



- Fast quarter turn open or closed operation
- Stainless steel ball and stem
- Positive shut-off
- Two-piece body construction

### Application

- Water-side control of air handling apparatus in ventilation and air-conditioning system
- Water/Steam control in heating systems
- 300:1 rangeability

The dimensions and drilling of end flanges conform to the American cast iron flange standard, Class 150 (ANSI B16.1).

### Technical Data

Media	chilled or hot water, glycol, 250# steam
Flow characteristic	equal percentage
Action	90% rotation valve open CW, valve closed CCW
Sizes	3", 4", 6"
Type of end fittings	flanged

### Materials:

Body	Carbon Steel
Ball	Stainless Steel with Hardened Chrome Plating
Seats	Teflon
Stem	Stainless Steel
Packing	Spring-loaded Teflon

Pressure rating	ANSI 150
Media temp. range	-22°F to 400°F (-30°C to 204°C)
Close-off pressure	150 psig @ 400°F
Maximum differential pressure ( $\Delta P$ )	steam: 100psi water: 150psi

Cv	Valve Nominal Size		Type	Suitable Actuators		
	Inches	DN [mm]	2-way NPT	Spring	Electronic Fail-Safe	Non-Spring
207	3"	80	B6300VB-207	AF		GM AM Series
350	4"	100	B6400VB-350		GK	
507	6"	150	B6600VB-507			SY Series

# SY...24 NEMA 4X Industrial Style Actuators

24VAC



## Attention

SY Series actuators are fractional horsepower devices, and utilize **full-wave power supplies**. Observe wire sizing and transformer sizing requirements. Proportional models CANNOT be connected to Belimo direct coupled (AF, AM, GM...etc) actuator power supplies or any type of half-wave device. You **MUST** use a separate, dedicated transformer or power supply to power the SY actuator. Please do not connect other automation equipment to the dedicated SY supply source. You **MUST** use four wires (plus a ground) to control a proportional control SY actuator (**See SY Wiring Section**).

See page 26 for dimensions

Technical Data		SY1-24(P), SY2-24MFT
Power supply		24 VAC 50/60Hz, single phase
Electrical connection		½" conduit connector, screw terminals
Overload protection		thermally protected 135°C cut-out
Motor protection	SY1	H class insulation
	SY2	F class insulation
Geartrain		high alloy steel gear sets, self locking
Operating range	SY...-24	on/off
	SY...-24MFT	2-10 VDC, 4-20mA, 1-5 VDC
Sensitivity	SY...-24MFT	0.2mA / 100mV
Feedback	SY...-24MFT	2-10 VDC, 4-20mA
Angle of rotation		mechanically limited to 95°
Direction of rotation		reversible
Position indication		top mounted domed indicator
Internal humidity control		resistive heating element
Auxiliary switches		(2) SPDT, 10A 250 VAC factory set for 3° and 87° change of state
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
<b>Power Consumption</b>		
	SY1-24(P)	1.8A
	SY2-24MFT	3.0A
<b>Torque</b>		
	SY1-24(P)	35 Nm / 310 in-lb
	SY2-24MFT	90 Nm / 801 in-lb
<b>Manual Override</b>		
	SY1-24(P)	8mm wrench
	SY2-24	hand wheel
<b>Running Time</b>		
	SY1-24(P)	15 seconds
	SY2-24MFT	15 seconds

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## Wiring Diagrams

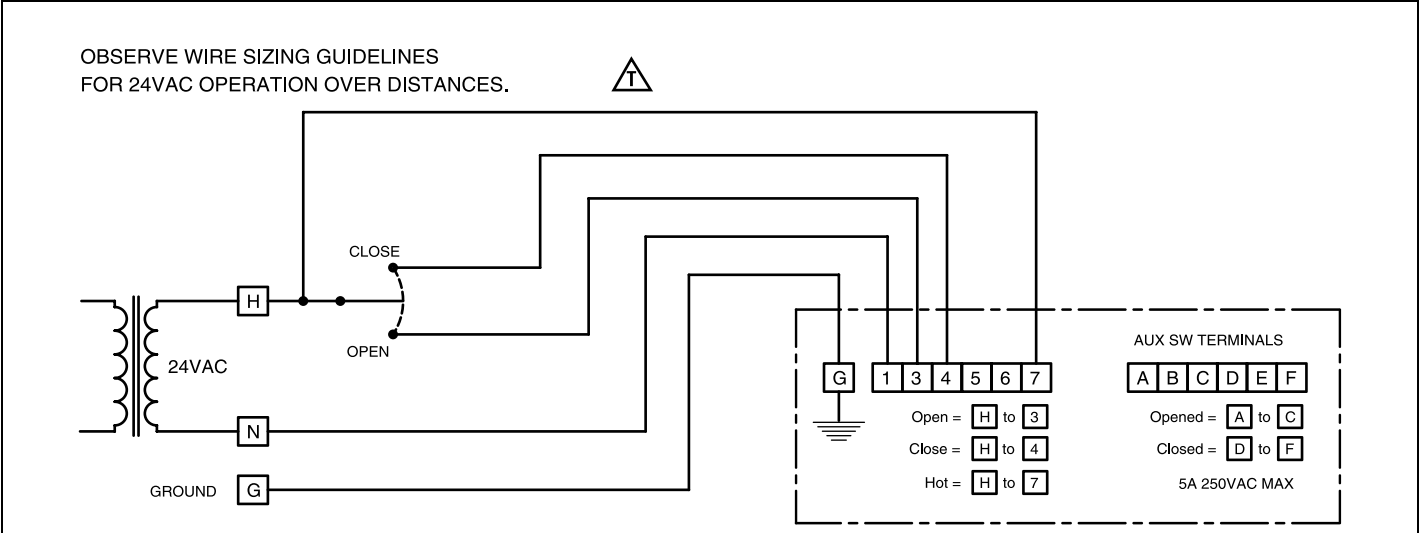
### ✂️ INSTALLATION NOTES

- T** Transformer sizing = SY actuator draw X 1.25 (safety margin)  
EXAMPLE: SY2-24 requires 3.0A x 1.25 = 3.75A, 3.75A X 24 VAC = 90VA Transformer.
- There can be no connection (internal to automation controller, external wiring, or otherwise) between actuator supply neutral & control signal reference. These actuators are full wave devices. Any connection to half wave equipment will result in equipment damage.
- 1** Do not change sensitivity or dip switch settings with power applied.

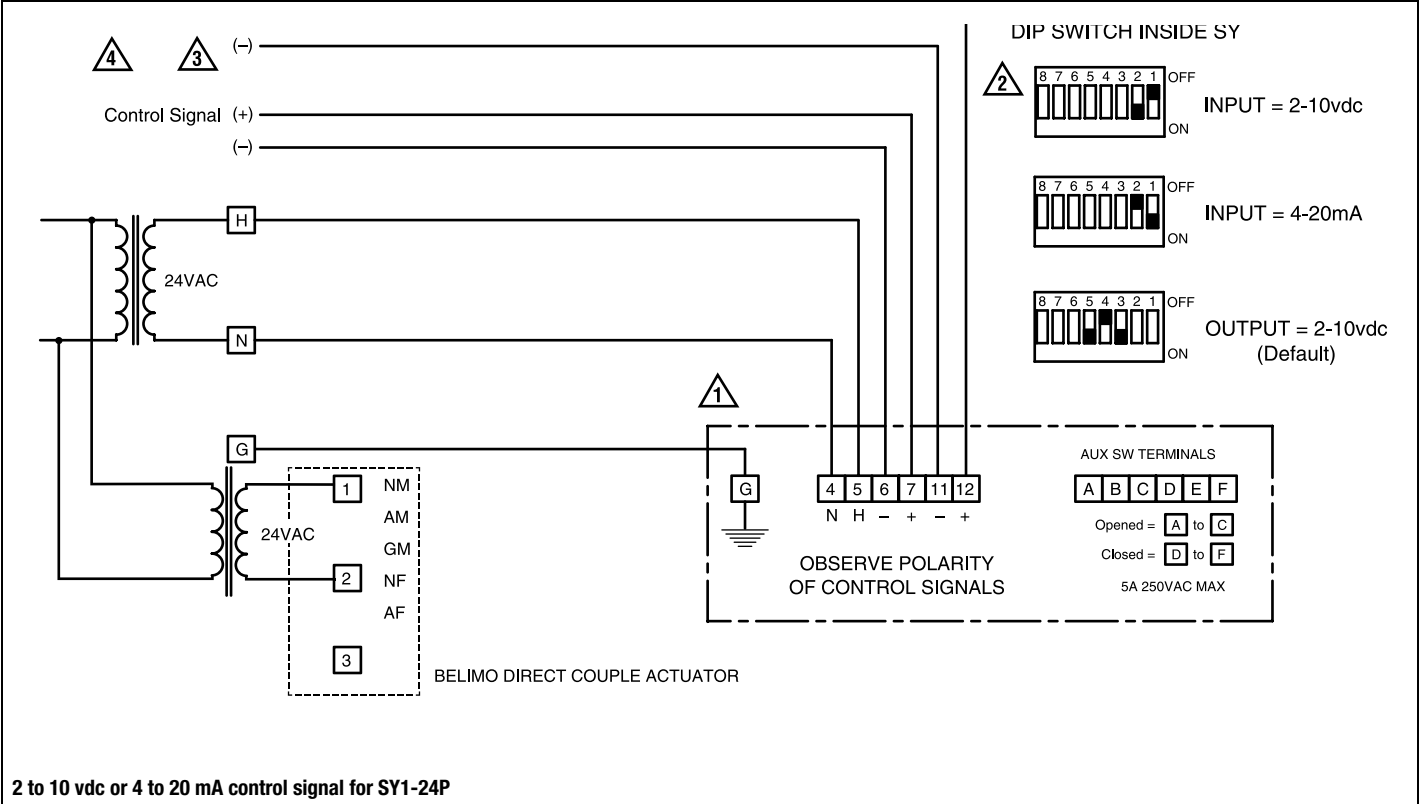
**3** Terminals 6 & 11 can be common when control and feedback signals are both set for 2-10VDC operation.

**4** Use of feedback is optional.

**!** **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 for SY(2-5)-24



2 to 10 vdc or 4 to 20 mA control signal for SY1-24P

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# SY...120 NEMA 4X Industrial Style Actuators

120VAC



## Application

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

**See page 26 for dimensions**

Technical Data	SY1-110(P), SY2-120MFT	
Power supply	120 VAC 50/60Hz, single phase	
Electrical connection	½" conduit connector, screw terminals	
Overload protection	thermally protected 135°C cut-out	
Motor protection	SY1	H class insulation
	SY2	F class insulation
Geartrain	high alloy steel gear sets, self locking	
Operating range	SY...-110	on/off, floating point
	SY...-120MFT	2-10 VDC 4-20mA, 1-5vdc
Sensitivity	SY...-120MFT	0.2mA / 100mV
Feedback	SY...120MFT	2-10 VDC, 4-20mA
Angle of rotation	mechanically limited to 95°	
Direction of rotation	reversible	
Position indication	top mounted domed indicator	
Internal humidity control	resistive heating element	
Auxiliary switches	(2) SPDT, 5A 250VAC factory set for 5° and 85° change of state	
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	
<b>Power Consumption</b>		
SY1-110(P)	0.5A	
SY2-120MFT	1.0A	
<b>Torque</b>		
SY1-110(P)	35 Nm / 310 in-lb	
SY2-120MFT	90 Nm / 801 in-lb	
<b>Manual Override</b>		
SY1-110(P)	8mm wrench	
SY2-120MFT – SY8-120MFT	hand wheel	
<b>Running Time</b>		
	<b>50hz</b>	<b>60hz</b>
SY1-110(P)	13 seconds	12 seconds
SY2-120MFT	17 seconds	15 seconds

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### Wiring Diagrams

#### 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.



#### APPLICATION NOTES



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



Use of feedback is optional.



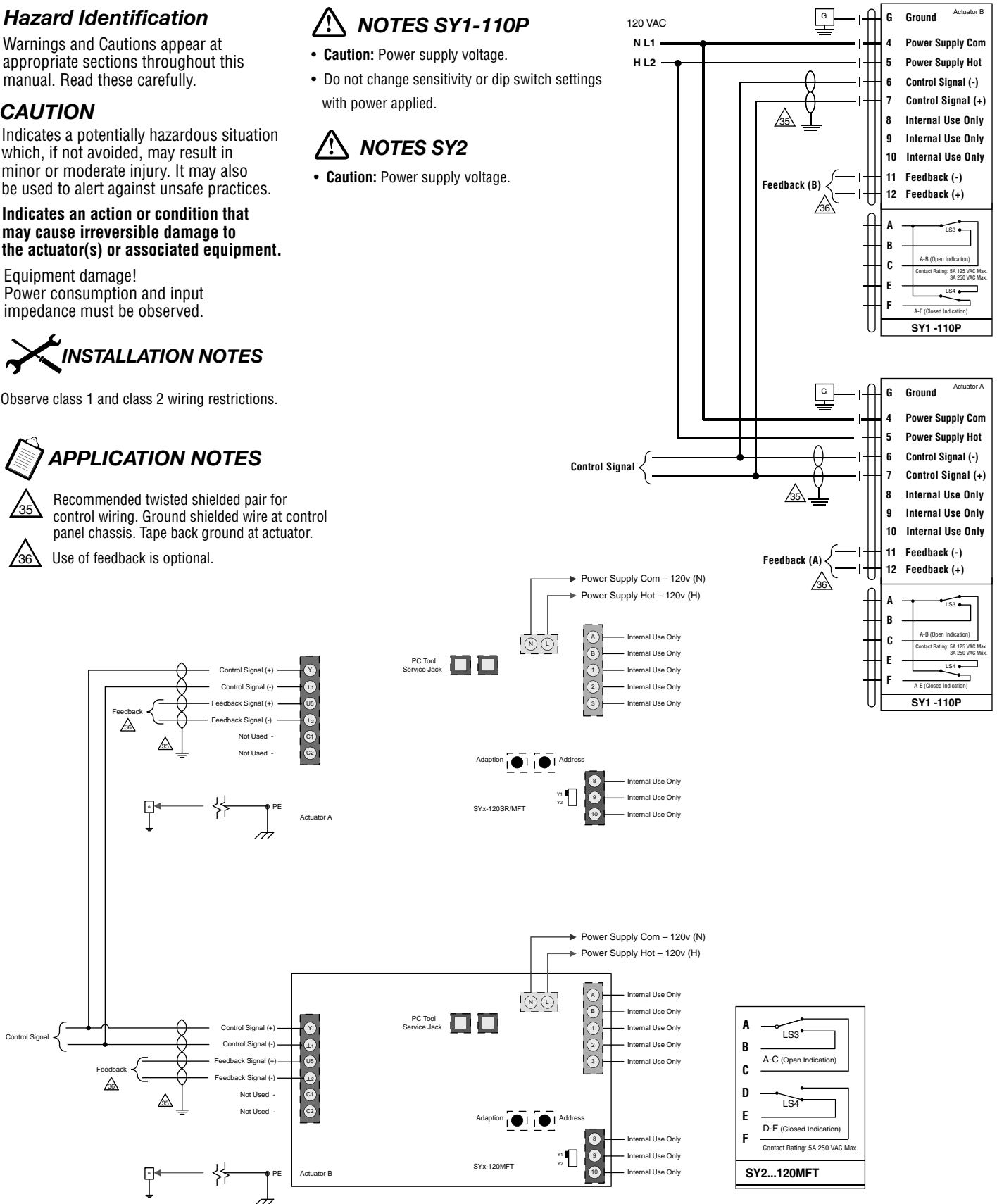
#### NOTES SY1-110P

- **Caution:** Power supply voltage.
- Do not change sensitivity or dip switch settings with power applied.



#### NOTES SY2

- **Caution:** Power supply voltage.



# SY...230 NEMA 4X Industrial Style Actuators

230VAC



## Attention

SY Series actuators are fractional horsepower devices, and utilize **full-wave power supplies**. Observe wire sizing and transformer sizing requirements. Proportional models CANNOT be connected to Belimo direct coupled (AF, AM, GM...etc) actuator power supplies or any type of half-wave device. You **MUST** use a separate, dedicated transformer or power supply to power the SY actuator. Please do not connect other automation equipment to the dedicated SY supply source. You **MUST** use four wires (plus a ground) to control a proportional control SY actuator (**See SY Wiring Section**).

**See page 26 for dimensions**

Technical Data		SY1-220(P), SY2-230MFT
Power supply		230 VAC 50/60Hz, single phase
Electrical connection		1/2" conduit connector, screw terminals
Overload protection		thermally protected 135°C cut-out
Motor protection	SY1	H class insulation
	SY2	F class insulation
Geartrain		high alloy steel gear sets, self locking
Operating range	SY...-220	on/off, floating point
	SY...-230MFT	2-10 VDC, 4-20mA, 1-5vdc
Sensitivity	SY...-230MFT	0.2mA / 200mV
Feedback	SY...-230MFT	2-10 VDC, 4-20mA
Angle of rotation		mechanically limited to 95°
Direction of rotation		reversible
Position indication		top mounted domed indicator
Internal humidity control		resistive heating element
Auxiliary switches		(2) SPDT, 5A 250VAC factory set for 5° and 85° change of state
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
<b>Power consumption</b>		
SY1-220(P)		0.3A
SY2-230MFT		0.5A
<b>Torque</b>		
SY1-220(P)		35 Nm / 310 in-lb
SY2-230MFT		90 Nm / 801 in-lb
<b>Manual Override</b>		
SY1-220(P)		8mm wrench
SY2-230MFT		hand wheel
<b>Running Time</b>		
	<b>50hz</b>	<b>60hz</b>
SY1-220(P)	13 seconds	12 seconds
SY2-230MFT	17 seconds	15 seconds

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### Wiring Diagrams

#### 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.



#### APPLICATION NOTES

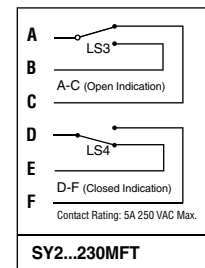
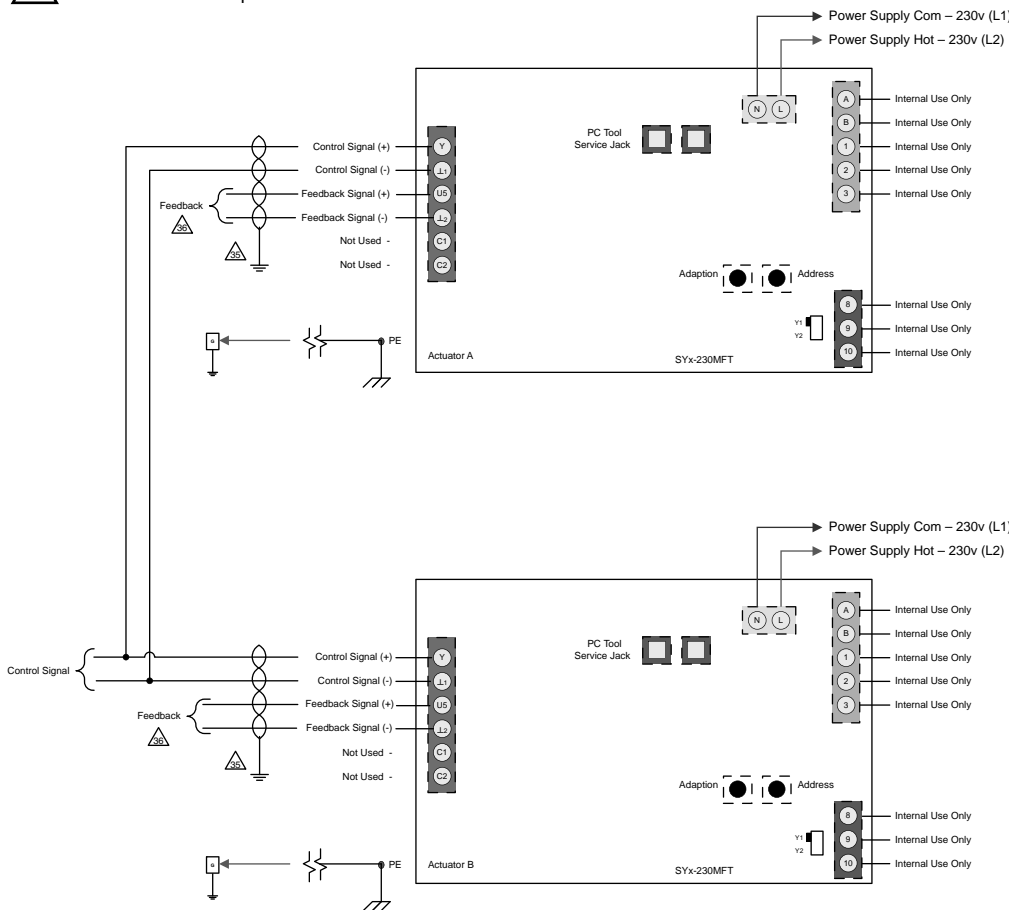
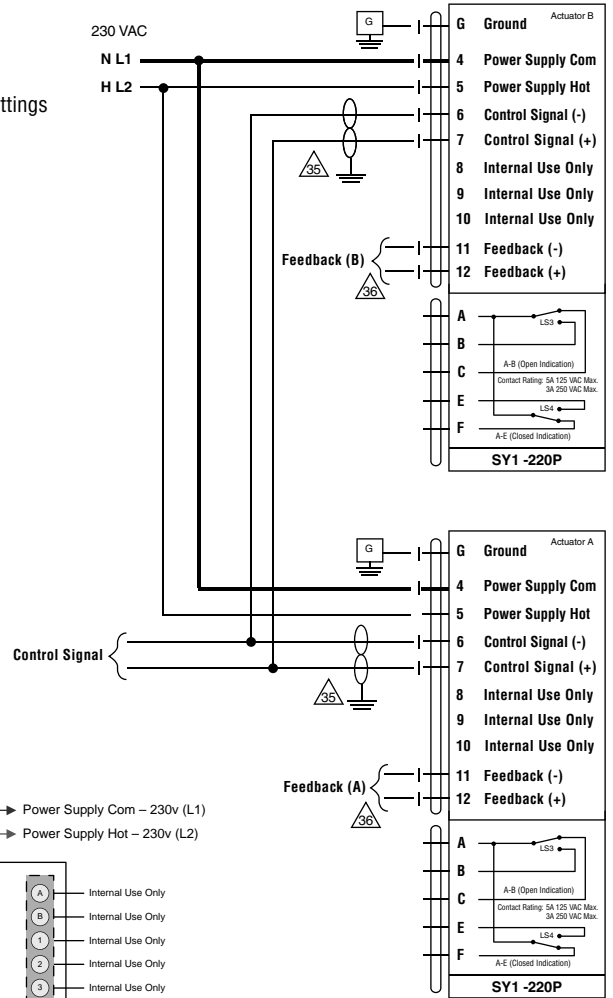
- Recommended twisted shielded pair for control wiring. Ground shielded wire at control panel chassis. Tape back ground at actuator.
- Use of feedback is optional.

#### NOTES SY1-220P

- **Caution:** Power supply voltage.
- Do not change sensitivity or dip switch settings with power applied.

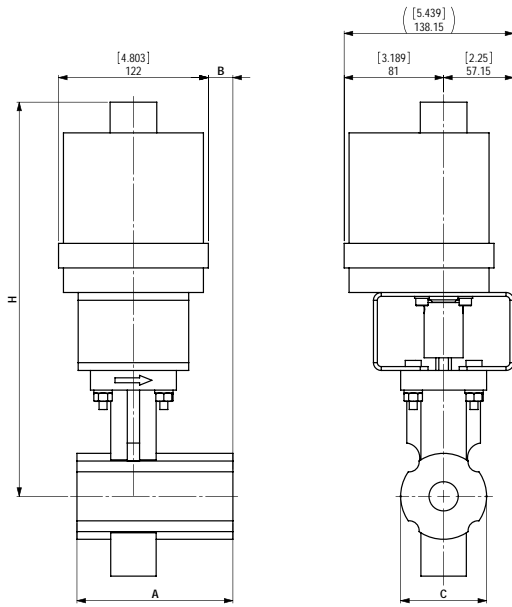
#### NOTES SY2

- **Caution:** Power supply voltage.



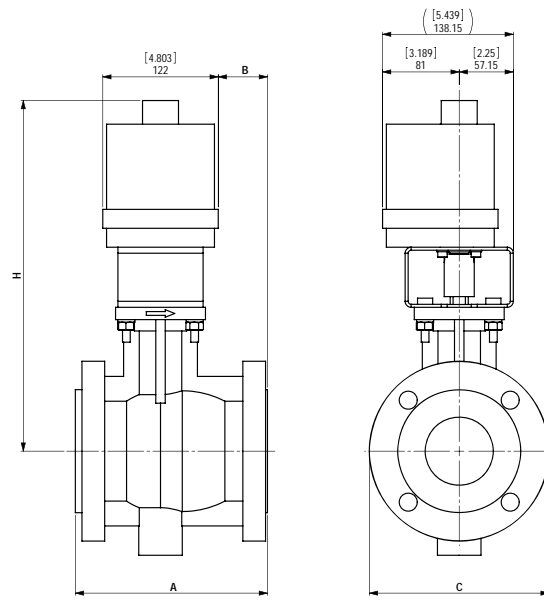
# Ball Valve Dimensions with SY... Series Actuators

## Dimensions with 2-Way Valves



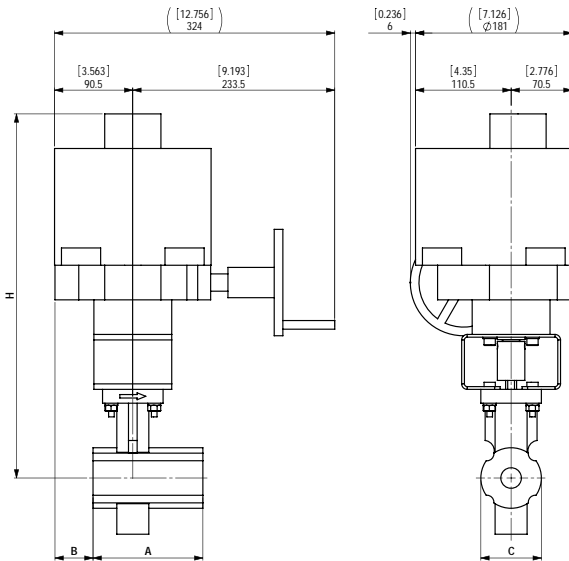
SY1 Valve Body	COP	Valve Nominal Size		Dimensions (Inches)			
		Inches	DN [mm]	A	B	C	H
B2100VB-024	150	1"	25	5.00	0.78	2.75	12.64
B2150VB-055	150	1½"	40	7.00	1.92	3.42	13.03
B2200VB-077	150	2"	50	7.00	1.92	3.93	13.74

## Dimensions with Flanged Valves



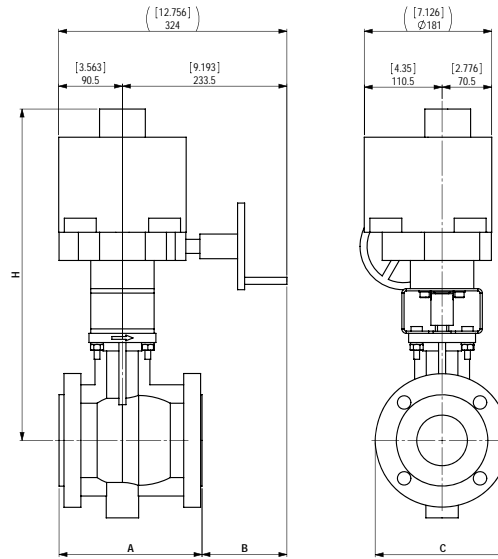
SY1 Valve Body	COP	Valve Nominal Size		Dimensions (Inches)			
		Inches	DN [mm]	A	B	C	H
B6300VB-207	150	3"	80	8.00	2.05	7.48	14.59

## Dimensions with 2-Way Valves



SY2 Valve Body	COP	Valve Nominal Size		Dimensions (Inches)			
		Inches	DN [mm]	A	B	C	H
B2100VB-024	150	1"	25	5.00	1.73	2.75	16.57
B2150VB-055	150	1½"	40	7.00	0.86	3.42	16.97
B2200VB-077	150	2"	50	7.00	0.86	3.93	17.68

## Dimensions with Flanged Valves



SY2 Valve Body	COP	Valve Nominal Size		Dimensions (Inches)			
		Inches	DN [mm]	A	B	C	H
B6300VB-207	150	3"	80	8.00	4.74	7.48	18.54
B6300VB-350	150	4"	100	9.00	4.50	9.01	19.61
B6300VB-507	150	6"	150	10.49	3.76	10.98	20.51

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# GKX24-MFT-X1 Actuators

Multi-Function Technology



**MFT**

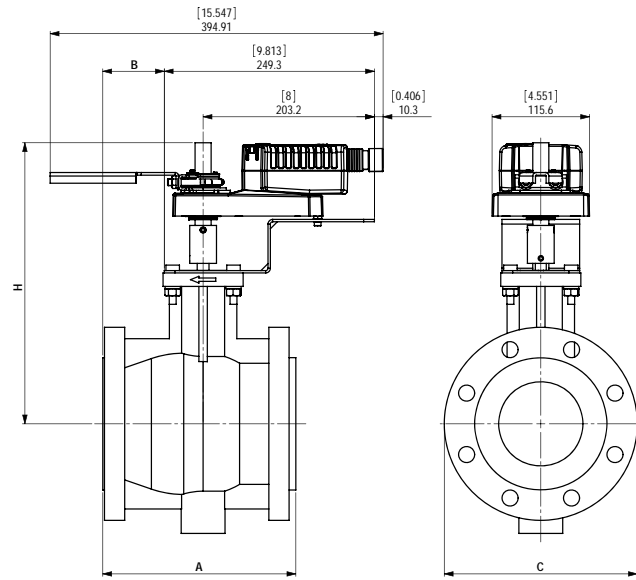


**Models**  
GKX24-MFT-X1



Technical Data	
Power supply	24VAC ±20% 50/60Hz 24VDC ±10%
Power consumption	15W (1.5W)
Transformer sizing	20VA (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
Torque	360 in-lb [40Nm]
Direction of rotation	reversible with  switch
Fail-safe position	adjustable with knob or tool 0 to 100%
Position indication	reflective visual indicator (snap-on)
Manual override	external push button
Running time	normal operation 95 seconds (default), variable 90 to 150 seconds fail-safe 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) at 90 seconds
Servicing	maintenance free
Quality standard	ISO 9001
Weight	3.85 lbs [1.75 kg]

## Dimensions with 2-Way Valve



Valve Body	COP	Valve Nominal Size		Dimensions (Inches)			
		Inches	DN [mm]	A	B	C	H
B6400VB-350	150	4"	100	9.02	2.87	9.02	13.13

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