



Valve Specifications

Service	chilled or hot water, 60% glycol max (open loop/steam not allowed)
Flow characteristic	equal percentage/linear
Size	2½", 3", 4", 5", 6"
Type of end fitting	pattern to mate with ANSI 125 flange
Materials	
Body	
Valve	cast iron - GG25
Sensor housing	ductile iron - GGG50
Ball	stainless steel
Seat	PTFE
Characterizing disc	stainless steel
Packing	2 EPDM O-rings, lubricated
Body pressure rating	according to ANSI 125, standard class B
Media temperature range	14°F to 250°F [-10°C to +120°C]
Maximum sound level	70 dBA
Conductivity	min. 20uS/cm
Leakage	0%
Close-off pressure	100 psi
Differential pressure range(ΔP)	1 to 50 psi* , 5 to 50 psi
Inlet length required to meet specified measurement accuracy	5x nominal pipe size (NPS)
Humidity	<95% RH non-condensing
Flow metering technology	electromagnetic
Flow control tolerance	±5%
Flow measurement tolerance	±2%
Flow measurement repeatability	±0.5%
Temperature sensors	32.8 ft. [10m] PT1000 insertion sensors Thermal well ½ NPT
Remote temperature sensor length	
Standard	32.8 ft. [10 m]
Optional	4.9 ft. [1.5m], 9.8 ft. [3m], 16.4 ft. [5m]
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 table on page 41.

Valve Nominal Size		Weights
Inches	DN [mm]	Pounds [kg]
2½"	65	52 [23.6]
3"	80	63 [28.7]
4"	100	89 [40.5]
5"	125	120 [54.7]
6"	150	154 [70.0]

Application

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

Mode of Operation

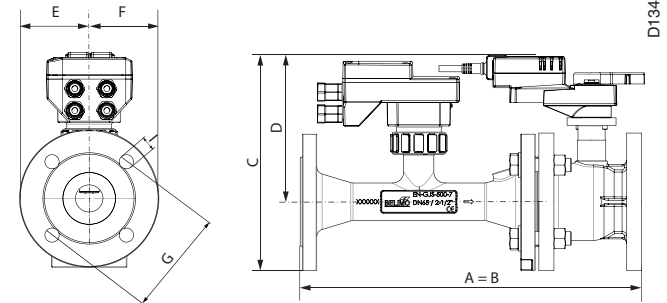
The Energy Valve is an energy metering pressure independent control valve that optimizes, documents and proves water coil performance.

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.

Dimensions



Valve Nominal Size		Dimensions (Inches [mm])							
In.	DN [mm]	A	B	C	D	E	F	G	I
2½"	65	17.9" [454]	17.9" [454]	11.2" [284]	7.9" [201]	3.64" [92]	3.64" [92]	7.28" [185]	0.75" [19]
3"	80	19.7" [499]	19.7" [499]	11.8" [300]	7.9" [201]	3.94" [100]	3.94" [100]	7.87" [200]	0.75" [19]
4"	100	22.85" [581]	22.85" [581]	12.8" [325]	8.3" [211]	3.75" [95]	3.75" [95]	7.5" [191]	0.75" [19]
5"	125	25.18" [640]	25.18" [640]	14.4" [366]	9.4" [239]	5" [127]	5" [127]	10" [254]	0.88" [22]
6"	150	30.2" [767]	30.2" [767]	14.9" [378]	9.4" [239]	5.5" [140]	5.5" [140]	11" [279]	0.88" [22]

Available Flow Rates

Design Flow Range GPM	Valve Nominal Size		Type	Actuator Type	
	Inches	DN [mm]	2-way Flanged	Non-Spring Return	Electronic Fail-Safe
80-127	2½	65	EV250S-127	ARB, ARX	AKRB, AKRX
128-180	3	80	EV300S-180	ARB, ARX	AKRB, AKRX
200-317	4	100	EV400S-317	GRB, GRX	AKRB, AKRX
337-495	5	125	EV500S-495	GRB, GRX	GKRB, GKRX
513-713	6	150	EV600S-713	GRB, GRX	GKRB, GKRX

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	4.5 W
NR Series	5.5 W
GR Series	8 W
AR Series	7 W
AKR Series	7.5W (½" to 2"), 16W (2½ to 6")
GKR Series	17W
Transformer sizing	
LR Series	8 VA (class 2 power source)
NR Series	9 VA (class 2 power source)
GR Series	12 VA (class 2 power source)
AR Series	11 VA (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	proportional
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	electronically variable
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

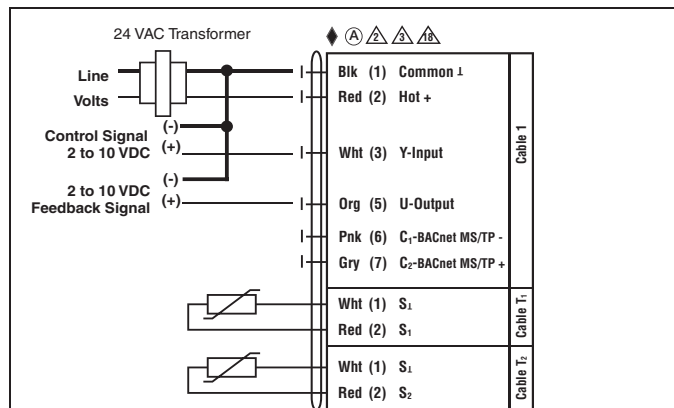
- Ⓐ Actuators with appliance cables are numbered.
- ⚠ **CAUTION Equipment damage!**
Actuators may be connected in parallel.
Power consumption and input impedance must be observed.
- ⚠ Actuators may also be powered by 24 VDC.
- ⚠ Actuators with plenum rated cable do not have numbers on wires; use color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

📄 APPLICATION NOTES

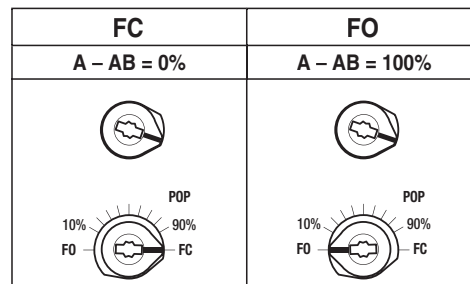
- ◆ Meets cULus requirements without the need of an electrical ground connection

⚠ **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.



2-10 VDC



Fail-Safe Power-Off Position, AKRB, AKRX, GKRB, GKRX

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.

Tech.Doc - 03/14 - Subject to change. © Belimo Aircontrols (USA), Inc.

Flow Reduction Chart

MAXIMUM FLOW BASED ON MINIMUM DIFFERENTIAL PRESSURE

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

*V^{nom} = Maximum flow for each valve body size.

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 TO INPUT SIGNAL (Y)

0.5-10 VDC Signal	2-10 VDC Signal	Power in % of P' 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%