F6 Series 2-Way, Victaulic Butterfly Valve

- **200 psi (2” to 12”) bubble tight shut-off**
- **Long stem design allows for 2” insulation**
- **Completely assembled and tested, ready for installation**

Application

These valves are designed to meet the needs of HVAC and commercial applications requiring bubble tight shut-off for liquids. Typical applications include chiller isolation, cooling tower isolation, change-over systems, large air handler coil control, bypass and process control applications. The large C_V values provide for an economical control valve solution for larger flow applications.

Jobsite Note

Valves should be stored in a weather protected area prior to construction.

Technical Data	
Service	chilled, hot water, 60% glycol
Flow characteristic	modified equal percentage
Controllable flow range	82°
Sizes	2” to 12”
Type of end fitting	grooved ANSI/AWWA (C606)
Valve materials*	
Body	ductile iron ASTM A536, grade 65-45-12
Body finish	black alkyd enamel
Disc	electroless nickel coated ductile iron
Seat	EPDM
Shaft	416 stainless steel
Bearing	fiberglass with TFE lining
Body pressure rating	300 psi
Media temperature range	-30°F to 250°F [-34°C to 120°C]
Rangeability	100:1
Maximum close-off pressure	200 psi
Maximum velocity	20 FPS

*VIC®300 Masterseal™ as manufactured by Victaulic Company

		2-way			Suitable Actuators			
		Valve Nominal Size		Type	Non Fail-Safe			Fail-Safe
C_V 90°	C_V 60°	IN	DN [mm]	2-way				Spring Return	Electronic
115	36	2	50	F650VIC	AM Series			AF Series	
260	80	2½	65	F665VIC		GM Series			
440	140	3	80	F680VIC					
820	250	4	100	F6100VIC			DR Series		GK
1200	370	5	125	F6125VIC					PKR Series
1800	560	6	150	F6150VIC					
3400	1050	8	200	F6200VIC					
5800	1800	10	250	F6250VIC					
9000	2790	12	300	F6300VIC					

PR / PKR Series

SY (2 Year Warranty)

Valve	Size	C_V	30°	40°	50°	60°	70°	90°
F650VIC	2”	115	7	14	23	36	60	115
F665VIC	2-1/2”	260	16	30	50	80	140	260
F680VIC	3”	440	26	50	90	140	230	440
F6100VIC	4”	820	50	100	160	250	430	820
F6125VIC	5”	1200	70	140	240	370	620	1200
F6150VIC	6”	1800	110	220	360	560	940	1800
F6200VIC	8”	3400	200	410	670	1050	1770	3400
F6250VIC	10”	5800	350	700	1150	1800	3020	5800
F6300VIC	12”	9000	540	1080	1780	2790	4680	9000

Maximum Dimensions (Inches)

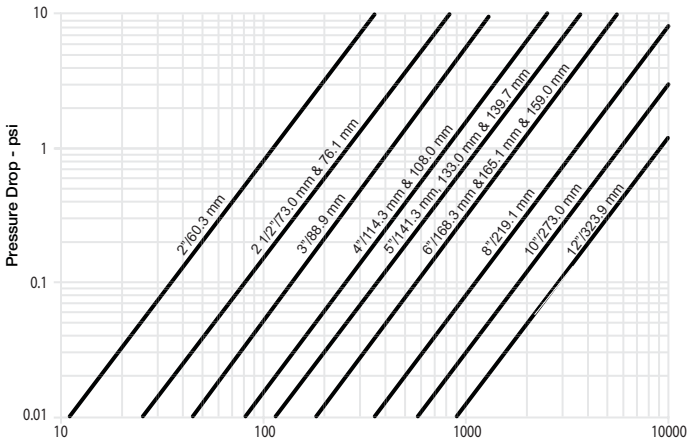
Valve	Size	C_V 90°	A	B	C	D	Actuator	Close-Off (PSI)	
F650VIC	2"	115	3.21	2.00	8.60	14.00	AF…	200	Spring Return
F665VIC	2½"	260	3.77	2.00	8.60	14.50		50	
F665VIC	2½"	260	3.77	8.60	8.60	18.70	2*AF…	200	
F680VIC	3"	440	3.77	8.60	8.60	18.70		50	
F665VIC	2½"	260	3.21	7.00	8.00	14.65	GK	200	Electronic Fail-Safe
F680VIC	3"	440	3.77	7.00	8.00	14.95		50	
F6100VIC	4"	820	4.63	8.60	8.00	20.25	2*GK	200	
F650VIC	2"	115	3.21	4.70	8.00	13.20	AM…	200	Non-Spring Return Electronic Fail-Safe (K)
F665VIC	2½"	260	3.77	4.70	8.00	13.60		50	
F665VIC	2½"	260	3.77	7.00	8.00	14.00	GM…	200	
F680VIC	3"	440	3.77	7.00	8.00	14.30		50	
F6100VIC	4"	820	4.63	8.60	8.00	19.60	2*GM	200	
F650VIC	2"	115	3.21	3.20	2.40	15.70	GR	200	
F665VIC	2½"	260	3.77	3.20	2.40	16.20		200	
F680VIC	3"	440	3.77	3.20	2.40	16.40		50	
F680VIC	3"	440	13.00	3.77	19.50	18.00	PR/PKR	200	
F6100VIC	4"	820	13.00	4.63	20.00	18.40		200	
F6125VIC	5"	1200	13.00	5.88	21.00	19.50	PR/PKR	200	
F6150VIC	6"	1800	13.00	5.88	22.50	20.50		200	
F6200VIC	8"	3400	5.33	7.30	10.90	33.30	SY4…	200	
F6250VIC	10"	5800	6.40	7.30	10.90	35.00	SY4…/ SY5…	50/200	
F6300VIC	12"	9000	6.50	7.30	10.90	36.00	SY6…	200	

†SY6 and larger available in 110/220 VAC versions only.
SY... maximum actuator ambient temperature is 150°F.

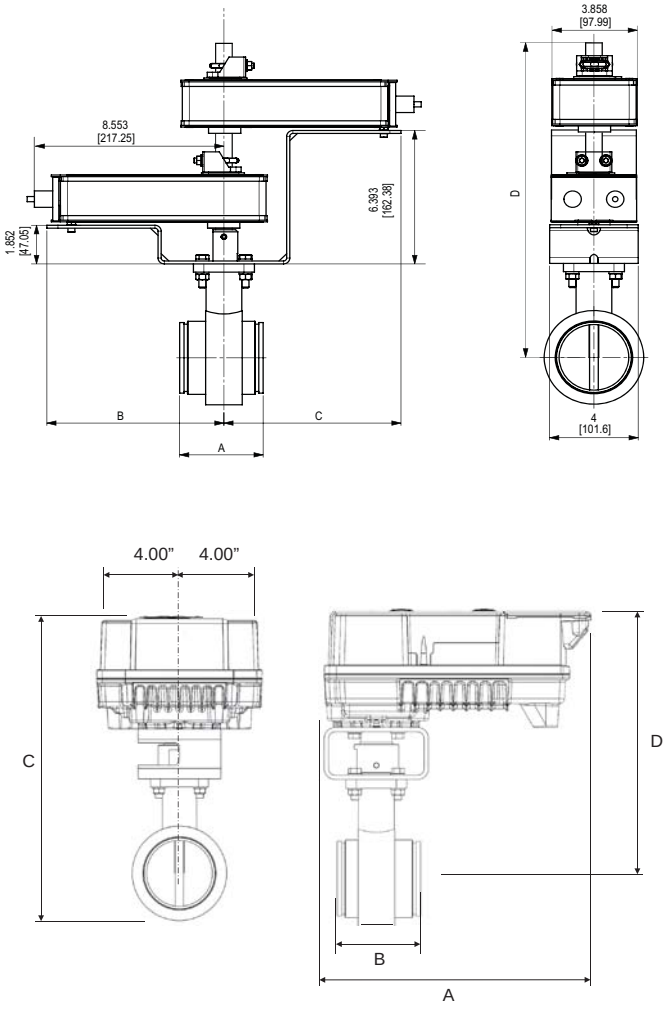
Application Notes

1. Valves are rated at 200 psi differential pressure in the closed position
2. 2-way assemblies are furnished assembled and tested, ready for installation.
3. Dimension "D" allows for actuator removal without the need to remove the valve from the pipe.
4. Belimo SY and PR Series actuators are NEMA 4X rated.
5. Provide support for the actuator if it is mounted at any angle other than 90° vertical.
6. Installer is to use rigid type couplings for connecting the valve to the piping.

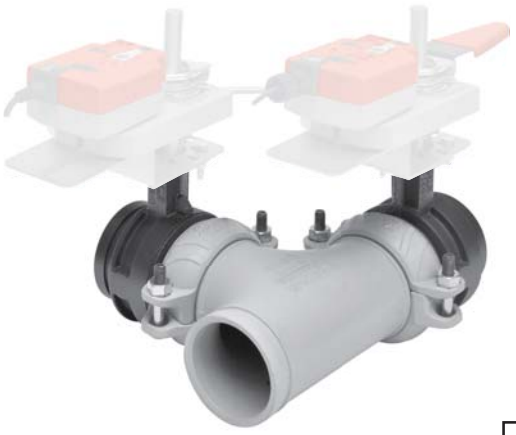
Flow Rate (GPM)



Dimensions



F7 Series 3-Way, Victaulic Butterfly Valve



- **200 psi (2” to 12”) bubble tight shut-off**
- **Long stem design allows for 2” insulation**
- **Completely assembled and tested, ready for installation**

Application

These valves are designed to meet the needs of HVAC and commercial applications requiring bubble tight shut-off for liquids. Typical applications include chiller isolation, cooling tower isolation, change-over systems, large air handler coil control, bypass and process control applications. The large C_V values provide for an economical control valve solution for larger flow applications.

Jobsite Note

Valves should be stored in a weather protected area prior to construction.

Technical Data	
Service	chilled, hot water, 60% glycol
Flow characteristic	modified equal percentage
Controllable flow range	82°
Sizes	2” to 12”
Type of end fitting	grooved ANSI/AWWA (C606)
Valve materials*	
Body	ductile iron ASTM A536, grade 65-45-12
Body finish	black alkyd enamel
Disc	electroless nickel coated ductile iron
Seat	EPDM
Shaft	416 stainless steel
Bearing	fiberglass with TFE lining
Body pressure rating	300 psi
Media temperature range	-30°F to 250°F [-34°C to 120°C]
Rangeability	100:1
Maximum close-off pressure	200 psi
Maximum velocity	20 FPS

*VIC®300 Masterseal™ as manufactured by Victaulic Company

		3-way			Suitable Actuators				
		Valve Nominal Size		Type	Non Fail-Safe			Fail-Safe	
C_V 90°	C_V 60°	IN	DN [mm]	3-way				Spring Return	Electronic
115	36	2	50	F750VIC	AM		PR / PKR Series	AF	PKR Series
260	80	2½	65	F765VIC		GM Series			
440	140	3	80	F780VIC					
820	250	4	100	F7100VIC					
1200	370	5	125	F7125VIC					
1800	560	6	150	F7150VIC			SY Series (2 Year Warranty)		
3400	1050	8	200	F7200VIC					
5800	1800	10	250	F7250VIC					
9000	2790	12	300	F7300VIC					

Valve	Size	C_V	30°	40°	50°	60°	70°	90°
F750VIC	2”	115	7	14	23	36	60	115
F765VIC	2½”	260	16	30	50	80	140	260
F780VIC	3”	440	26	50	90	140	230	440
F7100VIC	4”	820	50	100	160	250	430	820
F7125VIC	5”	1200	70	140	240	370	620	1200
F7150VIC	6”	1800	110	220	360	560	940	1800
F7200VIC	8”	3400	200	410	670	1050	1770	3400
F7250VIC	10”	5800	350	700	1150	1800	3020	5800
F7300VIC	12”	9000	540	1080	1780	2790	4680	9000

Maximum Dimensions (Inches)

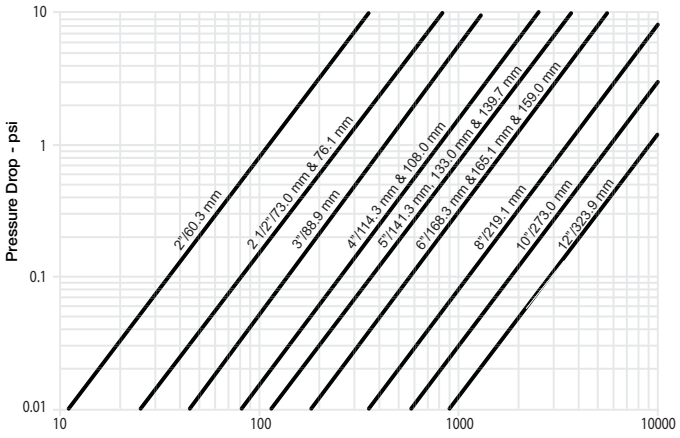
Valve	Size	C_V 90°	A	B	C	D	Actuator	Close-Off (PSI)	
F750VIC	2”	115	3.25	2.00	8.60	14.00	AF…	50	Spring Return
F750VIC	2”	115	3.25	2.00	8.60	14.00	2*AF…	200	
F765VIC	2½”	260	3.75	8.60	8.60	18.70		50	
F750VIC	2”	115	3.25	6.50	13.60	15.25	GK	200	Electronic Fail-Safe
F765VIC	2½”	260	3.75	7.50	14.10	14.65		50	
F780VIC	3”	440	4.25	8.00	14.30	20.25	2*GK	50	
F750VIC	2”	115	3.25	6.50	13.10	13.20	AM…	50	Non-Spring Return Electronic Fail-Safe (K)
F750VIC	2”	115	3.25	6.50	13.60	13.60	GM…	200	
F765VIC	2½”	260	3.75	7.50	14.10	14.00		50	
F765VIC	2½”	260	3.75	7.50	14.10	14.30	2*GM	200	
F780VIC	3”	440	4.25	8.00	14.30	19.60		50	
F750VIC	2”	115	3.25	6.50	15.70	15.70	GM	200	
F765VIC	2½”	260	3.75	7.50	16.20	16.20		50	
F765VIC	2½”	260	3.75	7.50	11.50	8.40	PR/PKR	200	
F780VIC	3”	440	4.25	8.00	12.00	18.00		200	
F7100VIC	4”	820	5.00	9.60	14.00	19.00		200	
F7125VIC	5”	1200	5.50	11.40	15.50	20.00	PR/PKR	200	
F7150VIC	6”	1800	6.50	12.40	16.40	20.00		50	
F7150VIC	6”	1800	6.50	12.40	32.10	33.30	SY4…	200	
F7200VIC	8”	3400	7.75	13.10	33.30	35.00		200	
F7250VIC	10”	5800	9.00	15.40	35.10	35.10	SY6…	50	
F7250VIC	10”	5800	9.00	15.40	38.70	38.70	SY7…	200	
F7300VIC	12”	9000	10.00	16.50	39.70	39.70		200	

†SY6 and larger available in 110/220 VAC versions only.
SY... maximum actuator ambient temperature is 150°F.

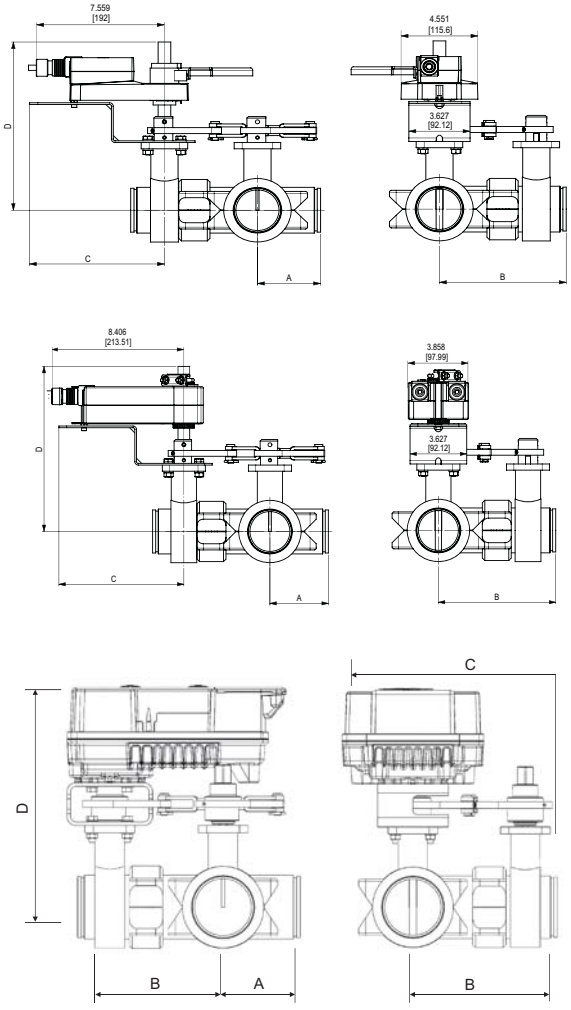
Application Notes

1. Valves are rated at 200 psi differential pressure in the closed position
2. 2-way assemblies are furnished assembled and tested, ready for installation.
3. Dimension “D” allows for actuator removal without the need to remove the valve from the pipe.
4. Belimo SY and PR Series actuators are NEMA 4X rated.
5. Provide support for the actuator if it is mounted at any angle other than 90° vertical.
6. Installer is to use rigid type couplings for connecting the valve to the piping.

Flow Rate (GPM)



Dimensions



2 YEAR WARRANTY

Application:

The SY actuators are NEMA 4X rated and designed to meet the needs of HVAC and Commercial applications. Offered on Belimo standard and high performance valve series, these actuators are available for on/off and modulating applications.

Depending on the application, they are available in 24 VAC/ VDC, 120 VAC and 230 VAC.

Technical Data	
Electrical connection	½" conduit connector, screw terminals
Motor protection	H Class insulation (SY-1), F Class (SY-2…5)
Gear train	high alloy steel gear sets, self locking
Operating range	(SY…-24) on/off, floating point (SY...24MFT) 2-10 VDC, 4-20 mA, 0-10 VDC
Sensitivity	(SY…24MFT) 0.4 mA/200mV
Reversal hysteresis	(SY…24MFT)1.0 mA/500mV
Feedback	(SY…24MFT) 2-10 VDC
Angle of rotation	90°
Direction of rotation	reversible
Position indication	top mounted domed indicator
Internal humidity control	resistive heating element
Auxiliary switches	factory set for 5° and 85° change of state SY1: (2) SPDT, min 1 mA, 24 VAC; max 3A, 250 VAC. SY4-12: (2) SPDT, min 1 mA, 24 VAC; max 5A, 250 VAC.
Ambient temperature	-22°F to +150°F [-30°C to +65°C]
Humidity range	up to 95%
Housing type	IP67, NEMA 4X
Housing material	die cast aluminum alloy
Agency listings	ISO, CE, cCSAus

Power Supply 24 VAC/VDC 50/60Hz, single phase

Model	Torque	Speed	Power Consumption	Duty Cycle		Override	Weight
				On/Off	MFT		
SY4-24(MFT)	400Nm/3560 in-lbs	**20**s	**9.4**A	30%	75%	Hand Wheel	22kg/48.5 lb.
SY5-24(MFT)	500Nm/4450 in-lbs	**26**s	**8.9**A	30%	75%	Hand Wheel	22kg/48.5 lb.

SY...120V Series Non-Spring Return Actuator
Technical Data - 120 VAC

Application:

The SY actuators are NEMA 4X rated and designed to meet the needs of HVAC and Commercial applications. Offered on Belimo standard and high performance valve series, these actuators are available for on/off and modulating applications. Depending on the application, they are available in 24 VAC/ VDC, 120 VAC and 230 VAC.

Technical Data	
Electrical connection	½" conduit connector, screw terminals
Motor protection	H Class insulation (SY-1), F Class (SY-2…12)
Gear train	high alloy steel gear sets, self locking
Operating range	(SY…-110) on/off, floating point (SY...120MFT) 2-10 VDC, 4-20 mA, 0-10 VDC
Sensitivity	(SY…120MFT) 0.4 mA/200mV
Reversal hysteresis	(SY…120MFT) 1.0 mA/500mV
Feedback	(SY…120MFT) 2-10 VDC
Angle of rotation	90°
Direction of rotation	reversible
Position indication	top mounted domed indicator
Internal humidity control	resistive heating element
Auxiliary switches	factory set for 5° and 85° change of state SY1: (2) SPDT, min 1 mA, 24 VAC; max 3A, 250 VAC. SY4-12: (2) SPDT, min 1 mA, 24 VAC; max 5A, 250 VAC.
Ambient temperature	-22°F to +150°F [-30°C to +65°C]
Humidity range	up to 95%
Housing type	IP67, NEMA 4X
Housing material	die cast aluminum alloy
Agency listings	ISO, CE, cCSAus

Note: Leakage current is possible (<3.5 mA).
Connect ground before applying voltage.

Power Supply **120 VAC 50/60Hz, single phase**

Model	Torque	Speed 60Hz		Power Consumption	Duty Cycle		Override	Weight
					On/Off	Proportional		
SY4-120(MFT)	400Nm/3560 in-lbs	**24**s		**2.1**A	30%	75%	Hand Wheel	22kg/48.5 lb.
SY5-120(MFT)	500Nm/4450 in-lbs	**28**s		**1.9**A	30%	75%	Hand Wheel	22kg/48.5 lb.
SY6-120(MFT)	650Nm/5785 in-lbs	**36**s		**2**A	30%	75%	Hand Wheel	22kg/48.5 lb.
SY7-120(MFT)	1000Nm/8900 in-lbs	**59**s		**2**A	30%	75%	Hand Wheel	36kg/79.5 lb.
SY8-120(MFT)	1500Nm/13350 in-lbs	**79**s		**2.8**A	30%	75%	Hand Wheel	36kg/79.5 lb.
SY9-120(MFT)	2000Nm/17800 in-lbs	**65**s		**2.7**A	30%	50%	Hand Wheel	56kg/123.5 lb.
SY10-120(MFT)	2500Nm/22250 in-lbs	**76**s		**3**A	30%	50%	Hand Wheel	56kg/123.5 lb.
SY11-120(MFT)	3000Nm/26700 in-lbs	**71**s		**4.3**A	30%	50%	Hand Wheel	56kg/123.5 lb.
SY12-120(MFT)	3500Nm/31150 in-lbs	**76**s		**4.5**A	30%	50%	Hand Wheel	56kg/123.5 lb.

2 YEAR WARRANTY

Application:

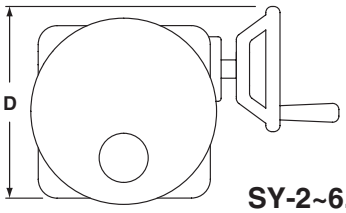
The SY actuators are NEMA 4X rated and designed to meet the needs of HVAC and Commercial applications. Offered on Belimo standard and high performance valve series, these actuators are available for on/off and modulating applications. Depending on the application, they are available in 24 VAC/ VDC, 120 VAC and 230 VAC.

Technical Data	
Electrical connection	½" conduit connector, screw terminals
Overload protection	thermally protected 135°C cut-out
Motor protection	H Class insulation (SY-1), F Class (SY-2…12)
Gear train	high alloy steel gear sets, self locking
Operating range	(SY…-220) on/off, floating point (SY...230MFT) 2-10 VDC, 4-20 mA, 0-10 VDC
Sensitivity	(SY…230MFT) 0.4 mA/200mV
Reversal hysteresis	(SY…230MFT) 1.0 mA/500mV
Feedback	(SY…230MFT) 2-10 VDC
Angle of rotation	90°
Direction of rotation	reversible
Position indication	top mounted domed indicator
Internal humidity control	resistive heating element
Auxiliary switches	factory set for 5° and 85° change of state SY1: (2) SPDT, min 1 mA, 24 VAC; max 3A, 250 VAC. SY4-12: (2) SPDT, min 1 mA, 24 VAC; max 5A, 250 VAC.
Ambient temperature	-22°F to +150°F [-30°C to +65°C]
Humidity range	up to 95%
Housing type	IP67, NEMA 4X
Housing material	die cast aluminum alloy
Agency listings	ISO, CE, cCSAus

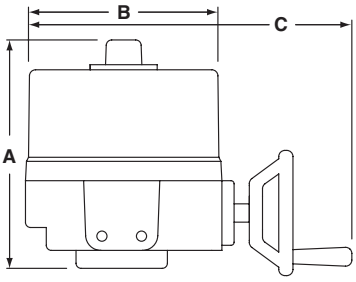
Power Supply 230 VAC 50/60Hz, single phase

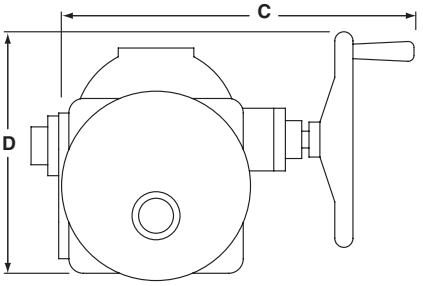
Model	Torque	Speed 60Hz		Power Consumption	Duty Cycle On/Off	Duty Cycle MFT	Override	Weight
SY4-230(MFT)	400Nm/3560 in-lbs	**22**s		**1.1**A	30%	75%	Hand Wheel	22kg/48.5 lb.
SY5-230(MFT)	500Nm/4450 in-lbs	**25**s		**1**A	30%	75%	Hand Wheel	22kg/48.5 lb.
SY6-230(MFT)	650Nm/5785 in-lbs	**35**s		**1**A	30%	75%	Hand Wheel	22kg/48.5 lb.
SY7-230(MFT)	1000Nm/8900 in-lbs	**59**s		**1.2**A	30%	75%	Hand Wheel	36kg/79.5 lb.
SY8-230(MFT)	1500Nm/13350 in-lbs	**79**s		**1.6**A	30%	75%	Hand Wheel	36kg/79.5 lb.
SY9-230(MFT)	2000Nm/17800 in-lbs	**72**s		**1.1**A	30%	50%	Hand Wheel	56kg/123.5 lb.
SY10-230(MFT)	2500Nm/22250 in-lbs	**85**s		**1.4**A	30%	50%	Hand Wheel	56kg/123.5 lb.
SY11-230(MFT)	3000Nm/26700 in-lbs	**61**s		**2.2**A	30%	50%	Hand Wheel	56kg/123.5 lb.
SY12-230(MFT)	3500Nm/31150 in-lbs	**65**s		**2.5**A	30%	50%	Hand Wheel	56kg/123.5 lb.

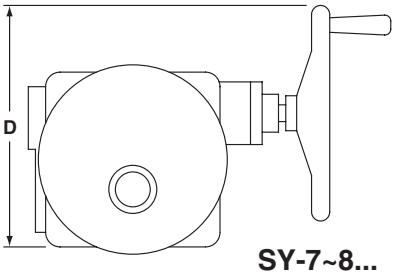
SY... Series Non-Spring Return Actuator Dimensions



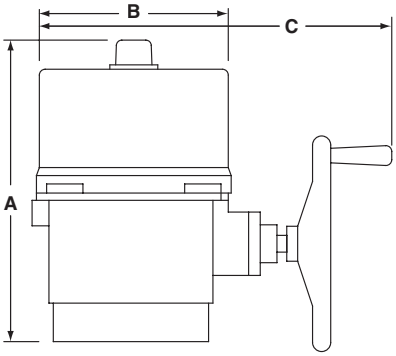
SY-2~6...

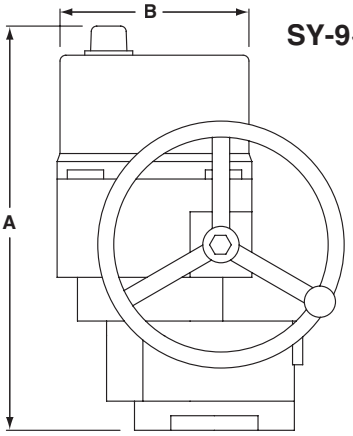






SY-7~8...





SY-9~12...

MODEL	DIM A (MAX)	Add to Dim A for cover removal	DIM B	DIM C (MAX)	DIM D
	Inches [mm]	Inches [mm]	Inches [mm]	Inches [mm]	Inches [mm]
SY4~6	12.40 [315]	8.86 [225]	9.21 [234]	14.96 [380]	11.81 [300]
SY7~8	16.54 [420]	8.86 [225]	9.21 [234]	17.72 [450]	13.39 [340]
SY9~12	23.23 [590]	8.86 [225]	10.24 [260]	18.50 [470]	13.78 [350]

W94L_12

SY Actuator Wiring Diagram, SY1...5-24V – On/Off
SY1...12-120V or 230V On/Off

Hazard Identification

Warnings and Cautions appear at appropriate sections throughout this manual. Read these carefully.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

Indicates a notice or condition that may cause known like damage to the actuator(s) or associated equipment.

Equipment damage!
Power consumption and input impedance must be observed.

INSTALLATION NOTES

Observe class 1 and class 2 wiring restrictions.

Transformer sizing – SY actuator draw X 1.25 (safety margin)
(Ex. SY2-24 requires 3.0A x 1.25 = 3.75A,
3.75A X 24 VAC = 89VA Transformer).

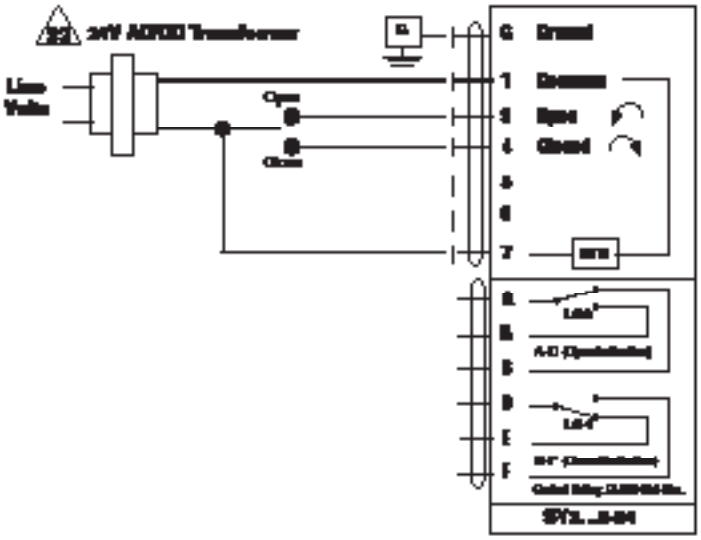
NOTES SY1...5-24

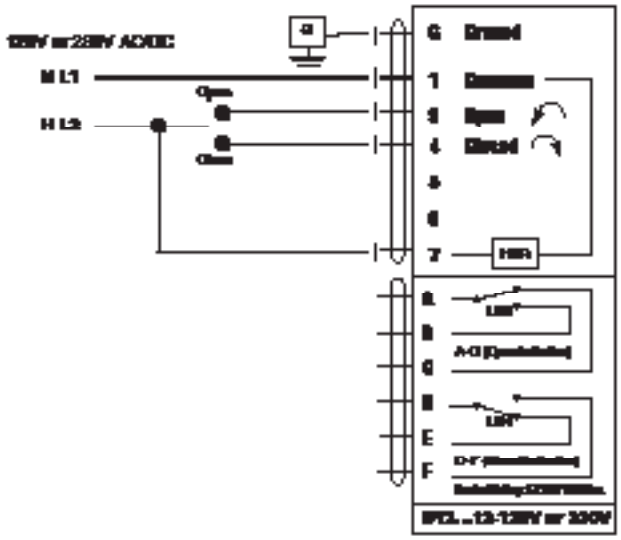
Each actuator should be powered by a single, isolated control transformer.

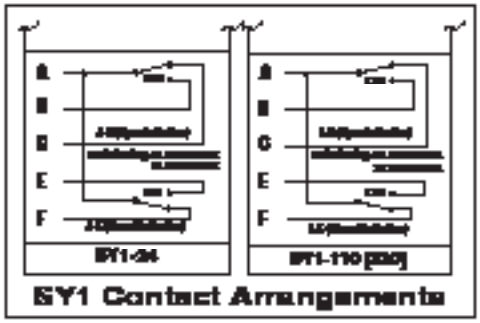
- Isolation relays must be used in parallel connection of multiple actuators using a common control signal input.
- "H" cannot be connected to terminal #3 and #4 simultaneously.

NOTES SY1...12-120V or 230V

- Caution: Power Supply Voltage
- Isolation relays must be used in parallel connection of multiple actuators using a common control signal input.
- "H" (L2) cannot be connected to terminal #3 and #4 simultaneously.







SY1 Contact Arrangements

Wiring for Control Valves
Proportional, 24V, 120/230V

W547_2_11

Actuator: **SY2…5-24MFT** **SY2...12-120MFT** **SY2...12-230MFT**

Hazard Identification

Warnings and Cautions appear at appropriate sections throughout this manual. Read these carefully.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

Indicates an action or condition that may cause irreversible damage to the actuator(s) or associated equipment.

Equipment damage!
Power consumption and input impedance must be observed.

INSTALLATION NOTES

Observe Class 1 and Class 2 wiring restrictions.

Transformer sizing = SY actuator draw X 1.25 (safety margin)
(Ex. SY2-24 requires 3.0A x 1.25 = 3.75A, 3.75A X 24 VAC = 90VA Transformer)

APPLICATION NOTES

34 Ground shielded wire at control panel chassis. Tape back ground at actuator.

36 Use of feedback is optional.

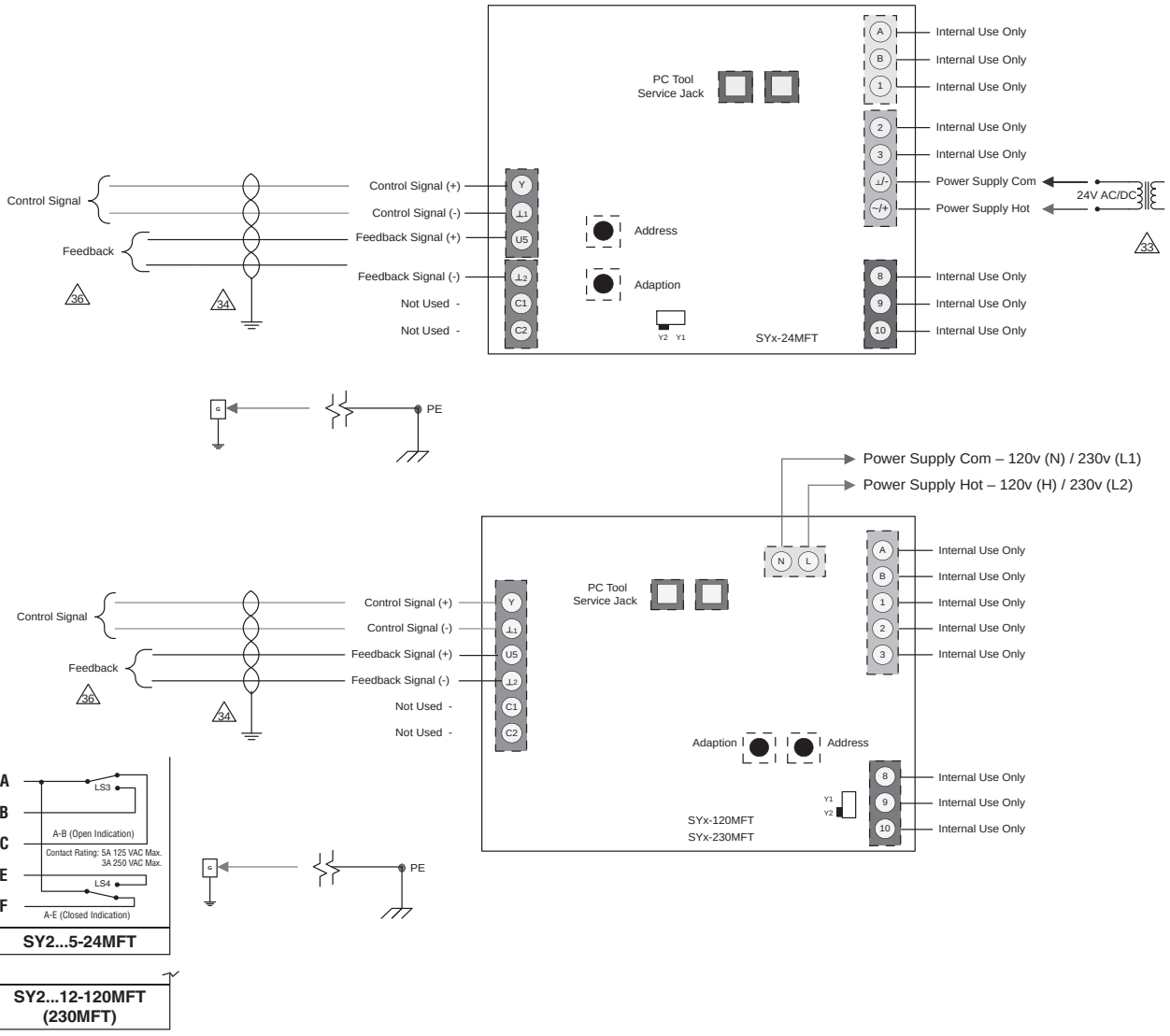
NOTES SY2...5-24MFT

33 Each actuator should be powered by a single, isolated control transformer.

- Power supply Com/Neutral and Control Signal "–" wiring to a common is prohibited.

NOTES SY2...12-120MFT (230MFT)

- **Caution:** Power supply voltage.



W549_11

SY Actuator Wiring Diagram, SY1…5-24 – Multiple Wiring
SY1…12-110 (220) – Multiple Wiring

Hazard Identification

Warnings and Cautions appear at appropriate sections throughout this manual. Read these carefully.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

Indicates an action or condition that may cause irreversible damage to the actuator(s) or associated equipment.

Equipment damage!
Power consumption and input impedance must be observed.

Isolation relays are required in parallel applications.
The reason parallel applications need isolation relays is that the motor uses two sets of windings, one for each direction. When one is energized to turn the actuator in a specific direction a voltage is generated in the other due to the magnetic field created from the first. It's called back EMF.
This is OK with one actuator because the voltage generated in the second winding isn't connected to anything so there is no flow; it has no magnetic effect on the motor.
On parallel applications without isolation, this EMF voltage energizes the winding it is connected to on the other actuators in the system, the actuators are then trying to turn in both directions at once. The EMF voltage is always less than the supply voltage due to the resistance of the windings, so while the actuator still turns in the commanded direction, the drag from the other reduces the torque output and causes overheating.

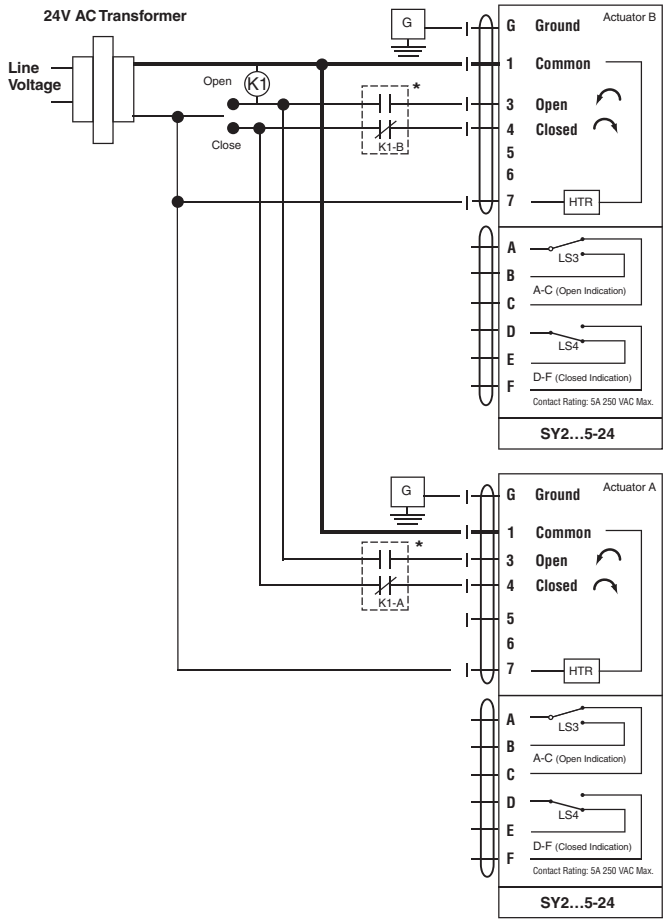
INSTALLATION NOTES

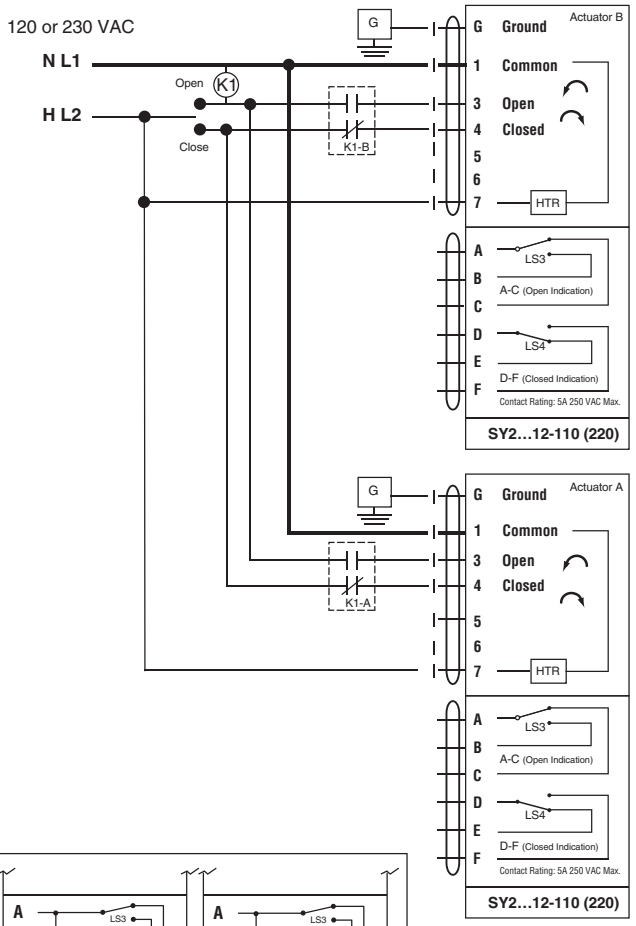
Observe class 1 and class 2 wiring restrictions.

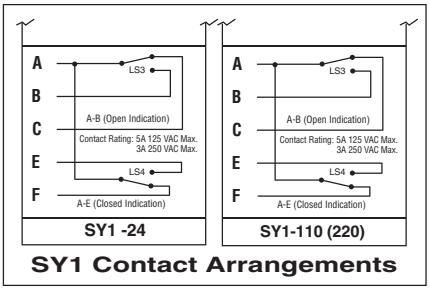
Transformer sizing = SY actuator draw X 1.25 (safety margin)
(Ex. SY2-24 requires 3.0A x 1.25 = 3.75A,
3.75A X 24 VAC = 90VA Transformer).

NOTES

- **Caution:** Power Supply Voltage.
- Isolation relays must be used in parallel connection of multiple actuators using a common control signal input. Should be DPDT.
- "H" (L2) cannot be connected to terminal #3 and #4 simultaneously.
- **Required:** Terminal #7 needs to be field wired to enable heater circuit.







W550_2_11

Actuators: SY2...5-24MFT

Hazard Identification

Warnings and Cautions appear at appropriate sections throughout this manual. Read these carefully.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

Indicates an action or condition that may cause irreversible damage to the actuator(s) or associated equipment.

Equipment damage!
Power consumption and input impedance must be observed.

Isolation relays are required in parallel applications.
The reason parallel applications need isolation relays is that the motor uses two sets of windings, one for each direction. When one is energized to turn the actuator in a specific direction a voltage is generated in the other due to the magnetic field created from the first. It's called back EMF.
This is OK with one actuator because the voltage generated in the second winding isn't connected to anything so there is no flow; it has no magnetic effect on the motor.
On parallel applications without isolation, this EMF voltage energizes the winding it is connected to on the other actuators in the system, the actuators are then trying to turn in both directions at once. The EMF voltage is always less than the supply voltage due to the resistance of the windings, so while the actuator still turns in the commanded direction, the drag from the other reduces the torque output and causes overheating.

INSTALLATION NOTES

Observe class 1 and class 2 wiring restrictions.

Transformer sizing = SY actuator draw X 1.25 (safety margin)
(Ex. SY2-24 requires 3.0A x 1.25 = 3.75A,
3.75A X 24 VAC = 90VA Transformer).

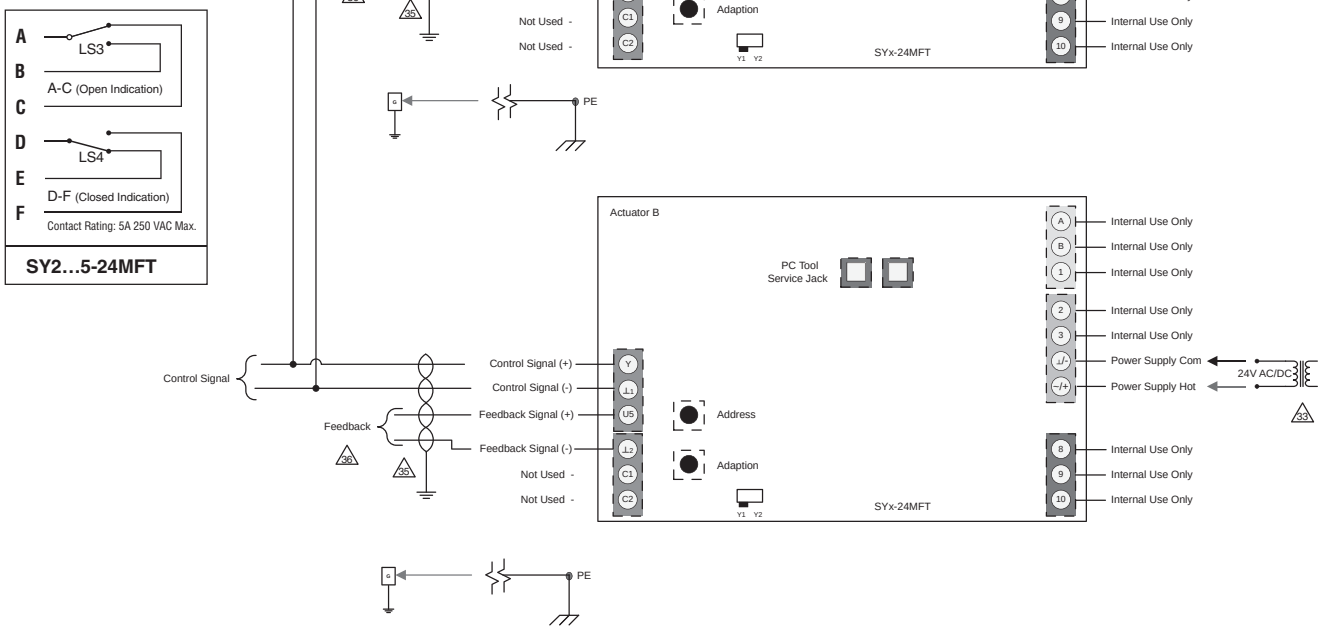
NOTES SY2...5-24MFT

33 Each actuator should be powered by a single, isolated control transformer.

APPLICATION NOTES

35 Recommended twisted shielded pair for control wiring.
Ground shielded wire at control panel chassis.
Tape back ground at actuator.

36 Use of feedback is optional.



W552_2

Actuators: SY2...12-120MFT SY2...12-230MFT

Hazard Identification

Warnings and Cautions appear at appropriate sections throughout this manual. Read these carefully.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

Indicates an action or condition that may cause irreversible damage to the actuator(s) or associated equipment.

Equipment damage!
Power consumption and input impedance must be observed.

Isolation relays are required in parallel applications.
The reason parallel applications need isolation relays is that the motor uses two sets of windings, one for each direction. When one is energized to turn the actuator in a specific direction a voltage is generated in the other due to the magnetic field created from the first. It's called back EMF.
This is OK with one actuator because the voltage generated in the second winding isn't connected to anything so there is no flow; it has no magnetic effect on the motor.
On parallel applications without isolation, this EMF voltage energizes the winding it is connected to on the other actuators in the system, the actuators are then trying to turn in both directions at once. The EMF voltage is always less than the supply voltage due to the resistance of the windings, so while the actuator still turns in the commanded direction, the drag from the other reduces the torque output and causes overheating.

INSTALLATION NOTES

Observe class 1 and class 2 wiring restrictions.

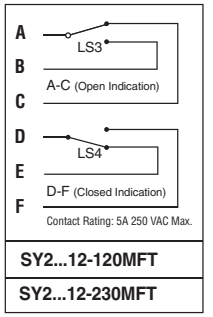
APPLICATION NOTES

35 Recommended twisted shielded pair for control wiring.
Ground shielded wire at control panel chassis.
Tape back ground at actuator.

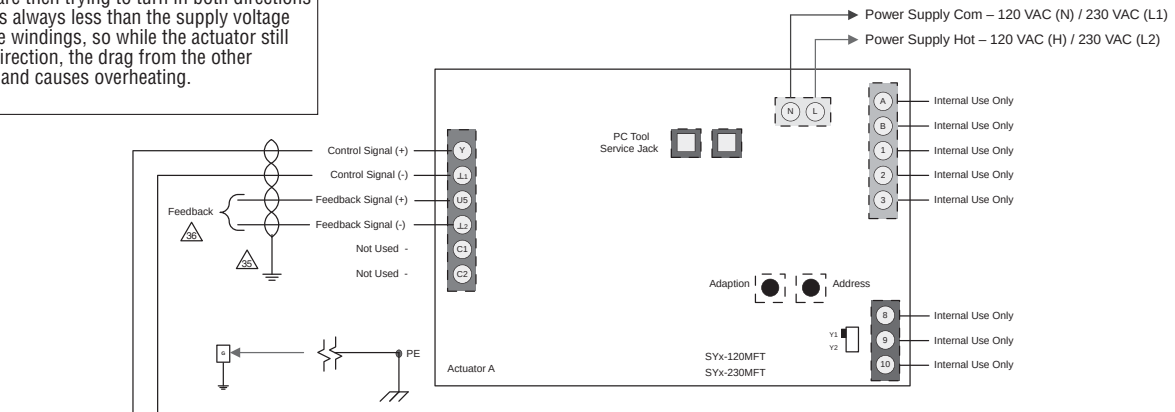
36 Use of feedback is optional.

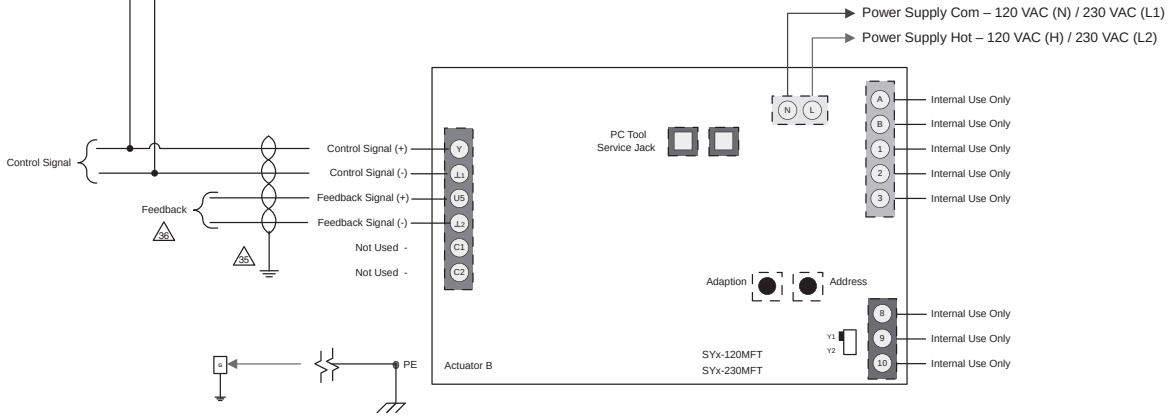
NOTES SY2...12-120MFT (230MFT)

- **Caution:** Power supply voltage.



SY2...12-120MFT
SY2...12-230MFT





AFBUP(-S)-X1, AFXUP(-S)-X1 Actuators, On/Off

Models

AFBUP-X1
AFBUP-S-X1
AFXUP-X1
AFXUP-S-X1

Technical Data		
Power supply		24...240 VAC -20% / +10%, 50/60 Hz 24...125 VDC ±10%
Power consumption	running	7 W
	holding	3.5 W
Transformer sizing		7 VA @ 24 VAC (class 2 power source) 8.5 VA @ 120 VAC 18 VA @ 240 VAC
Electrical connection		
AFBUP...		3 ft, 18 GA appliance cable, 1/2" conduit connector **-S models:** Two 3 ft, 18 gauge appliance cables with 1/2" conduit connectors
AFXUP...		3 ft [1m], 10 ft [3m] or 16 ft [5m] 18 GA appliance cable, with or without 1/2" conduit connector **-S models:** Two 3 ft [1m], 10 ft [3m] or 16 ft [5m] appliance cables with or without 1/2" conduit connectors
Overload protection		Electronic throughout 0 to 95° rotation
Control		On/Off
Torque		180 in-lb [20 Nm] minimum
Direction of rotation	spring	reversible with CW/CCW mounting
Mechanical angle of rotation		95° (adjustable with mechanical end stop, 35° to 95°)
Running time	motor	< 75 sec
	spring	20 sec @ -4°F to 122°F [-20°C to 50°C]; < 60 sec @ -22°F [-30°C]
Position indication		visual indicator, 0° to 95° (0° is full spring return position)
Manual override		5 mm hex crank (3/16" Allen), supplied
Humidity		max. 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, Enclosure Type2
Housing material		Zinc coated metal and plastic casing
Agency listings †		cULus acc. to UL60730-1A/-2-14, CAN/CSA E60730-1:02, CE acc. to 2004/108/EC & 2006/95/EC
Noise level		<50dB(A) motor @ 75 seconds ≤62dB(A) spring return
Servicing		maintenance free
Quality standard		ISO 9001
Weight		4.6 lbs (2.1 kg), 4.9 lbs (2.25 kg) with switches

† Rated Impulse Voltage 4kV, Type of action 1.AA (1.AA.B for -S version), Control Pollution Degree 3.

AFBUP-S-X1, AFXUP-S-X1	
Auxiliary switches	2 x SPDT 3A (0.5A) @ 250 VAC, UL Approved one set at +10°, one adjustable 10° to 90°

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.

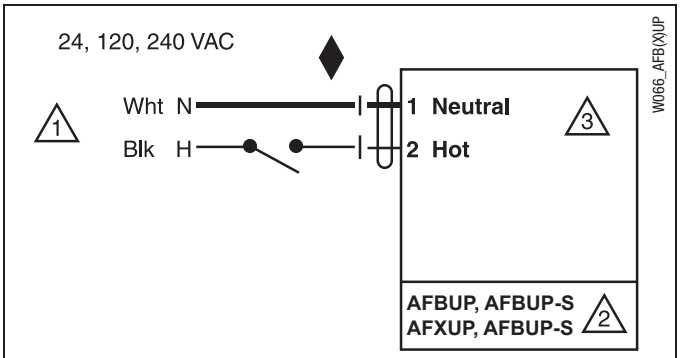
3 No ground connection is required.

4 For end position indication, interlock control, fan startup, etc., AFBUP-S-X1 and AFXUP-S-X1 incorporates two built-in auxiliary switches: 2 x SPDT, 3A (0.5A) @250 VAC, UL Approved, one switch is fixed at +10°, one is adjustable 10° to 90°.

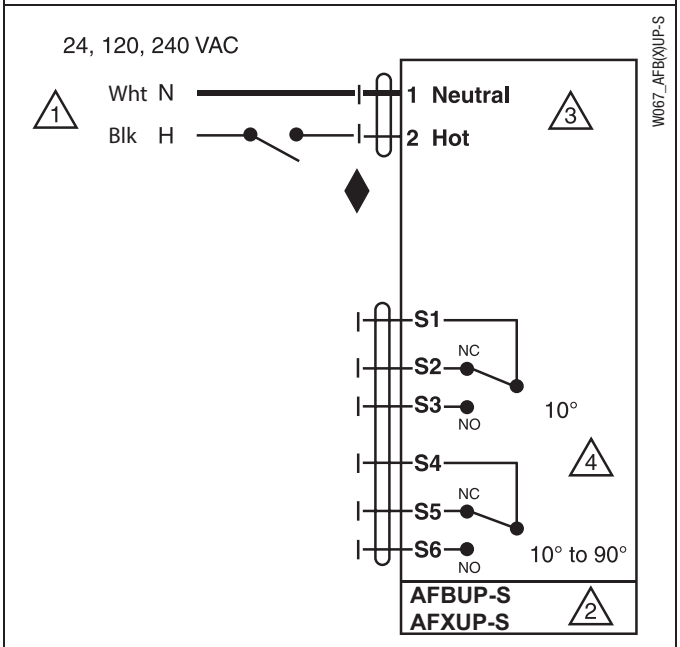
APPLICATION NOTES

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.



On/Off wiring for AFBUP-X1, AFXUP-X1



Auxiliary Switches for AFBUP-S-X1, AFXUP-S-X1

AF Actuators, Multi-Function Technology

Models

AFX24-MFT-X1
AFX24-MFT-S-X1 w/built-in Aux. Switches
2*AFX24-MFT-X1
2*AFX24-MFT-S-X1

Technical Data	
Power supply	24 VAC, +/- 20%, 50/60 Hz 24 VDC, +20% / -10%
Power consumption♦ running	7.5 W
Power consumption♦ holding	3 W
Transformer sizing	10 VA (Class 2 power source)
Electrical connection AFX...	 3 ft [1m] default, 10 ft [3m] or 16 ft [5m] 18 GA appliance or plenum cables, with or without 1/2" conduit connector **-S models:** two 3 ft [1m] default, 10 ft [3m] or 16 ft [5m] appliance cables with or without 1/2" conduit connectors
Overload protection	electronic throughout 0 to 95° rotation
Operating range Y*	2 to 10 VDC, 4 to 20 mA (default) variable (VDC, PWM, floating point, on/off)
Input impedance	100 kΩ for 2 to 10 VDC (0.1 mA) 500 Ω for 4 to 20 mA 1500 Ω for PWM, floating point and on/off control
Feedback output U*	2 to 10 VDC, 0.5 mA max
Torque	minimum 180 in-lb (20 Nm)
Direction of rotation* spring	reversible with cw/ccw mounting
Direction of rotation* motor	reversible with built-in switch
Mechanical angle of rotation*	95° (adjustable with mechanical end stop, 35° to 95°)
Running time spring	<20 sec @ -4°F to 122°F [-20° C to 50° C]; <60 sec @ -22°F [-30° C]
Running time motor*	150 seconds (default), variable (70 to 220 seconds)
Angle of rotation adaptation	off (default)
Override control*	min position = 0% mid. position = 50% max. position = 100%
Position indication	visual indicator, 0° to 95° (0° is spring return position)
Manual override	5 mm hex crank (3/16" Allen), supplied
Humidity	max. 95% RH, non-condensing
Ambient temperature	-22 to 122° F (-30 to 50° C)
Storage temperature	-40 to 176° F (-40 to 80° C)
Housing	NEMA 2, IP54, Enclosure Type 2
Housing material	zinc coated metal and plastic casing
Noise level	≤40dB(A) motor @ 150 seconds, run time dependent ≤62dB(A) spring return
Agency listings †	cULus acc. to UL60730-1A/-2-14, CAN/CSA E60730-1:02, CE acc. to 2004/108/EC & 2006/95/EC
Quality standard	ISO 9001
Servicing	maintenance free
Weight	4.6 lbs. (1.9 kg), 4.9 lbs. (2 kg) with switch

* Variable when configured with MFT options

† Rated Impulse Voltage 800V, Type of action 1.AA (1.AA.B for -S version), Control Pollution Degree 3.

♦ Programmed for 70 sec motor run time. At 150 sec motor run time, transformer sizing is 8.5 VA and power consumption is 6 W running / 3 W holding.

AFX24-MFT-S-X1	
Auxiliary switches	2 x SPDT 3A (0.5A) @ 250 VAC, UL approved one set at +10°, one adjustable 10° to 90°

Wiring Diagrams

INSTALLATION NOTES

3 Actuators may also be powered by 24 VDC.

4 IN4004 or IN4007 diode (IN4007 supplied, Belimo part number 40155).

5 Triac A and B can also be contact closures.

6 Control signal may be pulsed from either the Hot (Source) or Common (Sink) 24 VAC line.

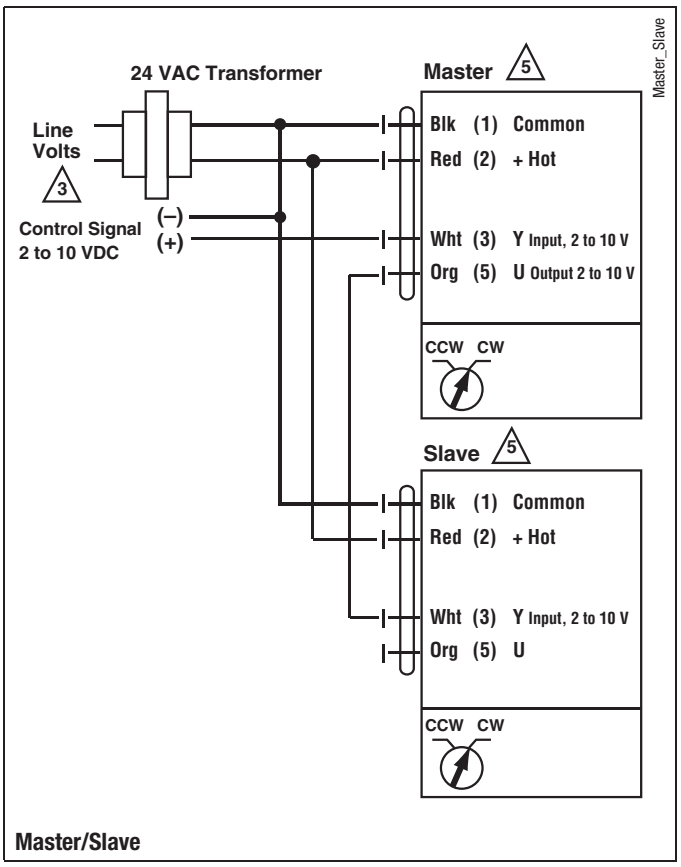
7 Position feedback cannot be used with Triac sink controller. The actuators internal common reference is not compatible.

APPLICATION NOTES

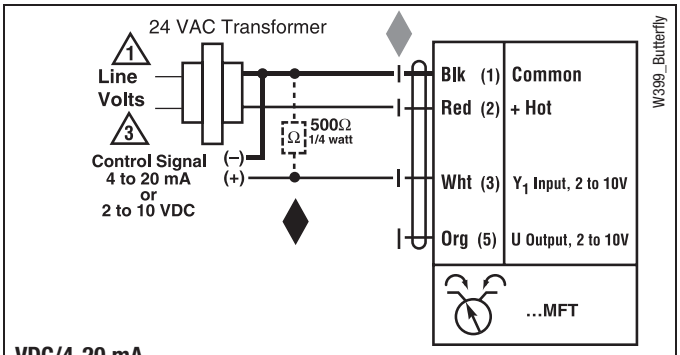
- The ZG-R01 500 Ω resistor converts the 4 to 20 mA control signal to 2 to 10 VDC, up to 2 actuators may be connected in parallel.
- Meets cULus or UL and CSA requirements without the need of an electrical ground connection.

WARNING Live Electrical Components!

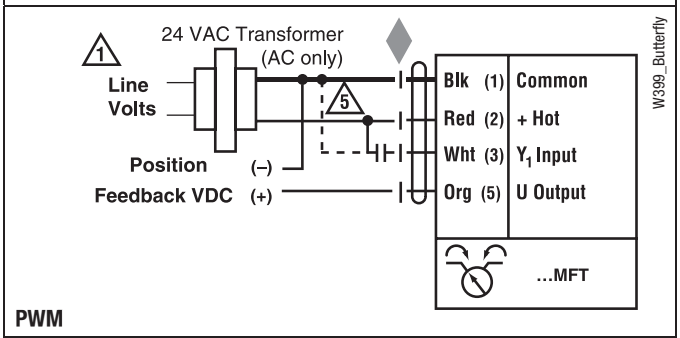
During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow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



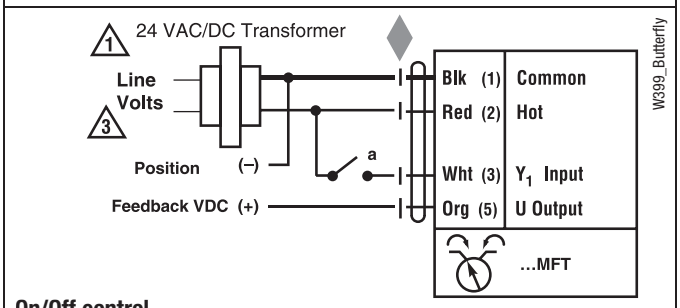
Master/Slave



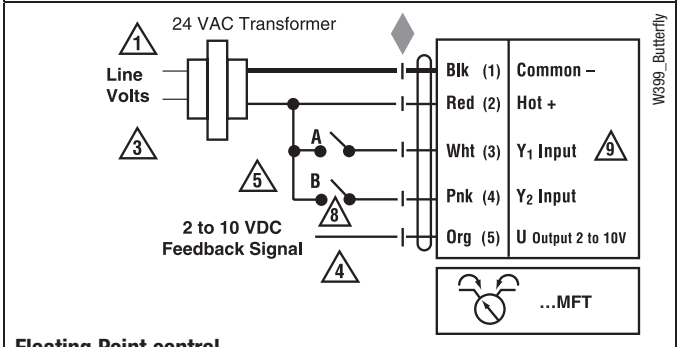
VDC/4-20 mA



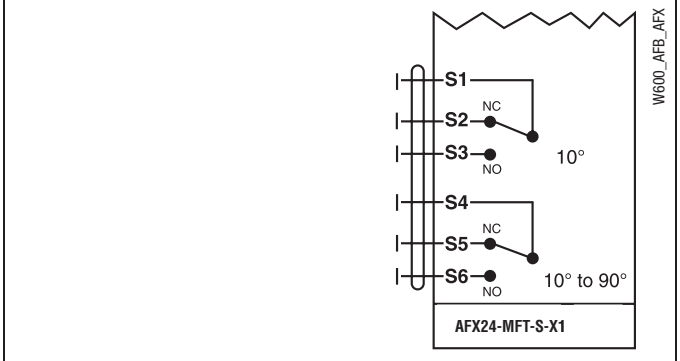
PWM



On/Off control



Floating Point control



Auxiliary Switches for AFX24-MFT-S-X1

DKRX24-3-T, DKRX(B)24-3-T N4(H)
NEMA 2/NEMA 4X Actuators, On/Off, Floating Point

Models

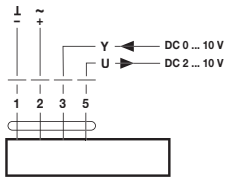
DKRX24-3-T	w/terminal block
DKRX24-3-T N4	w/terminal block
DKRB24-3-T N4H	w/heater

Technical Data		
Control		on/off, floating point
Power supply		24 VAC ± 20/-10% 50/60 Hz
Power consumption	running	12W / heater 33W
	holding	3W
Transformer sizing		21 VA (class 2 power source) / heater 36 VA
Electrical connection		screw terminal (for 22 to 12 AWG wire)
Overload protection		electronic throughout 0° to 90° rotation
Input impedance		100 Ω at control input 1500 Ω floating point
Angle of rotation		90°
Position indication		visual pointer (N4)
Manual override		internal push button (UL Type 4) external push buttom (UL Type 2)
Running time		150 seconds (default)
Fail-Safe		35 seconds
Humidity		5 to 100% RH (UL Type 4) 5 to 95% RH non condensation (UL Type 2)
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 type		UL Type 4/NEMA 4X/IP66 UL Type 2/NEMA 2/IP54
Housing material		Polycarbonate
Agency listings		cULus according to UL 60730-1A, UL 60730-2-14 and CAN/CSA E60730-1; Certified to IEC/EN 60730-1 and IEC/EN 60730-2-14
EMC		CE according to 2004/108/EC
Quality standard		ISO 9001
Servicing		maintenance free

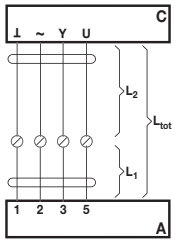
Electrical Installation

Wiring diagram

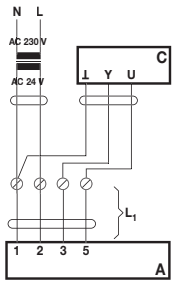
Note
- Connect via safety isolation transformer.
- Parallel connection of other actuators possible. Note performance data for supply.



Cable lengths



Note
When several actuators are connected in parallel, the maximum cable length must be divided by the number of actuators.



Note
There are no special restrictions on installation if the supply and data cable are routed separately.

Cable colors:
1 = black
2 = red
3 = white
5 = orange

A = Actuator
C = Control unit
L_1 = Belimo connecting cable, 1 m (4 x 0.75 mm²)
L_2 = Customer cable
L_{tot} = Maximum cable length

Cross section L_2 ⊥ / ~	Max. cable length $L_{tot} = L_1 + L_2$ AC	DC	Example for DC
0.75 mm²	≤30 m	≤5 m	1 m (L_1) + 4 m (L_2)
1.00 mm²	≤40 m	≤8 m	1 m (L_1) + 7 m (L_2)
1.50 mm²	≤70 m	≤12 m	1 m (L_1) + 11 m (L_2)
2.50 mm²	≤100 m	≤20 m	1 m (L_1) + 19 m (L_2)

A = Actuator
C = Control unit
L_1 = Belimo connecting cable, 1 m (4 x 0.75 mm²)

Wiring Diagrams

INSTALLATION NOTES

1 Provide overload protection and disconnect as required.

2 ***CAUTION*** *Equipment Damage!*
Actuators may be connected in parallel if not mechanically mounted to the same shaft. Power consumption and input impedance must be observed.

4 Position feedback cannot be used with Triac sink controller. The actuator internal common reference is not compatible.

5 Control signal may be pulsed from either the Hot (source) or the Common (sink) 24 VAC line.

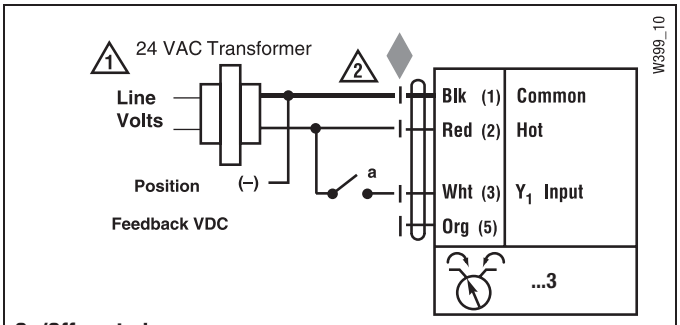
8 Contact closures A & B also can be triacs.
A & B should both be closed for triac source and open for triac sink.

9 For triac sink the common connection from the actuator must be connected to the hot connection of the controller.

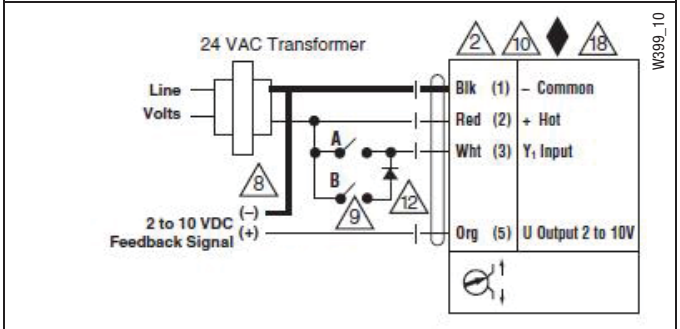
APPLICATION NOTES

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.



On/Off control



Floating Point control

DKRX24-MFT-T, DKRX(B)24-MFT-T N4(H)
NEMA 2/NEMA 4X Actuators, Multi-Function Technology

MFT

Models

DKRX24-MFT-T	w/terminal block
DKRX24-MFT-T N4	w/terminal block
DKRB24-MFT-T N4H	w/heater

Technical Data	
Control	2 to 10 VDC, 4 to 20 mA (default) variable (VDC, floating point, on/off)
Power supply	24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Power consumption running	12 W / heater 33W
holding	3 W
Transformer sizing	21 VA (class 2 power source) / heater 36 VA
Electrical connection	screw terminal (for 22 to 12 AWG wire)
Overload protection	electronic throughout 0° to 90° rotation
Input impedance	100 kΩ (0.1 mA) 500 Ω 1500 Ω (floating point, on/off)
Angle of rotation	90° electronically variable
Position indication	visual pointer (N4)
Manual override	internal push button (UL Type 4) external push buttom (UL Type 2)
Running time	150 seconds (default) variable (75 to 290 seconds)
Fail-Safe	35 seconds
Humidity	5 to 100% RH (UL Type 4) 5 to 95% RH non condensation (UL Type 2)
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 type	UL Type 4/NEMA 4X/IP66 UL Type 2/NEMA 2/IP54
Housing material	Polycarbonate
Agency listings	cULus according to UL 60730-1A, UL 60730-2-14 and CAN/CSA E60730-1; Certified to IEC/EN 60730-1 and IEC/EN 60730-2-14
EMC	CE according to 2004/108/EC
Quality standard	ISO 9001
Servicing	maintenance free

Wiring Diagrams

INSTALLATION NOTES

△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.

△5 Actuators with plenum rated cable do not have numbers on wires; use color codes instead. Actuators with appliance cables are numbered.

△8 Control signal may be pulsed from either the Hot (source) or the Common (sink) 24 VAC line.

△9 Contact closures A & B also can be triacs.
A& B should both be closed for triac source and open for triac sink.

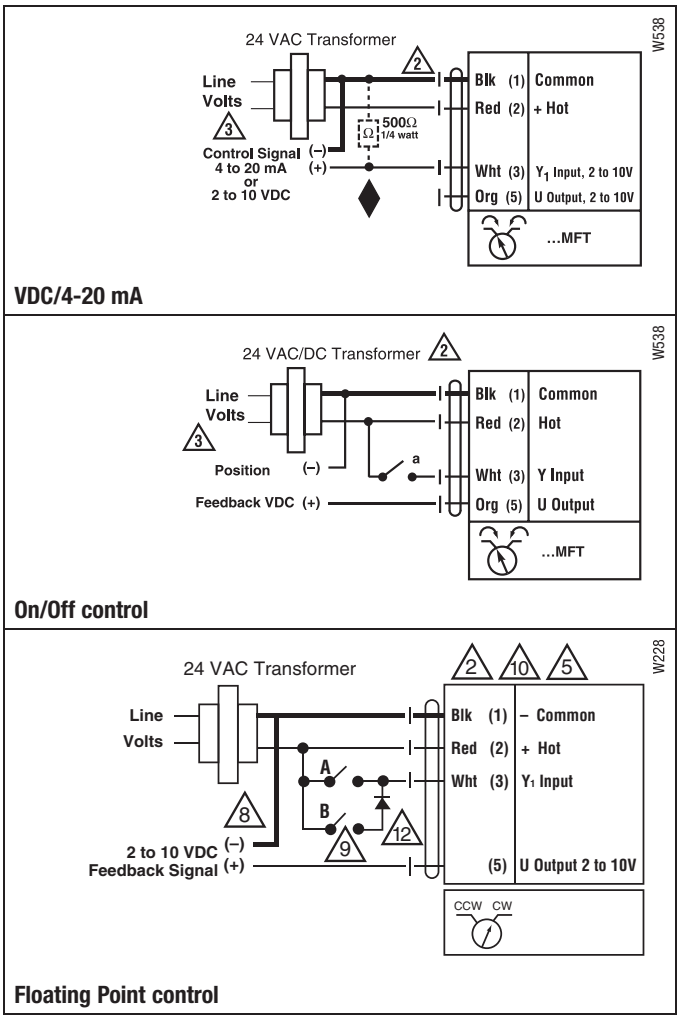
△10 For triac sink the Common connection from the actuator must be connected to the Hot connection of the controller. Position feedback cannot be used with a Triac sink controller. The actuator internal common reference is not compatible.

△12 IN4004 or IN4007 diode. (IN4007 supplied, Belimo part number 40155).

APPLICATION NOTES

♦ The ZG-R01 500 Ω resistor converts the 4 to 20 mA control signal to 2 to 10 VDC, up to 2 actuators may be connected in parallel.

***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.



DRCX24-3-T, DRCX(B)24-3-T N4(H)
NEMA 2/NEMA 4X Actuators, On/Off, Floating Point

Models

DRCX24-3-T	w/terminal block
DRCX24-3-T N4	w/terminal block
DRCB24-3-T N4H	w/heater

Technical Data	
Control	on/off, floating point
Power supply	24 VAC ± 20/-10% 50/60 Hz 24 VDC ± 10%
Power consumption running	9W / heater 29W
holding	2W
Transformer sizing	12 VA (class 2 power source) / heater 27 VA
Electrical connection	screw terminal (for 22 to 12 AWG wire)
Overload protection	electronic throughout 0° to 90° rotation
Input impedance	1000 Ω at control input
Angle of rotation	90°
Position indication	visual pointer
Manual override	internal push button (UL Type 4) external push buttom (UL Type 2)
Running time	35 seconds (default)
Humidity	5 to 100% RH (UL Type 4) 5 to 95% RH non condensation (UL Type 2)
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 type	UL Type 4/NEMA 4X/IP66 UL Type 2/NEMA 2/IP54
Housing material	Polycarbonate
Agency listings	cULus according to UL 60730-1A, UL 60730-2-14 and CAN/CSA E60730-1; Certified to IEC/EN 60730-1 and IEC/EN 60730-2-14
EMC	CE according to 2004/108/EC
Quality standard	ISO 9001

Wiring Diagrams

INSTALLATION NOTES

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

△4 Actuators may also be powered by 24 VDC.

△5 Actuators with plenum rated cable do not have numbers on wires; use color codes instead. Actuators with appliance cables are numbered.

△8 Control signal may be pulsed from either the Hot (Source) or Common (Sink) 24 VAC line.

△9 Contact closures A & B also can be triacs. A & B should both be closed for triac source and open for triac sink.

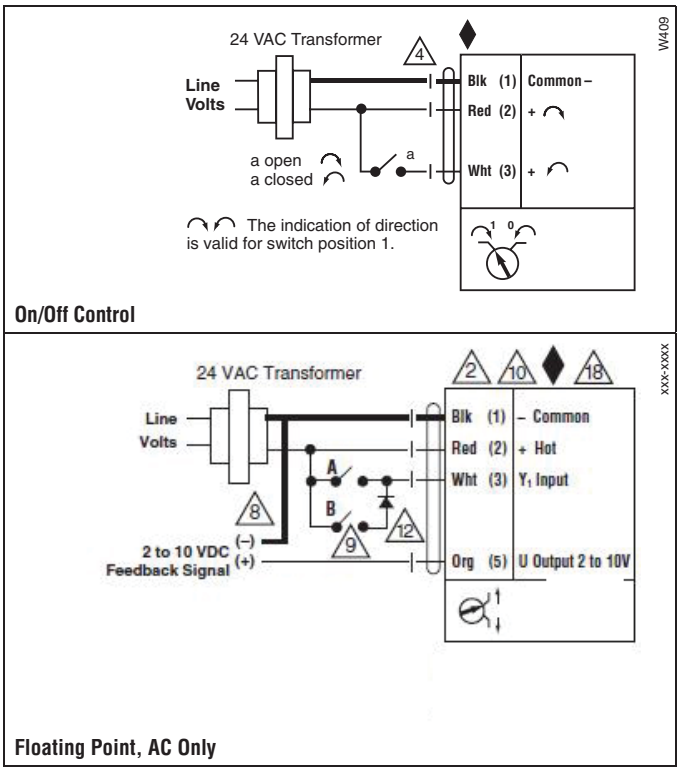
△10 For triac sink the Common connection from the actuator must be connected to the Hot connection of the controller. Position feedback cannot be used with a Triac sink controller. The actuator internal common reference is not compatible.

APPLICATION NOTES

♦ Meets cULus or UL and CSA 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.

⚠ ***WARNING** Mechanical Precautions*
The mechanical end stops cannot be moved or repositioned. Doing so will adversely effect the operation of the valve.
The directional switch cannot be moved. Maintain Factory Settings



DRX24-MFT-T, DRX24-MFT-T N4, DRCX24-MFT-T, DRCX(B)24-MFT-T N4(H)
NEMA 2/NEMA 4X Actuators, Multi-Function Technology

MFT

Models

DRX24-MFT-T	w/terminal block
DRX24-MFT-T N4	w/terminal block
DRCX24-MFT-T	w/terminal block
DRCX24-MFT-T N4	w/terminal block
DRCB24-MFT-T N4H	w/heater

Technical Data		
Control		2 to 10 VDC, 4 to 20 mA (default) variable (VDC, floating point, on/off)
Power supply		24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Power consumption	running	6.5 W / heater 27W
	holding	2.5 W
Transformer sizing		9.5 VA (class 2 power source) / heater 25 VA
Electrical connection		screw terminal (for 22 to 12 AWG wire)
Overload protection		electronic throughout 0° to 90° rotation
Input impedance		100 kΩ for 2 to 10 VDC (0.1 mA) 500 Ω for 4 to 20 mA 1000 Ω for floating point and on-off control
Angle of rotation		90° electronically variable
Position indication		visual pointer
Manual override		internal push button (UL Type 4) external push buttom (UL Type 2)
Running time		
DRX...		150 seconds
DRCX...		35 seconds
Humidity		5 to 100% RH (UL Type 4) 5 to 95% RH non condensation (UL Type 2)
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 type		UL Type 4/NEMA 4X/IP66 UL Type 2/NEMA 2/IP54
Housing material		Polycarbonate
Agency listings		cULus according to UL 60730-1A, UL 60730-2-14 and CAN/CSA E60730-1; Certified to IEC/EN 60730-1 and IEC/EN 60730-2-14"
EMC		CE according to 2004/108/EC
Quality standard		ISO 9001

Wiring Diagrams

INSTALLATION NOTES

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.

5 Actuators with plenum rated cable do not have numbers on wires; use color codes instead. Actuators with appliance cables are numbered.

8 Control signal may be pulsed from either the Hot (source) or the Common (sink) 24 VAC line.

9 Contact closures A & B also can be triacs.
A& B should both be closed for triac source and open for triac sink.

10 For triac sink the Common connection from the actuator must be connected to the Hot connection of the controller. Position feedback cannot be used with a Triac sink controller. The actuator internal common reference is not compatible.

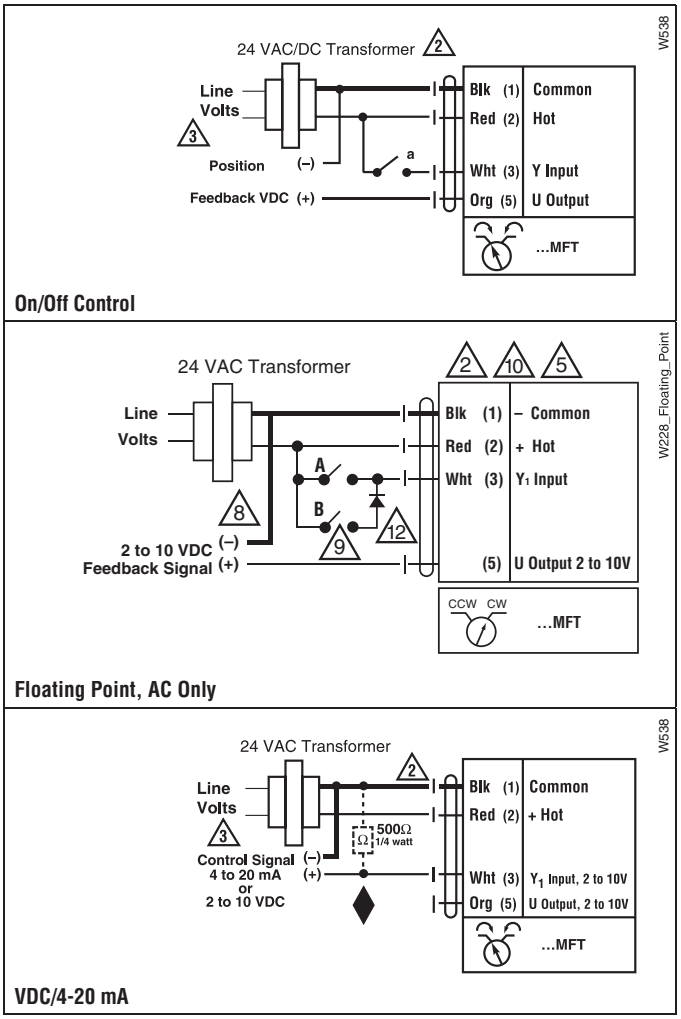
12 IN4004 or IN4007 diode. (IN4007 supplied, Belimo part number 40155).

APPLICATION NOTES

The ZG-R01 500 Ω resistor converts the 4 to 20 mA control signal to 2 to 10 VDC, up to 2 actuators may be connected in parallel.

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.

WARNING *Mechanical Precautions*
The mechanical end stops cannot be moved or repositioned. Doing so will adversely effect the operation of the valve.
The directional switch cannot be moved. Maintain Factory Settings



GK Actuators, On/Off, Floating Point

Models

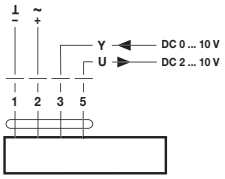
GKRB24-3-X1
GKRB24-3-5
GKB24-3-X1

Technical Data	
Power supply	24VAC ±20% 50/60Hz
Power consumption	12W (3W)
Transformer sizing	21VA (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 95 rotation
Operation range Y	on/off, floating point
Input impedance	100kΩ (0.1 mA), 500Ω 1500Ω (floating point, on/off)
Feedback output U	2 to 10VDC, 0.5mA max, VDC variable
Angle of rotation	max. 95°, adjustable with mechanical stop electronically variable
Direction of rotation	reversible with ↷/↶ switch
Fail-safe position	adjustable with dial or tool 0 to 100% in 10% increments
Position indication	reflective visual indicator (snap-on)
Manual override	external push button
Running time normal operation fail-safe	 150 seconds (default), variable 90 to 150 seconds 35 seconds
Humidity	5 to 95% RH non-condensing (EN 60730-1)
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
Housing material	UL94-5VA
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

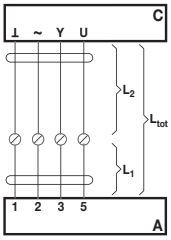
Electrical Installation

Wiring diagram

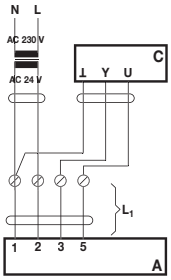
Note
- Connect via safety isolation transformer.
- Parallel connection of other actuators possible. Note performance data for supply.



Cable lengths



Note
When several actuators are connected in parallel, the maximum cable length must be divided by the number of actuators.



Note
There are no special restrictions on installation if the supply and data cable are routed separately.

Cable colors:
1 = black
2 = red
3 = white
5 = orange

A = Actuator
C = Control unit
L_1 = Belimo connecting cable, 1 m (4 x 0.75 mm²)
L_2 = Customer cable
L_{tot} = Maximum cable length

Cross section L_2 ⊥ / ~	Max. cable length $L_{tot} = L_1 + L_2$ AC	DC	Example for DC
0.75 mm²	≤30 m	≤5 m	1 m (L_1) + 4 m (L_2)
1.00 mm²	≤40 m	≤8 m	1 m (L_1) + 7 m (L_2)
1.50 mm²	≤70 m	≤12 m	1 m (L_1) + 11 m (L_2)
2.50 mm²	≤100 m	≤20 m	1 m (L_1) + 19 m (L_2)

A = Actuator
C = Control unit
L_1 = Belimo connecting cable, 1 m (4 x 0.75 mm²)

Wiring Diagrams

INSTALLATION NOTES

1. Provide overload protection and disconnect as required.
3. Actuators may also be powered by 24 VDC.
4. Position feedback cannot be used with Triac sink controller. The actuator internal common reference is not compatible.
5. Control signal may be pulsed from either the Hot (source) or the Common (sink) 24 VAC line.
8. Contact closures A & B also can be triacs. A & B should both be closed for triac source and open for triac sink.
9. For triac sink the common connection from the actuator must be connected to the hot connection of the controller.

APPLICATION NOTES

Meets UL requirements without the need of an electrical ground connection.

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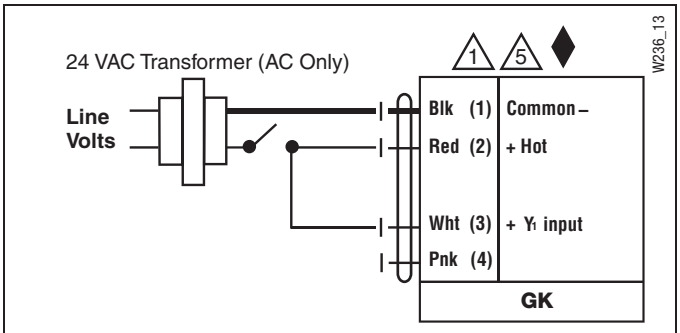
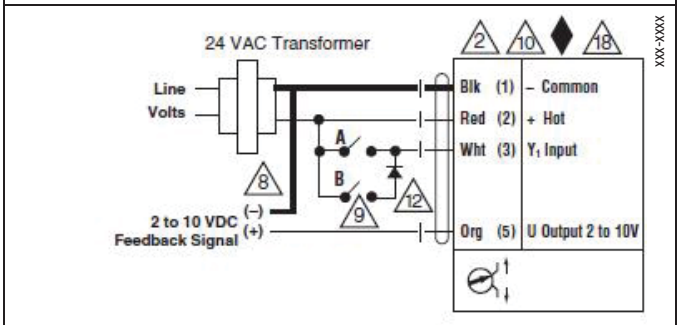
NOTE: Wiring diagrams shown are for single actuator mounted solutions



On/Off control



Floating Point control

GK Actuators, Multi-Function Technology

MFT

Models

GKRX24-MFT-X1
GKX24-MFT-X1

Technical Data	GKX24-MFT-X1
Power supply	24VAC ±20% 50/60Hz 24VDC ±10%
Power consumption	12W (3W)
Transformer sizing	21VA (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 95 rotation
Operation range Y	2 to 10 VDC, 4 to 20mA (default) variable (VDC,PWM, floating point, on/off)
Input impedance	100 kΩ (0.1 mA), 500 Ω 1500 Ω (PWM, floating point, on/off)
Feedback output U	2 to 10VDC, 0.5mA max, VDC variable
Angle of rotation	max. 95°, adjustable with mechanical stop electronically variable
Direction of rotation	reversible with ↷/↶ switch
Fail-safe position	adjustable with dial or tool 0 to 100% in 10% increments
Position indication	reflective visual indicator (snap-on)
Manual override	external push button
Running time normal operation fail-safe	 95 seconds (default), variable 90 to 150 seconds 35 seconds
Humidity	5 to 95% RH non-condensing (EN 60730-1)
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
Housing material	UL94-5VA
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

Note: GKR Actuators are on 2-way valves
GKX Actuators are on 3-way valves

Wiring Diagrams

INSTALLATION NOTES

1 Provide overload protection and disconnect as required.

3 Actuators may also be powered by 24 VDC.

4 Position feedback cannot be used with Triac sink controller.
The actuator internal common reference is not compatible.

5 Control signal may be pulsed from either the Hot (source)
or the Common (sink) 24 VAC line.

8 Contact closures A & B also can be triacs.
A & B should both be closed for triac source and open for triac sink.

9 For triac sink the common connection from the actuator
must be connected to the hot connection of the controller.

APPLICATION NOTES

Meets UL requirements without the need of an electrical ground connection.

The ZG-R01 500 Ω resistor may be used.

***WARNING** Live Electrical Components!*
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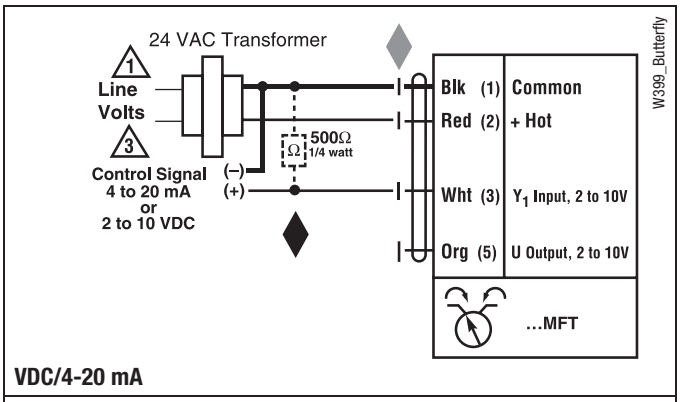
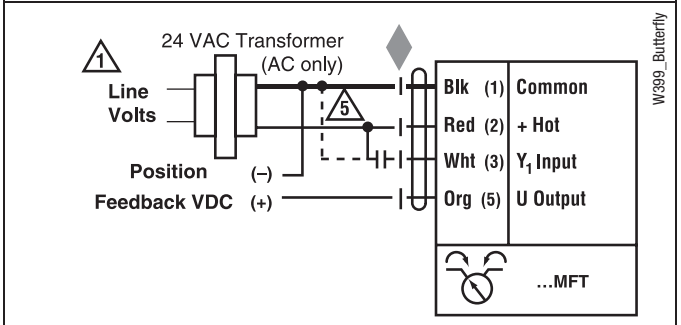
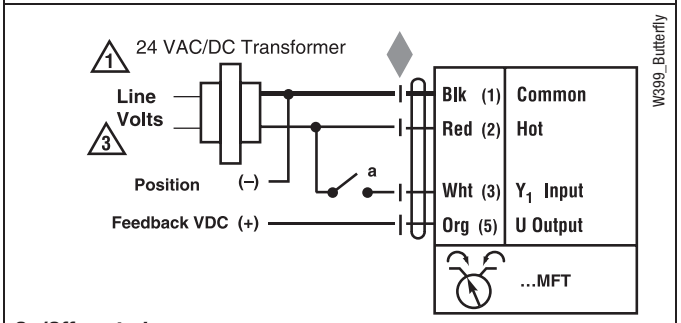
NOTE: Wiring diagrams shown are for single actuator mounted solutions



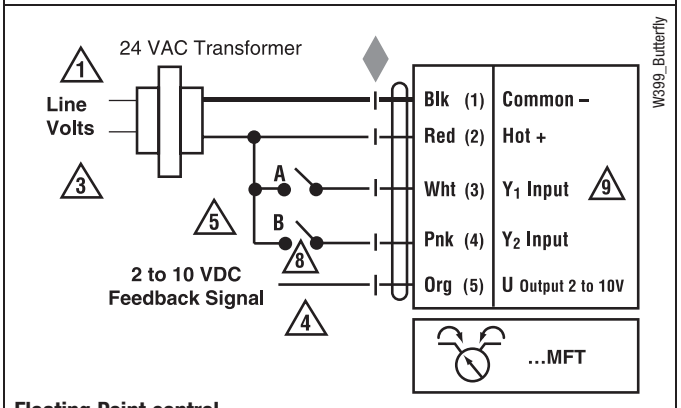
VDC/4-20 mA



PWM



On/Off control



Floating Point control

AM/AR Series Actuators, On/Off, Floating Point

Models

AMB24-3-X1
ARB24-3-X1
ARB24-3-5

Technical Data		
Power supply		24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Power consumption	running	2.0 W
	holding	0.2 W
Transformer sizing		5.5 VA (class 2 power source)
Electrical connection		3 ft, 18 GA plenum rated cable ½" conduit connector
Overload protection		electronic throughout 0° to 95° rotation
Control		on/off, floating point
Input impedance		600 Ω
Angle of rotation		95°, adjustable with mechanical stop
Direction of rotation		reversible with protected ↷/↶ switch
Position indication		handle
Manual override		external push button
Running time		95 seconds
Humidity		5 to 95% RH non condensing (EN 60730-1)
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
Housing material		UL94-5VA
Agency listings†		cULus according to UL 60730-1A/-2-14, CAN/CSA E60730-1, CSA C22.2 No. 24-93, CE according to 89/336/EEC (and 2006/95/EC for line voltage and/or -S versions)
Noise level		<45dB(A)
Quality standard		ISO 9001

Note: AR Actuators are on 2-way valves
AM Actuators are on 3-way valves

Wiring Diagrams

INSTALLATION NOTES

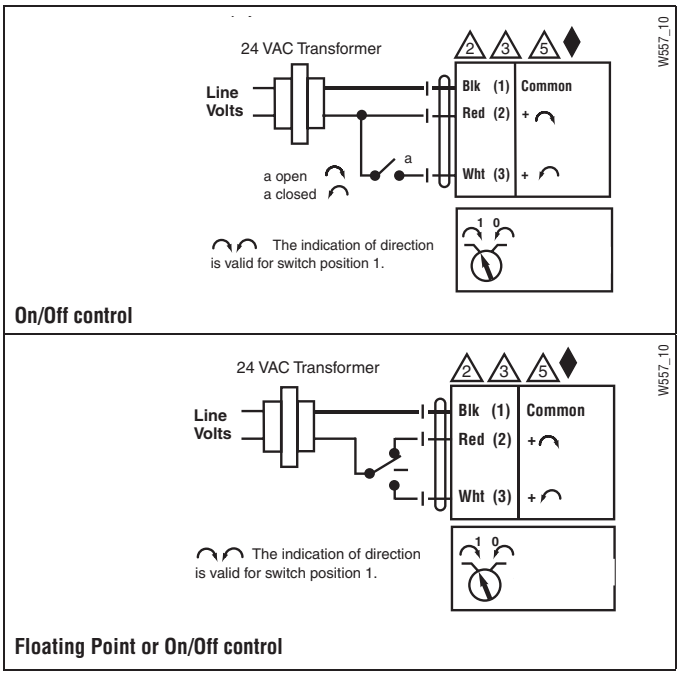
2 ***CAUTION** Equipment damage!*
Actuators may be connected in parallel.
Power consumption and input impedance must be observed.

4 Actuators may also be powered by 24 VDC.

APPLICATION NOTES

Meets cULus or UL and CSA 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.



On/Off control

Floating Point or On/Off control

AM/AR Series Actuators, Multi-Function Technology

Models

AMX24-MFT-X1
ARX24-MFT-X1
ARB24-MFT-5

Technical Data	
Power supply	24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Power consumption running	4 W
Power consumption holding	1.25 W
Transformer sizing	6 VA (class 2 power source)
Electrical connection	3 ft [1m], 10 ft [3m], 16 ft [5m] 18 GA plenum rated cable ½" conduit connector
Overload protection	electronic throughout 0° to 95° rotation
Operating range Y	2 to 10 VDC, 4 to 20 mA (default) variable (VDC, PWM, floating point, on/off)
Input impedance	100k Ω (0.1 mA), 500 Ω 1500 Ω (PWM, floating point, on/off)
Feedback output U	2 to 10 VDC, 0.5 mA max VDC variable
Angle of rotation	95° electronically variable
Direction of rotation	reversible with protected ↷/↶ switch
Position indication	handle
Manual override	external push button
Running time	150 seconds (default) variable (90 to 350 secs)
Humidity	5 to 95% RH non condensing (EN 60730-1)
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
Housing material	UL94-5VA
Agency listings†	cULus according to UL60730-1A/-2-14, CAN/CSA E60730-1, CSA C22.2 No. 24-93, CE according to 89/336/EEC
Noise level	<45dB(A)
Quality standard	ISO 9001

† Rated impulse voltage 4kV, Control pollution degree 3, Type of action 1

Wiring Diagrams

INSTALLATION NOTES

△3 Actuators may also be powered by 24 VDC.

△4 Position feedback cannot be used with Triac sink controller.
The actuator internal common reference is not compatible.

△6 Control signal may be pulsed from either the Hot (source) or the Common (sink) 24 VAC line.

△8 Contact closures A & B also can be triacs.
A& B should both be closed for triac source and open for triac sink.

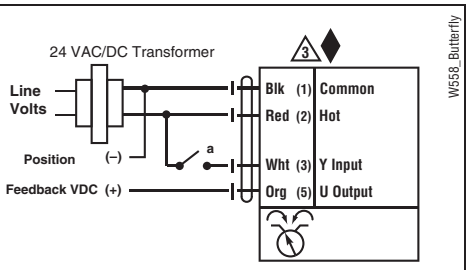
△9 For triac sink the common connection from the actuator must be connected to the hot connection.

APPLICATION NOTES

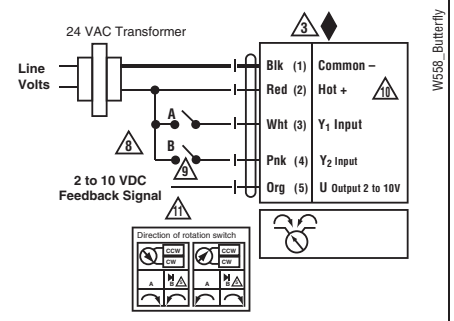
♦ The ZG-R01 500 Ω resistor converts the 4 to 10 mA control signal to 2 to 10 VDC, up to 2 actuators may be connected in parallel.

WARNING *Live Electrical Components!*

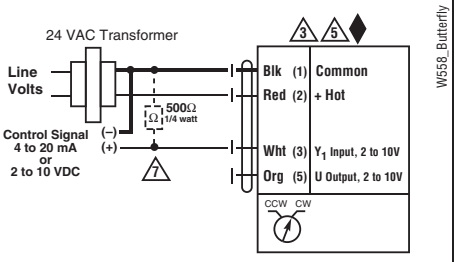
During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow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



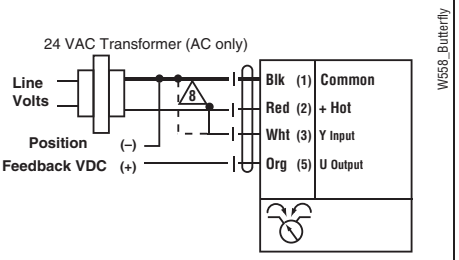
Two Position



Floating Point



VDC/4-20 mA



PWM

GM/GR Actuators, On/Off, Floating Point

Models

GMB24-3-X1
GRB24-3-X1
GRB24-3-5
GRB24-3-7

Technical Data		
Power supply		24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Power consumption	running	4.0 W
	holding	2 W
Transformer sizing		6 VA (class 2 power source)
Electrical connection		3 ft, 18 GA appliance cable, 1/2" conduit connector
Overload protection		electronic throughout 0 to 95° rotation
Control signal		On/Off, Floating Point
Input impedance		600 Ω
Angle of rotation		mechanically limited to 95°
Direction of rotation		reversible with switch A/B
Position indication		0 to 1 and reversible indicator
Running time		150 sec.
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
Housing material		UL94-5VA (flammability rating)
Agency listings		cULus according to UL60730-1A/-2-14, CAN/CSA E60730-1, CSA C22.2 No.24-93, CE according to 89/336/EEC
Noise level		max. 45 dB (A)
Servicing		maintenance free
Quality standard		ISO 9001

Note: GR Actuators are on 2-way valves
GM Actuators are on 3-way valves

Wiring Diagrams

INSTALLATION NOTES

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

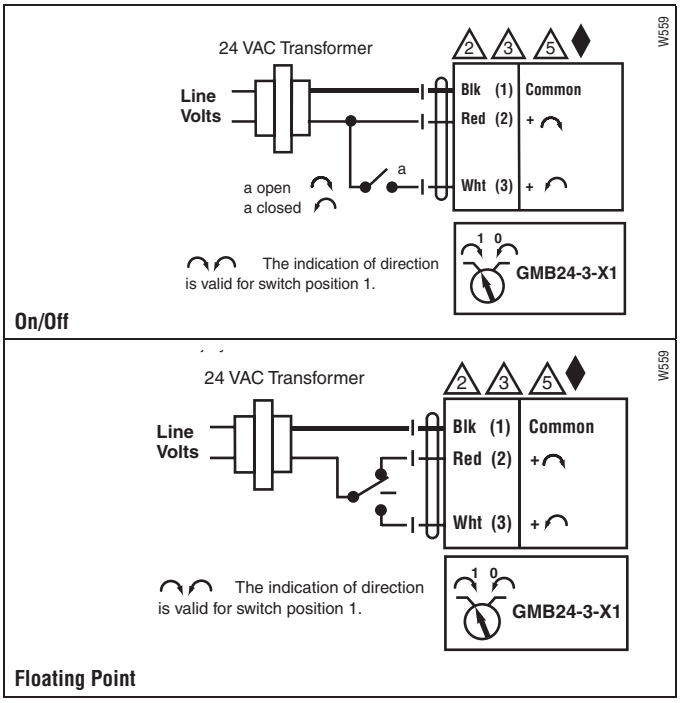
3 Actuators may also be powered by 24 VDC.

5 Actuators with plenum rated cable do not have numbers on wires; use color codes instead. Actuators with appliance cables are numbered.

APPLICATION NOTES

Meets cULus or UL and CSA 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.



BELIMO

MFT

Models

GMX24-MFT-X1
GRX24-MFT-X1
GRB24-MFT-5
GRX24-MFT-7

Technical Data		
Power supply		24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Power consumption	running	4.5 W
	holding	2 W
Transformer sizing		7 VA (class 2 power source)
Electrical connection		3 ft, 18 GA appliance cable, 1/2" conduit connector
Overload protection		electronic throughout 0 to 95° rotation
Control signal		2 to 10 VDC, 4 to 20 mA (with 500 Ω, 1/4 W resistor) ZG-R01
Input impedance		100 k Ω for 2 to 10 VDC (0.1 mA) 500 Ω for 4 to 20 mA 750 Ω for PWM 1500 Ω for on/off and floating point
Angle of rotation		mechanically limited to 95°
Direction of rotation		reversible with switch A/B
Position indication		0 to 1 and reversible indicator
Running time		150 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
Housing material		UL94-5VA (flammability rating)
Agency listings		cULus according to UL60730-1A/-2-14, CAN/CSA E60730-1, CSA C22.2 No.24-93, CE according to 89/336/EEC
Noise level		max. 45 dB(A)
Servicing		maintenance free
Quality standard		ISO 9001

Wiring Diagrams

INSTALLATION NOTES

△3 Actuators may also be powered by 24 VDC.

△5 Actuators with plenum rated cable do not have numbers on wires; use color coded instead. Actuators with appliance rated cable use numbers.

△8 Control signal may be pulsed from either the Hot (Source) or Common (Sink) 24 VAC line.

△10 For triac sink the Common connection from the actuator must be connected to the Hot connection of the controller.

APPLICATION NOTES

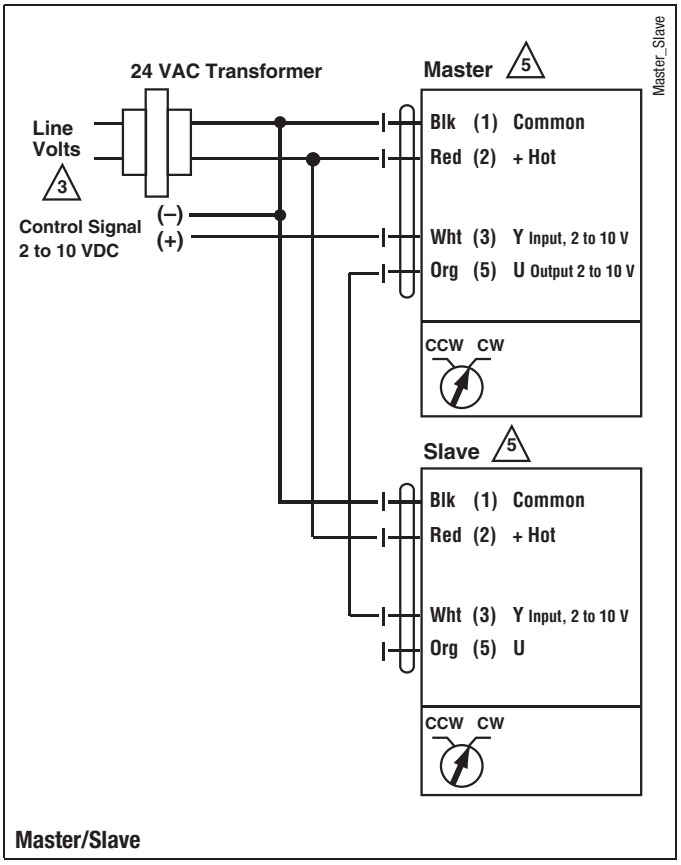
◆ Meets cULus or UL and CSA requirements without the need of an electrical ground connection.

△9 Contact closures A & B also can be triacs. A & B should both be closed for triac source and open for triac sink.

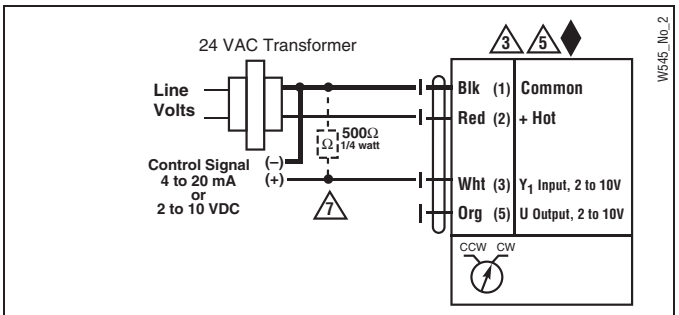
△11 Position feedback cannot be used with a Triac sink controller. The actuator internal common reference is not compatible.

⚠ *WARNING* *Live Electrical Components!*

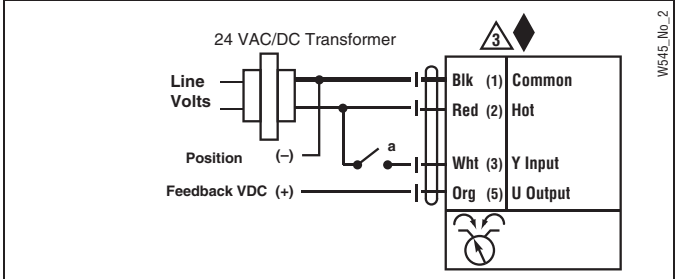
During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow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



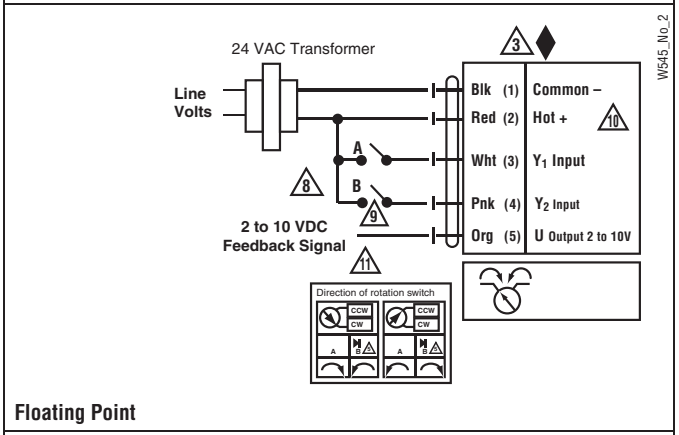
Master/Slave



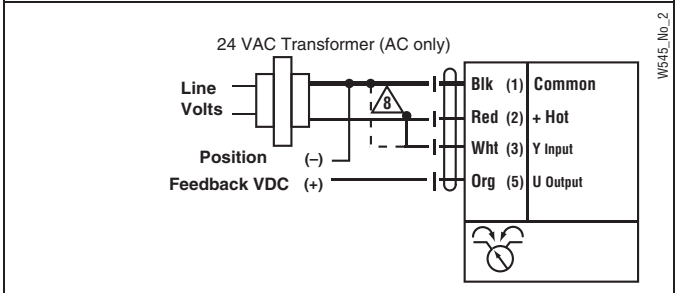
VDC/4-20 mA



Two Position



Floating Point



PWM

GRCX(B)24-3-T N4(H) NEMA 4X Actuators, On/Off, Floating Point

Models

GRCX24-3-T N4 w/terminal block
GRCB24-3-T N4H w/heater

Technical Data		
Control		on/off, floating point
Power supply		24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Power consumption	running	8W / heater 29W
	holding	2.5W
Transformer sizing		11 VA (class 2 power source) / heater 26 VA
Electrical connection		screw terminal (for 22 to 12 AWG wire)
Overload protection		electronic throughout 0° to 90° rotation
Input impedance		1000 Ω at control input
Angle of rotation		90°, adjustable with mechanical stop
Position indication		visual pointer
Manual override		internal push button (UL Type 4)
Running time		35 seconds (default)
Humidity		5 to 100% RH (UL Type 4)
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 type		UL Type 4/NEMA 4X/IP66
Housing material		Polycarbonate
Agency listings		cULus according to UL 60730-1A, UL 60730-2-14 and CAN/CSA E60730-1; Certified to IEC/EN 60730-1 and IEC/EN 60730-2-14
EMC		CE according to 2004/108/EC
Quality standard		ISO 9001

Wiring Diagrams

INSTALLATION NOTES

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

△4 Actuators may also be powered by 24 VDC.

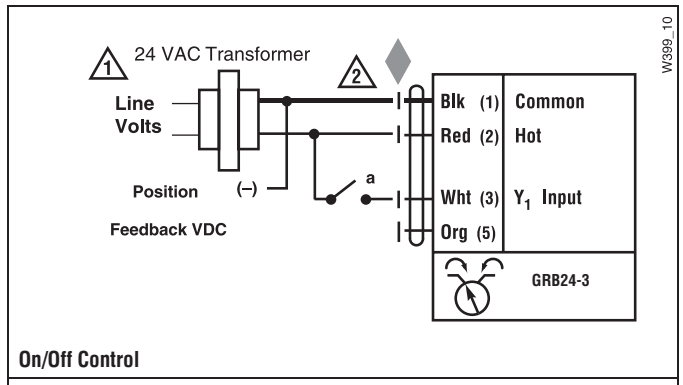
△5 Actuators with plenum rated cable do not have numbers on wires; use color codes instead. Actuators with appliance cables are numbered.

APPLICATION NOTES

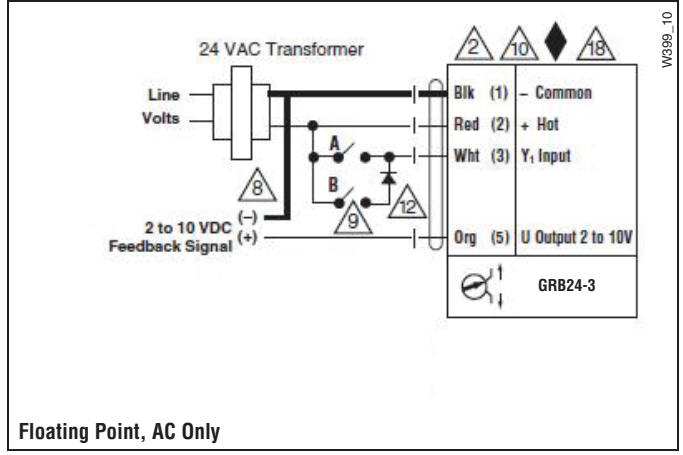
♦ Meets cULus or UL and CSA requirements without the need of an electrical ground connection. Use suitable flexible metallic conduit or its equivalent with the conduit fitting.

⚠ ***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.

⚠ ***WARNING** Mechanical Precautions*
The mechanical end stops cannot be moved or repositioned. Doing so will adversely effect the operation of the valve.
The directional switch cannot be moved. Maintain Factory Settings



On/Off Control



Floating Point, AC Only

GRX(B)24-MFT-T N4(H) NEMA 4X Actuators, Multi-Function Technology

MFT

Models

GRX24-MFT-T N4 w/terminal block
GRB24-MFT-T N4H w/heater

Technical Data		
Control		2 to 10 VDC, 4 to 20 mA (default) variable (VDC, floating point, on/off)
Power supply		24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Power consumption	running	8 W / heater 29W
	holding	2.5 W
Transformer sizing		11 VA (class 2 power source) / heater 24 VA
Electrical connection		screw terminal (for 22 to 12 AWG wire)
Overload protection		electronic throughout 0° to 90° rotation
Input impedance		100 kΩ for 2 to 10 VDC (0.1 mA) 500 Ω for 4 to 20 mA 1000 Ω for floating point and on-off control
Angle of rotation		90°, adjustable with mechanical stop electronically variable
Position indication		visual pointer
Manual override		internal push button (UL Type 4)
Running time		150 seconds (default) variable (75 to 290 seconds)
Humidity		5 to 100% RH (UL Type 4)
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 type		UL Type 4/NEMA 4X/IP66
Housing material		Polycarbonate
Agency listings		cULus according to UL 60730-1A, UL 60730-2-14 and CAN/CSA E60730-1; Certified to IEC/EN 60730-1 and IEC/EN 60730-2-14
EMC		CE according to 2004/108/EC
Quality standard		ISO 9001

Wiring Diagrams

INSTALLATION NOTES

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.

5 Actuators with plenum rated cable do not have numbers on wires; use color codes instead. Actuators with appliance cables are numbered.

8 Control signal may be pulsed from either the Hot (source) or the Common (sink) 24 VAC line.

9 Contact closures A & B also can be triacs.
A& B should both be closed for triac source and open for triac sink.

10 For triac sink the Common connection from the actuator must be connected to the Hot connection of the controller. Position feedback cannot be used with a Triac sink controller. The actuator internal common reference is not compatible.

12 IN4004 or IN4007 diode. (IN4007 supplied, Belimo part number 40155).

APPLICATION NOTES

The ZG-R01 500 Ω resistor converts the 4 to 20 mA control signal to 2 to 10 VDC, up to 2 actuators may be connected in parallel.

WARNING *Live Electrical Components!*
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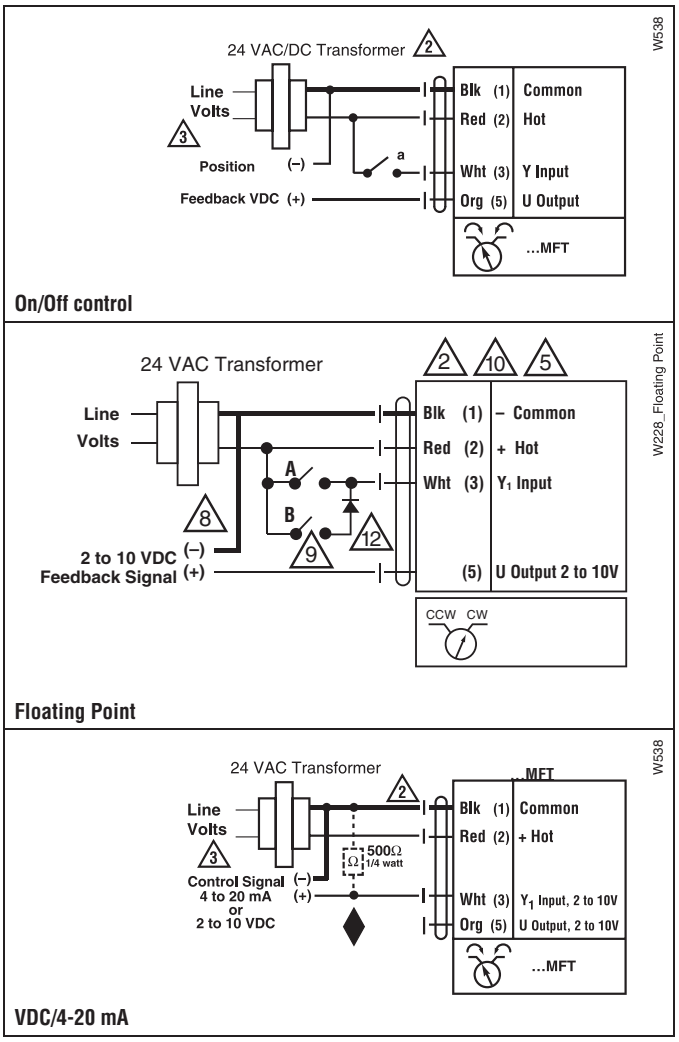
WARNING *Mechanical Precautions*
The mechanical end stops cannot be moved or repositioned. Doing so will adversely effect the operation of the valve.
The directional switch cannot be moved. Maintain Factory Settings



GMCX(B)24-3-T-X1 N4(H) NEMA 4X Actuators, On/Off, Floating Point

Models

GMCX24-3-T-X1 N4 w/terminal block
GMCB24-3-T-X1 N4H w/heater

Technical Data	
Control	on/off, floating point
Power supply	24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Power consumption running	8W / heater 28W
holding	2.5W
Transformer sizing	11 VA (class 2 power source) / heater 26 VA
Electrical connection	screw terminal (for 22 to 12 AWG wire)
Overload protection	electronic throughout 0° to 95° rotation
Input impedance	1000 Ω at control input
Angle of rotation	95°, adjustable with mechanical stop electronically variable
Direction of rotation	reversible with ↷/↶ switch
Position indication	visual pointer
Manual override	internal push button (UL Type 4)
Running time	35 seconds (default)
Humidity	5 to 100% RH (UL Type 4)
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 type	UL Type 4/NEMA 4X/IP66
Housing material	Polycarbonate
Agency listings	cULus according to UL 60730-1A, UL 60730-2-14 and CAN/CSA E60730-1; Certified to IEC/EN 60730-1 and IEC/EN 60730-2-14
EMC	CE according to 2004/108/EC
Quality standard	ISO 9001

Wiring Diagrams

INSTALLATION NOTES

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

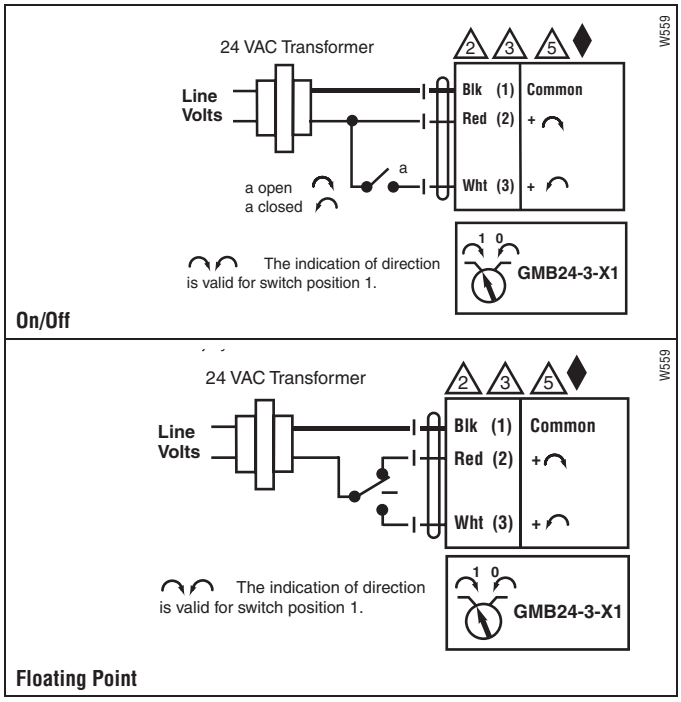
3 Actuators may also be powered by 24 VDC.

5 Actuators with plenum rated cable do not have numbers on wires; use color codes instead. Actuators with appliance cables are numbered.

APPLICATION NOTES

Meets cULus or UL and CSA 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.



GMX(B)24-MFT-T N4(H) NEMA 4X Actuators, Multi-Function Technology

MFT

5 YEAR WARRANTY

LISTED 94 D5 TEMP. IND. & REG. EQUIP. c UL us

BRUSHLESS d.c. motor

Models

GMX24-MFT-T-X1 N4 w/terminal block
GMB24-MFT-T-X1 N4H w/heater

Technical Data	
Control	2 to 10 VDC, 4 to 20 mA (default) variable (VDC, floating point, on/off)
Power supply	24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Power consumption running	8 W / heater 29W
holding	2.5 W
Transformer sizing	11 VA (class 2 power source) / heater 26 VA
Electrical connection	screw terminal (for 22 to 12 AWG wire)
Overload protection	electronic throughout 0° to 95° rotation
Input impedance	100 kΩ for 2 to 10 VDC (0.1 mA) 500 Ω for 4 to 20 mA 1000 Ω for floating point and on-off control
Angle of rotation	95°, adjustable with mechanical stop electronically variable
Direction of rotation	reversible with ↷/↶ switch
Position indication	visual pointer
Manual override	internal push button (UL Type 4)
Running time	150 seconds (default) variable (75 to 290 seconds)
Humidity	5 to 100% RH (UL Type 4)
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 type	UL Type 4/NEMA 4X/IP66
Housing material	Polycarbonate
Agency listings	cULus according to UL 60730-1A, UL 60730-2-14 and CAN/CSA E60730-1; Certified to IEC/EN 60730-1 and IEC/EN 60730-2-14
EMC	CE according to 2004/108/EC
Quality standard	ISO 9001

△8 Contact closures A & B also can be triacs.
A & B should both be closed for triac source and open for triac sink.

△9 For triac sink the common connection from the actuator must be connected to the hot connection of the controller.

APPLICATION NOTES

♦ The ZG-R01 500 Ω resistor may be used.

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.

Wiring Diagrams

INSTALLATION NOTES

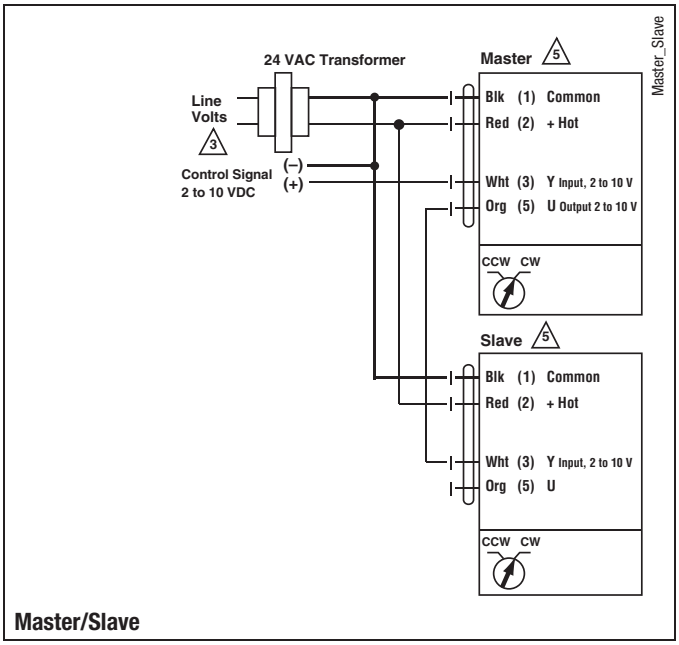
△1 Provide overload protection and disconnect as required.

△2 **CAUTION** *Equipment Damage!*
Actuators may be connected in parallel if not mechanically mounted to the same shaft. Power consumption and input impedance must be observed.

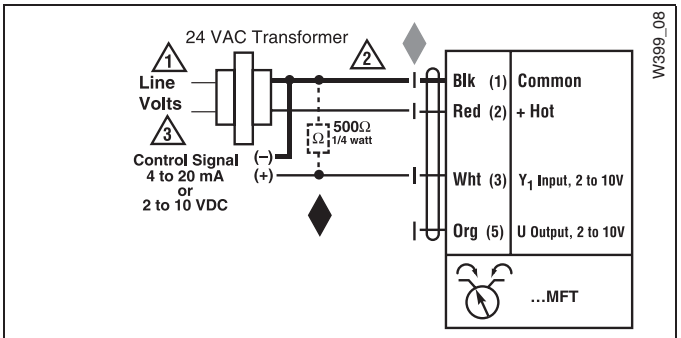
△3 Actuators may also be powered by 24 VDC.

△4 Position feedback cannot be used with Triac sink controller.
The actuator internal common reference is not compatible.

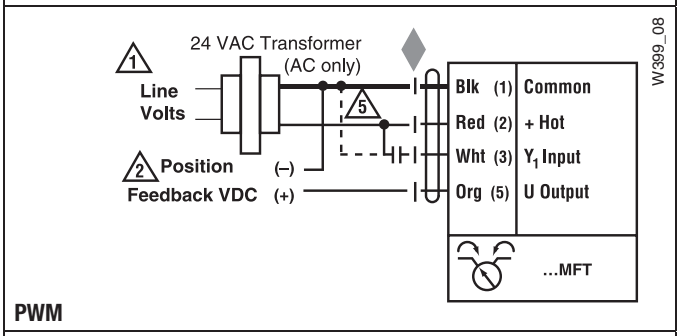
△5 Control signal may be pulsed from either the Hot (source) or the Common (sink) 24 VAC line.



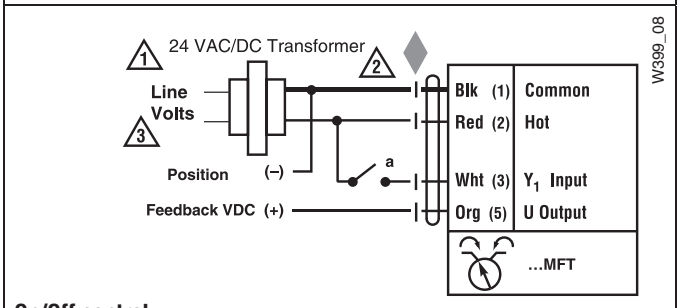
Master/Slave



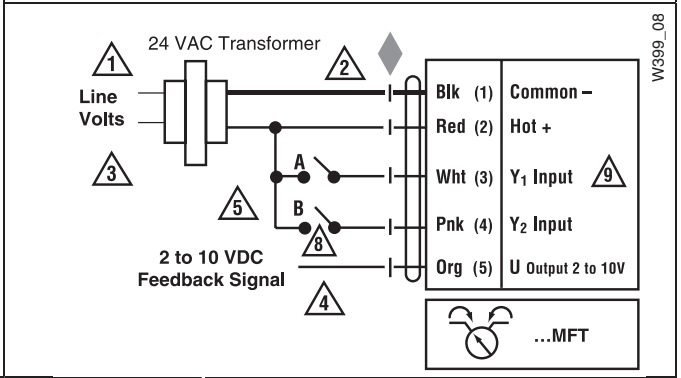
VDC/4-20 mA



PWM

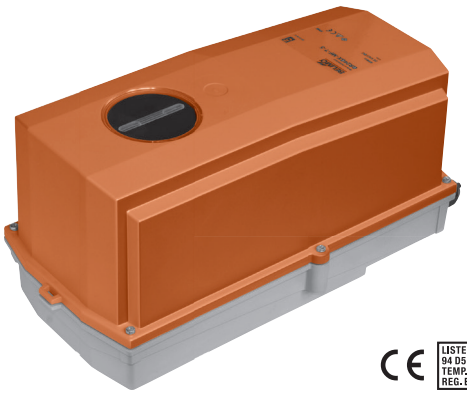


On/Off control



DRCX120-3-T N4

On/Off, Floating Point, Non-Spring Return, 100 to 240 VAC



Technical Data	
Power Supply	100...240 VAC, ±10%, 50/60 Hz, DC,
Power Consumption Running	6 W
Power Consumption Holding	2 W
Transformer Sizing	11 VA (class 2 power source)
Electrical Connection	screw terminal (for 22 to 12 AWG wire)
Overload Protection	electronic thoughout 0° to 90° rotation
Input Impedance	100 Ω
Direction of Rotation (Motor)	reversible with built-in switch
Position Indication	dial
Manual Override	under cover
Running Time (Motor)	35 sec, constant, independent of load
Ambient Humidity	5 to 95% RH non condensing (EN 60730-1)
Storage Temperature Range	-40°F to 176°F [-40°C to 80°C]
Housing	NEMA 4X, IP66/67, UL Enclosure Type 4X
Housing Material	polycarbonate
Noise Level (Motor)	<45 dB (A)
Servicing	maintenance free
Quality Standard	ISO 9001
Degree of Protection IEC/EN	IP66/67

Control Signal must be specified at time of order. Control cannot be changed via field wiring.

DRCX120-3-T N4

On/Off, Floating Point, Non-Spring Return, 100 to 240 VAC

Wiring Diagrams

INSTALLATION NOTES

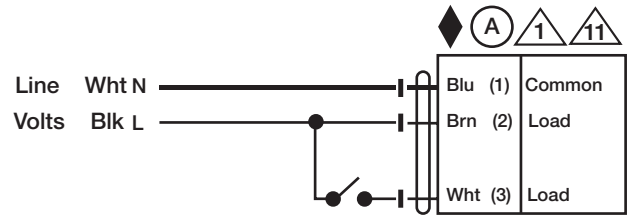
1 Provide overload protection and disconnect as required.

16 Actuators are provided with a numbered screw terminal strip instead of a cable.

◆ 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.



On/Off 100 to 240 VAC

DRCX120-3

On/Off, Floating Point, Non-Spring Return, 100 to 240 VAC

Technical Data	
Power Supply	100...240 VAC, ±10%, 50/60 Hz
Power Consumption Running	5 W
Power Consumption Holding	2 W
Electrical Connection	(2) 3ft [1m], 10ft [3m] or 16ft [5m] 18 GA appliance cables, with 1/2" conduit connectors
Overload Protection	electronic thoughout 0° to 90° rotation
Position Indication	integrated into handle
Manual Override	external push button
Running Time (Motor)	35 sec, constant, independent of load
Ambient Humidity	5 to 95% RH non condensing (EN 60730-1)
Storage Temperature Range	-40°F to 176°F [-40°C to 80°C]
Housing	NEMA 2, IP54, UL Enclosure Type 2
Housing Material	UL94-5VA
Servicing	maintenance free
Quality Standard	ISO 9001
Degree of Protection IEC/EN	IP54

Wiring Diagrams

INSTALLATION NOTES

A Actuators with appliance cables are numbered.

1 Provide overload protection and disconnect as required.

11 Actuators may be connected in parallel if not mechanically linked. Power consumption and input impedance must be observed.

Meets cULus requirements without the need of an electrical ground connection.

WARNING! LIVE ELECTRICAL COMPONENTS!

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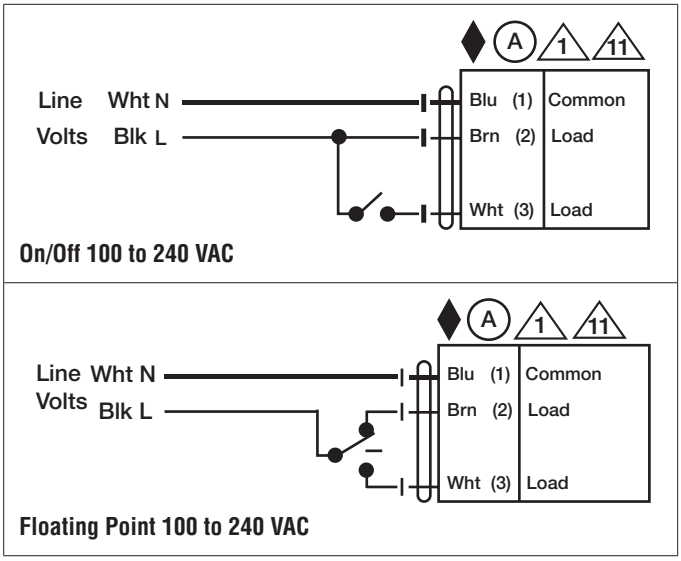
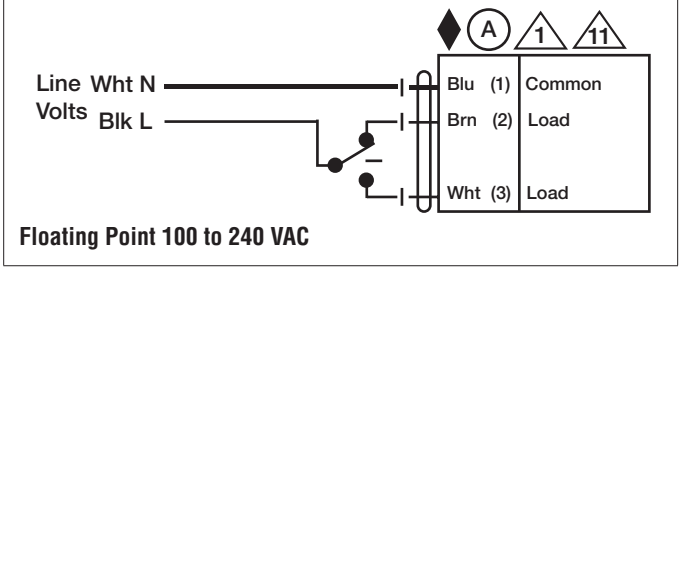


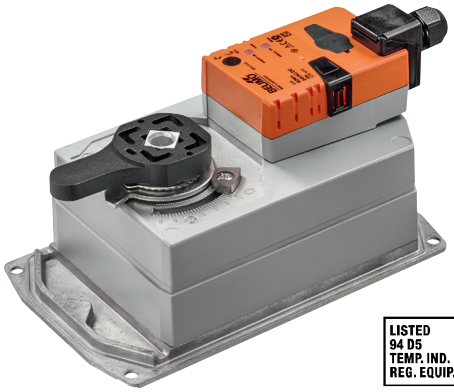
On/Off 100 to 240 VAC



Floating Point 100 to 240 VAC

DRX24-MFT-T

Modulating, Non-Spring Return, 24 V, for 2 to 10 VDC or 4 to 20 mA



Technical Data	
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	screw terminal (for 22 to 12 AWG wire)
Overload Protection	electronic thoughout 0° to 90° rotation
Operating Range Y	2 to 10 VDC, 4 to 20 mA w/ ZG-R01 (500 Ω, 1/4 W resistor), variable (VDC, floating point, on/off)
Input Impedance	100 k Ω for 2 to 10 VDC (0.1 mA), 500 Ω for 4 to 20 mA, 1500 Ω for On/Off
Feedback Output U	2 to 10 VDC, 0.5 mA max, VDC variable
Direction of Rotation (Motor)	reversible with built-in switch
Position Indication	integrated into handle
Manual Override	external push button
Running Time (Motor)	default 150 sec, variable 90...150 sec
Ambient Humidity	5 to 95% RH non condensing (EN 60730-1)
Storage Temperature Range	-40°F to 176°F [-40°C to 80°C]
Housing	NEMA 2, IP54, UL Enclosure Type 2
Housing Material	UL94-5VA
Noise Level (Motor)	<45 dB (A)
Servicing	maintenance free
Quality Standard	ISO 9001
Degree of Protection IEC/EN	IP54

Wiring Diagrams

INSTALLATION NOTES

1 Provide overload protection and disconnect as required.

3 Actuators may also be powered by 24 VDC.

5 Only connect common to negative (-) leg of control circuits.

7 A 500 Ω resistor (ZG-R01) converts the 4 to 20 mA control signal to 2 to 10 VDC.

10 For triac sink the Common connection from the actuator must be connected to the Hot connection of the controller. Position feedback cannot be used with a triac sink controller; the actuator internal common reference is not compatible.

12 IN4004 or IN4007 diode. (IN4007 supplied, Belimo part number 40155).

16 Actuators are provided with a numbered screw terminal strip instead of a cable.

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

! WARNING! LIVE ELECTRICAL COMPONENTS!

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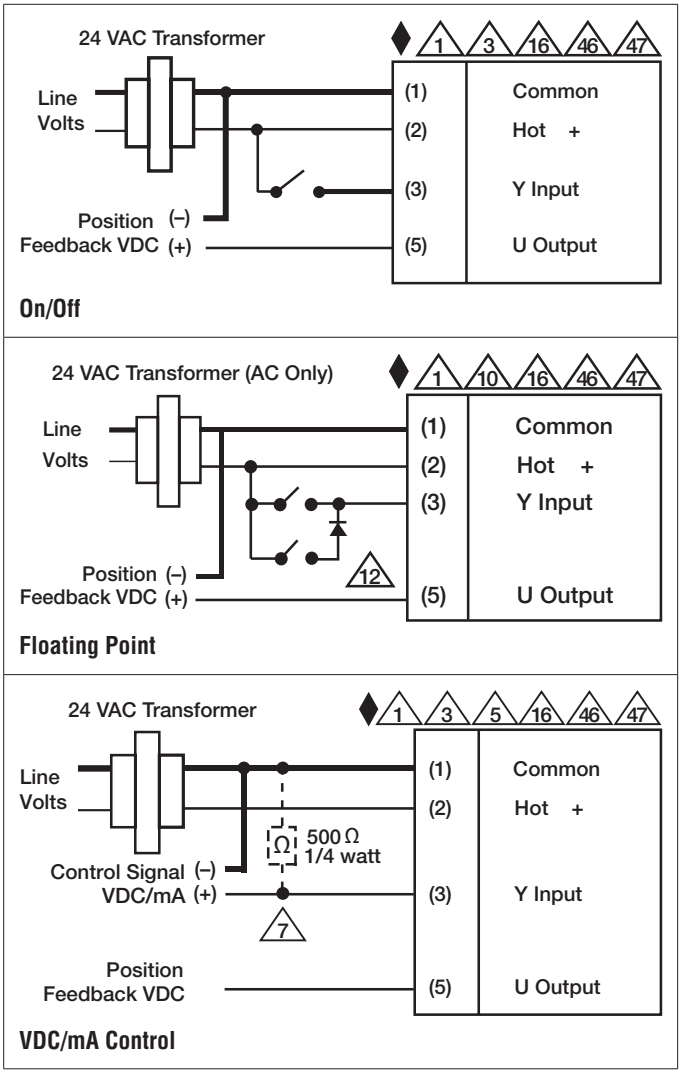
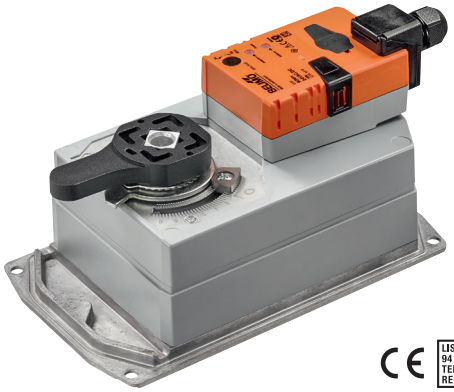


DRCX24-3-T

On/Off or Floating Point, Non-Spring Return, 24 V



Technical Data	
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	screw terminal (for 22 to 12 AWG wire)
Overload Protection	electronic thoughout 0° to 90° rotation
Input Impedance	100 Ω
Direction of Rotation (Motor)	reversible with built-in switch
Position Indication	integrated into handle
Manual Override	external push button
Running Time (Motor)	35 sec, constant, independent of load
Ambient Humidity	5 to 95% RH non condensing (EN 60730-1)
Storage Temperature Range	-40°F to 176°F [-40°C to 80°C]
Housing	NEMA 2, IP54, UL Enclosure Type 2
Housing Material	UL94-5VA
Noise Level (Motor)	<45 dB (A)
Servicing	maintenance free
Quality Standard	ISO 9001
Degree of Protection IEC/EN	IP54

Control Signal must be specified at time of order. Control cannot be changed via field wiring.

Wiring Diagrams

INSTALLATION NOTES

1 Provide overload protection and disconnect as required.

3 Actuators may also be powered by 24 VDC.

10 For triac sink the Common connection from the actuator must be connected to the Hot connection of the controller. Position feedback cannot be used with a triac sink controller; the actuator internal common reference is not compatible.

12 IN4004 or IN4007 diode. (IN4007 supplied, Belimo part number 40155).

16 Actuators are provided with a numbered screw terminal strip instead of a cable.

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

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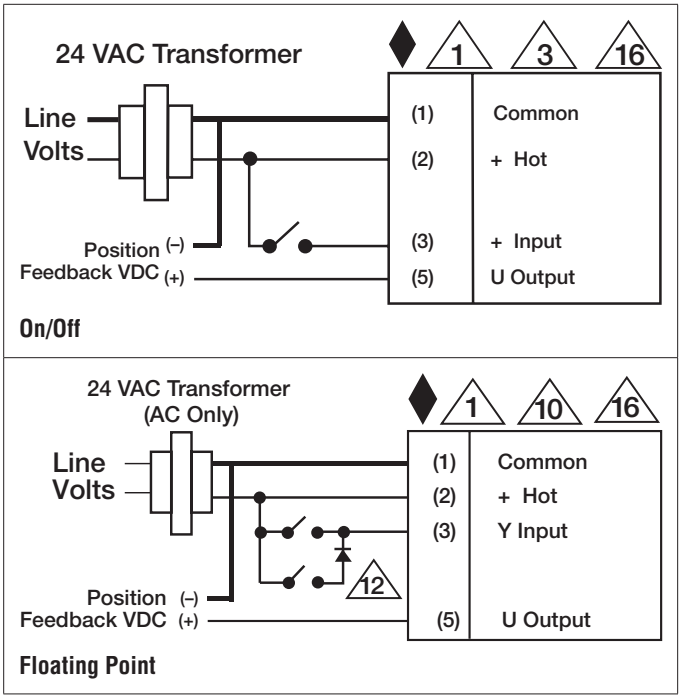
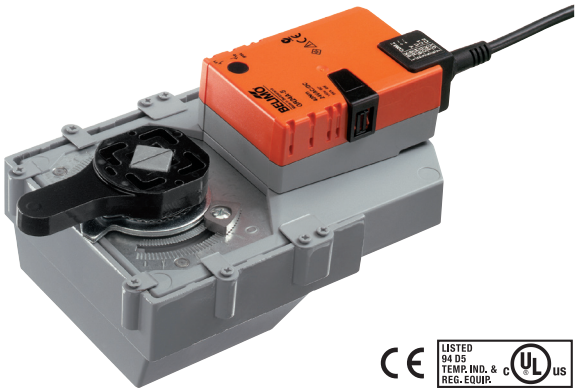


GRX120-3

On/Off Floating Point, Non-Spring Return, 110 V



Technical Data	
Power Supply	100...240 VAC, ±20%, 50/60 Hz
Power Consumption Running	4 W
Power Consumption Holding	2 W
Transformer Sizing	7 VA @ 24 VAC (class 2 power source)
Electrical Connection	18 GA applicance rated cable with 1/2" conduit connector protected NEMA 2 (IP54) 3ft [1m] 10ft [3m] and 16ft [5m]
Overload Protection	electronic throughout 0° to 95° rotation
Input Impedance	600 Ω
Angle of Rotation	90°, adjustable with mechanical stop
Direction of Rotation (Motor)	reversible with built-in switch
Manual Override	external push button
Running Time (Motor)	150 sec
Ambient 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	UL94-5VA
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)	<45 dB (A)
Servicing	maintenance free
Quality Standard	ISO 9001
Weight	3.5 lb [1.6 kg]
Degree of Protection IEC/EN	IP42

†Rated Impulse Voltage 800V, Type of action 1.AA, Control Pollution Degree 3

Wiring Diagrams

INSTALLATION NOTES

A Actuators with appliance cables are numbered.

1 Provide overload protection and disconnect as required.

2 Actuators may be connected in parallel. Power consumption and input impedance must be observed.

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

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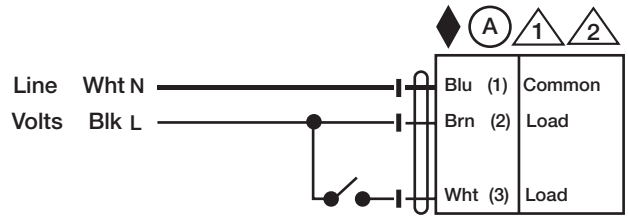
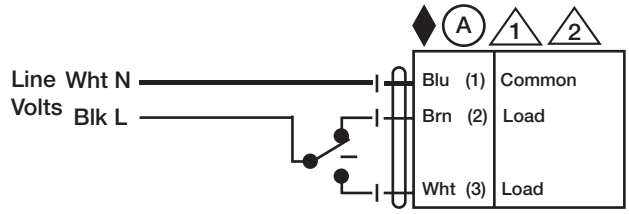


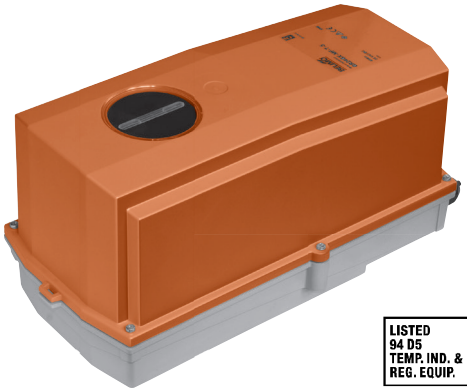
On/Off 100 to 240 VAC



Floating Point 100 to 240 VAC

GRCX120-3 N4

On/Off, Floating Point, Non-Spring Return, 100 to 240 VAC



Technical Data	
Power Supply	100...240 VAC, ±20%, 50/60 Hz, DC, ±10%
Power Consumption Running	6 W
Power Consumption Holding	2 W
Transformer Sizing	11 VA (class 2 power source)
Electrical Connection	3ft [1m], 18 GA appliance cable with 1/2" conduit connector
Overload Protection	electronic thoughout 0° to 90° rotation
Input Impedance	600 Ω
Angle of Rotation	90°, adjustable with mechanical stop
Direction of Rotation (Motor)	reversible with built-in switch
Position Indication	dial
Manual Override	under cover
Running Time (Motor)	35 sec, constant, independent of load
Ambient 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 4X, IP66/67, UL Enclosure Type 4X
Housing Material	polycarbonate
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)	<45 dB (A)
Servicing	maintenance free
Quality Standard	ISO 9001
Weight	9.9 lb [4.5 kg]
Degree of Protection IEC/EN	IP66/67

†Rated Impulse Voltage 2.5kV, Type of Action 1.AA, Control Pollution Degree 3.

GRCX120-3 N4

On/Off, Floating Point, Non-Spring Return, 100 to 240 VAC

Wiring Diagrams

INSTALLATION NOTES

Ⓐ Actuators with appliance cables are numbered.

△1 Provide overload protection and disconnect as required.

△2 Actuators may be connected in parallel. Power consumption and input impedance must be observed.

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

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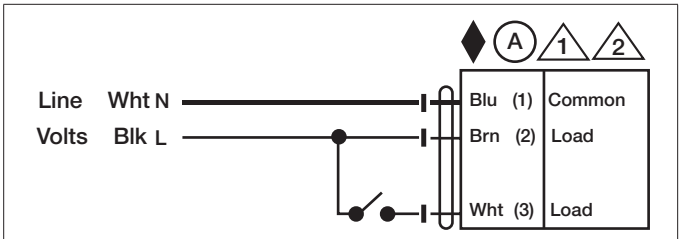
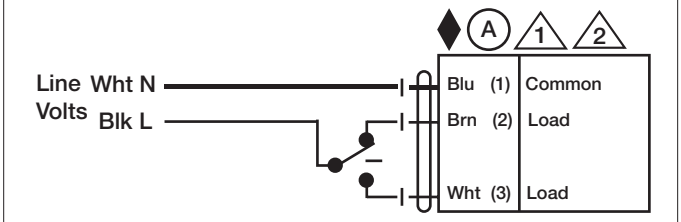


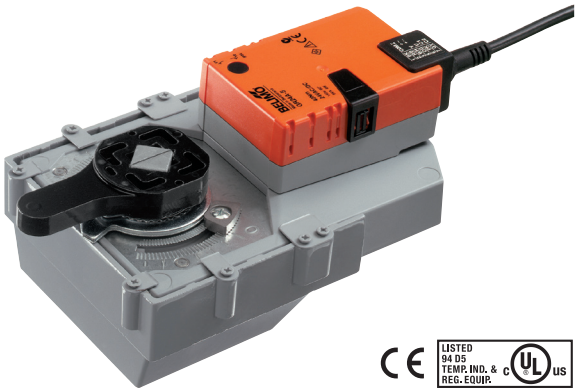
On/Off 100 to 240 VAC



Floating Point 100 to 240 VAC

GRCX120-3

On/Off, Floating Point, Non-Spring Return, 100 to 240 VAC



Technical Data	
Power Supply	100...240 VAC, ±20%, 50/60 Hz
Power Consumption Running	6 W
Power Consumption Holding	2 W
Transformer Sizing	11 VA (class 2 power source)
Electrical Connection	3ft [1m], 18 GA plenum rated cable with 1/2" conduit connector protected NEMA 2 (IP54)
Overload Protection	electronic throughout 0° to 95° rotation
Operating Range Y	on/off, floating point
Input Impedance	600 Ω
Angle of Rotation	90°, adjustable with mechanical stop
Direction of Rotation (Motor)	reversible with built-in switch
Position Indication	reflective visual indicator (snap on)
Manual Override	external push button
Running Time (Motor)	35 sec, constant, independent of load
Ambient 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, IP54, UL Enclosure Type 2
Housing Material	UL94-5VA
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	3.5 lb [1.6 kg]
Degree of Protection IEC/EN	IP54

†Rated Impulse Voltage 2.5kV, Type of Action 1.AA, Control Pollution Degree 3.

GRCX120-3

On/Off, Floating Point, Non-Spring Return, 100 to 240 VAC

Wiring Diagrams

INSTALLATION NOTES

A Actuators with appliance cables are numbered.

1 Provide overload protection and disconnect as required.

2 Actuators may be connected in parallel. Power consumption and input impedance must be observed.

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

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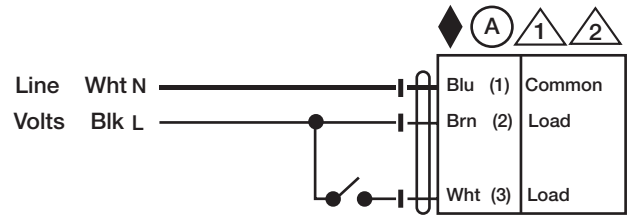
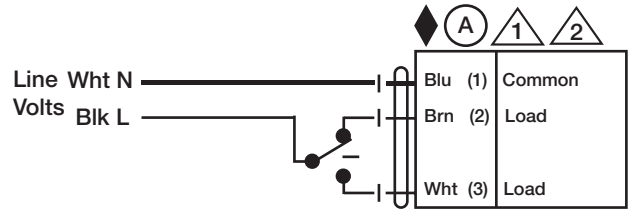


On/Off 100 to 240 VAC



Floating Point 100 to 240 VAC

PRBUP-MFT-T

Modulating, Non-Spring Return, 24-240 V, NEMA 4X with BACnet

Technical Data	
Power Supply	24...240 VAC, -20% / +10%, 50/60 Hz, 24...125 VDC, -20% / +10%
Power Consumption Running	20 W @ 24 V, 18 W @ 120 V, 20 W @ 230 V
Power Consumption Holding	3.5 W @ 24 V, 4 W @ 120 V, 6 W @ 230 V
Transformer Sizing	20 VA @ 24 VAC/DC (class 2 power source), 23 VA @ 120 VAC/DC, 52 VA @ 230 VAC
Electrical Connection	terminal block
Overload Protection	electronic thoughout 0° to 90° rotation
Operating Range Y	2 to 10 VDC, 4 to 20 mA variable (VDC, floating point, on/off)
Input Impedance	100 k Ω for 2 to 10 VDC (0.1 mA), 500 Ω for 4 to 20 mA, 1500 Ω for On/Off
Feedback Output U	2 to 10 VDC, 0.5 mA max, VDC variable
Angle of Rotation	90°
Torque motor	Min. 1400 in-lbs [160 Nm]
Direction of Rotation (Motor)	reversible with app
Position Indication	integral pointer and bottom mounted reflective indicators
Manual Override	7 mm hex crank, supplied
Running Time (Motor)	35 sec
Ambient Humidity	5 to 100% RH (UL Type 4)
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 4X, IP66/67, UL Enclosure Type 4
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)	68 dB (A)
Servicing	maintenance free
Quality Standard	ISO 9001
Weight	12.8 lbs [5.8kg]
Auxiliary switch	2 x SPDT, 3A resistive (0.5A inductive) @ 250 VAC, one set at 10°, one adjustable 0° to 90°
Communication	BACnet MS/TP
Passive Sensor Inputs	2 (PT1000) (NI1000) (NTC)

Application

PR Series valve actuators are designed with an integrated linkage and visual position indicators. For outdoor applications, the installed valve must be mounted with the actuator at or above horizontal. For indoor applications the actuator can be in any location including directly under the valve.

Operation

The PR series actuator provides 90° of rotation and a visual indicator shows the position of the valve. The PR Series actuator uses a low power consumption brushless DC motor and is electronically protected against overload. A universal power supply is furnished to connect supply voltage in the range of 24-240 VAC and 24-125 VDC. Included is a smart heater with thermostat to eliminate condensation. Two auxiliary switches are provided; one set at 10° open and the other is field adjustable. Running time is field adjustable from 30-120 seconds by using the Near Field Communication (NFC) app and a smart phone.

†Use 60°C/75°C copper wire size range 12-28 AWG, stranded or solid. 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 4000V. Type of action 1. Control pollution degree 3.

PRBUP-MFT-T

Modulating, Non-Spring Return, 24-240 V, NEMA 4X with BACnet

Wiring Diagrams

Meets cULus requirements without the need of an electrical ground connection.

Universal Power Supply (UP) models can be supplied with 24 VAC up to 240 VAC, or 24 VDC up to 240 VDC.

Disconnect power.

1 Provide overload protection and disconnect as required.

4 Two built-in auxiliary switches (2x SPDT), for end position indication, interlock control, fan startup, etc.

5 Only connect common to negative (-) leg of control circuits.

46 Actuators may be controlled in parallel. Current draw and input impedance must be observed.

WARNING! LIVE ELECTRICAL COMPONENTS!

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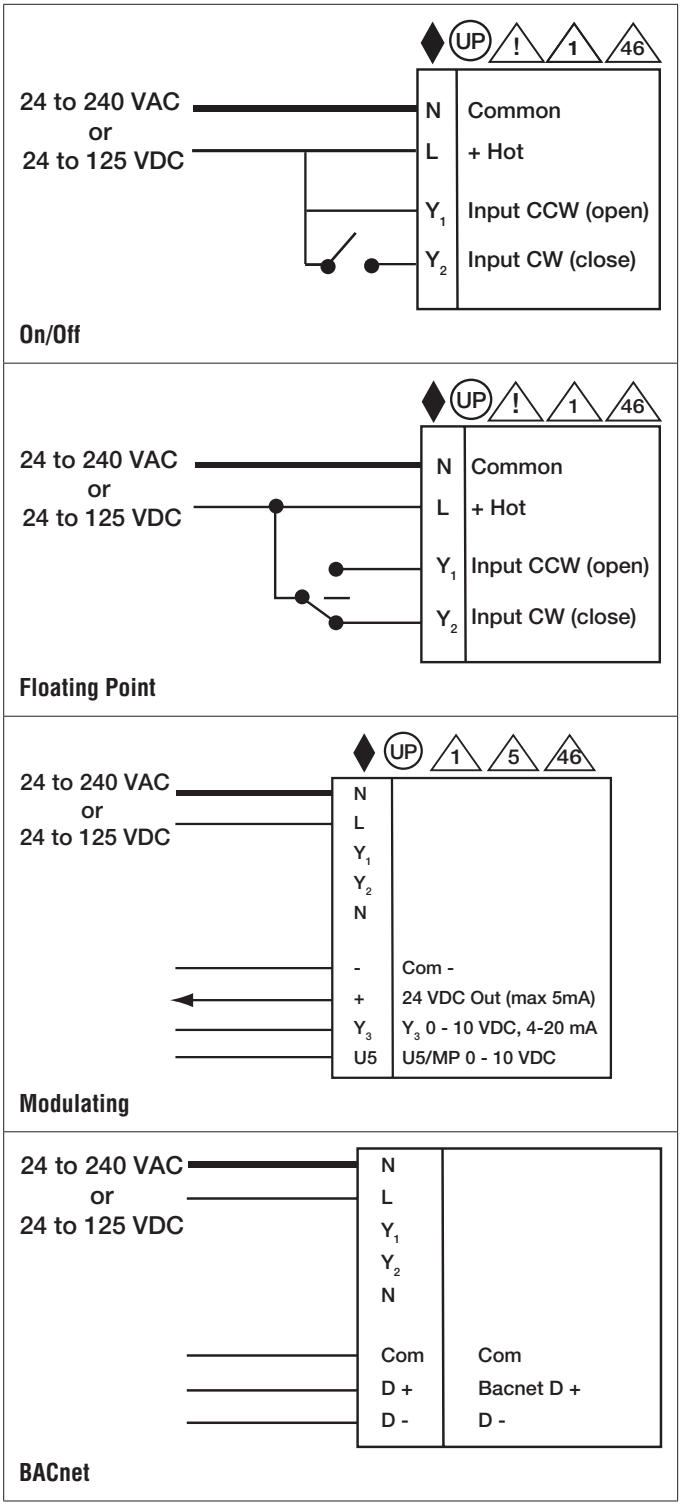
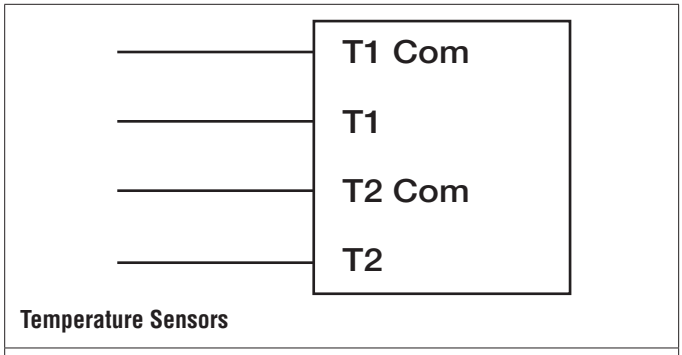
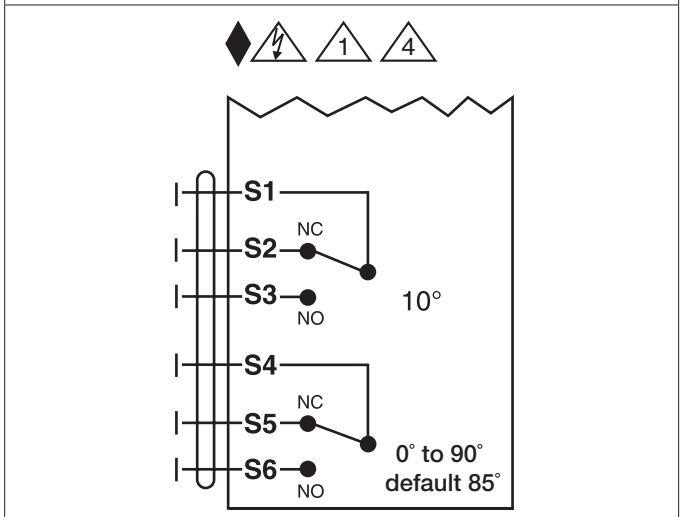


PRBUP-MFT-T

Modulating, Non-Spring Return, 24-240 V, NEMA 4X with BACnet



Temperature Sensors



Auxiliary Switches

PRXUP-3-T

On/Off, Floating Point, Non-Spring Return, 24-240 V, NEMA 4X

Technical Data	
Power Supply	24...240 VAC, -20% / +10%, 50/60 Hz, 24...125 VDC, -20% / +10%
Power Consumption Running	20 W @ 24 V, 18 W @ 120 V, 20 W @ 230 V
Power Consumption Holding	3.5 W @ 24 V, 4 W @ 120 V, 6 W @ 230 V
Transformer Sizing	20 VA @ 24 VAC/DC (class 2 power source), 23 VA @ 120 VAC/DC, 52 VA @ 230 VAC
Electrical Connection	terminal block
Overload Protection	electronic thoughout 0° to 90° rotation
Input Impedance	1000 Ω
Angle of Rotation	90°
Position Indication	integral pointer and bottom mounted reflective indicators
Manual Override	7 mm hex crank, supplied
Running Time (Motor)	35 sec
Ambient Humidity	5 to 100% RH (UL Type 4)
Ambient Temperature Range	-22°F to 122°F [-30°C to 50°C]
Housing	NEMA 4X, IP66/67, UL Enclosure Type 4X
Housing Material	aluminum die cast polycarbonate cover
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)	68 dB (A)
Servicing	maintenance free
Quality Standard	ISO 9001
Weight	12.8 lbs [5.8kg]
Auxiliary switch	2 x SPDT, 3A resistive (0.5A inductive) @ 250 VAC, one set at 10°, one adjustable 0° to 90°

Application

PR Series valve actuators are designed with an integrated linkage and visual position indicators. For outdoor applications, the installed valve must be mounted with the actuator at or above horizontal. For indoor applications the actuator can be in any location including directly under the valve.

Operation

The PR series actuator provides 90° of rotation and a visual indicator shows the position of the valve. The PR Series actuator uses a low power consumption brushless DC motor and is electronically protected against overload. A universal power supply is furnished to connect supply voltage in the range of 24-240 VAC and 24-125 VDC. Included is a smart heater with thermostat to eliminate condensation. Two auxiliary switches are provided; one set at 10° open and the other is field adjustable. Running time is field adjustable from 30-120 seconds by using the Near Field Communication (NFC) app and a smart phone.

†Use 60°C/75°C copper wire size range 12-28 AWG, stranded or solid. 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 4000V. Type of action 1. Control pollution degree 3.

PRXUP-3-T

On/Off, Floating Point, Non-Spring Return, 24-240 V, NEMA 4X

Wiring Diagrams

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

UP Universal Power Supply (UP) models can be supplied with 24 VAC up to 240 VAC, or 24 VDC up to 125 VDC.

Disconnect power.

1 Provide overload protection and disconnect as required.

4 Two built-in auxiliary switches (2x SPDT), for end position indication, interlock control, fan startup, etc.

46 Actuators may be controlled in parallel. Current draw and input impedance must be observed.

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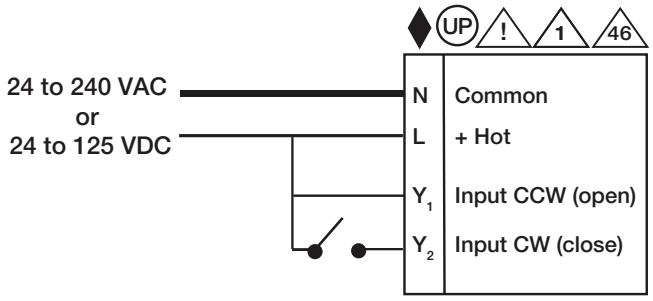
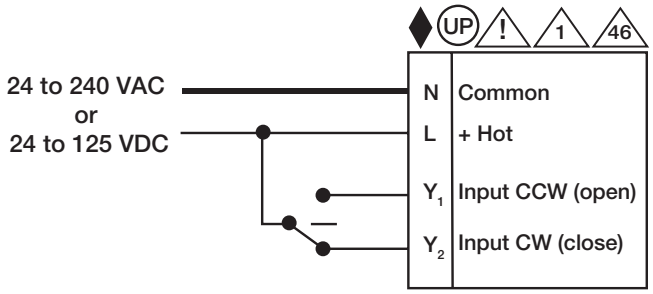
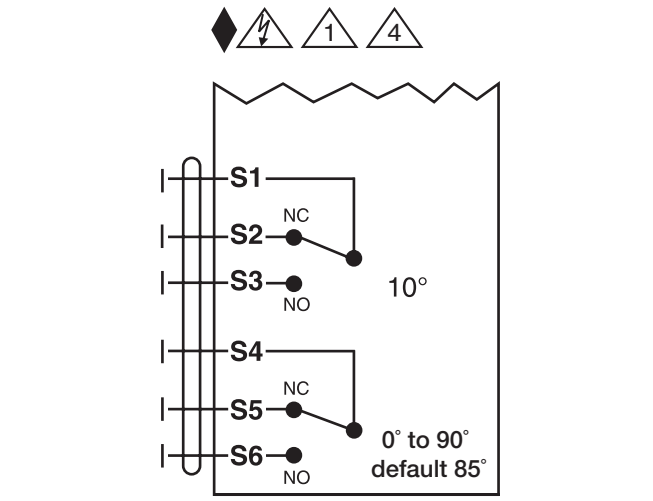


On/Off



Floating Point



Auxiliary Switches

PRXUP-MFT-T

Modulating, Non-Spring Return, 24-240 V, NEMA 4X with BACnet

Technical Data	
Power Supply	24...240 VAC, -20% / +10%, 50/60 Hz, 24...125 VDC, -20% / +10%
Power Consumption Running	20 W @ 24 V, 18 W @ 120 V, 20 W @ 230 V
Power Consumption Holding	3.5 W @ 24 V, 4 W @ 120 V, 6 W @ 230 V
Transformer Sizing	20 VA @ 24 VAC/DC (class 2 power source), 23 VA @ 120 VAC/DC, 52 VA @ 230 VAC
Electrical Connection	terminal block
Overload Protection	electronic thoughout 0° to 90° rotation
Operating Range Y	2 to 10 VDC, 4 to 20 mA variable (VDC, floating point, on/off)
Input Impedance	100 k Ω for 2 to 10 VDC (0.1 mA), 500 Ω for 4 to 20 mA, 1500 Ω for On/Off
Feedback Output U	2 to 10 VDC, 0.5 mA max, VDC variable
Angle of Rotation	90°
Torque motor	Min. 1400 in-lbs [160 Nm]
Direction of Rotation (Motor)	reversible with app
Position Indication	integral pointer and bottom mounted reflective indicators
Manual Override	7 mm hex crank, supplied
Running Time (Motor)	35 sec
Ambient Humidity	5 to 100% RH (UL Type 4)
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 4X, IP66/67, UL Enclosure Type 4
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)	68 dB (A)
Servicing	maintenance free
Quality Standard	ISO 9001
Weight	12.8 lbs [5.8kg]
Auxiliary switch	2 x SPDT, 3A resistive (0.5A inductive) @ 250 VAC, one set at 10°, one adjustable 0° to 90°
Communication	BACnet MS/TP
Passive Sensor Inputs	2 (PT1000) (NI1000) (NTC)

Application

PR Series valve actuators are designed with an integrated linkage and visual position indicators. For outdoor applications, the installed valve must be mounted with the actuator at or above horizontal. For indoor applications the actuator can be in any location including directly under the valve.

Operation

The PR series actuator provides 90° of rotation and a visual indicator shows the position of the valve. The PR Series actuator uses a low power consumption brushless DC motor and is electronically protected against overload. A universal power supply is furnished to connect supply voltage in the range of 24-240 VAC and 24-125 VDC. Included is a smart heater with thermostat to eliminate condensation. Two auxiliary switches are provided; one set at 10° open and the other is field adjustable. Running time is field adjustable from 30-120 seconds by using the Near Field Communication (NFC) app and a smart phone.

†Use 60°C/75°C copper wire size range 12-28 AWG, stranded or solid. 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 4000V. Type of action 1. Control pollution degree 3.

PRXUP-MFT-T

Modulating, Non-Spring Return, 24-240 V, NEMA 4X with BACnet

Wiring Diagrams

Meets cULus requirements without the need of an electrical ground connection.

Universal Power Supply (UP) models can be supplied with 24 VAC up to 240 VAC, or 24 VDC up to 240 VDC.

Disconnect power.

1 Provide overload protection and disconnect as required.

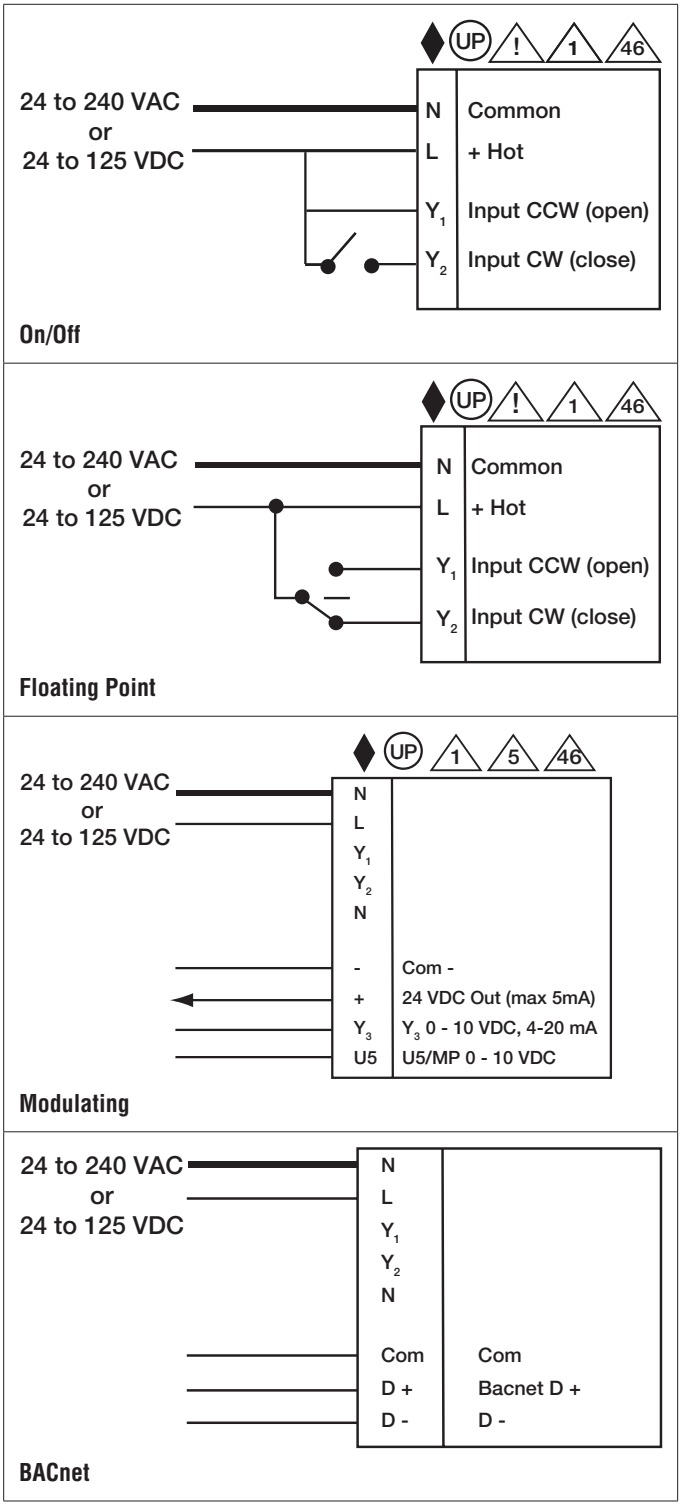
4 Two built-in auxiliary switches (2x SPDT), for end position indication, interlock control, fan startup, etc.

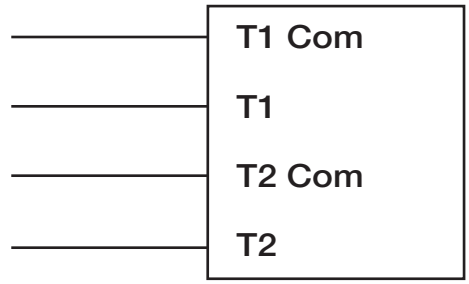
5 Only connect common to negative (-) leg of control circuits.

46 Actuators may be controlled in parallel. Current draw and input impedance must be observed.

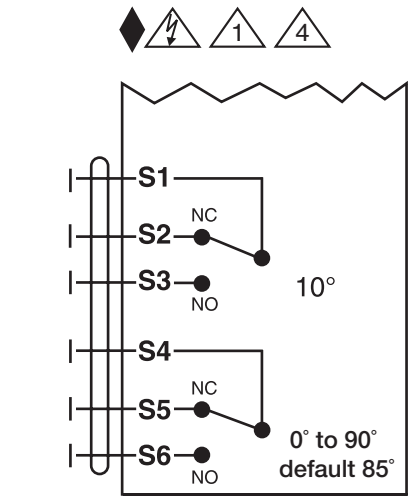
WARNING! LIVE ELECTRICAL COMPONENTS!

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.





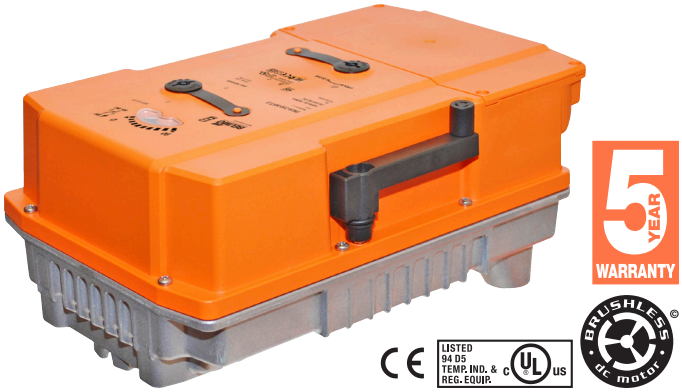
Temperature Sensors



Auxiliary Switches

PRBUP-3-T

On/Off, Floating Point, Non-Spring Return, 24-240 V, NEMA 4X



Technical Data	
Power Supply	24...240 VAC, -20% / +10%, 50/60 Hz, 24...125 VDC, -20% / +10%
Power Consumption Running	20 W @ 24 V, 18 W @ 120 V, 20 W @ 230 V
Power Consumption Holding	3.5 W @ 24 V, 4 W @ 120 V, 6 W @ 230 V
Transformer Sizing	20 VA @ 24 VAC/DC (class 2 power source), 23 VA @ 120 VAC/DC, 52 VA @ 230 VAC
Electrical Connection	terminal block
Overload Protection	electronic thoughout 0° to 90° rotation
Input Impedance	1000 Ω
Angle of Rotation	90°
Position Indication	integral pointer and bottom mounted reflective indicators
Manual Override	7 mm hex crank, supplied
Running Time (Motor)	35 sec
Ambient Humidity	5 to 100% RH (UL Type 4)
Ambient Temperature Range	-22°F to 122°F [-30°C to 50°C]
Housing	NEMA 4X, IP66/67, UL Enclosure Type 4X
Housing Material	aluminum die cast polycarbonate cover
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)	68 dB (A)
Servicing	maintenance free
Quality Standard	ISO 9001
Weight	12.8 lbs [5.8kg]
Auxiliary switch	2 x SPDT, 3A resistive (0.5A inductive) @ 250 VAC, one set at 10°, one adjustable 0° to 90°

Application

PR Series valve actuators are designed with an integrated linkage and visual position indicators. For outdoor applications, the installed valve must be mounted with the actuator at or above horizontal. For indoor applications the actuator can be in any location including directly under the valve.

Operation

The PR series actuator provides 90° of rotation and a visual indicator shows the position of the valve. The PR Series actuator uses a low power consumption brushless DC motor and is electronically protected against overload. A universal power supply is furnished to connect supply voltage in the range of 24-240 VAC and 24-125 VDC. Included is a smart heater with thermostat to eliminate condensation. Two auxiliary switches are provided; one set at 10° open and the other is field adjustable. Running time is field adjustable from 30-120 seconds by using the Near Field Communication (NFC) app and a smart phone.

†Use 60°C/75°C copper wire size range 12-28 AWG, stranded or solid. 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 4000V. Type of action 1. Control pollution degree 3.

PRBUP-3-T

On/Off, Floating Point, Non-Spring Return, 24-240 V, NEMA 4X

Wiring Diagrams

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

UP Universal Power Supply (UP) models can be supplied with 24 VAC up to 240 VAC, or 24 VDC up to 125 VDC.

Disconnect power.

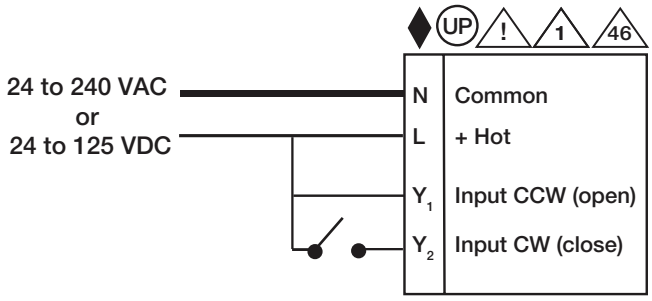
1 Provide overload protection and disconnect as required.

4 Two built-in auxiliary switches (2x SPDT), for end position indication, interlock control, fan startup, etc.

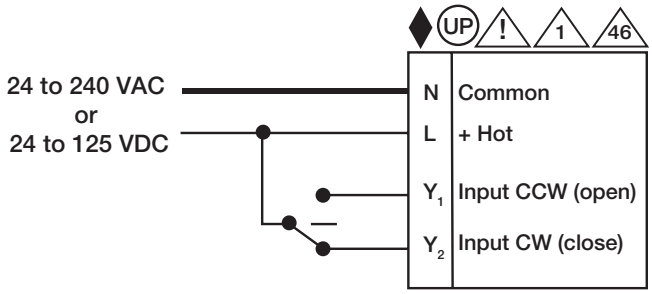
46 Actuators may be controlled in parallel. Current draw and input impedance must be observed.

! ***WARNING! LIVE ELECTRICAL COMPONENTS!***

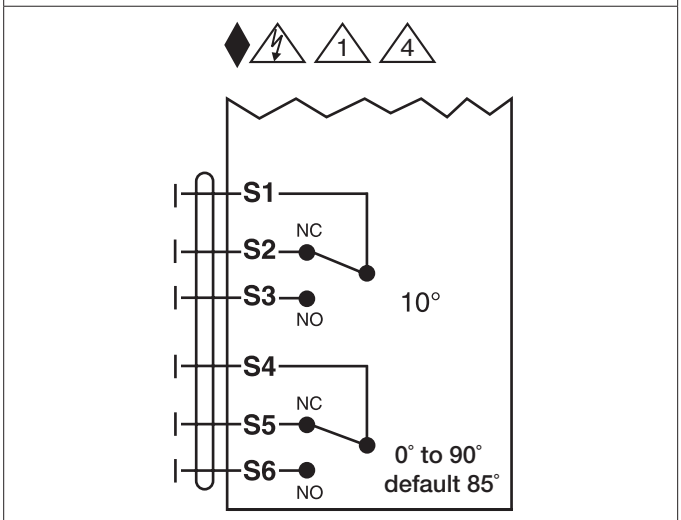
During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow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



On/Off



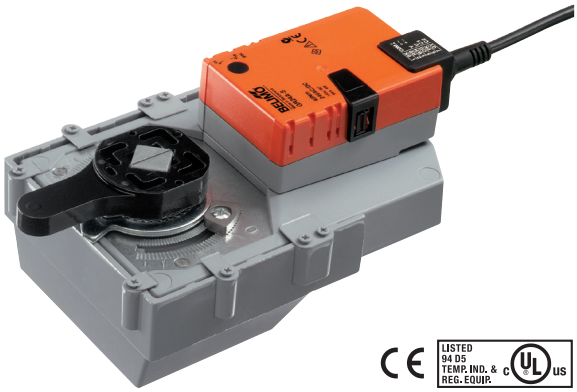
Floating Point



Auxiliary Switches

GRB120-3-5-14

On/Off Floating Point, Non-Spring Return, 110 V



Technical Data	
Power Supply	100-240 VAC ± 20%, 50/60 Hz
Power Consumption Running	4 W
Power Consumption Holding	2 W
Transformer Sizing	7 VA @ 24 VAC (class 2 power source)
Electrical Connection	18 GA applicance rated cable with 1/2" conduit connector protected NEMA 2 (IP54) 3 ft [1m] 10 ft [3m] and 16 ft [5m]
Overload Protection	electronic throughout 0° to 95° rotation
Input Impedance	600 Ω
Angle of Rotation	90°, adjustable with mechanical stop
Direction of Rotation (Motor)	reversible with built-in switch
Manual Override	external push button
Running Time (Motor)	150 sec
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	UL94-5VA
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)	<45 dB (A)
Servicing	maintenance free
Quality Standard	ISO 9001
Weight	3.5 lb [1.6 kg]

†Rated Impulse Voltage 800V, Type of action 1.AA, Control Pollution Degree 3

GRB120-3-5-14

On/Off Floating Point, Non-Spring Return, 110 V

Wiring Diagrams

INSTALLATION NOTES

(A) Actuators with appliance cables are numbered.

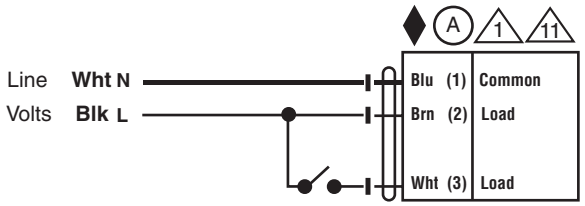
1 Provide overload protection and disconnect as required.

11 Actuators may be connected in parallel if not mechanically linked. Power consumption and input impedance must be observed.

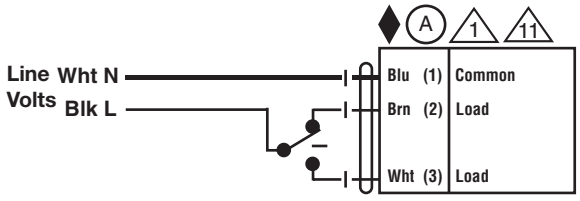
◆ Meets cULus requirements without the need of an electrical ground connection.

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.



On/Off 100 to 240 VAC



Floating Point 100 to 240 VAC