



EV... Series Energy Valve Stainless Steel Ball, NPT Female Ends

Application

Water-side control of heating and cooling systems for AHUs and water coils. Equal Percentage / Linear: heating / cooling applications.

Mode of Operation

The Energy Valve is an energy metering pressure independent control valve that optimizes, documents and proves water coil performance.

Product Features

The Energy Valve measures energy, controls power, and manages delta T.

- Measures Energy: using its built-in electronic flow sensor and supply and return temperature sensors.
- Controls Power: with its Power Control logic, providing linear heat transfer regardless of temperature and pressure variations.
- Manages Delta T: The Energy Valve solves Low Delta T Syndrome. In addition, it reduces pumping costs while increasing chiller/boiler efficiency by optimizing coil efficiency.

Valve Specifications

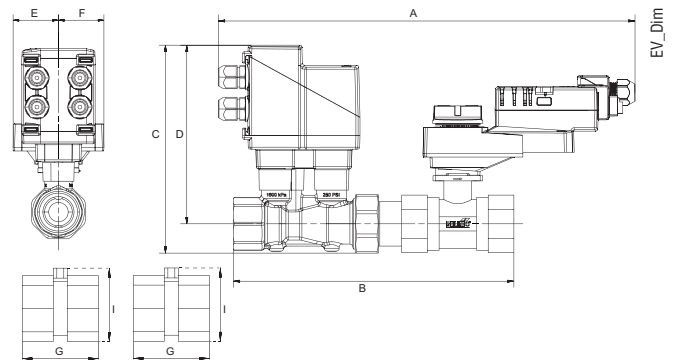
| | |
|--|--|
| Service | chilled or hot water, 60% glycol max (open loop/steam not allowed) |
| Flow characteristic | equal percentage/linear |
| Size | ½", ¾", 1", 1¼", 1½", 2" |
| Type of end fitting | NPT female ends |
| Materials | |
| Body | |
| Valve | forged brass, nickel plated |
| Sensor housing | forged brass, nickel plated |
| Ball | stainless steel |
| Stem | stainless steel |
| Seat | Teflon® PTFE |
| Characterizing disc | Tefzel® |
| O-ring | EPDM |
| Packing | EPDM |
| Body pressure rating | 360 psi |
| Media temperature range | 14°F to 250°F [-10°C to +120°C] 39°F to 250°F [4°C to 120°C]** |
| Maximum sound level | <35 dB(A) |
| Leakage | 0% |
| Close-off pressure | 200 psi |
| Differential pressure range(ΔP) | 1 to 50 psi*, 5 to 50 psi, 8 to 50 psi** |
| Inlet length required to meet specified measurement accuracy | 5x nominal pipe size (NPS) |
| Humidity | <95% RH non-condensing |
| Flow metering technology | ultrasonic with temperature and glycol compensation |
| Flow control tolerance | ±5% |
| Flow measurement tolerance | ±2% |
| Flow measurement repeatability | ±0.5% |
| Temperature sensors | PT1000 insertion sensors w/NPT pipe body |
| Remote temperature sensor length | 2 ft. 7.5 in. [0.8 m] short, 9.8 ft. [3 m] long |
| Temperature measurement tolerance | According to PT1000 DIN EN60751 Class B. |
| Resolution of temperature sensor | 0.18°F (0.1°C) |
| Rated impulse voltage | actuator/sensor: 0.8 kV (in accordance with EN 60730-1) |
| Power supply for the flow sensor | actuator is powered by the flow sensor |
| Quality standard | ISO 9001 |
| Agency listings | UL 60730-1/2-14, 2-18, CE according to 2004/108/EC and 2006/95/EC |

All flow tolerances are @ 68°F (20°C) & water.

*See flow reduction chart on page 43.

** Applies to 2" EV model EV200S-1000 only.

Dimensions



Valve Nominal Size Dimensions (Inches [mm])

| In. | DN [mm] | A | B | C | D | E | F | G | I |
|-----|---------|--------------|--------------|-------------|-------------|------------|------------|--------------|--------------|
| ½" | 15 | 14.64" [372] | 7.50" [191] | 6.85" [174] | 6.29" [160] | 1.55" [39] | 1.55" [39] | 2.05" [52] | 3.15" [80.1] |
| ¾" | 20 | 14.92" [379] | 8.00" [203] | 7.02" [178] | 6.37" [162] | 1.55" [39] | 1.55" [39] | 2.25" [57] | 3.15" [80.1] |
| 1" | 25 | 15.43" [392] | 9.1" [231] | 7.29" [185] | 6.49" [165] | 1.55" [39] | 1.55" [39] | 2.50" [64] | 3.23" [82] |
| 1¼" | 32 | 16.45" [418] | 10.00" [254] | 7.54" [192] | 6.61" [168] | 1.73" [44] | 1.73" [44] | 2.77" [70.5] | 3.39" [86] |
| 1½" | 40 | 16.84" [428] | 10.78" [274] | 7.87" [200] | 6.77" [172] | 1.73" [44] | 1.73" [44] | 2.77" [70.5] | 3.70" [94] |
| 2" | 50 | 17.12" [435] | 11.18" [284] | 8.26" [210] | 6.96" [177] | 1.73" [44] | 1.73" [44] | 3.15" [80.1] | 4.13" [105] |

| Design Flow Range GPM | Valve Nominal Size | | Type | Actuator Type | |
|-----------------------|--------------------|---------|------------------|-------------------|----------------------|
| | Inches | DN [mm] | 2-way Female NPT | Non-Spring Return | Electronic Fail-Safe |
| 1.65-5.5 | ½" | 15 | EV050S-5.5 | LRB, LRX | AKRB, AKRX |
| 3.1-10.3 | ¾" | 20 | EV075S-10.3 | LRB, LRX | AKRB, AKRX |
| 5.5-18.2 | 1" | 25 | EV100S-18.2 | LRB, LRX | AKRB, AKRX |
| 8.6-28.5 | 1¼" | 32 | EV125S-28.5 | NRB, NRX | AKRB, AKRX |
| 11.9-39.6 | 1½" | 40 | EV150S-39.6 | NRB, NRX | AKRB, AKRX |
| 22.8-76.1 | 2" | 50 | EV200S-76.1 | ARB, ARX | AKRB, AKRX |
| 30-100 | 2" | 50 | EV200S-1000 | ARB, ARX | AKRB, AKRX |

| Valve Nominal Size | | Weights | |
|--------------------|---------|-------------|--|
| Inches | DN [mm] | Pounds [kg] | |
| ½" | 15 | 5 [2.2] | |
| ¾" | 20 | 5.5 [2.5] | |
| 1" | 25 | 6.5 [2.9] | |
| 1¼" | 32 | 8.5 [3.8] | |
| 1½" | 40 | 10 [4.5] | |
| 2" | 50 | 13.5 [6] | |

EV...Series Energy Valve

Non-Spring Return and Electronic Fail-Safe Actuator Series



Operation

The actuator is electronically protected against overload.

The actuators use a brushless DC motor, which is controlled by an Application Specific Integrated Circuit (ASIC). The ASIC monitors and controls the actuators rotation and provides a digital rotation sensing (DRS) function to prevent damage to the actuator in a stall condition. Power consumption is reduced in a holding mode.

Add-on auxiliary switches or feedback potentiometers are easily fastened directly onto the actuator body for signaling and switching functions.

Non-Spring Return LR, NR, GR, AR and Electronic Fail-Safe Actuators AKR and GKR

| Actuator Specifications | |
|---------------------------------|--|
| Power supply | 24 VAC ± 20% 24 VDC ± 10% |
| Electric frequency | 50/60 Hz |
| Power consumption | |
| LR Series | 4W |
| NR Series | 5W |
| GR Series | 8W |
| AR Series | 5W (½" to 2"), 7W (2½" to 6") |
| AKR Series | 14W (½" to 2"), 16W (2½" to 6") |
| GKR Series | 17W |
| Transformer sizing | |
| LR Series | 7 VA (class 2 power source) |
| NR Series | 8 VA (class 2 power source) |
| GR Series | 12 VA (class 2 power source) |
| AR Series | 8 VA (½" to 6"), 11 VA (2½" to 6") (class 2 power source) |
| AKR Series | 23 VA (½" to 2"), 26VA (2½" to 6") (class 2 power source) |
| GKR Series | 29 VA (class 2 power source) |
| Electrical connection | 18 GA, plenum rated cable ½" conduit connector protected NEMA 2 (IP54) 3 ft. [1 m] cable |
| Overload protection | electronic throughout 0° to 90° rotation |
| Operation range Y | 2 to 10 VDC (default) VDC variable |
| Control | modulating |
| Input impedance | 100 kΩ (0.1 mA), 500Ω |
| Flow Feedback | 2 to 10 VDC (default), VDC variable |
| Communication | BACnet IP, BACnet MS/TP, Listed by BTL, web server, Belimo MP-Bus |
| Direction of rotation | motor fail-safe |
| electronically variable | |
| reversible with built-in switch | |
| Manual override | external push button |
| Running time normal operation | 90 seconds |
| Running time fail-safe | 35 seconds |
| Humidity | 5 to 95% RH, non-condensing |
| Ambient temperature | -22°F to 122°F [-30°C to 50°C] |
| Storage temperature | -40°F to 176°F [-40°C to 80°C] |
| Housing | NEMA 2, IP54, UL enclosure type 2 |
| Noise level | <45dB(A) at 90 seconds |
| Servicing | maintenance free |
| Quality standard | ISO 9001 |
| Agency listings | UL 60730-1/2-14, 2-18, CE according to 2004/108/EC and 2006/95/EC |

The Energy Valve is based on Belimo patent and patent pending technology:

- US-Patent: 6,039,304: Ball valve with modified characteristics.
- US-Patent Pending: 2011/0153089: HVAC actuator comprising a network interface, data store and a processor.
- US-Patent Pending: 2009/0009115: Control of sensor less and brushless DC-Motor.

The Energy Valve incorporates additional technology – Powered by Optimum Energy™.

Wiring Diagrams

✂ INSTALLATION NOTES

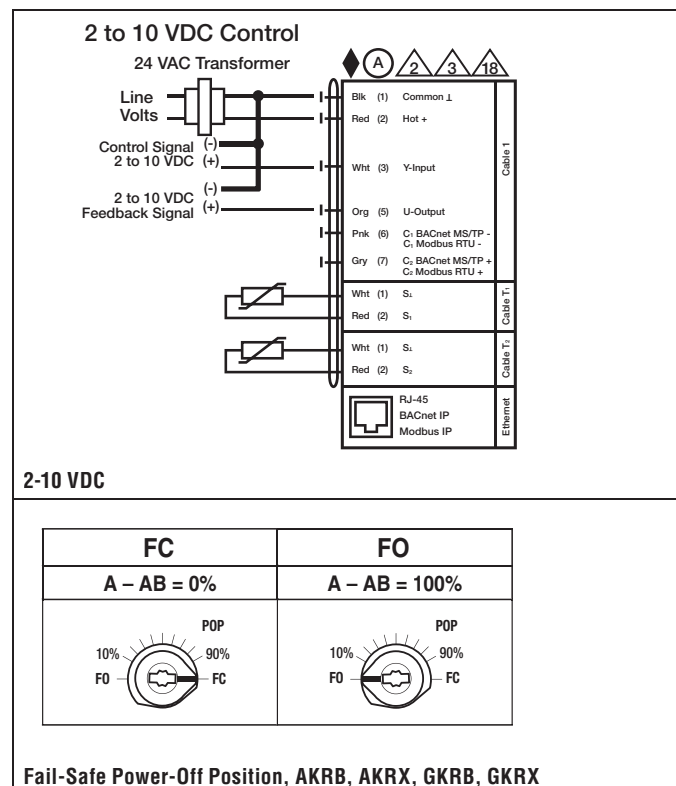
- Ⓐ Actuators with appliance cables are numbered.
- ⚠ **CAUTION Equipment damage!**
Actuators may be connected in parallel.
Power consumption and input impedance must be observed.
- ⚡ Actuators may also be powered by 24 VDC.
- ⚠ Actuators with plenum rated cable do not have numbers on wires; use color codes instead.

📄 APPLICATION NOTES

- ◆ Meets cULus requirements without the need of an electrical ground connection

⚠ **WARNING Live Electrical Components!**

During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.



System Ground

In cases where the valve body is electrically isolated from the water pipe, an earth ground should be installed in order for the sensor to work properly.

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Flow Reduction Chart

MAXIMUM FLOW BASED ON MINIMUM DIFFERENTIAL PRESSURE FOR ANSI 125 NPT MODELS

| Size | | 8 psi | 5 psi* | 4 psi | 3 psi | 2 psi | 1 psi |
|--------|---------|-----------|----------|----------|----------|----------|----------|
| Inches | DN [mm] | | | | | | |
| ½ | 15 | 5.5 GPM | 5.5 GPM | 5.5 GPM | 5.5 GPM | 4.8 GPM | 3.4 GPM |
| ¾ | 20 | 10.3 GPM | 10.3 GPM | 10.3 GPM | 9.9 GPM | 8.1 GPM | 5.7 GPM |
| 1 | 25 | 18.2 GPM | 18.2 GPM | 18.2 GPM | 17.2 GPM | 14.1 GPM | 9.9 GPM |
| 1¼ | 32 | 28.5 GPM | 28.5 GPM | 28.5 GPM | 28.5 GPM | 23.3 GPM | 16.5 GPM |
| 1½ | 40 | 39.6 GPM | 39.6 GPM | 39.6 GPM | 39.6 GPM | 34.9 GPM | 24.7 GPM |
| 2 | 50 | 100 GPM** | 76.1 GPM | 74 GPM | 64.1 GPM | 52.3 GPM | 37 GPM |
| 2½ | 65 | 127 GPM | 127 GPM | 93 GPM | 81 GPM | 66 GPM | 47 GPM |
| 3 | 80 | 180 GPM | 180 GPM | 138 GPM | 120 GPM | 97 GPM | 69 GPM |
| 4 | 100 | 317 GPM | 317 GPM | 235 GPM | 203 GPM | 166 GPM | 117 GPM |
| 5 | 125 | 495 GPM | 495 GPM | 367 GPM | 318 GPM | 260 GPM | 183 GPM |
| 6 | 150 | 713 GPM | 713 GPM | 550 GPM | 476 GPM | 389 GPM | 275 GPM |

* Select valve based on a minimum of 5 PSI differential.

** Applies to 2" EPIV models P2200S-800 through P2200S-1000 only.

MAXIMUM FLOW BASED ON MINIMUM DIFFERENTIAL PRESSURE FOR ANSI 250 FLANGED MODELS

| Size | | 7.5 psi*** | 5 psi | 4 psi | 3 psi | 2 psi | 1 psi |
|--------|---------|------------|---------|---------|---------|---------|---------|
| Inches | DN [mm] | | | | | | |
| 2½ | 65 | 127 GPM | 109 GPM | 98 GPM | 85 GPM | 69 GPM | 49 GPM |
| 3 | 80 | 180 GPM | 153 GPM | 137 GPM | 118 GPM | 97 GPM | 68 GPM |
| 4 | 100 | 317 GPM | 280 GPM | 251 GPM | 217 GPM | 177 GPM | 125 GPM |
| 5 | 125 | 495 GPM | 436 GPM | 390 GPM | 337 GPM | 275 GPM | 195 GPM |
| 6 | 150 | 713 GPM | 593 GPM | 531 GPM | 460 GPM | 375 GPM | 265 GPM |

*** Select valve based on a minimum of 7.5 PSI differential.

Input Signal Scaling

FLOW CONTROL: EQUAL PERCENTAGE FLOW RESPONSE TO INPUT SIGNAL (Y)

| 0.5-10 VDC Signal | 2-10 VDC Signal | Water Flow in % of V'max |
|-------------------|-----------------|--------------------------|
| 0.5 | 2 | 0% |
| 3.16 | 4.24 | 10% |
| 5.25 | 6 | 20% |
| 6.49 | 7.04 | 30% |
| 7.29 | 7.72 | 40% |
| 7.95 | 8.28 | 50% |
| 8.48 | 8.72 | 60% |
| 8.96 | 9.12 | 70% |
| 9.34 | 9.44 | 80% |
| 9.66 | 9.73 | 90% |
| 10 | 10 | 100% |

POWER CONTROL: LINEAR POWER RESPONSE OR FLOW CONTROL: LINEAR FLOW RESPONSE TO INPUT SIGNAL (Y)

| 0.5-10 VDC Signal | 2-10 VDC Signal | Power in % of P'max or Water Flow in % of V'max |
|-------------------|-----------------|---|
| 0.5 | 2 | 0% |
| 1.45 | 2.8 | 10% |
| 2.40 | 3.60 | 20% |
| 3.35 | 4.40 | 30% |
| 4.30 | 5.20 | 40% |
| 5.25 | 6 | 50% |
| 6.20 | 6.80 | 60% |
| 7.15 | 7.60 | 70% |
| 8.10 | 8.40 | 80% |
| 9.05 | 9.20 | 90% |
| 10 | 10 | 100% |

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