

VIC Series Actuators for Butterfly Valves

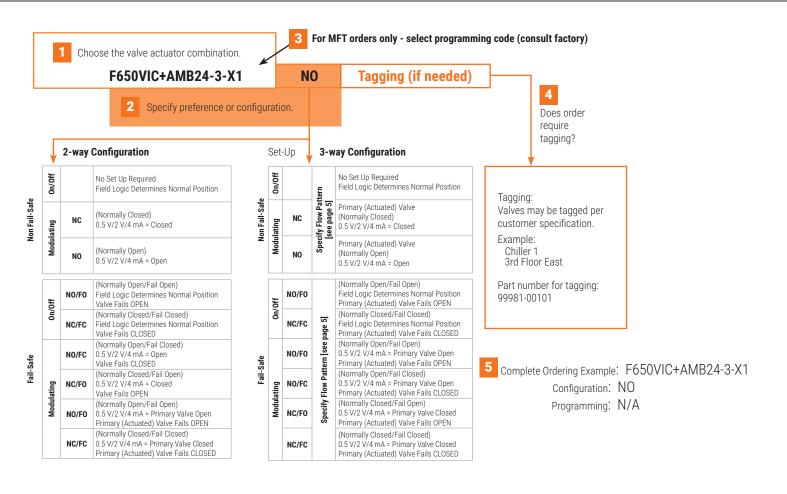




Butterfly Valve Nomenclature

F6	50	VIC	+AMB	24	-3-X1		
Valve F6 = 2-way F7 = 3-way	Valve Size 50 = 2" 65 = 2½" 80 = 3" 100 = 4" 125 = 5" 150 = 6" 200 = 8" 250 = 10" 300 = 12"	Trim Material VIC = Ductile Iron Grooved End Body, Nickel Coated Ductile Iron Disc, 0% Leakage up to 200 psid	Actuator Type Non Fail-Safe AMB, AMX GMB, GMX GRB, GRX PRB, PRX JRB, JRX SY Fail-Safe Electronic GKB, GKX GKN4 PKRB, PKRX Spring Return AFB, AFX AFRB, AFRX	Power Supply -24 = AC/DC 24 V -110 = AC 110/120 V -120 = AC 120 V -220 = AC 230 V UP = AC 24240 V or DC 24125 V	Control -3-X1 = On/Off, Floating Point -SR = Modulating Input = 210 V -MFT or -MFT-X1 = Multi-Function Technology	-S = Built-in Auxiliary Switch N4 = NEMA 4X -T = Terminal Block	-200 = 8" -250 = 10"

Ordering Example



			2-wa	у	Suitable Actuators					
			alve nal Size	Туре	Non Fail-Safe			Fai	l-Safe	
C _V	C _V 60°	IN	DN [mm]	2-way	N	on ran-	Saie	Spring Return	Electronic	
115	36	2	50	F650VIC	AM Series			es		
260	80	2½	65	F665VIC	Ser	GR Series		Series	GK Series	
440	140	3	80	F680VIC		3R Sc	Series	AF	3K S	ies
820	250	4	100	F6100VIC			JR Se			PKR Series
1200	370	5	125	F6125VIC						PKF
1800	560	6	150	F6150VIC						
3400	1050	8	200	F6200VIC			8			
5800	1800	10	250	F6250VIC			SY 2 Year War- anty)			
9000	2790	12	300	F6300VIC			SY (2 Year War- ranty)			

		3-way			Suitable Actuators								
			alve nal Size	Туре	N 5101		Fail- Non Fail-Safe			• •		-Safe	
C _V 90°	C _V 60°	IN	DN [mm]	3-way	NON	raii-Saie	Spring Return	Electronic					
115	36	2	50	F750VIC			AF						
260	80	2½	65	F765VIC	GM Series	JR Series		GK Series					
440	140	3	80	F780VIC	S	JR Sc		Ser					
820	250	4	100	F7100VIC		,			ies				
1200	370	5	125	F7125VIC		PR Series			PKR Series				
1800	560	6	150	F7150VIC		Ser			A N				
3400	1050	8	200	F7200VIC		SY Series (2 Year Warranty)							
5800	1800	10	250	F7250VIC		Ser Ye							
9000	2790	12	300	F7300VIC		SY (2 Wal							



MODE OF OPERATION

Grooved butterfly valves are designed for body pressures ranging from full vacuum to 300 psi and for bi-directional, dead end services to full body pressure. The valve patented seat design ensures full 360° sealing. The pressure enhanced seat compresses to form a larger seating area as the pressure increases. Valve construction and performance meet and exceed MSS-SP-67 requirements.

PRODUCT FEATURES

The unique single offset disc and seat design ensures positive valve seating while maintaining low seating torque.

ACTUATOR SPECIFICATIONS

Control type	on/off, floating point, modulating, 210 V, multi-function technology (MFT)
Manual override	all models
Electrical connection	3 ft. [1 m] cable terminal block (-T models)
Communication (PR)	BACnet MS/TP, NFC, (BTL certified), Modbus

VALVE SPECIFICATIONS

VALVE SPECIFICAT	10113
Fluid	chilled, hot water, up to 60% glycol max
Flow characteristic	F6 modified equal percentage F7 modified linear
Sizes	212"
End fitting	grooved ANSI/AWWA (C606)
Materials*	
Body	ductile iron ASTM A536, grade 65-45-12
Body finish	black powder coating
Disc	electroless nickel coated ductile iron
Shaft	416 stainless steel
Seat	EPDM
Bearings	fiberglass and 316 SS with TFE lining
Body pressure rating	300 psi
Fluid temperature range	-22+230°F [-30+110°C]
Close-off pressure	200 psid (for most combinations)
Maximum velocity	20 FPS
Leakage	0%

*VIC-300™ Masterseal" is manufactured by the Victaulic Company. Note: Valves rated for dead end service.

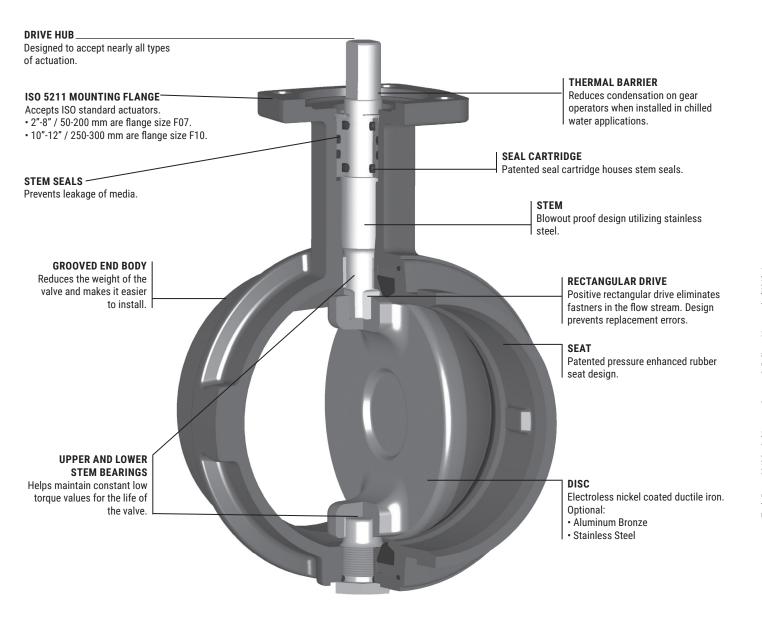
VIC.. Victaulic Butterfly Valves



Belimo VIC.. Series Victaulic®
Butterfly Valves are designed for pressure ranging from vacuum to 300psi and for dead end services to full working pressure. All Victaulic valves are supplied in grooved style body design.

Valve Design Features

- · The valve features a patented seat design that assures full 360° sealing.
- The pressure enhanced seat compresses to form a larger seating area as the pressure increases.
- The seat design also contributes to low breakaway torque of the valve.
- · Valves have EPDM seats that are DL classified to ANSI/NSF 61.
- The disc is ductile iron, conforming to ASTM A-536, grade 65-45-12 with electrolysis nickel coating conforming to ASTM B-733.
- · Stem is 416 stainless steel conforming to ASTM A-582.

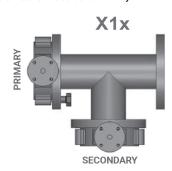


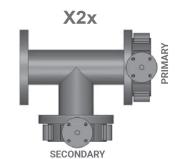


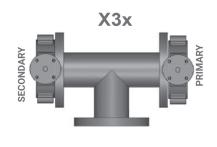
VIC Series Valves

Actuators installed default over Primary Valve.

MIXING/DIVERTING







CONFIG CODE	ON/OFF OR MOD@2 VDC PRIMARY VALVE IS	PRIMARY VALVE @ FAIL
X10	OPEN	FAIL IN PLACE
X11	OPEN	OPEN
X12	OPEN	CLOSED
X13	CLOSED	FAIL IN PLACE
X14	CLOSED	OPEN
X15	CLOSED	CLOSED

CONFIG CODE	ON/OFF OR MOD@2 VDC PRIMARY VALVE IS	PRIMARY VALVE @ FAIL
X20	OPEN	FAIL IN PLACE
X21	OPEN	OPEN
X22	OPEN	CLOSED
X23	CLOSED	FAIL IN PLACE
X24	CLOSED	OPEN
X25	CLOSED	CLOSED

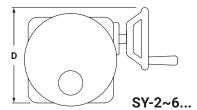
CONFIG CODE	ON/OFF OR MOD@2 VDC PRIMARY VALVE IS	PRIMARY VALVE @ FAIL
X30	OPEN	FAIL IN PLACE
X31	OPEN	OPEN
X32	OPEN	CLOSED
X33	CLOSED	FAIL IN PLACE
X34	CLOSED	OPEN
X35	CLOSED	CLOSED

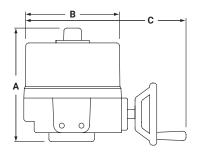
X Specifies Bi-Directional Flow Capability

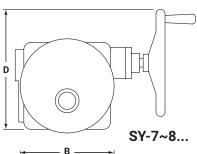
Notes:

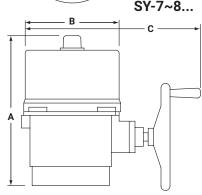
- 1. Secondary Valve operates inversely of the Primary Valve.
- 2. The Primary Valve is always located on the run.
- 3. The Secondary Valve may also have an actuator if required (Direct Coupled).
- 4. On/Off actuator normal position is a function of field logic.
- 5. Modulating actuator normal position (i.e., fully CW or fully CCW) is set by the direction control switch, PC-Tool or field programming via Belimo Assistant app.
- 6. All 3-way assemblies are designed for 90 degree actuator rotation.

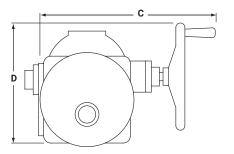
VIC Flow in	VIC Flow in Schedule 40 Pipe (Fluid Velocity in GPM). Use with Grooved Series Butterfly Valves.								
SIZE	1 FPS	3 FPS	5 FPS	8 FPS	10 FPS	12 FPS	15 FPS	16 FPS	20 FPS
2"	10	31	52	78	98	118	147	157	196
2½"	15	45	75	122	153	184	230	245	306
3"	23	69	115	176	220	264	330	353	441
4"	40	119	198	313	392	470	590	627	783
5"	62	187	312	490	612	734	920	979	1224
6"	90	270	450	705	881	1058	1321	1410	1763
8"	156	468	780	1253	1567	1880	2350	2507	3133
10"	246	737	1229	1958	2448	2738	3669	3917	4896
12"	353	1058	1763	2820	3525	4230	5288	5640	7050

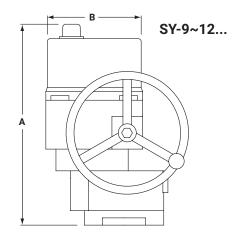












MODEL	DIM A (MAX)	Add to Dim A for cover removal	DIM B	DIM C (MAX)	DIM D
	Inches [mm]	Inches [mm]	Inches [mm]	Inches [mm]	Inches [mm]
SY4~6	12.40 [315]	8.86 [225]	9.21 [234]	14.96 [380]	11.81 [300]
SY7~8	16.54 [420]	8.86 [225]	9.21 [234]	17.72 [450]	13.39 [340]
SY9~12	23.23 [590]	8.86 [225]	10.24 [260]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

Note: ~ indicates range of actuator i.e., SY4~6 = SY-4 and SY-5 and SY-6



, Inc.
(USA)
Aircontrols
© Belimo
change. @
ect to
- Sub
03/22
Tech.Doc -

SY5	[A]	8.9			28	44	70	111	176
SY4	[∀]	6.4	oply [feet]		26	42	99	105	167
SY3	[A]	3.1	ance between actuator and sup	50	62	126	200	318	206
SY2	[A]	3.4	MAX distance bet	45	72	115	182	290	461
SY1	[A]	1.6		26	153	244	387	616	086
		current	wire gauge	18	16	14	12	10	8
			၁	ΑV	77	,			

SY1 SY2 SY4 SY5 SY6 SY7 SY8 SY10 SY11 SY11 SY12 SY12 SY12 SY12 SY12 SY12 SY12 SY11 SY12 SY13 SY12 SY13 SY12 SY13 SY12 SY1 SY14 T,774 T,774<
SY2 SY3 SY5 SY6 SY7 SY8 SY10 SY11 [A]
SY3 SY4 SY5 SY6 SY7 SY8 SY9 SY10 SY11 A
SY4 SY5 SY6 SY7 SY8 SY9 SY10 SY11 [A]
SY5 SY6 SY7 SY8 SY9 SY10 SY11 A
SY9 SY10 SY11 [A] [A] [A] 3 3.2 3.6 257 241 215 408 383 340 651 610 542 1,033 969 861 1,644 1,541 1,370 2,614 2,451 2,179
SY9 SY10 SY11 [A] [A] [A] 3 3.2 3.6 257 241 215 408 383 340 651 610 542 1,033 969 861 1,644 1,541 1,370 2,614 2,451 2,179
SY9 SY10 SY11 [A] [A] [A] 3 3.2 3.6 257 241 215 408 383 340 651 610 542 1,033 969 861 1,644 1,541 1,370 2,614 2,451 2,179
SY9 SY10 SY11 [A] [A] [A] 3 3.2 3.6 257 241 215 408 383 340 651 610 542 1,033 969 861 1,644 1,541 1,370 2,614 2,451 2,179
SY10 SY11 [A] [A] [A] 3.2 3.6 3.6 241 2.15 383 340 610 542 610 542 969 861 1.541 1.370 2.451 2.179
215 3.6 3.6 340 542 861 1,370 2.179
SY12 [A] 3.8 3.8 203 322 514 816 1,298

SY12	[A]	2.5		592	939	1,496	2,377	3,780	6,013	
SY11	[A]	2.7		548	870	1,385	2,201	3,500	5,568	
SY10	[A]	2.6		699	903	1,439	2,285	3,635	5,782	
SY9	[A]	2.5		592	686	1,496	2,377	3,780	6,013	
SY8	[A]	2	ipply [feet]	740	1,174	1,870	2,971	4,725	7,516	
SY7	[A]	2	ctuator and supply [feet]	740	1,174	1,870	2,971	4,725	7,516	
9XS	[A]	1.1	MAX distance between actu	1,346	2,135	3,401	5,401	8,591	13,666	
SY5	[A]	1	MAX distan	1,480	2,348	3,741	5,942	9,450	15,033	
SY4	[A]	1.1		1,346	2,135	3,401	5,401	8,591	13,666	
SY3	[A]	9.0		2,467	3,914	6,234	6,903	15,751	25,054	
SY2	[A]	9.0		2,467	3,914	6,234	6,903	15,751	25,054	
SY1	[A]	0.4		3,701	5,871	9,352	14,854	23,626	37,581	
		current	wire gauge	18	16	14	12	10	8	
230 VAC										

The NEC mandates that 24 VAC over 100 VA power requires CLASS 1 wiring conduit. Local codes may vary. Do NOT mix CLASS 1 & CLASS 2 circuits in the same conduit. Generally, 24 VAC actuators over 100 VA should be changed to 120 VAC models.

800-543-9038 USA **866-805-7089** CANADA **905-712-3118** LATIN AMERICA / CARIBBEAN

Wire Size vs. Length of Run for SY Series Actuators Modulating



SY5	[∀]	8.9			28	† †	02	111	176
8Y4	[∀]	9.4	oply [feet]		26	42	99	105	167
8A3	[∀]	3.1	ance between actuator and supply [feet	09	62	126	200	318	206
SY2	[∀]	3.4	MAX distance b	45	72	115	182	290	461
SY1	[A]	2.8		55	88	139	221	352	260
		current	wire gauge	18	16	14	12	10	8
24 VAC									

2		10		- 2	-2	+	6	9,	<u></u>	
SY12	[A]	4.5		172	272	434	689	1,096	1,743	
SY11	[A]	4.3		180	285	454	721	1,147	1,824	
SY10	[V]	8		257	408	159	1,033	1,644	2,614	
8Y9	[A]	2.7		286	454	723	1,148	1,826	2,905	
SY8	[A]	2.8	upply [feet]	276	438	269	1,107	1,761	2,801	
SY7	[A]	2	actuator and su	386	613	926	1,550	2,465	3,922	
SY6	[A]	2	ce between a	386	613	926	1,550	2,465	3,922	
SY5	[A]	1.9	MAX dista	407	645	1,027	1,632	2,595	4,128	
SY4	[A]	2.1		368	583	929	1,476	2,348	3,735	
SY3	[A]	0.7		1,103	1,750	2,788	4,428	7,044	11,204	
SY2	[A]	8.0		996	1,531	2,440	3,875	6,163	9,804	
SY1	[∀]	9.0		1,287	2,042	3,253	5,167	8,218	13,072	
		current	wire gauge	18	16	14	12	10	8	
120 VAC										

SY1	[A]	current 0.4	wire gauge	18 3,701	16 5,871	14 9,352	12 14,854	10 23,626	8 37,581
λS	[A]	0.4		3,701	5,871	9,352	14,854	23,626	37,581
_	-				1				
SY2	[A]	0.4		3,701	5,871	9,352	14,854	23,626	37,581
SY3	[A]	0.4		3,701	5,871	9,352	14,854	23,626	37,581
SY4	[A]	1.1		1,346	2,135	3,401	5,401	8,591	13,666
SY5	[A]	_	MAX distance	1,480	2,348	3,741	5,942	9,450	15,033
SY6	[A]	_	nce between a	1,480	2,348	3,741	5,942	9,450	15,033
SY7	[A]	1.2	between actuator and supply [feet]	1,234	1,957	3,117	4,951	7,875	12,527
SY8	[A]	1.6	upply [feet]	925	1,468	2,338	3,713	906′5	6,395
SY9	[A]	1.1		1,346	2,135	3,401	5,401	8,591	13,666
SY10	[4]	1.4		1,057	1,677	2,672	4,244	6,750	10,738
SY11	Ā	2.2		673	1,067	1,700	2,701	4,296	6,833
SY12	[A]	2.5		265	686	1,496	2,377	3,780	6,013

The NEC mandates that 24 VAC over 100 VA power requires CLASS 1 wiring conduit. Local codes may vary. Do NOT mix CLASS 1 & CLASS 2 circuits in the same conduit. Generally, 24 VAC actuators over 100 VA should be changed to 120 VAC models.



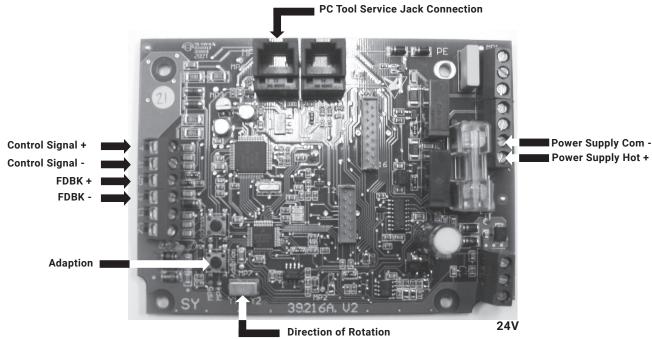
Actuators: SYx-MFT

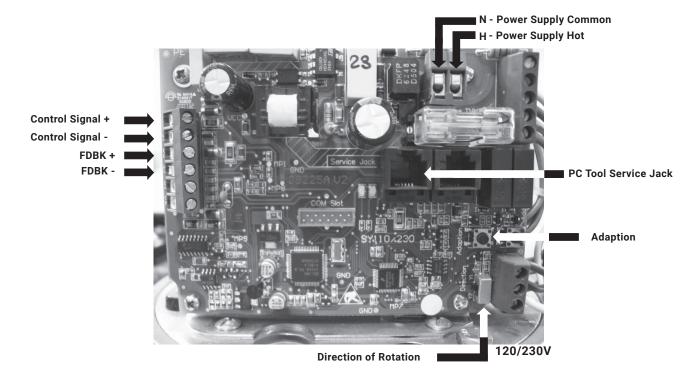




Notes:

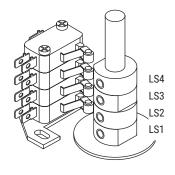
- 1. Motor CAMS have been factory calibrated and should not be moved.
- 2. An adaption must be performed if any limit switch is adjusted. This will calibrate the beginning and end stopping points. Press the adaption button for 3 seconds and release.
- 3. New SY actuators must have an adaption performed before operation.



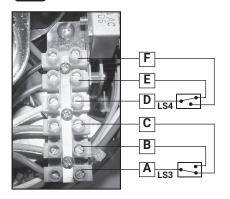


CAUTION Electrical Travel Adjustment

SY4-12



WARNING





Factory pre-set see chart below. Field adjustable if required



LS4

Auxiliary Switch for Closed Indication



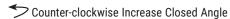
LS3

Auxiliary Switch for Opened Indication

Factory pre-set and calibrated. Do not adjust without consulting factory. This will void the warranty



Clockwise Decrease Closed Angle





Clockwise Increase Opening Angle

Counter-clockwise Decrease Opening Angle

Switches at left are shown with actuator fully open.

C)° 3	•		87	7°	90°
LS3		A - B			A - C	
C)° 3	•		87	7°	90°
LS4	D - F		D - E			

Notes:

- An adaption must be performed when the limit switches are adjusted. For the SYx-MFT actuators. This will calibrate the beginning and end stopping points. Press the adaption button for 3 seconds and release.
- 2. Contact Technical Support if travel adjustment is required.



Actuators: SY4...12-110 SY4...12-220

Hazard Identification

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

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.



NOTES SY4...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.
- Required: Terminal #7 needs to be field wired to enable heater circuit.



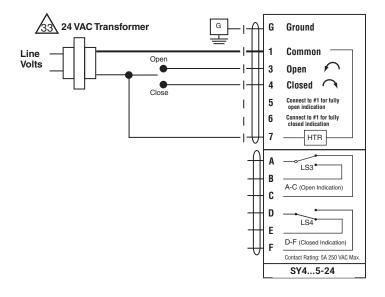
Observe class 1 and class 2 wiring restrictions.

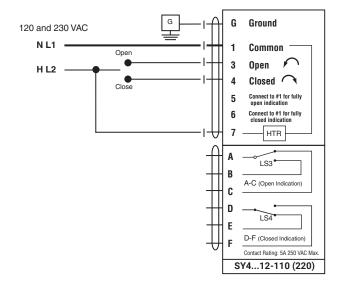
Transformer sizing = SY actuator draw X 1.25 (safety margin) (Ex. SY2-24 requires $3.0A \times 1.25 = 3.75A$, 3.75A X 24 VAC = 90VA Transformer).



/:\ NOTES SY4...12-110 (220)

- 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.
- Required: Terminal #7 needs to be field wired to enable heater circuit.





Tech. Doc - 03/22 - Subject to change.

Belimo Aircontrols (USA), Inc.



Actuators: SY4...5-24 SY4...12-110 SY4...12-220

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.

24 VAC Transformer Ground **K1** Open K1-B Closed HTR LS3 A-C (Open Indi D Contact Rating: 5A 250 VAC N SY4...5-24 Ground 3 Open Closed HTR LS3° A-C (Open Indication) C D 1.54 Contact Rating: 5A 250 VAC N SY4...5-24

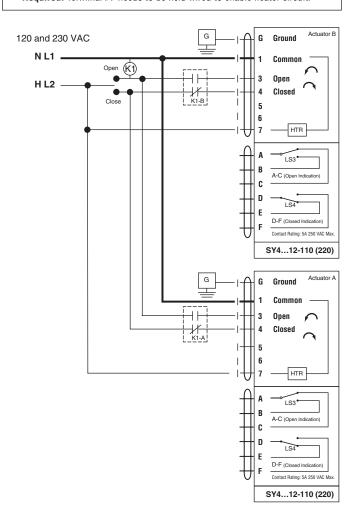
INSTALLATION NOTES

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.
- "H" (L2) cannot be connected to terminal #3 and #4 simultaneously.
- Required: Terminal #7 needs to be field wired to enable heater circuit.





SY4...5-24MFT SY4...12-120MFT SY4...12-230MFT **Actuators:**

Hazard Identification

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

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.



NOTES SY4...5-24MFT

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

• Power supply Com/Neutral and Control Signal "-" wiring to a common is



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)

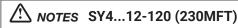


APPLICATION NOTES

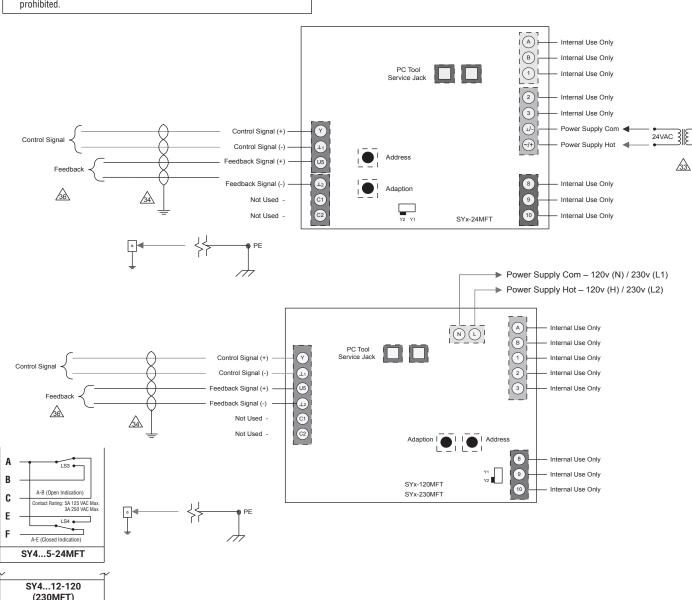


Ground shielded wire at control panel chassis. Tape back ground at actuator.

Use of feedback is optional.



• Caution: Power supply voltage.





Actuators: SY4...5-24MFT

550-2

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).



NOTES SY4...5-24MFT

 $\overline{\wedge}$

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



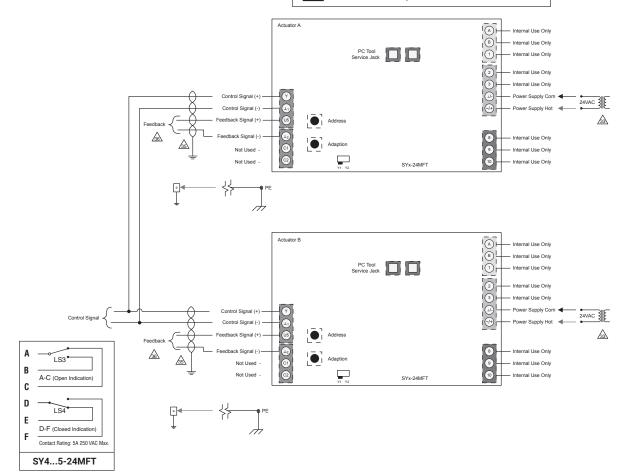
APPLICATION NOTES

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.





Actuators: SY4...12-120MFT SY4...12-230MFT

W552-2

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.



Observe class 1 and class 2 wiring restrictions.



APPLICATION NOTES

35 F

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

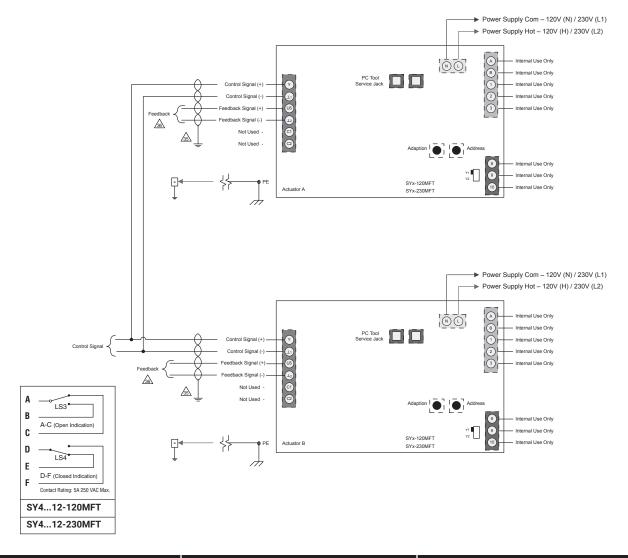
36

Use of feedback is optional.



NOTES SY4...12-120 (230MFT)

• Caution: Power supply voltage.



SY MFT Actuators **Quick Troubleshooting Guide**

Verify that Control Signal and Power are present at the actuator.

- Measure between Control Signal + and and power + and on control board. (See photo of control boards below for locations).
- Check fuses on both boards. If fuses are blown, replace before proceeding.

Verify that the green LED is lit on the control board – this indicates power is present.

If yes:

- Push the button labelled "Adaption", hold for 3-5 seconds then release. (see left photo for 24V, right photo for 120V)
- The LED next to green LED should light up (amber in color)
- Actuator should click. Drive fully in one direction. It will stop there for 5-10 seconds. Click and drive fully in the opposite direction.
- · The amber light should go out.

If the sequence does not happen as above, please have the tech make a note of what does happen.

Possibilities include

- Amber light goes on, actuator clicks but does not move at all.
- Amber light goes on, actuator clicks and drives in one direction, and clicks but does not drive in the other direction.
- · Amber light does not light, and the actuator does nothing at all.

If something else occurs, please make a note and communicate to a Belimo Technical Support Representative as the actuator most likely will need to be replaced.

If the actuator adapts correctly:

- Verify correct wiring of control signal (confirm correct polarity of field wiring and meter). Must have "Control +" and "Control -" and not share the "Control -" with the 24V common, or 120V Neutral (4 wires are required, 2 for power and 2 for Control Signal).
- 2. Provide a DC control signal other than minimum or maximum (suggest 6 VDC or 50% command).
- Measure with DC voltmeter on "Control +" and "Control -" at actuator and verify that a voltage other than 0(2) or 10V is present on those terminals. If actuator does not drive to approximately the mid position and voltage is present, the actuator most likely will need to be replaced.

The following information is helpful to determine warranty coverage and additional steps that might need to be taken:

- PO# or Belimo SO# or ID# (ID is located on actuator cover under the model #).
- 2. Is this a retrofit or was it factory assembled to a valve?
- Has this actuator ever worked on this site (brand new install that did not work, or has been working correctly for a certain period of time).
- 4. Proper transformer sizing (see PGPL for current VA requirements).
- Confirm correct wire size vs. length or run for SY actuators.

