

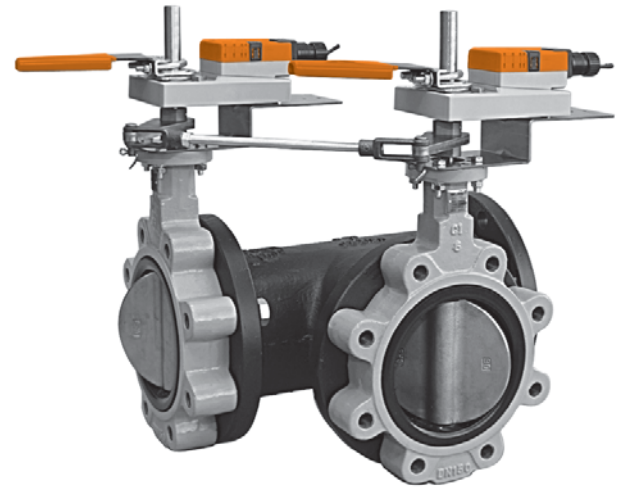
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Butterfly Valve:

UFLK Series **Linkage Solution**
 2-way Valves
 3-way Valves

Retrofit Solutions for Virtually any Valve

Manufacturers:

Butterfly: Bray, Centerline, Keystone, Flowseal and more
Control: On/Off, Floating, 2-10VDC Multi-Function Technology®
 Spring Return or Non-Spring Return

SY Series Actuators

Series	Model	Run Time(s) 90°@60Hz	Power Supply	Control			
				Proportional	3 Point	On/Off	Feedback
SY1	SY1-110	12 seconds	120 VAC ±10%, 50/60 Hz		•	•	none, opt 1k
	SY1-24	12 seconds	24 VAC ±10%, 50/60 Hz		•	•	none, opt 1k
	SY1-220	12 seconds	230 VAC ±10%, 50/60 Hz		•	•	none, opt 1k
	SY1-110P	12 seconds	120 VAC ±10%, 50/60 Hz	•			2-10 VDC/4-20 mA
	SY1-24P	12 seconds	24 VAC ±10%, 50/60 Hz	•			2-10 VDC/4-20 mA
	SY1-220P	12 seconds	230 VAC ±10%, 50/60 Hz	•			2-10 VDC/4-20 mA
SY2	SY2-110	15 seconds	120 VAC ±10%, 50/60 Hz		•	•	none, opt 1k
	SY2-24	15 seconds	24 VAC ±10%, 50/60 Hz		•	•	none, opt 1k
	SY2-220	15 seconds	230 VAC ±10%, 50/60 Hz		•	•	none, opt 1k
	SY2-120MFT	15 seconds	120 VAC ±10%, 50/60 Hz	•			2-10 VDC/4-20 mA
	SY2-24MFT	15 seconds	24 VAC ±10%, 50/60 Hz	•			2-10 VDC/4-20 mA
	SY2-230MFT	15 seconds	230 VAC ±10%, 50/60 Hz	•			2-10 VDC/4-20 mA
SY3	SY3-110	22 seconds	120 VAC ±10%, 50/60 Hz		•	•	none, opt 1k
	SY3-24	22 seconds	24 VAC ±10%, 50/60 Hz		•	•	none, opt 1k
	SY3-220	22 seconds	230 VAC ±10%, 50/60 Hz		•	•	none, opt 1k
	SY3-24MFT	22 seconds	120 VAC ±10%, 50/60 Hz	•			2-10 VDC/4-20 mA
	SY3-120MFT	22 seconds	120 VAC ±10%, 50/60 Hz	•			2-10 VDC/4-20 mA
	SY3-230MFT	22 seconds	230 VAC ±10%, 50/60 Hz	•			2-10 VDC/4-20 mA
SY4	SY4-110	16 seconds	120 VAC ±10%, 50/60 Hz		•	•	none, opt 1k
	SY4-24	16 seconds	24 VAC ±10%, 50/60 Hz		•	•	none, opt 1k
	SY4-220	16 seconds	230 VAC ±10%, 50/60 Hz		•	•	none, opt 1k
	SY4-24MFT	16 seconds	120 VAC ±10%, 50/60 Hz	•			2-10 VDC/4-20 mA
	SY4-120MFT	16 seconds	120 VAC ±10%, 50/60 Hz	•			2-10 VDC/4-20 mA
	SY4-230MFT	16 seconds	230 VAC ±10%, 50/60 Hz	•			2-10 VDC/4-20 mA
SY5	SY5-110	22 seconds	120 VAC ±10%, 50/60 Hz		•	•	none, opt 1k
	SY5-24	22 seconds	24 VAC ±10%, 50/60 Hz		•	•	none, opt 1k
	SY5-220	22 seconds	230 VAC ±10%, 50/60 Hz		•	•	none, opt 1k
	SY5-24MFT	22 seconds	120 VAC ±10%, 50/60 Hz	•			2-10 VDC/4-20 mA
	SY5-120MFT	22 seconds	120 VAC ±10%, 50/60 Hz	•			2-10 VDC/4-20 mA
	SY5-230MFT	22 seconds	230 VAC ±10%, 50/60 Hz	•			2-10 VDC/4-20 mA
SY6	SY6-110	28 seconds	120 VAC ±10%, 50/60 Hz		•	•	none, opt 1k
	SY6-220	28 seconds	230 VAC ±10%, 50/60 Hz		•	•	none, opt 1k
	SY6-120MFT	28 seconds	120 VAC ±10%, 50/60 Hz	•			2-10 VDC/4-20 mA
	SY6-230MFT	28 seconds	230 VAC ±10%, 50/60 Hz	•			2-10 VDC/4-20 mA
SY7	SY7-110	46 seconds	120 VAC ±10%, 50/60 Hz		•	•	none, opt 1k
	SY7-220	46 seconds	230 VAC ±10%, 50/60 Hz		•	•	none, opt 1k
	SY7-120MFT	46 seconds	120 VAC ±10%, 50/60 Hz	•			2-10 VDC/4-20 mA
	SY7-230MFT	46 seconds	230 VAC ±10%, 50/60 Hz	•			2-10 VDC/4-20 mA
SY8	SY8-110	46 seconds	120 VAC ±10%, 50/60 Hz		•	•	none, opt 1k
	SY8-220	46 seconds	230 VAC ±10%, 50/60 Hz		•	•	none, opt 1k
	SY8-120MFT	46 seconds	120 VAC ±10%, 50/60 Hz	•			2-10 VDC/4-20 mA
	SY8-230MFT	46 seconds	230 VAC ±10%, 50/60 Hz	•			2-10 VDC/4-20 mA

Proportional actuators will accept 0-10 VDC, 2-10 VDC, or 4-20 mA control signals as standard.
 All SY actuators are non-spring return, but can be used with NSV-SY back up systems for fail safe applications.
 These products carry a two year warranty when sold as part of an assembly or with a UFLK retrofit kit.

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SY Series Actuators

Series	Model	Run Time(s) 90°@60Hz	Power Supply	Control			
				Proportional	3 Point	On/Off	Feedback
SY9	SY9-110	58 seconds	120 VAC ±10%, 50/60 Hz		•	•	none, opt 1k
	SY9-220	58 seconds	230 VAC ±10%, 50/60 Hz		•	•	none, opt 1k
	SY9-120MFT	58 seconds	120 VAC ±10%, 50/60 Hz	•			2-10 VDC/4-20 mA
	SY9-230MFT	58 seconds	230 VAC ±10%, 50/60 Hz	•			2-10 VDC/4-20 mA
SY10	SY10-110	58 seconds	120 VAC ±10%, 50/60 Hz		•	•	none, opt 1k
	SY10-220	58 seconds	230 VAC ±10%, 50/60 Hz		•	•	none, opt 1k
	SY10-120MFT	58 seconds	120 VAC ±10%, 50/60 Hz	•			2-10 VDC/4-20 mA
	SY10-230MFT	58 seconds	230 VAC ±10%, 50/60 Hz	•			2-10 VDC/4-20 mA
SY11	SY11-110	58 seconds	120 VAC ±10%, 50/60 Hz		•	•	none, opt 1k
	SY11-220	58 seconds	230 VAC ±10%, 50/60 Hz		•	•	none, opt 1k
	SY11-120MFT	58 seconds	120 VAC ±10%, 50/60 Hz	•			2-10 VDC/4-20 mA
	SY11-230MFT	58 seconds	230 VAC ±10%, 50/60 Hz	•			2-10 VDC/4-20 mA
SY12	SY12-110	58 seconds	120 VAC ±10%, 50/60 Hz		•	•	none, opt 1k
	SY12-220	58 seconds	230 VAC ±10%, 50/60 Hz		•	•	none, opt 1k
	SY12-120MFT	58 seconds	120 VAC ±10%, 50/60 Hz	•			2-10 VDC/4-20 mA
	SY12-230MFT	58 seconds	230 VAC ±10%, 50/60 Hz	•			2-10 VDC/4-20 mA

Proportional actuators will accept 0-10 VDC, 2-10 VDC, or 4-20 mA control signals as standard.

All SY actuators are non-spring return, but can be used with NSV-SY back up systems for fail safe applications.

These products carry a two year warranty when sold as part of an assembly or with a UFLK retrofit kit.

SY Multi-Function Technology

Description	P-CODE	Control Input	Built-in Feedback	Loss of Signal	Running Time
MFT	ACE	2...10V	2...10V	stop	actuator(s) constant
MFT	ACF	0.5...10V	0.5...10V	stop	actuator(s) constant
MFT	ACG	4...20mA	4...20mA	stop	actuator(s) constant
MFT	ACH	4...20mA	2...10V	stop	actuator(s) constant
MFT	ACJ	2...10V	2...10V	open	actuator(s) constant
MFT	ACK	0.5...10V	0.5...10V	open	actuator(s) constant
MFT	ACL	4...20mA	4...20mA	open	actuator(s) constant
MFT	ACM	4...20mA	2...10V	open	actuator(s) constant
MFT	ACN	2...10V	2...10V	close	actuator(s) constant
MFT	ACP	0.5...10V	0.5...10V	close	actuator(s) constant
MFT	ACR	4...20mA	4...20mA	close	actuator(s) constant
MFT	ACS	4...20mA	2...10V	close	actuator(s) constant

Rotary Actuators

Series	Model	Spring Return	Control Input	Feedback Position	Power Supply
AF Series*	AF24 US	•	24 VAC/DC		24 VAC/DC
	AF24-MFT US	•	Variable with MFT (VDC, PWM, Floating Pt., On/Off)	variable VDC	24 VAC/DC
AM Series*	AMB24-3X1		24 VAC/DC		24 VAC/DC
	AMB24-MFTX1		Variable with MFT (VDC, PWM, Floating Pt., On/Off)	variable VDC	24 VAC/DC
GM Series*	GMB24-3X1		24 VAC/DC		24 VAC/DC
	GMB24-MFTX1		Variable with MFT (VDC, PWM, Floating Pt., On/Off)	variable VDC	24 VAC/DC

*Please consult the Product Guide and Price List for a complete selection of Spring Return and Non-Spring Return Actuators of the listed series.

Standard run times should be considered in the selection.

Multi-Function Technology

ROTARY ACTUATOR CODES	Programming Codes		Control Input	Running Time	Built-in Feedback
		P-10001	A01	2-10 VDC	150 seconds
	P-10002	A02	0-10 VDC	150 seconds	0-10 VDC
	P-10028	A28	0-10 VDC	150 seconds	0-10 VDC
	P-10063	A63	0.5-4.5 VDC	150 seconds	0.5-4.5 VDC
	P-10064	A64	5.5-10 VDC	150 seconds	5.5-10 VDC
	P-20002	W02	0.02-5.00 seconds PWM	150 seconds	2-10 VDC
	P-20003	W03	0.10-25.5 seconds PWM	150 seconds	2-10 VDC
	P-30001	F01	Floating Pt.	150 seconds	2-10 VDC
	P-40002	J02	On/Off	150 seconds	2-10 VDC

2-way Valves

		Spring Return		Non-Spring Return		SY		
Actuator		2*AF	AM	GM	2*GM	SY1	SY2	SY2
Linkage		UFLK3402	UFLK3400	UFLK3400	UFLK3408	UFLK3426	UFLK3428	UFLK3430
Size	Close-off psi							
2"	150	UFLK3402	UFLK3400			UFLK3426	UFLK3428	
2½"	150	UFLK3402	UFLK3400			UFLK3426	UFLK3428	
3"	150	UFLK3402		UFLK3400		UFLK3426	UFLK3428	
4"	150				UFLK3408			UFLK3430

		SY					
Actuator		SY2	SY3	SY4	SY4	SY6	SY6
Linkage		UFLK3432	UFLK3432	UFLK3434	UFLK3434	UFLK3438	UFLK3438
Size	Close-off psi						
5"	150	UFLK3432					
6"	150		UFLK3432				
8"	150			UFLK3434			
10"	150			UFLK3434			
12"	150					UFLK3438	
14"	150					UFLK3438	

3-way Valves

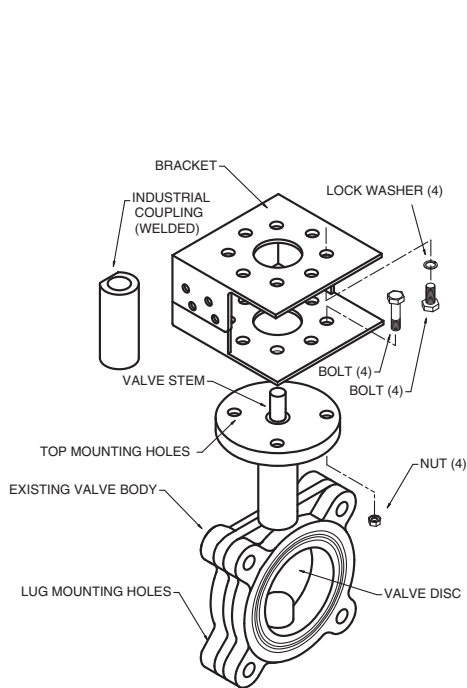
		Spring Return		Non-Spring Return		SY		
Actuator		2*AF	GM	2*GM	SY1	SY2	SY2	SY2
Linkage		UFLK6402	UFLK6400	UFLK6400	UFLK6426	UFLK6428	UFLK6428	UFLK6430
Size	Close-off psi							
2"	150	UFLK6402	UFLK6400		UFLK6426	UFLK6428		
2½"	150	UFLK6402	UFLK6400		UFLK6426	UFLK6428		
3"	150	UFLK6402	UFLK6400			UFLK6428		
4"	150			UFLK6400				UFLK6430

		SY					
Actuator		SY3	SY4	SY4	SY6	SY7	SY8
Linkage		UFLK6432	UFLK6434	UFLK6436	UFLK6438	UFLK6440	UFLK6442
Size	Close-off psi						
5"	150	UFLK6432					
6"	150		UFLK6434				
8"	150			UFLK6436			
10"	150				UFLK6438		
12"	150					UFLK6440	
14"	150						UFLK6442

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Industrial Electric 2-way

Generic – Must complete BFV Retrofit Form

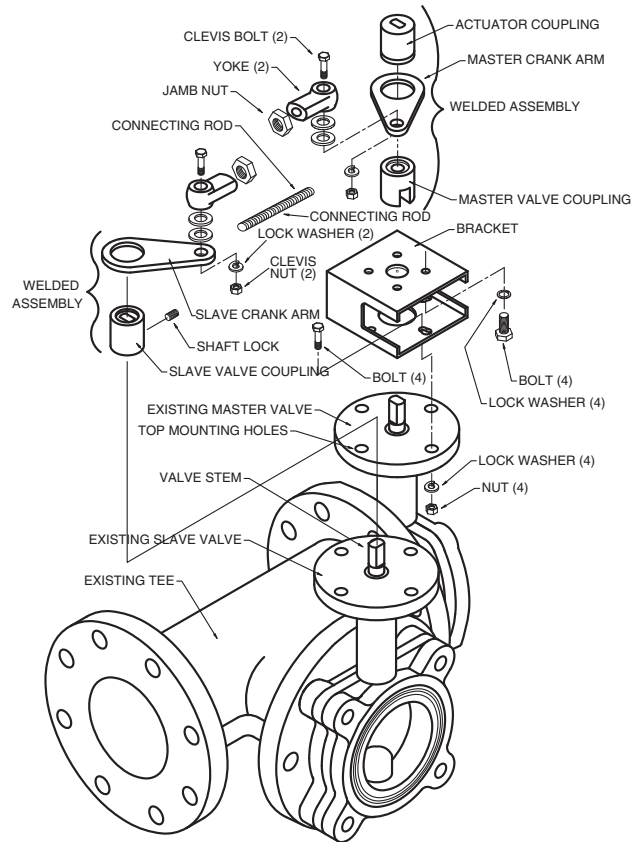


UFSP0020
UFSP0022

SY1 - SY8
SY9 - SY12

Industrial Electric 3-way

Generic – Must complete BFV Retrofit Form



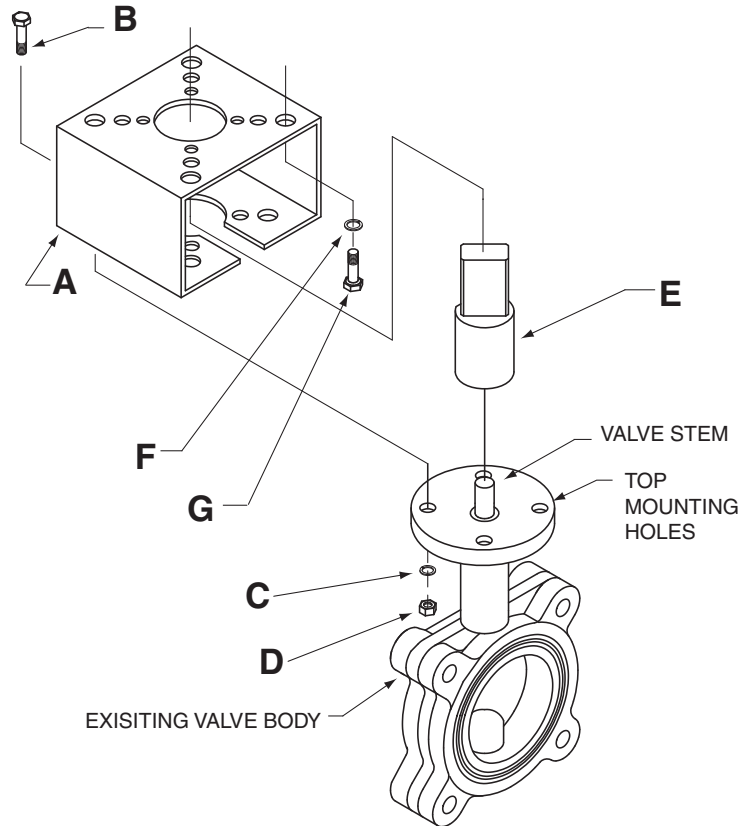
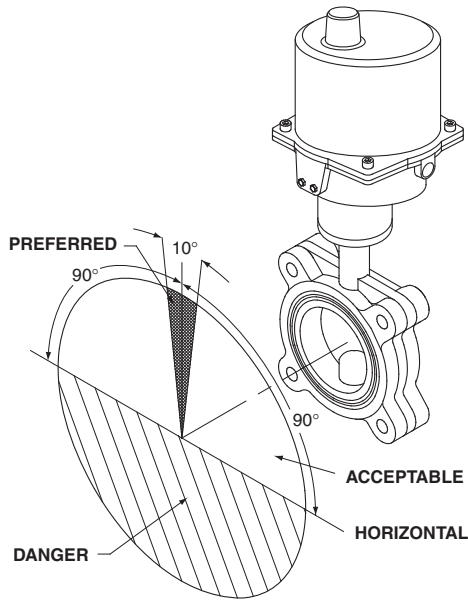
UFSP0024
UFSP0026

SY1 - SY8
SY9 - SY12

NOTE: 3-way bracket configuration shown is only one of many possible arrangements.

Assembly Procedure for SY...Retrofit Solution

Retrofit Requirement: The initial step is to determine if your application can accept a retrofit solution. As shown below (Fig. 1), the valve stem must not be located below the horizontal plane. If this condition exists, the SY actuator could not be used in this situation. A Belimo technical support person is available to help determine what solution best fits your application. A typical solution is shown in Fig. 2.



Assembly Procedure (Mechanical)



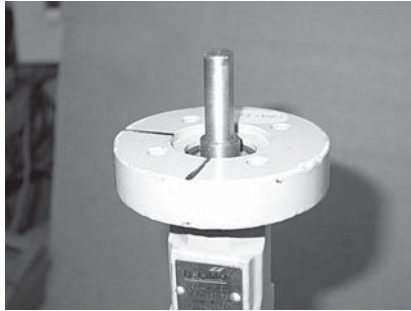
Step 1) The valve must be stripped down to its basic form. Remove all other linkage components before starting the assembly sequence below. The linkage components have been designed to attach to the existing valve flange rather than to any existing hardware.



Step 2) The valve has either flats, a key slot, holes or a mark indicating the position of the disc with respect to the shaft. Usually, the flats, keys, holes and marks are PARALLEL to the valve disc. The photo at left shows the flattened shaft in the CLOSED position.

SY... Series Butterfly Valve Retrofit Solution

Retrofitting 2-way Valves with Belimo SY Non-Spring Return Actuator

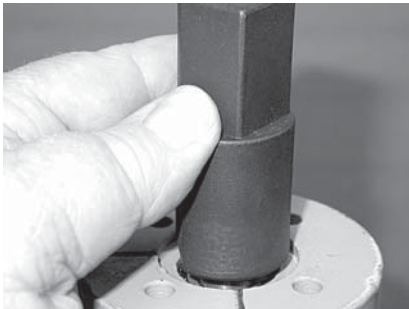


Step 3) The valve MUST be in the OPEN position before starting the retrofit process. The photo at the left shows the shaft flats are PARALLEL to the piping, but the disc is PARALLEL to the flats, thereby indicating the valve

disc is in the fully OPEN position. You MUST verify the disc is fully OPEN before proceeding.

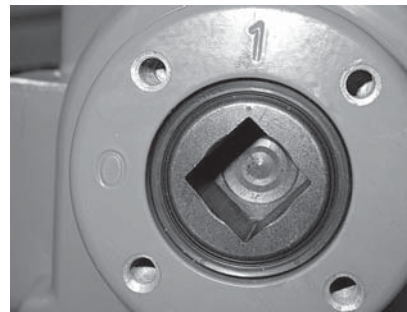


Step 7) The SY actuator is shipped in the OPEN position. Make sure the actuator is in the OPEN position before attaching to the valve/coupling assembly. The SY actuator turns counter clockwise (CCW) to the OPEN position, when viewed from ABOVE the actuator.

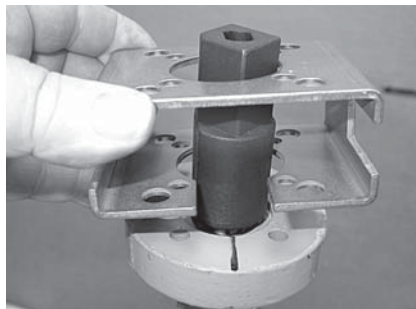


Step 4) Place the coupling (E) over the valve stem. It can be assembled in two different positions 180 degrees apart, but either position is OK. It would be helpful at this time to make a mark on the coupling and on the valve body so you

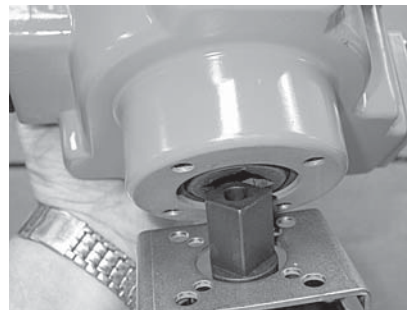
can easily reference the position of the valve after the actuator is attached.



Step 8) Verify that the SY actuator is in the OPEN position also by looking at the bottom of the actuator. There is a dimple mark punched in the output shaft which will align with the "1" mark when the actuator is in the OPEN position.

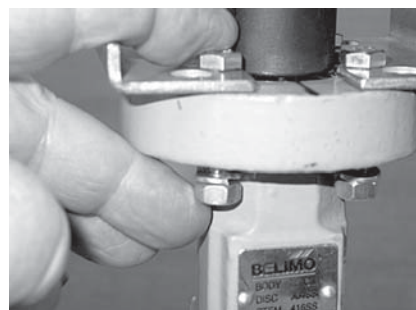


Step 5) Install the actuator mounting bracket (A) onto the valve top works flange as shown.

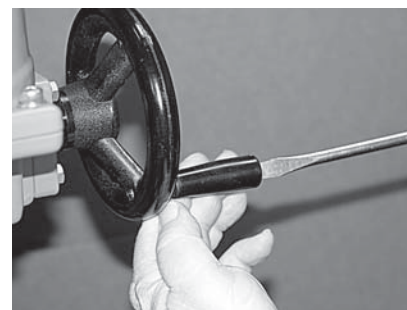


actuator with the square drive or keys in the coupling (C). The SY actuator will slide completely over the drive square and will rest ON the mounting bracket (A).

Step 9) Stand with the valve face (where the piping flange connects to the valve body) towards you. Hold the SY actuator with the handwheel on the RIGHT, and the EMT connectors to your LEFT. Align the square drive or keyway in the SY

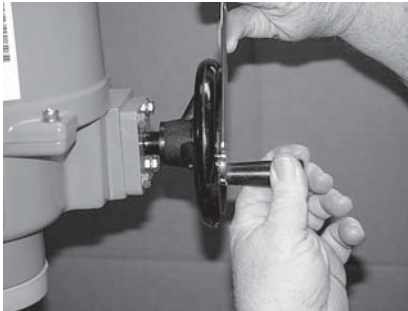


Step 6) Insert the four mounting bolts (B), lockwashers (C), and the hex nuts (D). Do NOT tighten at this time.

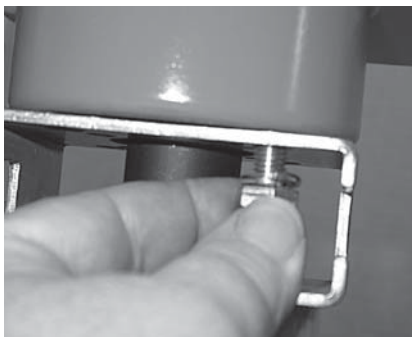


Step 10) Attach the hand knob to the hand wheel as shown below (if not already completed).

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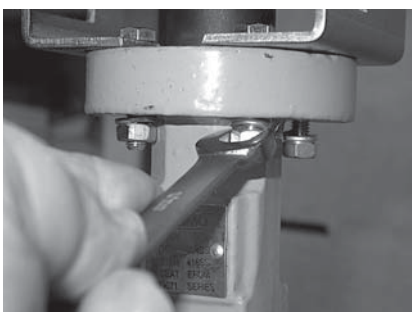
Step 11) Tighten the jam nut to prevent the hand knob from becoming loose.



Step 12) Insert the four hex bolts (G) and lock washers (F) through the bracket and into the bottom of the SY actuator as shown. Do NOT tighten until all four sets have been installed. Slight twisting of the entire SY actuator will facilitate alignment of the bolts.



Step 13) After all four have been inserted, tighten accordingly.



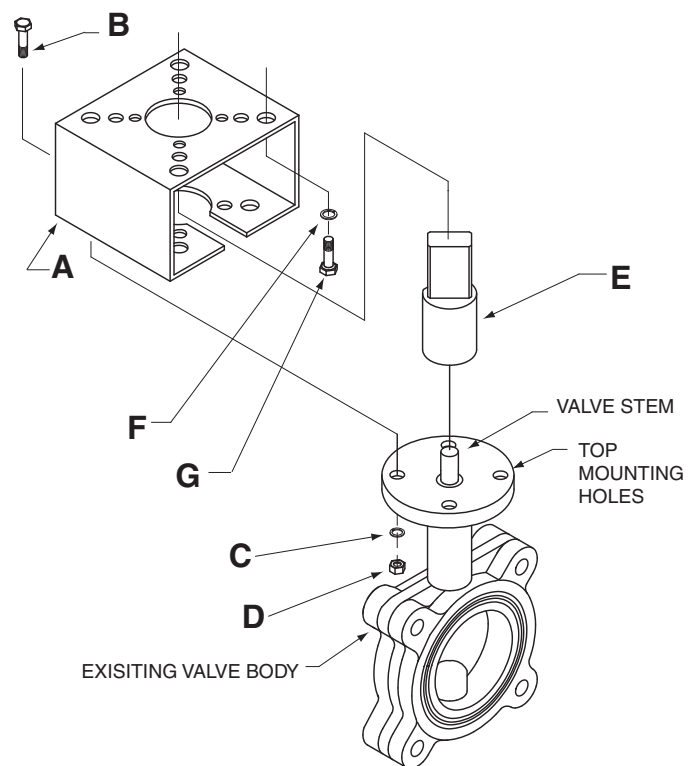
Step 14) Now tighten the four bracket bolts (B, C, D) assembled previously in step 6 .



Step 15) When mechanical assembly is complete, the SY actuator and valve body should be oriented as shown below. The actuator is in the OPEN position, and the valve disc is fully OPEN. All bolts are tight, and electrical checkout is now possible.

Application Note:

The hand wheel on the SY actuator is engaged at all times but does not rotate when the actuator is running. It is possible at anytime to turn the hand wheel by simply rotating it CW or CCW. The hand wheel does NOT need to be pulled or pushed into the actuator to make it operational. However, it should be noted that if a control signal and power is present at the actuator when the hand wheel is turned, the actuator will return to its controlled position. If it is desired to have the actuator maintain its position after turning the hand wheel, it will be necessary to remove power from the actuator, either at the source or by use of an optional SY-HOA local switch.



SY... Series Butterfly Valve Retrofit Solution

Retrofitting 2-way Valves with Belimo SY On/Off Non-Spring Return Actuator

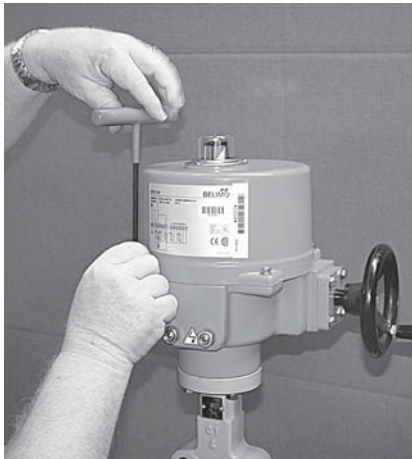


Assembly Procedure (Electrical), On/Off Models

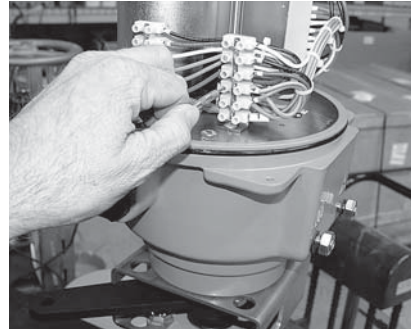


Hazard Identification

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

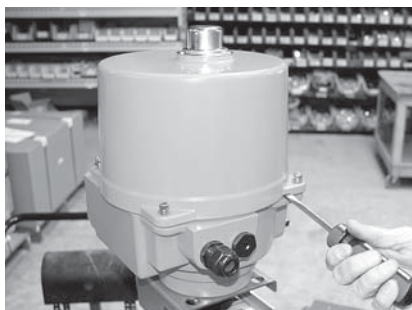


Step 1) Remove the four hex bolts securing the cover to the base casting.

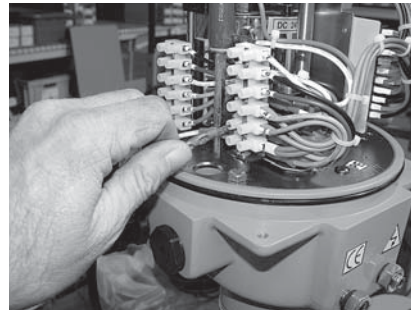


Step 6) Apply proper voltage to terminals 1 (Neutral) & 7 (Hot). Apply proper actuator voltage to terminals 1 (Neutral) & 4 (Hot) to drive the actuator CLOSED until the end-of-travel cam STOPS the actuator movement.

7. Visually check the position of the valve to make sure it reaches its full CLOSED position.



Step 2) Remove cover from the SY actuator. A flat blade screwdriver inserted carefully into the provided slot (as shown) will facilitate removal of the cover.



Step 8) Apply proper voltage to terminals 1 (Neutral) & 7 (Hot). Apply proper actuator voltage to terminals 1 (Neutral) & 3 (Hot) to drive the actuator OPEN until the end-of-travel cam STOPS the actuator movement.

Step 3) Conduit entries into the SY actuator must be selected for their operating location (indoors protected, indoors wash down, outdoors, etc). Be sure to follow standard NEC guidelines when selecting conduit and connector types.

Step 4) Follow the wire sizing chart in the IOM guide (Belimo p/n 70103-00001D page 17) to make sure you use the correctly size wire when connecting the SY to your power source. Failure to follow the recommendations in the table could cause actuator failure or nuisance tripping.

Step 5) Follow the wiring diagrams in the IOM guide pages 18 (single) & 23 (multiple) for proper power and control wiring to the SY actuator. Make note of the following:

- a. Do NOT connect multiple actuators in parallel without isolation relays.
- b. Be sure "Hot" is connected to terminal #7 to enable the heater circuit, and "Neutral" is connected to terminal #1.

Step 9) Visually check the position of the valve disc to make sure it reaches its full OPEN position.

Step 10) If the valve functions properly, mechanical assembly and electrical checkout are complete.



WARNING

FACTORY NOTE:

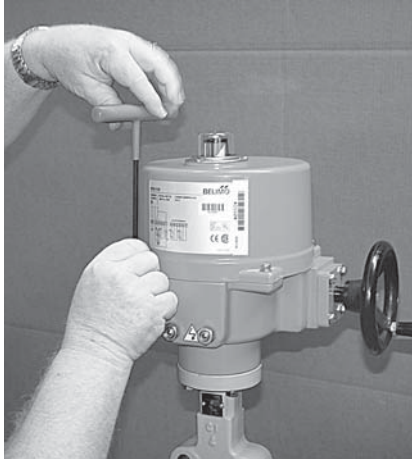
The SY... actuator has been calibrated at the factory before shipping to you for use in this retrofit kit. 99% of the time the SY actuator calibration will suffice for your application. Before making ANY adjustments to the actuator, improper calibration may VOID your warranty. If you have any questions, please contact a Belimo Technical Support representative at 800-543-9038 for assistance.

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Assembly Procedure (Electrical), Proportional Models

Hazard Identification

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

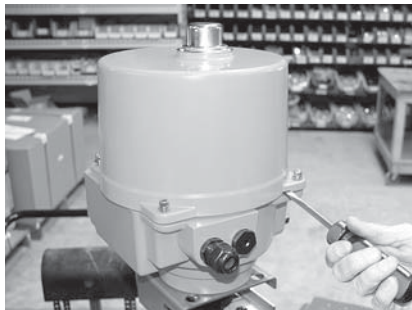


Step 1) Remove the four hex bolts securing the cover to the base casting.

Step 6) Connect the proper electrical power and control wiring per the wiring diagrams located in the Installation Operation Manual Guide pages 14-37.

Step 7) Check the operation of the actuator by commanding the control system to generate control signals matching the needs of the job to run the valve from fully CLOSED to fully OPEN, as well as a MID-POINT position. The indicator on the top of the SY actuator will be an indicator as to the position of the actuator, and therefore, the valve position.

Step 8) If the valve functions properly, mechanical assembly and electrical checkout are complete.



Step 2) Remove cover from the SY actuator. A flat blade screwdriver inserted carefully into the provided slot (as shown) will facilitate removal of the cover.

WARNING

FACTORY NOTE:

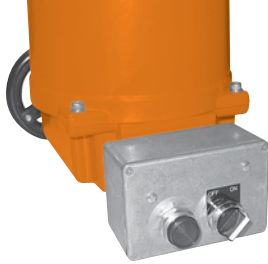
The SY actuators have been calibrated at the factory before shipping to you for use in this retrofit kit. 99% of the time the SY actuator calibration will suffice for your application. Before making ANY adjustments to the actuator, improper calibration may VOID your warranty. If you have any questions, please contact a Belimo Technical Support representative at 800-543-9038 for assistance.

Step 3) Conduit entries into the SY actuator must be selected for their operating location (indoors protected, indoors wash down, outdoors, etc). Be sure to follow standard NEC guidelines when selecting conduit and connector types.

Step 4) Follow the wire sizing chart in the IOM guide (Belimo p/n 70103-00001D page 17) to make sure you use the correct size wire when connecting the SY to your power source. Failure to follow the recommendations in the table could cause actuator failure or nuisance tripping.

Step 5) Follow the wiring diagrams in the IOM guide pages 14 through 37 for proper power and control wiring to the SY actuator.

Note: All SY1-P and SY2..12-SR/MFT actuators are factory pre-set with the proper customer requested control programming.



**SY-HOA...
Local Electric Disconnect**



NSV-SY...Battery Backup System



SY...Handwheel

SY-HOA-110	Local Electric Disconnect SY2-SY12 110V 2 Position
SY-HOA-110P	Local Electric Disconnect SY2-SY12 110V Proportional
SY-HOA-24	Local Electric Disconnect SY2-SY12 24V 2 Position
SY-HOA-24P	Local Electric Disconnect SY2-SY12 24V Proportional

SY-1000-FB01	1000 Ω Feedback Potentiometer SY2-12 2 Position
SY-1000-FB02	1000 Ω Feedback Potentiometer SY2-12 Proportional

NSV-SY-01	Battery Backup System for SY1-SY6 2 Position - 110 VAC
NSV-SY-02	Battery Backup System for SY1-SY6 Proportional - 110 VAC
NSV-SY-03	Battery Backup System for SY7 2 Position - 110 VAC
NSV-SY-04	Battery Backup System for SY7 Proportional - 110 VAC
NSV-SY-05	Battery Backup System for SY8-SY12 2 Position - 110 VAC
NSV-SY-06	Battery Backup System for SY8-SY12 Proportional - 110 VAC
NSV-SY-11	Battery Backup System for SY1-SY5 2 Position - 24 VAC
NSV-SY-12	Battery Backup System for SY1-SY5 Proportional - 24 VAC
NSV-SY-21	Battery Backup System for SY1-SY6 2 Position - 220 VAC
NSV-SY-22	Battery Backup System for SY1-SY6 Proportional - 220 VAC
NSV-SY-23	Battery Backup System for SY7-SY9 2 Position - 220 VAC
NSV-SY-24	Battery Backup System for SY7-SY9 Proportional - 220 VAC
NSV-SY-25	Battery Backup System for SY10-SY12 2 Position - 220 VAC
NSV-SY-26	Battery Backup System for SY10-SY12 Proportional - 220 VAC

ZG-SY23	SY2-3 Handwheel (replacement only)
ZG-SY46	SY4-6 Handwheel (replacement only)
ZG-SY78	SY7-8 Handwheel (replacement only)
ZG-SY912	SY9-12 Handwheel (replacement only)