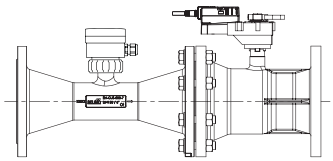
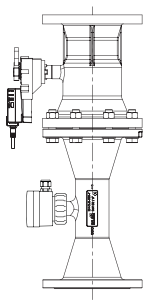
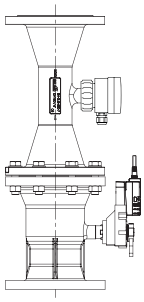
Orientation

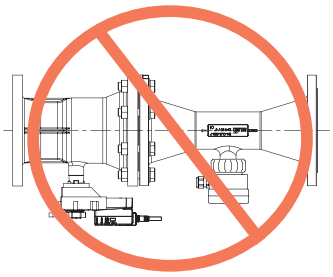
ePIVs shall be installed with flow in the direction of the arrow on the valve body.

The valve assembly can be installed in a vertical or horizontal arrangement, as long as the actuator is positioned to avoid condensation from dripping onto the actuator.









(Not for use with weather shields)

Flow Reduction Chart

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

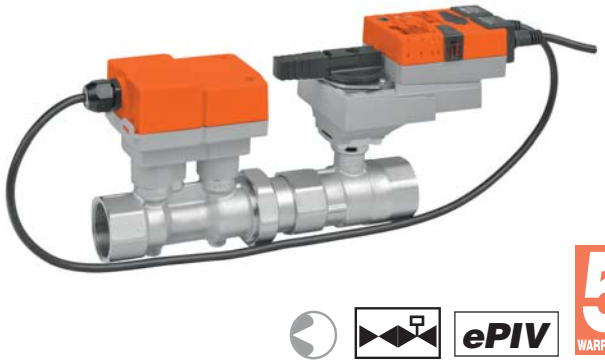
Size		8 psi	5 psi*	4 psi	3 psi	2 psi	1 psi
Inches	DN [mm]						
½	15	5.5 GPM	5.5 GPM	5.5 GPM	5.5 GPM	4.8 GPM	3.4 GPM
¾	20	10.3 GPM	10.3 GPM	10.3 GPM	9.9 GPM	8.1 GPM	5.7 GPM
1	25	18.2 GPM	18.2 GPM	18.2 GPM	17.2 GPM	14.1 GPM	9.9 GPM
1¼	32	28.5 GPM	28.5 GPM	28.5 GPM	28.5 GPM	23.3 GPM	16.5 GPM
1½	40	39.6 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.



Application

Water-side control of heating and cooling systems for AHUs and heat pumps.
Equal Percentage: Heating / cooling applications.
Linear Characteristic: Bypass control.

Mode of Operation

The Electronic Pressure Independent Control Valve is a two-way valve which maintains constant flow regardless of pressure variations in the system.

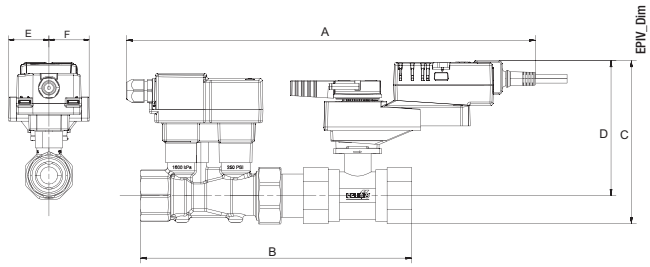
Product Features

Provides constant flow regardless of pressure variations in the system.
Maximizes chiller ΔP, preventing energizing additional chillers due to low ΔT.
Simplified valve sizing and selection, no Cv calculations required.

Valve Specifications	
Service	chilled or hot water, 60% glycol max (open loop/steam not allowed)
Flow characteristic	equal percentage / linear
Controllable flow range	75° rotation
Size	½", ¾", 1", 1¼", 1½", 2"
End fitting	NPT female ends
Materials	
Body	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]**
Noise 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%
Rated impulse voltage	actuator/sensor: 0.8 kV (in accordance with EN 60730-1)
Power supply for the flow sensor	sensor is powered by the actuator
Quality standard	ISO 9001
Agency listings	UL 60730-1/2-14, 2-18, CE according to 2004/108/EC and 2006/95/EC

* See flow reduction chart on page 5.
** Applies to 2" EPIV models P2200S-800 through P2200S-1000 only
***All flow accuracies are @ 68°F (20°C).

Dimensions



Valve Nominal Size		Dimensions (Inches [mm])					
Inches	DN [mm]	A	B	C	D	E	F
½"	15	14.56" [370]	7.50" [191]	5.47" [139]	4.92" [125]	1.55" [39]	1.55" [39]
¾"	20	14.83" [377]	8.00" [203]	5.57" [141]	4.92" [125]	1.55" [39]	1.55" [39]
1"	25	15.30" [390]	9.10" [231]	5.80" [147]	5.00" [127]	1.55" [39]	1.55" [39]
1¼"	32	16.37" [416]	10.00" [254]	6.08" [154]	5.15" [131]	1.73" [44]	1.73" [44]
1½"	40	16.76" [426]	10.78" [274]	6.65" [169]	5.55" [141]	1.73" [44]	1.73" [44]
2"	50	17.04" [433]	11.18" [284]	6.89" [175]	5.59" [142]	1.73" [44]	1.73" [44]

	Valve Nominal Size		Type	Actuator Type	
GPM Range	Inches	DN [mm]	2-way Female NPT	Non-Spring Return	Electronic Fail-Safe
1.65-5.5	½"	15	P2050S	LRX	AKRX
6-10.3	¾"	20	P2075S	LRX	AKRX
11.1-18.2	1"	25	P2100S	LRX	AKRX
18.0-28.5	1¼"	32	P2125S	NRX	AKRX
26.1-39.6	1½"	40	P2150S	NRX	AKRX
32.7-100**	2"	50	P2200S	ARX	AKRX

P6... Series Electronic Pressure Independent Valves (ePIV)
Stainless Steel Ball, ANSI 125 Flange Ends

Application

Water-side control of heating and cooling systems for AHUs and heat pumps.
Equal Percentage: Heating / cooling applications.
Linear Characteristic: Bypass control.

Mode of Operation

The Electronic Pressure Independent Control Valve is a two-way valve which maintains constant flow regardless of pressure variations in the system.

Product Features

Provides constant flow regardless of pressure variations in the system.
Maximizes chiller ΔP, preventing energizing additional chillers due to low ΔT.
Simplified valve sizing and selection, no Cv calculations required.

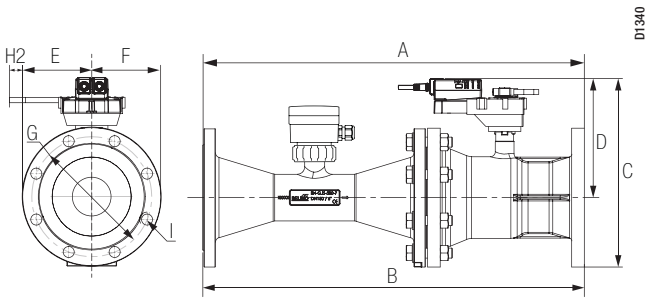
Valve Specifications	
Service	chilled or hot water, 60% glycol max (open loop/steam not allowed)
Flow characteristic	equal percentage / linear
Controllable flow range	75° rotation
Size	2½", 3", 4", 5", 6"
End fitting	pattern to mate with ANSI 125 flange
Materials	
Body	cast iron - GG25 and ductile iron - 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]
Conductivity of media	Min. 20uS/cm (no fully desalinated systems)
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%
Power supply for the flow sensor	sensor is powered by the actuator
Quality standard	ISO 9001
Agency listings	UL 60730-1/2-14, 2-18, CE according to 2004/108/EC and 2006/95/EC

*See flow reduction chart on page 5.
**All flow accuracies are @ 68°F (20°C).

Weights

Valve Nominal Size		Weights
Inches	DN [mm]	Pounds [kg]
2½"	65	52 [23.3]
3"	80	63 [28.3]
4"	100	89 [40.1]
5"	125	120 [54.3]
6"	150	154 [69.6]

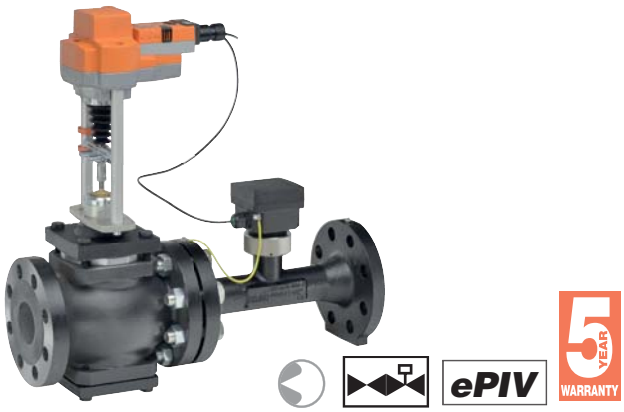
Dimensions



Valve Nominal Size		Dimensions (Inches [mm])							
Inches	DN [mm]	A	B	C	D	E	F	G	I
2½"	65	17.9" [454]	17.9" [454]	10.82" [275]	7.18" [182]	3.64" [92]	3.64" [92]	5.50" [140]	0.75" [19]
3"	80	19.7" [499]	19.7" [499]	10.82" [275]	7.18" [182]	3.64" [92]	3.64" [92]	6.07" [154]	0.75" [19]
4"	100	22.85" [581]	22.85" [581]	11.92" [303]	8.17" [208]	3.75" [95]	3.75" [95]	7.50" [190.5]	0.75" [19]
5"	125	25.18" [640]	25.18" [640]	14.42" [366]	9.42" [239]	5" [127]	5" [127]	8.50" [215.9]	0.88" [22]
6"	150	30.2" [767]	30.2" [767]	14.92" [379]	9.42" [239]	5.5" [140]	5.5" [140]	9.50" [241.3]	0.88" [22]

	Valve Nominal Size		Type	Actuator Type	
GPM Range	Inches	DN [mm]	2-way Flanged	Non-Spring Return	Electronic Fail-Safe
80-127	2½"	65	P6250S	ARX	AKRX
128-180	3"	80	P6300S	ARX	AKRX
200-317	4"	100	P6400S	GRX	AKRX
337-495	5"	125	P6500S	GRX	GKRX
513-713	6"	150	P6600S	GRX	GKRX

P6... Series Electronic Pressure Independent Valves (ePIV)
Stainless Steel Plug and Seat, ANSI 250 Flange Ends



Application

Water-side control of heating and cooling systems for AHUs and heat pumps.
Equal Percentage: Heating / cooling applications.
Linear Characteristic: Bypass control.

Mode of Operation

The Electronic Pressure Independent Control Valve is a two-way valve which maintains constant flow regardless of pressure variations in the system.

Product Features

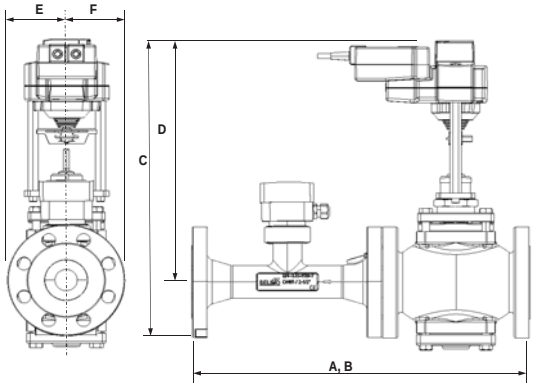
Provides constant flow regardless of pressure variations in the system.
Maximizes chiller ΔP, preventing energizing additional chillers due to low ΔT.
Simplified valve sizing and selection, no Cv calculations required.

Valve Specifications

Service	chilled or hot water, 60% glycol max (open loop/steam not allowed)
Flow characteristic	equal percentage / linear
Action	stem up - open A to AB
Size	2½", 3", 4", 5", 6"
End fitting	pattern to mate with ANSI 250 flange
Materials	
Body	cast iron - GG25 and ductile iron - GGG50
Plug	stainless steel
Seat	stainless steel
Stem	stainless steel
Packing	EPDM NLP
Body pressure rating	according to ANSI 250
Media temperature range	14°F to 250°F [-10°C to +120°C]
Conductivity of media	Min. 20uS/cm (no fully desalinated systems)
Leakage	ANSI IV
Differential pressure range(ΔP)	7.5 to 50 psid or 1 to 50 psid with flow reductions
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%
Power supply for the flow sensor	sensor is powered by the actuator
Quality standard	ISO 9001
Agency listings	UL 60730-1/2-14, 2-18, CE according to 2004/108/EC and 2006/95/EC

*See flow reduction chart on page 5.
**All flow accuracies are @ 68°F (20°C).

Dimensions



Valve Nominal Size		Dimensions (Inches [mm])					
Inches	DN [mm]	A	B	C	D	E	F
2½"	65	22.2" [564]	22.2" [564]	20.4" [516]	18.25" [464]	4.5" [114]	4.5" [114]
3"	80	23.81" [605]	23.81" [605]	20.99" [533]	19.18" [487]	4.5" [114]	4.5" [114]
4"	100	28.27" [718.1]	28.27" [718.1]	22.73" [577.3]	20.37" [517]	4.5" [114]	4.5" [114]
5"	125	31.5" [800]	31.5" [800]	20.99" [533]	20.87" [530]	4.5" [114]	4.5" [114]
6"	150	36.37" [924]	36.37" [924]	25.12" [638]	21.25" [540]	4.5" [114]	4.5" [114]

Close-off Pressures

Valve Nominal Size		Actuators	
Inches	DN [mm]	EV	AVK
2½"	65	310 psi	310 psi
3"	80	310 psi	310 psi
4"	100	310 psi	290 psi
5"	125	296 psi	202 psi
6"	150	215 psi	135 psi

Weights

Valve Nominal Size		Weights
Inches	DN [mm]	Pounds [kg]
2½"	65	54 [24.5]
3"	80	63 [28.3]
4"	100	99 [44.9]
5"	125	126 [57.2]
6"	150	173 [78.5]

Non-Spring Return Actuators

AR Series LR Series
GR Series NR Series

Actuator Specifications	
Power supply	24 VAC ± 20% 24 VDC ± 10%
Electric Frequency	50/60 Hz
Power consumption	
LR Series	3.5W
NR Series	4.5W
AR Series	4.5W (½" to 2") 8.5W (2½" to 6")
GR Series	9.5W
Transformer sizing	
LR Series	6 VA (class 2 power source)
NR Series	7 VA (class 2 power source)
AR Series	7 VA (class 2 power source) (½" to 2") 11 VA (class 2 power source) (2½" to 6")
GR Series	13 VA (class 2 power source)
Electrical connection	18 GA, Plenum rated cable ½" conduit connector protected NEMA 2 (IP54) 3ft [1m] 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
Feedback	2 to 10VDC (default), VDC variable
Torque	
LR Series	45 in-lbs [5 Nm]
NR Series	90 in-lbs [10 Nm]
AR Series	180 in-lbs [20 Nm]
GR Series	360 in-lbs [40 Nm]
Direction of rotation	electronically variable
Manual override	external push button
Running time normal operation	90 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
Agency listings	cULus acc. to UL60730-1A/-2-14, CAN/CSA, CE acc. to 2004/108/EC and 2006/95/EC
Noise level	<45dB(A) at 90 seconds
Servicing	maintanence free
Quality standard	ISO 9001
Weight	
LR Series	1.50 lbs [.68 kg]
NR Series	1.20 lbs [.54 kg]
AR Series	2.65 lbs [1.2 kg]
GR Series	4.85 lbs [2.2 kg]

The ZTH US and the PC-Tool are tools created to easily adapt the flow settings for the ePIV in the field. It directly connects to the Belimo actuator.

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.

Electronic Fail-Safe Actuators

AKR Series
GKR Series

Actuator Specifications	
Power supply	24VAC ±20% 24VDC ±10%
Electric Frequency	50/60 Hz
Power consumption	
AKR Series	12W
GKR Series	14W
Transformer sizing	24 VA (class 2 power source)
Electrical connection	18 GA plenum rated cable ½" conduit connector protected NEMA 2 (IP54) 3 ft [1m] 10 ft [3m] 16 ft [5m]
Overload protection	electronic throughout 0° to 90° rotation
Operation range Y	2 to 10VDC (default), VDC variable
Input impedance	100 kΩ (0.1 mA), 500Ω
Feedback output U	2 to 10VDC, 0.5mA max, VDC variable
Torque	
AKR Series	180 in-lb [20Nm]
GKR Series	360 in-lb [40 Nm]
Direction of rotation	electronically variable
Fail-safe position	adjustable with dial or tool 0 to 100% in 10% increments
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	NEMA2, IP54, UL enclosure type 2
Agency list	cULus acc. to UL 60730-1A/-2-14 CAN/CSA E60730-1:02 CE acc. to 2004/108/EEC and 2006/95/EC
Noise level	< 45dB(A)
Servicing	maintenance free
Quality standard	ISO 9001
Weight	
AKR Series	3.30 lb [1.5 kg]
GKR Series	5.51 lb [2.5 kg]

Non-Spring Return Actuators

EV Series

Actuator Specifications	
Power Supply	24 VAC ± 20%, 50/60 Hz, 24 VDC ± 10%
Power Consumption Running	10 W
Power Consumption Holding	6 W
Transformer Sizing	14 VA (class 2 power source)
Electrical Connection	3 ft, 18 GA plenum cable with 1/2" conduit connector
Overload Protection	electronic throughout full stroke
Electrical Protection	actuators are double insulated
Operating Range Y	2 to 10 VDC (default) VDC variable
Input Impedance	100 kΩ (0.1 mA), 500 Ω
Feedback Output U	2 to 10 VDC (default) VDC variable
Direction of Rotation (Motor)	reversible with built-in switch
Position Indication	stroke indicator on bracket
Manual Override	5 mm hex crank (3/16" Allen), supplied
Running Time (Motor)	90 seconds, constant independent of load
Humidity	5 to 95% RH non-condensing
Ambient Temperature Range	-22°F to +122°F [-30°C to +50°C]
Storage Temperature Range	-40°F to +176°F [-40°C TO +80°C]
Housing	NEMA 2, IP42, UL enclosure type 2
Housing Material	aluminum die cast and plastic casing
Agency Listings†	cULus acc. to UL60730-1A/-2-14, CAN/CSA E60730-1:02, CE acc. to 2004/108/EC and 2006/95/EC
Noise Level (Motor)	<60 dB (A)
Servicing	maintenance free
Quality Standard	ISO 9001
Weight	9 lb [4 kg]

Use flexible metal conduit. Push the Listed conduit fitting device over the actuator's cable to butt against the enclosure. Screw in conduit connector. Jacket the actuators input wiring with Listed flexible conduit. Properly terminate the conduit in a suitable junction box. Rated impulse Voltage 800V. Type of action 1. Control Pollution Degree 3.

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. Earth ground can be connected directly on the sensor body. A connection point is provided on the flange of the sensor body.

The ZTH US and the PC-Tool are tools created to easily adapt the flow settings for the ePIV in the field. It directly connects to the Belimo actuator.

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.

Electronic Fail-Safe Actuators

AVK Series

Actuator Specifications	
Power Supply	24 VAC ± 20%, 50/60 Hz, 24 VDC ± 10%
Power Consumption Running	12 W
Power Consumption Holding	3 W
Transformer Sizing	21 VA (class 2 power source)
Electrical Connection	3 ft, 18 GA plenum cable with 1/2" conduit connector
Overload Protection	electronic throughout full stroke
Electrical Protection	actuators are double insulated
Operating Range Y	2 to 10 VDC (default) VDC variable
Input Impedance	100 kΩ (0.1 mA), 500 Ω
Feedback Output U	2 to 10 VDC (default) VDC variable
Direction of Rotation (Motor)	reversible with built-in switch
Direction of Rotation (Fail-Safe)	reversible with switch
Position Indication	stroke indicator on bracket
Manual Override	5 mm hex crank (3/16" Allen), supplied
Running Time (Motor)	90 seconds, constant independent of load
Running Time (Fail-Safe)	35 seconds
Humidity	5 to 95% RH non-condensing
Ambient Temperature Range	-22°F to +122°F [-30°C to +50°C]
Storage Temperature Range	-40°F to +176°F [-40°C TO +80°C]
Housing	NEMA 2, IP42, UL enclosure type 2
Housing Material	Aluminum die cast and plastic casing
Agency Listings†	cULus acc. to UL60730-1A/-2-14, CAN/CSA E60730-1:02, CE acc. to 2004/108/EC and 2006/95/EC
Noise Level (Motor)	<60 dB (A)
Noise Level (Fail-Safe)	<60 dB (A)
Servicing	maintenance free
Quality Standard	ISO 9001
Weight	16 lb [7 kg]
Bridging time	2 second delay before fail-safe activates
Pre-charging time	5 to 20 seconds

Wiring Diagrams

INSTALLATION NOTES

1 Provide overload protection and disconnect as required.

2 ***CAUTION** Equipment damage!*
Actuators may be connected in parallel.
Power consumption and input impedance must be observed.

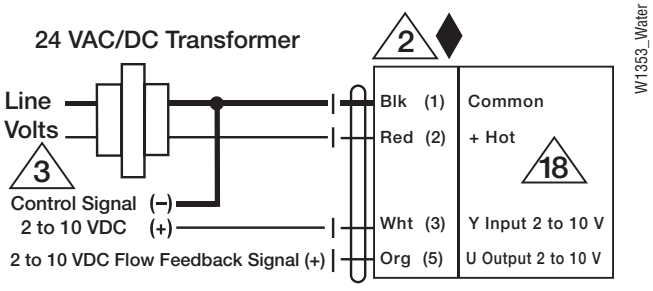
3 Actuators may also be powered by 24 VDC.

18 Actuators with plenum rated cable do not have numbers on wires; use color codes instead. Wire numbers are provided for reference.

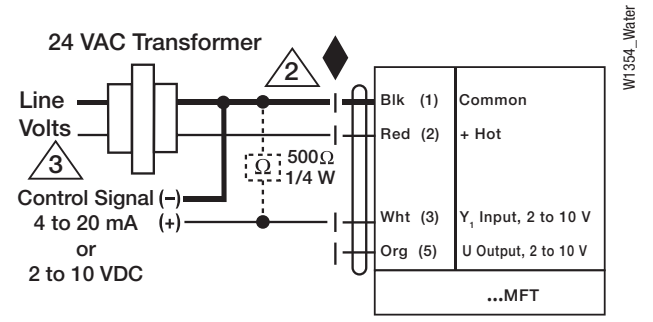
APPLICATION NOTES

◆ Meets UL 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 to 10 VDC control signal for Non-Spring Return and Electronic Fail-Safe



4 to 20 mA control signal for Non-Spring Return and Electronic Fail-Safe

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. Earth ground can be connected directly on the sensor body. A connection point is provided on the flange of the sensor body (2½" to 6" only).