                |   |  |
|--------------------------------|---|--|
| <b>Functional data</b>         | Close-off pressure $\Delta p_s$           | 200 psi  |
|                                | Differential Pressure Range               | 5...50 psi or 1...50 psi see flow reductions chart in tech doc   |
|                                | Flow characteristic                       | equal percentage or linear   |
|                                | Body Pressure Rating                      | 360 psi  |
|                                | GPM                                       | 18.2   |
|                                | Pipe connection                           | Internal thread<br>NPT (female)  |
|                                | Servicing                                 | maintenance-free   |
|                                | Manual override                           | external push button   |
| <b>Measuring data</b>          | Temperature sensor                        | Pt1000 - EN 60751, 2-wire technology, inseparably connected<br>Cable length external sensor T1: 3 m  |
| <b>Temperature measurement</b> | Measuring accuracy absolute temperature   | 32.6°F @ 50°F [ $\pm 0.35^\circ\text{C}$ @ 10°C] (Pt1000 EN60751 Class B)<br>33°F @ 140°F [ $\pm 0.6^\circ\text{C}$ @ 60°C] (Pt1000 EN60751 Class B) |
|                                | Measuring accuracy temperature difference | $\pm 0.22\text{ K}$ @ $\Delta T = 10\text{ K}$<br>$\pm 0.32\text{ K}$ @ $\Delta T = 20\text{ K}$   |
|                                | Resolution                                | 0.05°C   |
|                                | <b>Flow measurement</b>                   | Measuring accuracy flow  |
|                                | Measurement repeatability                 | $\pm 0.5\%$ (Flow)   |
|                                | Sensor technology                         | Ultrasonic with glycol and temperature compensation  |
| <b>Safety data</b>             | Power source UL                           | Class 2 Supply   |
|                                | Degree of protection IEC/EN               | IP66   |
|                                | Degree of protection NEMA/UL              | NEMA 4   |
|                                | Enclosure                                 | UL Enclosure Type 4  |
|                                | Agency Listing                            | cULus acc. to UL60730-1A/-2-14, CAN/CSA E60730-1:02<br>CE acc. to 2014/30/EU and 2014/35/EU  |
|                                | Quality Standard                          | ISO 9001   |
|                                | UL 2043 Compliant                         | Suitable for use in air plenums per Section 300.22(C) of the NEC and Section 602 of the IMC  |
|                                | Ambient humidity                          | Max. 95% RH, non-condensing  |
|                                | Ambient temperature                       | -22...122°F [-30...50°C]   |
|                                | Storage temperature                       | -40...176°F [-40...80°C]   |
| <b>Materials</b>               | Valve body                                | Nickel-plated brass body   |
|                                | Flow measuring pipe                       | brass body nickel-plated   |
|                                | Stem                                      | stainless steel  |
|                                | Stem seal                                 | EPDM (lubricated)  |
|                                | Seat                                      | PTFE   |
|                                | Characterized disc                        | TEFZEL®  |
|                                | O-ring                                    | EPDM   |
|                                | Ball                                      | stainless steel  |

Safety notes



- This device has been designed for use in stationary heating, ventilation and air-conditioning systems and must not be used outside the specified field of application, especially in aircraft or in any other airborne means of transport.
- Outdoor application: only possible in case that no (sea) water, snow, ice, insolation or aggressive gases interfere directly with the actuator and that is ensured that the ambient conditions remain at any time within the thresholds according to the data sheet.
- Only authorized specialists may carry out installation. All applicable legal or institutional installation regulations must be complied with during installation.
- The device contains electrical and electronic components and must not be disposed of as household refuse. All locally valid regulations and requirements must be observed.

Product features

**Application** Water-side control of heating and cooling systems for AHUs and water coils.

**Operation** The Energy Valve is an energy metering pressure independent control valve that measures, documents and optimises water coil performance.

**Operating mode** The HVAC performance device is comprised of four components: characterized control valve (CCV), measuring pipe with flow sensor, temperature sensors and the actuator itself. The adjusted maximum flow (V'max) is assigned to the maximum control signal DDC (typically 10 V / 100%). Alternatively, the control signal DDC can be assigned to the valve opening angle or to the power required on the heat exchanger (see power control). The HVAC performance device can be controlled via communicative or analog signals. The fluid is detected by the sensor in the measuring pipe and is applied as the flow value. The measured value is balanced with the setpoint. The actuator corrects the deviation by changing the valve position. The angle of rotation  $\alpha$  varies according to the differential pressure through the control element (see flow curves).

**Flow measurement** \*All flow tolerances are at 68°F [20°C] & water.

Accessories

| Replacement sensor modules | Description   | Type       |
|----------------------------|---|------------|
|                            | T-piece with thermowell DN 1/2" [15]                              | A-22PE-A09 |
|                            | T-piece with thermowell DN 3/4" [20]                              | A-22PE-A10 |
|                            | T-piece with thermowell DN 1" [25]                                | A-22PE-A11 |
|                            | T-piece with thermowell DN 1 1/4" [32]                            | A-22PE-A12 |
|                            | T-piece with thermowell DN 1 1/2" [40]                            | A-22PE-A13 |
|                            | T-piece with thermowell DN 2" [50]                                | A-22PE-A14 |
| Sensors                    | Description   | Type       |
|                            | Differential pressure sensor Water, 0...15 psi, active, 0...10 V  | 22WDP-511  |
|                            | Differential pressure sensor Water, 0...30 psi, active, 0...10 V  | 22WDP-512  |
|                            | Differential pressure sensor Water, 0...50 psi, active, 0...10 V  | 22WDP-514  |
|                            | Differential pressure sensor Water, 0...100 psi, active, 0...10 V | 22WDP-515  |

Electrical installation



Supply from isolating transformer.

Parallel connection of other actuators possible. Observe the performance data.

The wiring of the line for BACnet MS/TP / Modbus RTU is to be carried out in accordance with applicable RS485 regulations.

Modbus / BACnet: Supply and communication are not galvanically isolated. Connect earth signal of the devices with one another.

Sensor connection: An additional sensor can optionally be connected to the thermal energy meter. This can be a passive resistance sensor Pt1000, Ni1000, NTC10k (10k2), an active sensor with output DC 0...10 V or a switching contact. Thus the analogue signal of the sensor can be easily digitised with the thermal energy meter and transferred to the corresponding bus system.

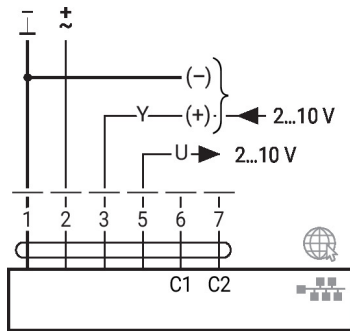
Analog output: An analog output is available on the thermal energy meter. This can be selected as DC 0...10 V, DC 0.5...10 V or DC 2...10 V. For example, the flow rate or the temperature of the temperature sensor T1 / T2 can be output as an analog value.

Wire colors:

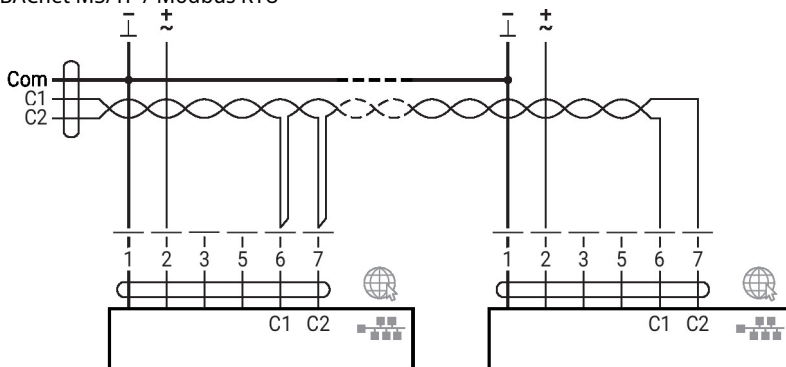
- 1 = black
- 2 = red
- 3 = white
- 5 = orange
- 6 = pink
- 7 = grey

Functions:

- 1 = Com
- 2 = AC/DC 24 V
- 3 = Sensor (optional)
- 5 = 0...10 V, MP-Bus
- C1 = D- = A (wire 6)
- C2 = D+ = B (wire 7)

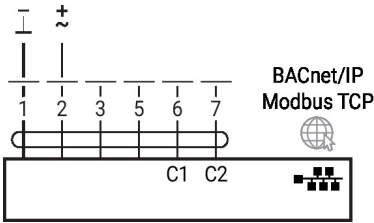


BACnet MS/TP / Modbus RTU

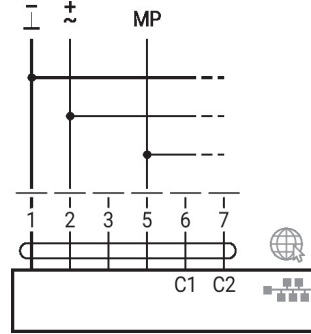


**Electrical installation**

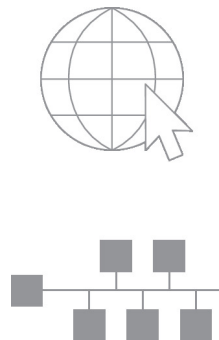
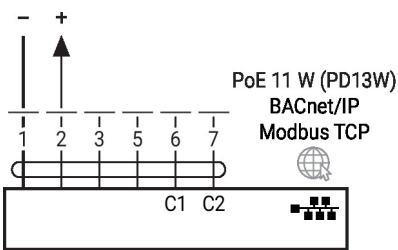
BACnet/IP / Modbus TCP



MP-Bus, supply via 3-wire connection



PoE with BACnet/IP / Modbus TCP

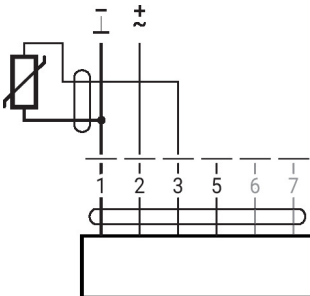


Connection of a notebook for parametrisation and manual control via RJ45.

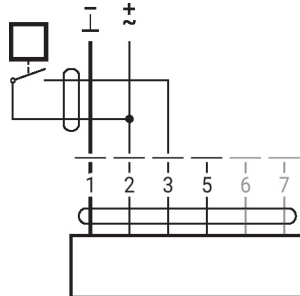
Optional connection via RJ45 (direct connection to notebook / connection via Intranet or Internet) for access to the integrated web server

**Converter for sensors**

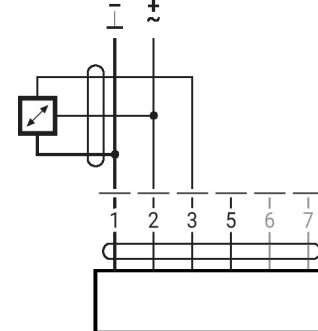
Connection with passive sensor



Connection with switching contact



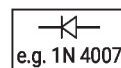
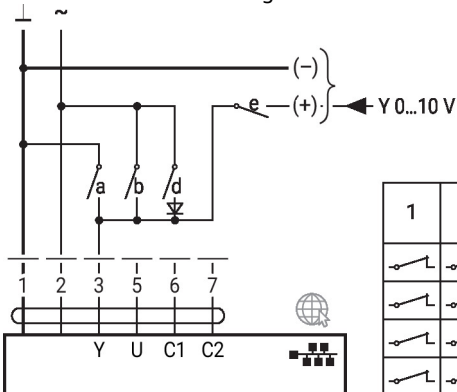
Connection with active sensor



**Functions**

**Functions with specific parameters (parametrisation necessary)**

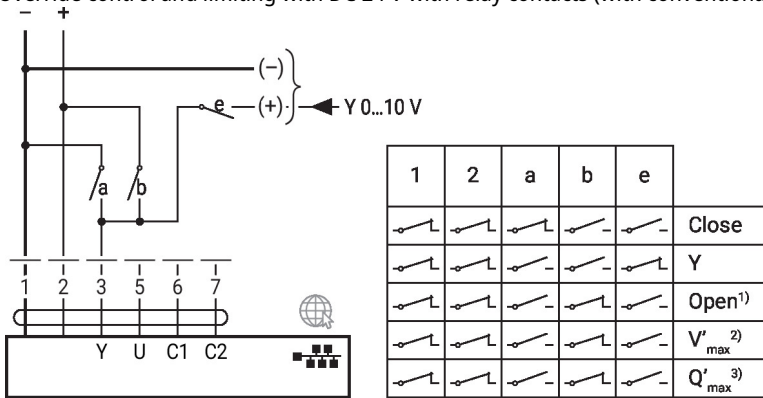
Override control and limiting with AC 24 V with relay contacts



| 1 | 2 | a | b | d | e |        |
|---|---|---|---|---|---|--------|
|   |   |   |   |   |   | Close  |
|   |   |   |   |   |   | V' max |
|   |   |   |   |   |   | Open   |
|   |   |   |   |   |   | Y      |

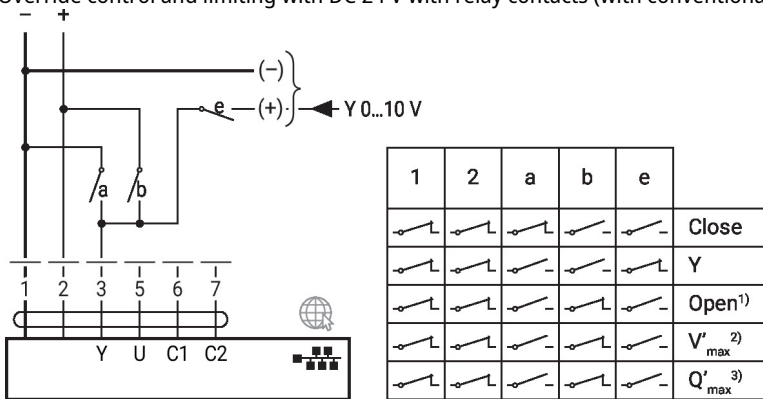
**Functions with specific parameters (parametrisation necessary)**

Override control and limiting with DC 24 V with relay contacts (with conventional control or hybrid mode)



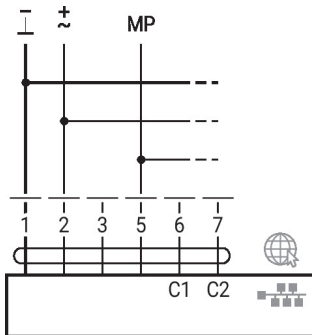
- 1) Position control
- 2) Flow control
- 3) Power control

Override control and limiting with DC 24 V with relay contacts (with conventional control or hybrid mode)

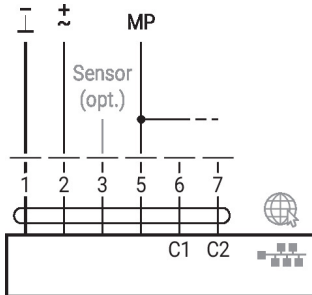


- 1) Position control
- 2) Flow control
- 3) Power control

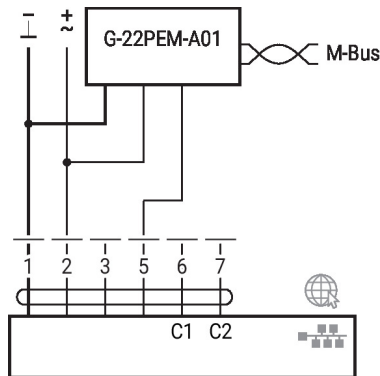
MP-Bus, supply via 3-wire connection



MP-Bus via 2-wire connection, local power supply



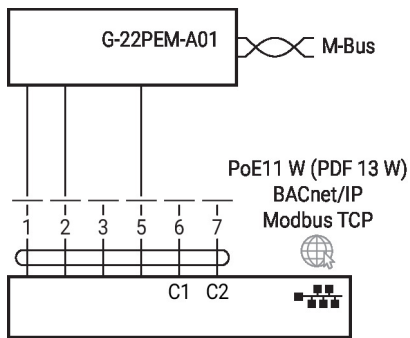
M-Bus with converter



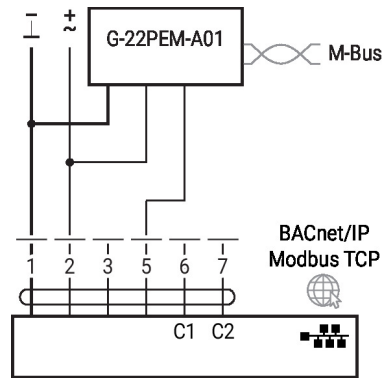
**Functions**

**Functions with specific parameters (parametrisation necessary)**

M-Bus with converter in parallel mode with PoE with BACnet/IP / Modbus TCP

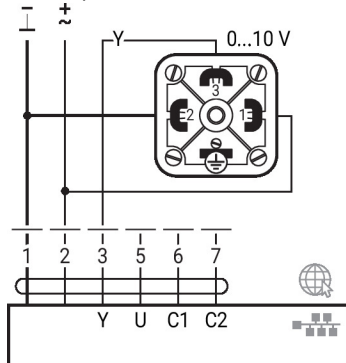


M-Bus with converter in parallel mode with BACnet/IP / Modbus TCP

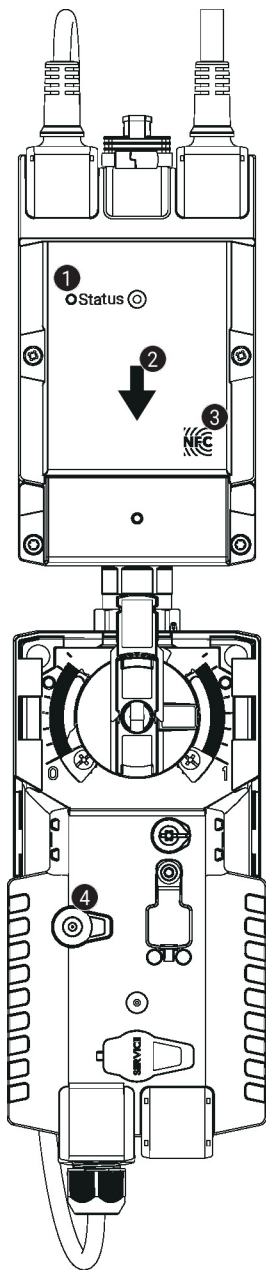


**Differential pressure control operating mode**

Connection of differential pressure sensor 22WDP-51.. (sensor not included)



## Operating controls and indicators


**1 LED display green**

|           |                         |
|-----------|-------------------------|
| On:       | Device starting up      |
| Flashing: | In operation (Power ok) |
| Off:      | No power                |

**2 Flow direction**
**3 NFC interface**
**4 Manual override button**

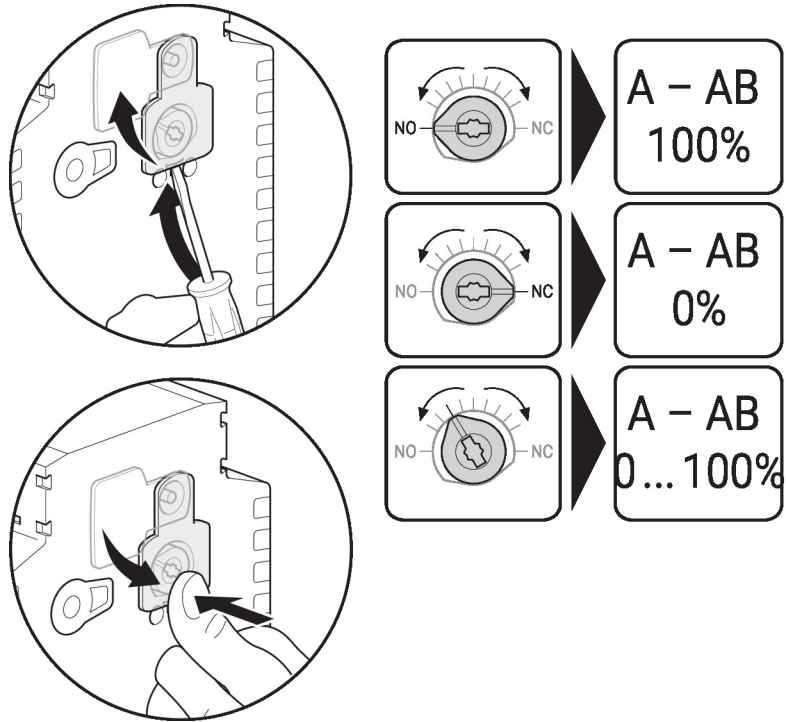
|                 |  |
|-----------------|--|
| Press button:   | Gear train disengages, motor stops, manual override possible |
| Release button: | Gear train engages, standard mode                            |



Operating controls and indicators

Setting fail-safe position

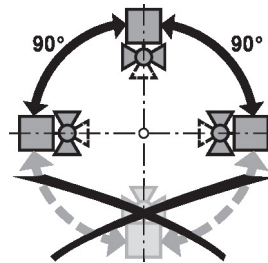
Setting emergency setting position (POP)



Installation notes

**Permissible installation orientation**

The ball valve can be installed upright to horizontal. The ball valve may not be installed in a hanging position, i.e. with the stem pointing downwards.



**Installation location in return**

Installation in the return is recommended.

**Water quality requirements**

The water quality requirements specified in VDI 2035 must be adhered to. Belimo valves are regulating devices. For the valves to function correctly in the long term, they must be kept free from particle debris (e.g. welding beads during installation work). The installation of a suitable strainer is recommended.

**Servicing**

Ball valves, rotary actuators and sensors are maintenance-free.

Before any service work on the control element is carried out, it is essential to isolate the rotary actuator from the power supply (by unplugging the electrical cable if necessary). Any pumps in the part of the piping system concerned must also be switched off and the appropriate slide valves closed (allow all components to cool down first if necessary and always reduce the system pressure to ambient pressure level).

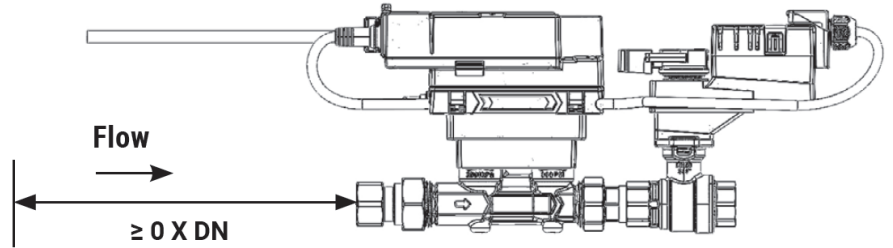
The system must not be returned to service until the ball valve and the rotary actuator have been correctly reassembled in accordance with the instructions and the pipeline has been refilled by professionally trained personnel.

**Flow direction**

The direction of flow, specified by an arrow on the housing, is to be complied with, since otherwise the flow rate will be measured incorrectly.

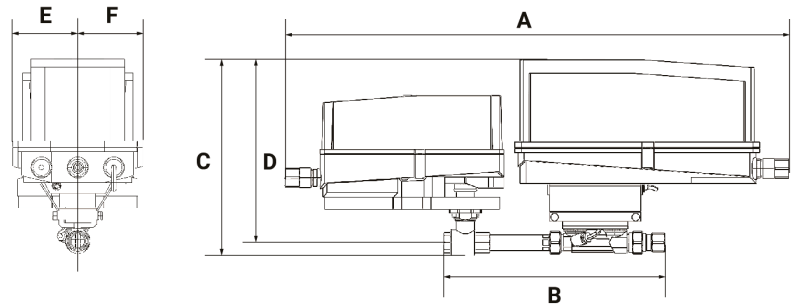
Installation notes

**Inlet section** There are no requirements for straight inlet sections prior to the flow sensor. Product has been tested to and fulfills the requirements of EN1434-4:2022



Dimensions

Dimensional drawings



Type

EV100+AKRX-E N4

Weight

14 lb [6.3 kg]

| A           | B           | C           | D          | E         | F         |
|-------------|-------------|-------------|------------|-----------|-----------|
| 26.6" [675] | 13.6" [346] | 10.8" [275] | 9.7" [246] | 3.4" [86] | 3.4" [86] |