

# B2...VS Series, 2-way, Ball Valve Bronze Body, Stainless Steel Ball and Stem



- Live-load packing set
- Stainless steel ball & stem
- Blow-out proof stem design

## Application

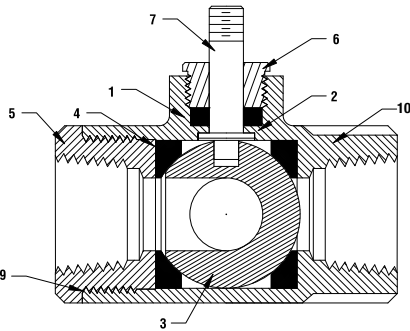
This valve is typically used in air handling units on heating or cooling coils, and fan coil unit heating or cooling coils. Some other common applications include Unit Ventilators, VAV Box re-heat coils and bypass loops. This valve is suitable for use in a hydronic system with variable flow.

This valve is designed with MFT functionality which facilitates the use of various control input.

- Up to 35 psi steam
- ½" - 600 PSIG WOG, Cold Non-Shock.
- Federal Specification: WW-V-35C, Type II  
Composition: BZ  
Style: 3

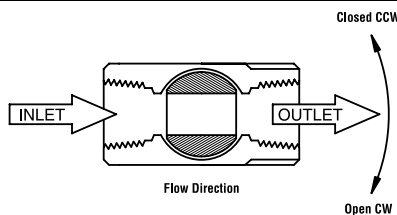
Technical Data	
Media	chilled or hot water, glycol, 35# steam
Flow characteristic	modified equal percentage
Action	90° rotation valve open CW, valve closed CCW
Sizes	½", ¾", 1", 1¼", 1½", 2"
Type of end fitting	SAE NPT (female connections)
Materials:	
1 Stem packing	reinforced PTFE
2 Stem bearing	reinforced PTFE
3 Ball	316 stainless steel
4 Seat (x2)	reinforced PTFE w/ Durafill
5 Retainer	B16 (¾" - 1") stainless steel B584 (1¼" - 2") stainless steel
6 Gland	B16 brass
7 Stem	316 stainless steel
8 Jam nut	stainless steel
9 Body seal	PTFE (1-1/4" to 2")
10 Body	B584-C84400 bronze

C <sub>v</sub>	Valve Nominal Size		Type	Suitable Actuators	
	Inches	DN [mm]	2-way NPT	Spring Return	Non-Spring Return
1	½	15	B2050VS-01	LF Series	LM Series
2	½	15	B2050VS-02		
4	½	15	B2050VS-04		
15	½	15	B2050VS-15	NF	NM
30	¾	20	B219VS		
51	¾	20	B220VS	AF Series	AM Series
43	1	25	B224VS		
68	1	25	B225VS		
48	1¼	32	B232VS		
84	1½	40	B239VS		
177	1½	40	B240VS		
108	2	50	B249VS	GM Series	SY Series



Pressure rating	600 psig WOG
Media temp. range	-22°F to +280°F (-30°C to +138°C)
Close-off pressure	600 psig @ 100°F
Maximum differential pressure (ΔP)	<600 psig

## Flow Patterns



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## Models

SY1-24(P)  
SY2-24MFT

## 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**).

### Technical Data - continued

Power Consumption	
SY1-24(P)	1.8A
SY2-24MFT	3.0A
Torque	
SY1-24(P)	35 Nm / 310 in-lbs
SY2-24MFT	90 Nm / 801 in-lbs
Manual Override	
SY1-24(P)	8mm wrench
SY2-24	hand wheel
Running Time	
SY1-24(P)	15 seconds
SY2-24MFT	15 seconds

Technical Data	
Power supply	24 VAC 50/60 Hz, 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 0.2 mA / 100mV
Feedback	SY...-24MFT 2-10 VDC, 4-20 mA
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 250VAC 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

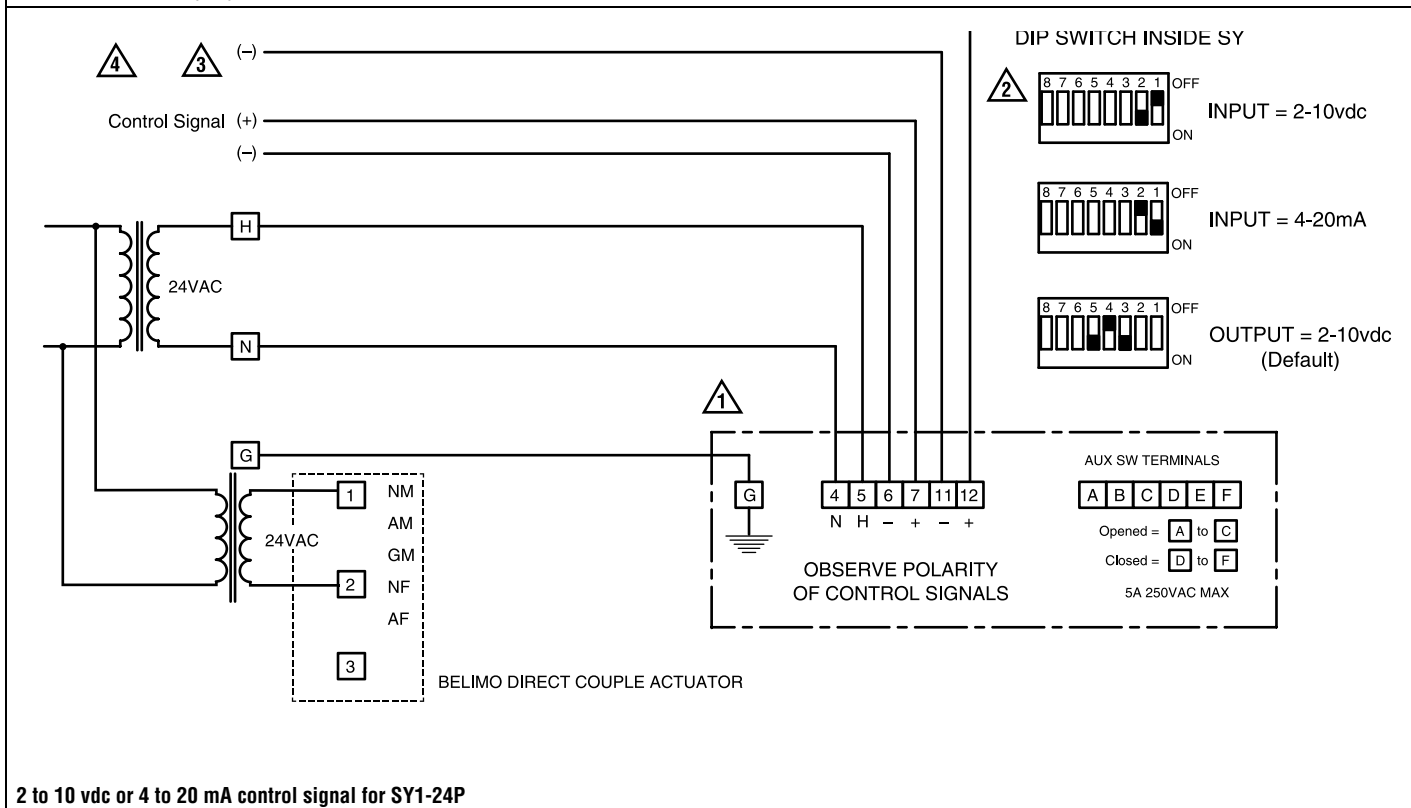
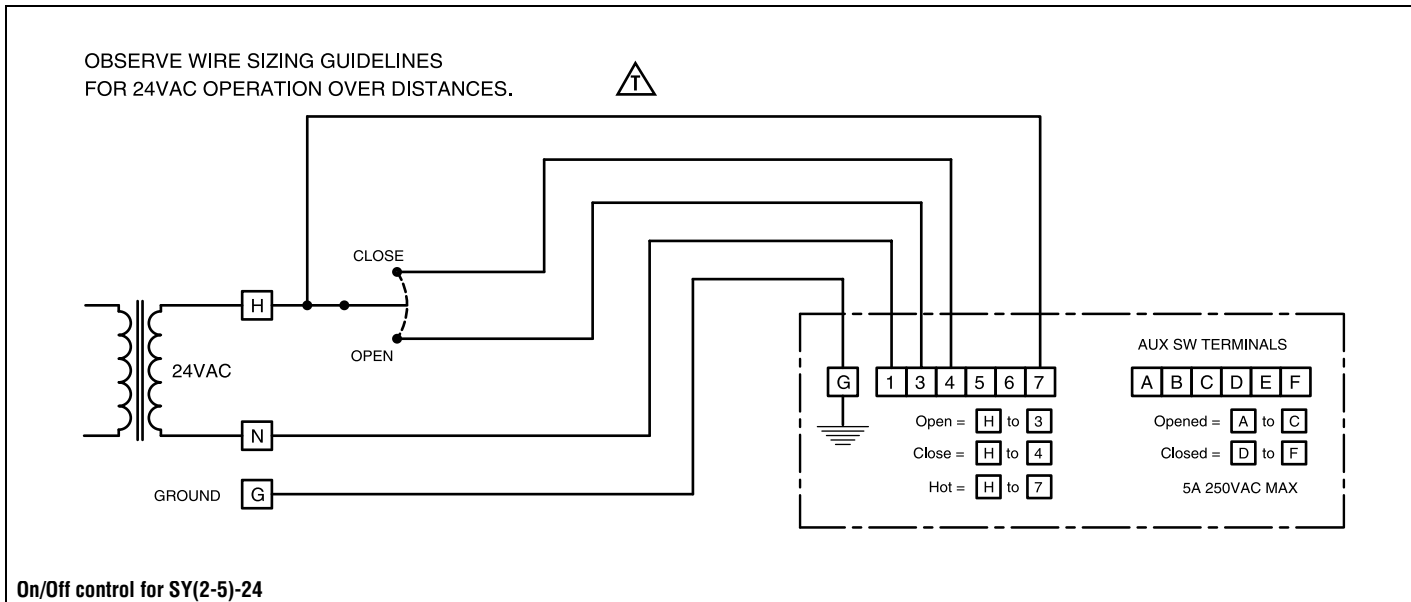
## Wiring Diagrams

### ✂️ INSTALLATION NOTES

- 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.
- Do not change sensitivity or dip switch settings with power applied.

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



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### Application:

The SY actuators are NEMA 4X rated and designed to meet the needs of HVAC and Commercial applications. Offered on the HDU and HD 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.

Technical Data - <i>continued</i>		
<b>Power Consumption</b>		
SY1-110(P)	0.5A	
SY2-120MFT	1.0A	
<b>Torque</b>		
SY1-110(P)	35 Nm / 310 in-lbs	
SY2-120MFT	90 Nm / 801 in-lbs	
<b>Manual Override</b>		
SY1-110(P)	8mm wrench	
SY2-120MFT	hand wheel	
<b>Running Time</b>		
	<b>50 Hz</b>	<b>60 Hz</b>
SY1-110(P)	13 seconds	12 seconds
SY2-120MFT	17 seconds	15 seconds

### Models

- SY1-110(P)
- SY2-110
- SY2-120MFT

Technical Data	
Power supply	120 VAC 50/60 Hz, 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 4-20 mA, 1-5 VDC
Sensitivity	SY...-120MFT 0.2 mA / 100mV
Feedback	SY...-120MFT 2-10 VDC, 4-20 mA
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 250 VAC 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

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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.



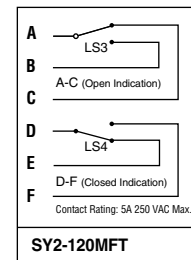
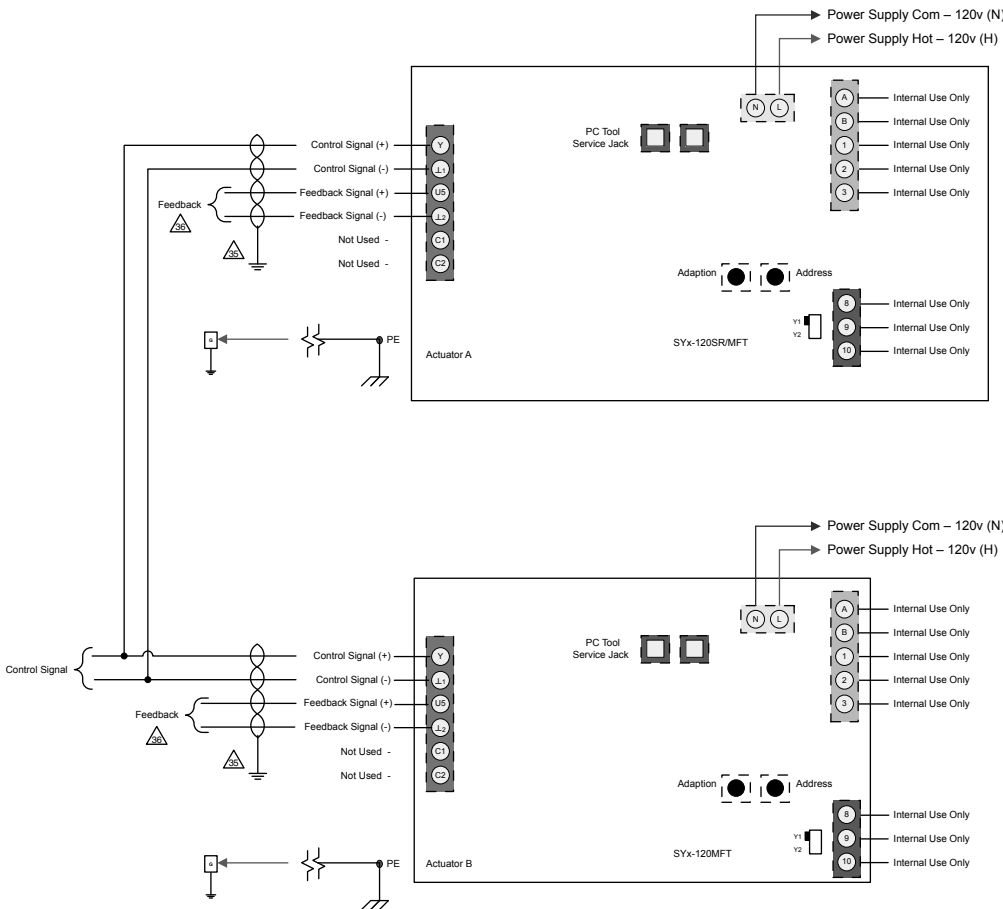
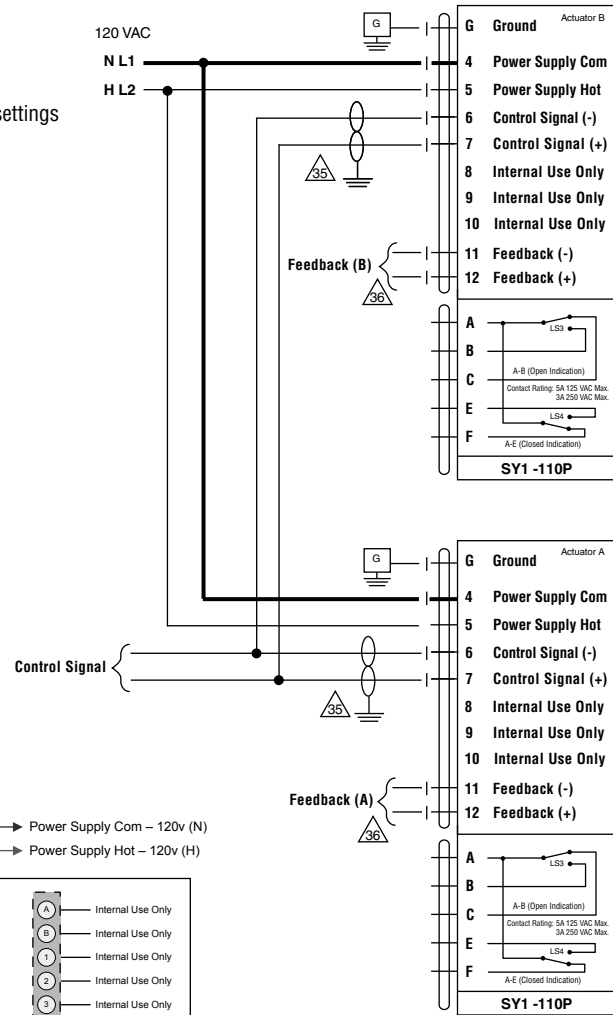
Use of feedback is optional.

### NOTES SY1-110P

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

### NOTES SY2-120MFT

- **Caution:** Power supply voltage.





## Models

SY1-220(P)  
SY2-230MFT

Technical Data	
Power supply	230 VAC 50/60 Hz, 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...-220 on/off, floating point SY...-230MFT 2-10 VDC, 4-20 mA, 1-5 VDC
Sensitivity	SY...-230MFT 0.2 mA / 200mV
Feedback	SY...-230MFT 2-10 VDC, 4-20 mA
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
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Technical Data - Continued		
<b>Power consumption</b>		
SY1-220(P)	0.3A	
SY2-230MFT	0.5A	
<b>Torque</b>		
SY1-220(P)	35 Nm / 310 in-lbs	
SY2-230MFT	90 Nm / 801 in-lbs	
<b>Manual Override</b>		
SY1-220(P)	8mm wrench	
SY2-230MFT	hand wheel	
<b>Running Time</b>	<b>50 Hz</b>	<b>60 Hz</b>
SY1-220(P)	13 seconds	12 seconds
SY2-230MFT	17 seconds	15 seconds

## Wiring Diagrams

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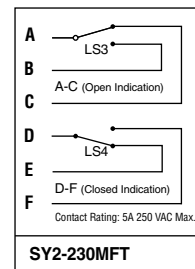
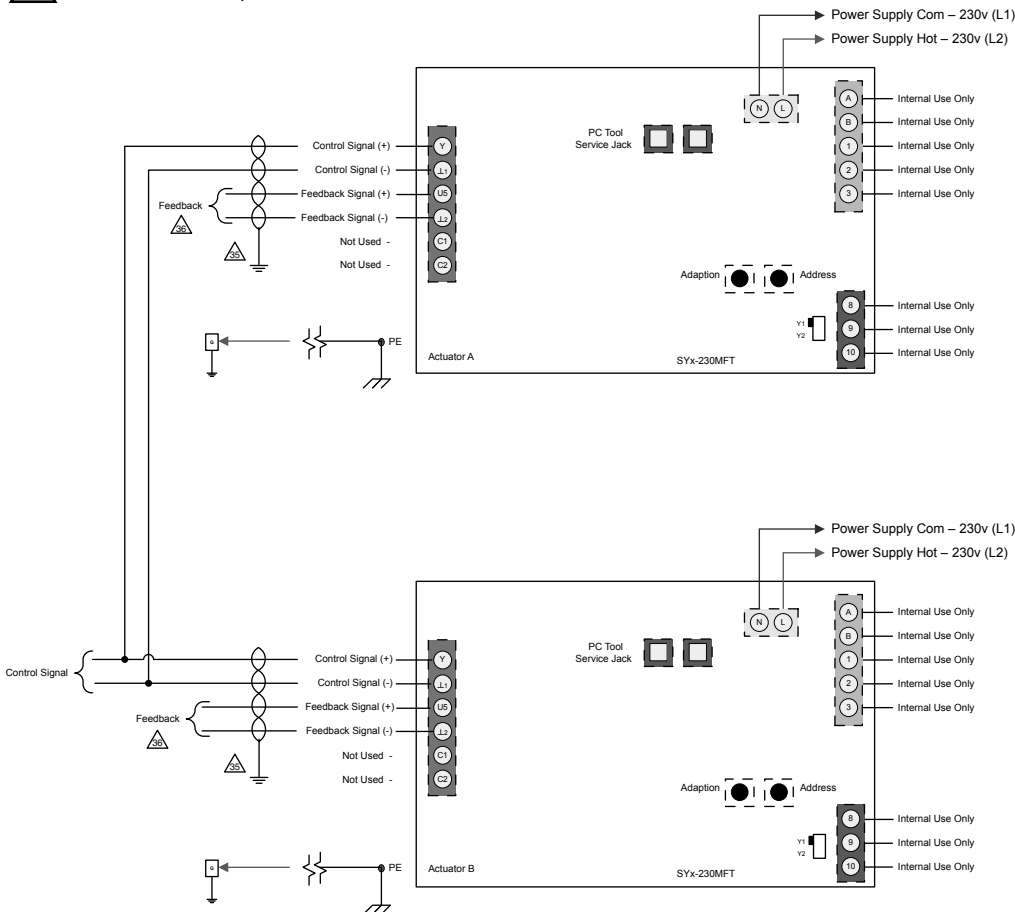
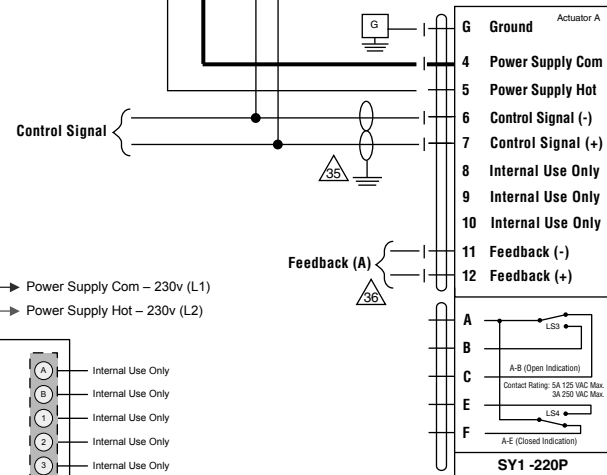
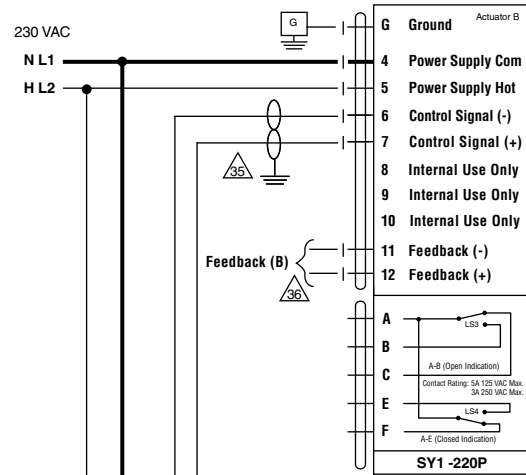
Use of feedback is optional.

### NOTES SY1-220P

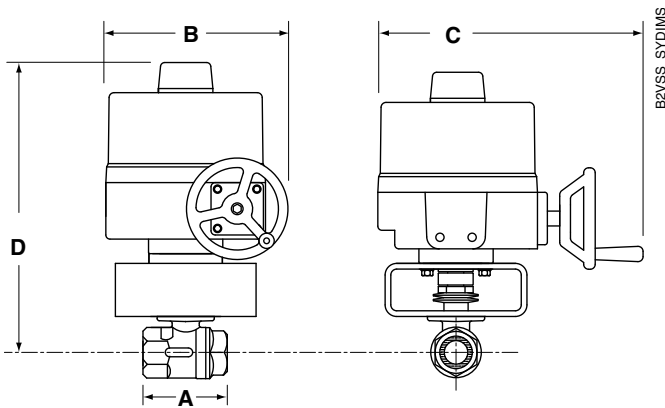
- **Caution:** Power supply voltage.
- Do not change sensitivity or dip switch settings with power applied.

### NOTES SY2-230MFT

- **Caution:** Power supply voltage.



**Dimensions with 2-Way Valves**



**Valve Nominal Size      Dimensions (Inches)**

	Valve Body	COP	Inches	DN [mm]	A	B	C	D
<b>SY1</b>	B2050VS-01	600	½"	15	2.25	4.00	6.25	8.00
	B2050VS-02	600	½"	15	2.25	4.00	6.25	8.00
	B2050VS-04	600	½"	15	2.25	4.00	6.25	8.00
	B2050VS-15	600	½"	15	2.25	4.00	6.25	8.00
<b>SY1 &amp; SY2</b>	B219VS	600	¾"	20	3.00	4.00	6.25	8.00
	B220VS	600	¾"	20	3.12	4.00	6.25	3.12
	B224VS	600	1"	25	3.37	4.00	6.25	16.00
	B225VS	600	1"	25	3.62	4.00	6.25	9.00
	B232VS	600	1¼"	32	3.97	4.00	6.25	9.50
<b>SY2</b>	B239VS	600	1½"	40	4.37	4.00	6.25	17.50
	B240VS	600	1½"	40	4.75	8.00	13.00	19.00
	B249VS	600	2"	50	4.68	8.00	13.00	19.50
	B250VS	600	2"	50	5.37	8.00	13.00	20.00
	B265VS	600	2½"	65	6.25	8.00	13.00	20.00

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