



# Belimo Resilient Seat Butterfly Valves HD & L Series Technical Documentation

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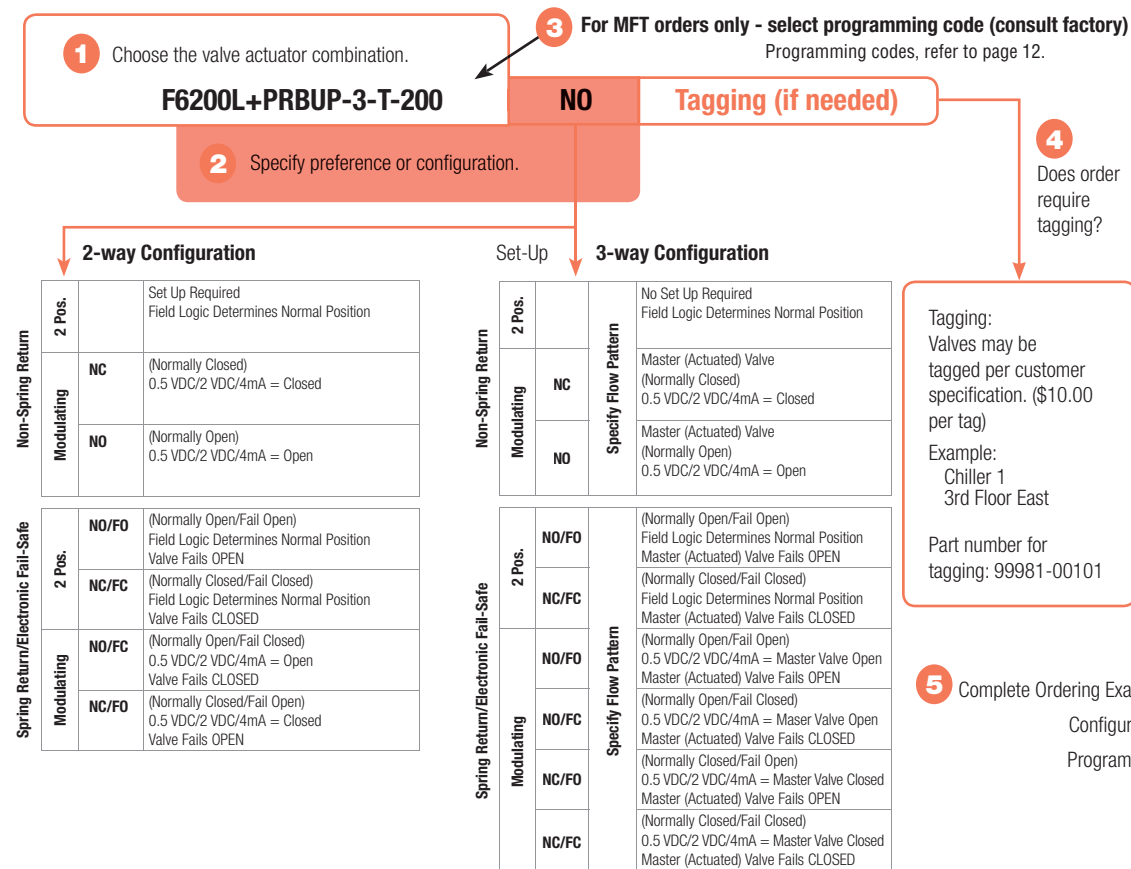
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# Butterfly Valve Nomenclature

F6	200	L	+PRB	UP	-3	-T	-200
<b>Valve</b> F6 = 2-way F7 = 3-way	<b>Valve Size</b> 50 = 2" 65 = 2½" 80 = 3" 100 = 4" 125 = 5" 150 = 6" 200 = 8" 250 = 10" 300 = 12" 350 = 14" 400 = 16" 450 = 18" 500 = 20" 600 = 24"	<b>Trim Material</b> <b>H</b> DU/LU = 0% Leakage, 50 psi (3" to 10") <b>HD</b> = Stainless Disc, Ductile Iron Body, EPDM Liner, 0% Leakage to 200 psi (2" to 6" & 12"), 150 psi (14" +) <b>L</b> = Stainless Disc, Ductile Iron Body, EPDM Liner, 0% Leakage to 200 psi (8" to 12") <b>VIC</b> = Ductile Iron Grooved End Body, Nickel Coated Ductile Iron Disc, 0% Leakage up to 200 psi <b>-150SHP</b> = ANSI Class 150, Stainless Disc, Steel Body, RPTFE Seat, 0% Leakage up to 285 psi <b>-300SHP</b> = ANSI Class 300, Stainless Disc, Steel Body, RPTFE Seat, 0% Leakage up to 600 psi	<b>Actuator Type</b> <b>Non-Spring Return</b> ARB, ARX AMB, AMX GMB, GMX GRB, GRX GR/GM... N4(H) DRB, DRX DR... N4(H) PRB, PRX SY <b>Electronic Fail-Safe</b> GKB, GKX DKRB, DKRX DKR...N4(H) PKRX <b>Spring Return</b> AFB, AFX AFRB, AFRX	<b>Power Supply</b> -24 = 24 VAC/DC -110 = 110/120 VAC -120 = 120 VAC -230 = 230 VAC UP = 24-240 VAC or 24-125 VDC	<b>Control</b> -3-X1 = On/Off, Floating Point MFT or MFT-X1 = Multi-Function Technology	-S = Built-in Auxiliary Switch N4 = NEMA 4/4X N4H = NEMA 4 with Heater -T = Terminal Block	-200 = 8" -250 = 10" L Series Only

"X" models are customizable.  
Refer to page 12 for programming options.

## Ordering Example



# Resilient Seat Butterfly Valve Product Range

		2-way		Suitable Actuators						
		Valve Nominal Size		Type	Non-Spring Return			Spring Return	Electronic Fail-Safe	
C <sub>v</sub> 90°	C <sub>v</sub> 60°	IN	DN [mm]	2-way	HDU LU	L	HD	HD	L	HD
115	44	2	50	F650			AR			
196	75	2½	65	F665			GR Series	AF Series		
302	116	3	80	F680	AR GR					GKR
600	230	4	100	F6100	GR	DR				DKR
1022	392	5	125	F6125			PR Series			
1579	605	6	150	F6150	DR					PKR Series
3136	1202	8	200	F6200L	PR	PR			PKR	
5340	2047	10	250	F6250L						
8250	3162	12	300	F6300L						
11917	4568	14	350	F6350						
16388	6282	16	400	F6400						
21705	8320	18	450	F6450						
27908	10698	20	500	F6500						
43116	16528	24	600	F6600						

		3-way		Suitable Actuators						
		Valve Nominal Size		Type	Non-Spring Return			Spring Return	Electronic Fail-Safe	
C <sub>v</sub> 90°	C <sub>v</sub> 60°	IN	DN [mm]	3-way	HDU	L	HD	HD	L	HD
115	44	2	50	F750			AM			
196	75	2½	65	F765				AF		
302	116	3	80	F780	GM					GK
600	230	4	100	F7100						
1022	392	5	125	F7125	2*GM Series		PR Series			PKR Series
1579	605	6	150	F7150						
3136	1202	8	200	F7200L						
5340	2047	10	250	F7250L		PR			PKR	
8250	3162	12	300	F7300L						
11917	4568	14	350	F7350						
16388	6282	16	400	F7400						
21705	8320	18	450	F7450						



## Mode of Operation

Butterfly valves are capable of handling higher flow rates with relatively low pressure loss. These valves may be used for isolation (shut-off) service or throttling service within a range of 0-60 degrees for two-way valves. Butterfly valves are controlled with a maintenance-free electronic actuator or manually with an ergonomic handle or gear operator.

## Product Features

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

## Actuator Specifications

Control type	on/off, floating point, modulating, 2-10 VDC, multi-function technology (MFT)
Manual override	all models
Electrical connection	3 ft. [1 m] cable terminal block

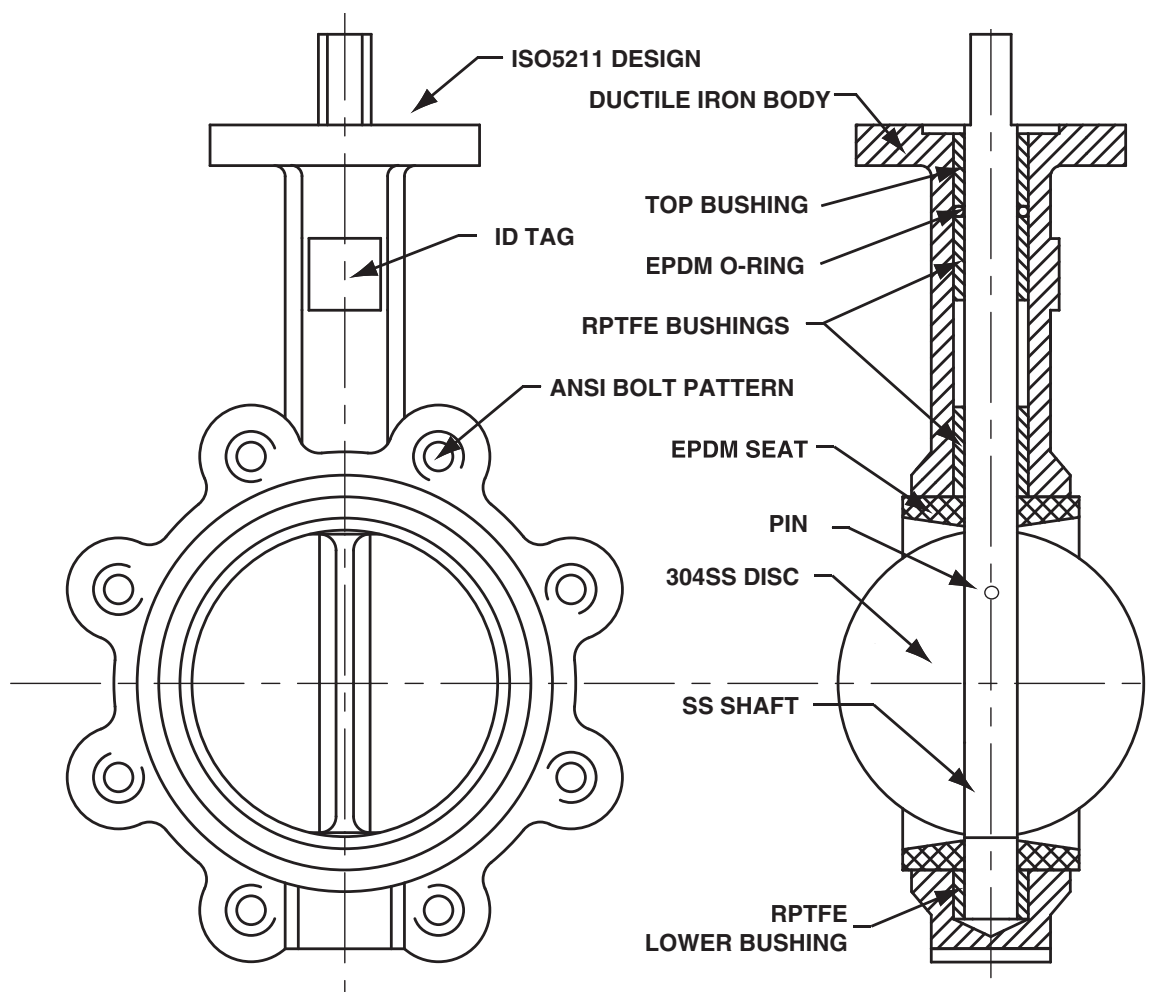
## Valve Specifications

Service	chilled, hot water, 60% glycol
Flow characteristic	F6 modified equal percentage F7 modified linear
Sizes	2" to 24"
End fitting	for ASME/ANSI Class 125/150 flanges
Materials	
Body	ductile iron ASTM A536
Body finish	HD Series: epoxy powder coat L Series: polyester powder coat
Disc	304 stainless steel
Shaft	HD Series: 416 stainless steel L Series: 420 stainless steel
Seat	EPDM
O-rings	EPDM
Bushings	HD Series: RPTFE L Series: bronze, steel, PTFE
Media (water) temp. range	-22°F to +250°F [-30°C to +120°C]
Body pressure rating	consistent with ASME/ANSI Class 125
Close-off pressure	HDU, LU: 50 psi, 3" to 10" HD: 200 psi, 2" to 6", & 12" 150 psi, 14" to 24" L Series: 200 psi
Rangeability	10:1
Maximum velocity	12 FPS
Leakage	0%

Belimo resilient seat HD and L Series Butterfly Valves are designed for use in ANSI Class 150 piping systems and are supplied in standard lug style body designs.

### VALVE DESIGN FEATURES

- Unique seat and disc design ensures positive valve sealing while maintaining low seating torque
- Butterfly valve discs are precision machined to half ball profile, providing a precise disc-to-seat relationship
- Cartridge style seat incorporates an elastomer bonded to a phenolic stabilizing ring, eliminating elastomer movement and reducing seat tearing or fatiguing due to bunching
- Cartridge seat has a much smaller mass of elastomer than traditional boot seat designs, limiting seat swell and the accompanying variations in seating torque
- The five bushing design completely isolates the valve shaft from the body, resulting in increased control of the valve disc, lower valve seating torque, and longer valve life
- Ductile Iron Full Lug Bodies
- EPDM liner
- Stainless Steel Disc
- Three Models to suit the application:
  - HDU/LU Series provides undercut disc to 50 psi
  - HD Series provides full-rated close-off to 200 psi (2" to 6") or 150 psi (12" to 24")
  - L Series provides full-rated close-off to 200 psi (8" to 12")
- 2-way and 3-way applications



# Butterfly Valve Selection

## HD, L Series Valves, 3-way Configuration



D163\_12



CONFIG CODE	ON/OFF OR MOD@2 VDC MASTER VALVE IS	MASTER 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 MASTER VALVE IS	MASTER 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 MASTER VALVE IS	MASTER 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. Slave Valve operates inversely of the Master Valve.
  2. The Master Valve is always located on the run.
  3. The Slave 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 or field programming via NFC app.
  6. All 3-way assemblies are designed for 90 degree actuator rotation.
  7. Actuators installed default over Master Valve.

Flow in Schedule 40 Pipe (Fluid Velocity in GPM). Use with HD/L Series Butterfly Valves.							
VALVE	SIZE	2 FPS	4 FPS	6 FPS	8 FPS	10 FPS	12 FPS
HD	2"	19	39	59	78	98	117
HD	2½"	30	61	92	122	153	184
HD	3"	44	88	132	176	220	264
HD	4"	78	157	235	313	392	470
HD	5"	122	245	367	490	612	734
HD	6"	176	352	529	705	881	1058
L	8"	313	627	940	1253	1567	1880
L	10"	490	979	1469	1958	2448	2738
L	12"	705	1410	2115	2820	3525	4230
HD	14"	959	1919	2879	3838	4798	5758
HD	16"	1253	2507	3760	5013	6267	7520
HD	18"	1586	3173	4759	6345	7931	9518
HD	20"	1958	3917	5875	7834	9792	11750
HD	24"	2820	5640	8460	11280	14100	16921

It is not recommended to exceed 12 feet per second through resilient seat butterfly valves.

Velocities greater than 12 fps may damage the valve liner and disc. Torque may increase, potentially exceeding the actuator's capacity.



SERIES	MODEL	Run Time(s) 90° @60Hz	Power Supply	Duty Cycle	CONTROL TYPE			
					Modulating	3 Point	On/Off	Feedback
PR	PRBUP-3-T*	35 seconds	24-240 VAC/ 24-125 VDC, 50/60 Hz	100%		•	•	none
	PRXUP-3-T*	35, 30 - 120 seconds	24-240 VAC/ 24-125 VDC, 50/60 Hz	100%		•	•	none
	PRXUP-MFT-T*	35, 30 - 120 seconds	24-240 VAC/ 24-125 VDC, 50/60 Hz	100%	•			2-10 VDC
PKR	PKRXUP-MFT-T*	35, 30 - 120 seconds	24-240 VAC/ 24-125 VDC, 50/60 Hz	100%	•			2-10 VDC
SY1	SY1-110	12 seconds	120 VAC ±10%, 50/60 Hz	30%		•	•	none, opt 1k
	SY1-24	20 seconds	24 VAC ±10%, 50/60 Hz	30%		•	•	none, opt 1k
	SY1-220	11 seconds	230 VAC ±10%, 50/60 Hz	30%		•	•	none, opt 1k
	SY1-110P	18 seconds	120 VAC ±10%, 50/60 Hz	75%	•			2-10 VDC
	SY1-24P	15 seconds	24 VAC ±10%, 50/60 Hz	75%	•			2-10 VDC
	SY1-220P	16 seconds	230 VAC ±10%, 50/60 Hz	75%	•			2-10 VDC
SY4	SY4-110	18 seconds	120 VAC ±10%, 50/60 Hz	30%		•	•	none, opt 1k
	SY4-24	30 seconds	24 VAC ±10%, 50/60 Hz	30%		•	•	none, opt 1k
	SY4-220	18 seconds	230 VAC ±10%, 50/60 Hz	30%		•	•	none, opt 1k
	SY4-24MFT	23 seconds	24 VAC ±10%, 50/60 Hz	75%	•			2-10 VDC
	SY4-120MFT	17 seconds	120 VAC ±10%, 50/60 Hz	75%	•			2-10 VDC
	SY4-230MFT	17 seconds	230 VAC ±10%, 50/60 Hz	75%	•			2-10 VDC
SY5	SY5-110	25 seconds	120 VAC ±10%, 50/60 Hz	30%		•	•	none, opt 1k
	SY5-24	35 seconds	24 VAC ±10%, 50/60 Hz	30%		•	•	none, opt 1k
	SY5-220	25 seconds	230 VAC ±10%, 50/60 Hz	30%		•	•	none, opt 1k
	SY5-24MFT	29 seconds	24 VAC ±10%, 50/60 Hz	75%	•			2-10 VDC
	SY5-120MFT	21 seconds	120 VAC ±10%, 50/60 Hz	75%	•			2-10 VDC
	SY5-230MFT	22 seconds	230 VAC ±10%, 50/60 Hz	75%	•			2-10 VDC
SY6	SY6-110	36 seconds	120 VAC ±10%, 50/60 Hz	30%		•	•	none, opt 1k
	SY6-220	31 seconds	230 VAC ±10%, 50/60 Hz	30%		•	•	none, opt 1k
	SY6-120MFT	29 seconds	120 VAC ±10%, 50/60 Hz	75%	•			2-10 VDC
	SY6-230MFT	32 seconds	230 VAC ±10%, 50/60 Hz	75%	•			2-10 VDC
SY7	SY7-110	49 seconds	120 VAC ±10%, 50/60 Hz	30%		•	•	none, opt 1k
	SY7-220	48 seconds	230 VAC ±10%, 50/60 Hz	30%		•	•	none, opt 1k
	SY7-120MFT	44 seconds	120 VAC ±10%, 50/60 Hz	75%	•			2-10 VDC
	SY7-230MFT	44 seconds	230 VAC ±10%, 50/60 Hz	75%	•			2-10 VDC
SY8	SY8-110	50 seconds	120 VAC ±10%, 50/60 Hz	30%		•	•	none, opt 1k
	SY8-220	49 seconds	230 VAC ±10%, 50/60 Hz	30%		•	•	none, opt 1k
	SY8-120MFT	48 seconds	120 VAC ±10%, 50/60 Hz	75%	•			2-10 VDC
	SY8-230MFT	57 seconds	230 VAC ±10%, 50/60 Hz	75%	•			2-10 VDC
SY9	SY9-110	57 seconds	120 VAC ±10%, 50/60 Hz	30%		•	•	none, opt 1k
	SY9-220	57 seconds	230 VAC ±10%, 50/60 Hz	30%		•	•	none, opt 1k
	SY9-120MFT	47 seconds	120 VAC ±10%, 50/60 Hz	50%	•			2-10 VDC
	SY9-230MFT	61 seconds	230 VAC ±10%, 50/60 Hz	50%	•			2-10 VDC
SY10	SY10-110	62 seconds	120 VAC ±10%, 50/60 Hz	30%		•	•	none, opt 1k
	SY10-220	62 seconds	230 VAC ±10%, 50/60 Hz	30%		•	•	none, opt 1k
	SY10-120MFT	51 seconds	120 VAC ±10%, 50/60 Hz	50%	•			2-10 VDC
	SY10-230MFT	70 seconds	230 VAC ±10%, 50/60 Hz	50%	•			2-10 VDC
SY11	SY11-110	69 seconds	120 VAC ±10%, 50/60 Hz	30%		•	•	none, opt 1k
	SY11-220	64 seconds	230 VAC ±10%, 50/60 Hz	30%		•	•	none, opt 1k
	SY11-120MFT	56 seconds	120 VAC ±10%, 50/60 Hz	50%	•			2-10 VDC
	SY11-230MFT	48 seconds	230 VAC ±10%, 50/60 Hz	50%	•			2-10 VDC
SY12	SY12-110	60 seconds	120 VAC ±10%, 50/60 Hz	30%		•	•	none, opt 1k
	SY12-220	61 seconds	230 VAC ±10%, 50/60 Hz	30%		•	•	none, opt 1k
	SY12-120MFT	62 seconds	120 VAC ±10%, 50/60 Hz	50%	•			2-10 VDC
	SY12-230MFT	51 seconds	230 VAC ±10%, 50/60 Hz	50%	•			2-10 VDC

Modulating actuators will accept 0-10 VDC or 2-10 VDC control signals as standard.

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

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

\*-200 and -250 versions have the same ratings.



## Power Supply

## 24 VAC/VDC Single Phase

Model	Torque	Speed 50 Hz/60 Hz	Current Draw (50 Hz)	Current Draw (60 Hz)	W (50 Hz)	W (60 Hz)	VA (50 Hz)	VA (60 Hz)	Override	Weight
PRBUP-3-T*	1400 in-lbs/ 160 Nm	35 seconds	0.8 A	0.8 A	20	20	20	20	Manual override crank	5.8 kg/12.8 lbs.
PRXUP-3-T*	1400 in-lbs/ 160 Nm	35, 30-120 seconds	0.8 A	0.8 A	20	20	20	20	Manual override crank	5.8 kg/12.8 lbs.
SY1-24	310 in-lbs/ 35 Nm	20 seconds	1.6 A	1.7 A	30	29	38	41	8 mm Wrench Required	2.0 kg/4.9 lbs.
SY4-24	3540 in-lbs/ 400 Nm	30 seconds	9.5 A	9.5 A	208	212	228	228	Hand Wheel	22 kg/48.5 lbs.
SY5-24	4430 in-lbs/ 500 Nm	35 seconds	9.3 A	9.4 A	178	168	223	227	Hand Wheel	22 kg/48.5 lbs.

## Power Supply

## 120 VAC Single Phase

Model	Torque	Speed 50 Hz	Speed 60 Hz	Current Draw (50 Hz)	Current Draw (60 Hz)	W (50 Hz)	W (60 Hz)	VA (50 Hz)	VA (60 Hz)	Override	Weight
PRBUP-3-T*	1400 in-lbs/ 160 Nm	35 seconds	35 seconds	0.2 A	0.2 A	18	18	23	23	Manual override crank	5.8 kg/12.8 lbs.
PRXUP-3-T*	1400 in-lbs/ 160 Nm	35, 30-120 seconds	35, 30-120 seconds	0.2 A	0.2 A	18	18	23	23	Manual override crank	5.8 kg/12.8 lbs.
SY1-110	310 in-lbs/ 35 Nm	17 seconds	12 seconds	0.8 A	0.7 A	81	75	96	84	8 mm Wrench Required	2.0 kg/4.9 lbs.
SY4-110	3540 in-lbs/ 400 Nm	21 seconds	18 seconds	2.2 A	1.8 A	240	196	264	216	Hand Wheel	22 kg/48.5 lbs.
SY5-110	4430 in-lbs/ 500 Nm	29 seconds	25 seconds	2.2 A	1.8 A	242	193	264	216	Hand Wheel	22 kg/48.5 lbs.
SY6-110	5750 in-lbs/ 650 Nm	37 seconds	32 seconds	2.2 A	1.8 A	247	198	264	216	Hand Wheel	22 kg/48.5 lbs.
SY7-110	8850 in-lbs/ 1000 Nm	59 seconds	49 seconds	6.4 A	3.5 A	670	385	768	420	Hand Wheel	36 kg/79.5 lbs.
SY8-110	13280 in-lbs/ 1500 Nm	60 seconds	50 seconds	8.2 A	4.8 A	847	514	984	576	Hand Wheel	36 kg/79.5 lbs.
SY9-110	17700 in-lbs/ 2000 Nm	68 seconds	57 seconds	2.7 A	2.8 A	304	311	324	336	Hand Wheel	72 kg/176.4 lbs.
SY10-110	22130 in-lbs/ 2500 Nm	75 seconds	62 seconds	2.8 A	2.9 A	318	335	336	348	Hand Wheel	72 kg/176.4 lbs.
SY11-110	26550 in-lbs/ 3000 Nm	78 seconds	69 seconds	3.3 A	3.6 A	365	387	396	432	Hand Wheel	72 kg/176.4 lbs.
SY12-110	30980 in-lbs/ 3500 Nm	72 seconds	60 seconds	3.7 A	3.8 A	415	422	444	456	Hand Wheel	72 kg/176.4 lbs.

## Power Supply

## 230 VAC Single Phase

Model	Torque	Speed 50 Hz	Speed 60 Hz	Current Draw (50 Hz)	Current Draw (60 Hz)	W (50 Hz)	W (60 Hz)	VA (50 Hz)	VA (60 Hz)	Override	Weight
PRBUP-3-T*	1400 in-lbs/ 160 Nm	35 sec.	35 sec.	0.2 A	0.2 A	20	20	52	52	Manual override crank	5.8 kg/12.8 lbs.
PRXUP-3-T*	1400 in-lbs/ 160 Nm	35, 30-120 sec.	35, 30-120 sec.	0.2 A	0.2 A	20	20	52	52	Manual override crank	5.8 kg/12.8 lbs.
SY1-220	310 in-lbs/ 35 Nm	14 seconds	11 seconds	0.4 A	0.4 A	68	69	92	92	8mm Wrench Required	2.0 kg/4.9 lbs.
SY4-220	3540 in-lbs/ 400 Nm	21 seconds	18 seconds	1.1 A	0.9 A	221	180	253	207	Hand Wheel	22 kg/48.5 lbs.
SY5-220	4430 in-lbs/ 500 Nm	29 seconds	25 seconds	1.1 A	0.9 A	216	179	253	207	Hand Wheel	22 kg/48.5 lbs.
SY6-220	5750 in-lbs/ 650 Nm	38 seconds	31 seconds	1.0 A	0.9 A	193	177	230	207	Hand Wheel	22 kg/48.5 lbs.
SY7-220	8850 in-lbs/ 1000 Nm	58 seconds	48 seconds	1.8 A	1.4 A	381	290	414	322	Hand Wheel	36 kg/79.5 lbs.
SY8-220	13280 in-lbs/ 1500 Nm	59 seconds	49 seconds	1.9 A	1.4 A	428	294	437	322	Hand Wheel	36 kg/79.5 lbs.
SY9-220	17700 in-lbs/ 2000 Nm	68 seconds	57 seconds	1.6 A	2.4 A	356	509	368	552	Hand Wheel	72 kg/176.4 lbs.
SY10-220	22130 in-lbs/ 2500 Nm	73 seconds	62 seconds	1.7 A	2.5 A	377	531	391	579	Hand Wheel	72 kg/176.4 lbs.
SY11-220	26550 in-lbs/ 3000 Nm	46 seconds	64 seconds	1.8 A	2.5 A	397	547	414	579	Hand Wheel	72 kg/176.4 lbs.
SY12-220	30980 in-lbs/ 3500 Nm	74 seconds	61 seconds	1.8 A	2.4 A	409	505	414	552	Hand Wheel	72 kg/176.4 lbs.

\*-200 and -250 versions have the same ratings.

## Power Supply

### 24 VAC/VDC Single Phase

Model	Torque	Speed 50 Hz/60 Hz	Current Draw (50 Hz)	Current Draw (60 Hz)	W (50 Hz)	W (60 Hz)	VA (50 Hz)	VA (60 Hz)	Override	Weight
PRXUP-MFT-T*	1400 in-lbs/160 Nm	30-120 sec.	0.9 A	0.9 A	20	20	20	20	Manual override crank	5.8 kg/12.8 lbs.
PKRXUP-MFT-T*	1400 in-lbs/160 Nm	30-120 sec.	2.2 A	2.2 A	52	52	55	55	Manual override crank	6.4 kg/14.1 lbs.
SY1-24P	310 in-lbs/ 35 Nm	15 seconds	2.0 A	2.0 A	32	33	48	48	8 mm Wrench Required	2.0 kg/4.9 lbs.
SY4-24MFT	3540 in-lbs/ 400 Nm	23 seconds	11.0 A	11.0 A	254	251	264	264	Hand Wheel	22 kg/48.5 lbs.
SY5-24MFT	4430 in-lbs/ 500 Nm	30 seconds	10.2 A	10.2 A	232	230	245	245	Hand Wheel	22 kg/48.5 lbs.

## Power Supply

### 120 VAC Single Phase

Model	Torque	Speed 50 Hz	Speed 60 Hz	Current Draw (50 Hz)	Current Draw (60 Hz)	W (50 Hz)	W (60 Hz)	VA (50 Hz)	VA (60 Hz)	Override	Weight
PRXUP-MFT-T*	1400 in-lbs/160 Nm	30-120 sec.	30-120 sec.	0.2 A	0.2 A	18	18	23	23	Manual override crank	5.8 kg/12.8 lbs.
PKRXUP-MFT-T*	1400 in-lbs/160 Nm	30-120 sec.	30-120 sec.	0.3 A	0.3 A	40	40	43	43	Manual override crank	6.4 kg/14.1 lbs.
SY1-110P	310 in-lbs/ 35 Nm	18 seconds	18 seconds	0.6 A	0.6 A	56	58	72	72	8mm Wrench Required	2.0 kg/4.9 lbs.
SY4-120MFT	3540 in-lbs/ 400 Nm	16 seconds	17 seconds	2.3 A	2.4 A	258	256	276	288	Hand Wheel	22 kg/48.5 lbs.
SY5-120MFT	4430 in-lbs/ 500 Nm	21 seconds	21 seconds	2.3 A	2.3 A	216	208	276	276	Hand Wheel	22 kg/48.5 lbs.
SY6-120MFT	5750 in-lbs/ 650 Nm	28 seconds	29 seconds	2.2 A	2.2 A	240	236	264	264	Hand Wheel	22 kg/48.5 lbs.
SY7-120MFT	8850 in-lbs/ 1000 Nm	41 seconds	44 seconds	1.8 A	1.7 A	198	192	216	204	Hand Wheel	36 kg/79.5 lbs.
SY8-120MFT	13280 in-lbs/ 1500 Nm	48 seconds	48 seconds	2.6 A	2.6 A	275	266	312	312	Hand Wheel	36 kg/79.5 lbs.
SY9-120MFT	17700 in-lbs/ 2000 Nm	47 seconds	47 seconds	3.6 A	3.4 A	397	382	432	408	Hand Wheel	72 kg/176.4 lbs.
SY10-120MFT	22130 in-lbs/ 2500 Nm	52 seconds	51 seconds	4.0 A	4.0 A	450	445	480	480	Hand Wheel	72 kg/176.4 lbs.
SY11-120MFT	26550 in-lbs/ 3000 Nm	55 seconds	56 seconds	3.1 A	3.0 A	332	318	372	360	Hand Wheel	72 kg/176.4 lbs.
SY12-120MFT	30980 in-lbs/ 3500 Nm	61 seconds	62 seconds	3.6 A	3.4 A	386	368	432	408	Hand Wheel	72 kg/176.4 lbs.

## Power Supply

### 230 VAC Single Phase

Model	Torque	Speed 50 Hz	Speed 60 Hz	Current Draw (50 Hz)	Current Draw (60 Hz)	W (50 Hz)	W (60 Hz)	VA (50 Hz)	VA (60 Hz)	Override	Weight
PRXUP-MFT-T*	1400 in-lbs/160 Nm	30-120 sec.	30-120 sec.	0.1 A	0.1 A	20	20	52	52	Manual override crank	5.8 kg/12.8 lbs.
PKRXUP-MFT-T*	1400 in-lbs/160 Nm	30-120 sec.	30-120 sec.	0.2 A	0.2 A	40	40	68	68	Manual override crank	6.4 kg/14.1 lbs.
SY1-220P	310 in-lbs/ 35 Nm	16 seconds	16 seconds	0.4 A	0.4 A	64	62	92	92	8mm Wrench Required	2.0 kg/4.9 lbs.
SY4-230MFT	3540 in-lbs/ 400 Nm	16 seconds	17 seconds	1.1 A	1.1 A	222	217	253	253	Hand Wheel	22 kg/48.5 lbs.
SY5-230MFT	4430 in-lbs/ 500 Nm	22 seconds	22 seconds	1.1 A	1.0 A	211	200	253	230	Hand Wheel	22 kg/48.5 lbs.
SY6-230MFT	5750 in-lbs/ 650 Nm	32 seconds	32 seconds	1.1 A	1.1 A	236	232	253	253	Hand Wheel	22 kg/48.5 lbs.
SY7-230MFT	8850 in-lbs/ 1000 Nm	44 seconds	44 seconds	0.9 A	0.8 A	167	157	207	184	Hand Wheel	36 kg/79.5 lbs.
SY8-230MFT	13280 in-lbs/ 1500 Nm	55 seconds	57 seconds	1.3 A	1.4 A	288	286	299	322	Hand Wheel	36 kg/79.5 lbs.
SY9-230MFT	17700 in-lbs/ 2000 Nm	61 seconds	61 seconds	1.1 A	1.1 A	240	233	253	253	Hand Wheel	72 kg/176.4 lbs.
SY10-230MFT	22130 in-lbs/ 2500 Nm	72 seconds	70 seconds	1.4 A	1.4 A	277	284	322	322	Hand Wheel	72 kg/176.4 lbs.
SY11-230MFT	26550 in-lbs/ 3000 Nm	44 seconds	48 seconds	2.0 A	1.9 A	376	363	460	437	Hand Wheel	72 kg/176.4 lbs.
SY12-230MFT	30980 in-lbs/ 3500 Nm	47 seconds	51 seconds	2.2 A	2.0 A	490	456	506	460	Hand Wheel	72 kg/176.4 lbs.

\*-200 and -250 versions have the same ratings.

24 VAC					
	SY1	SY2	SY3	SY4	SY5
	Amps	Amps	Amps	Amps	Amps
wire gauge	2.00	3.60	3.60	11.00	10.20
MAX Distance between Actuator and Supply (feet)					
18	77	43	43		
16	122	68	68	22	24
14	195	108	108	35	38
12	310	172	172	56	60
10	493	273	273	89	96
8	784	435	435	142	153

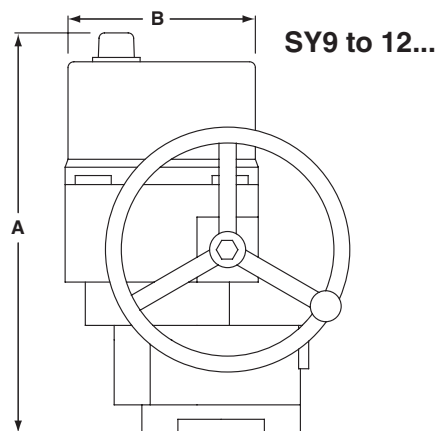
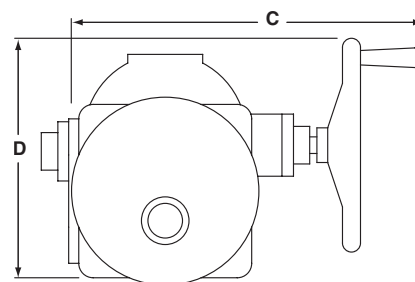
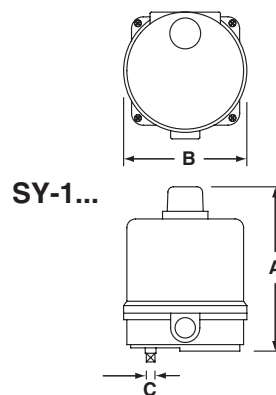
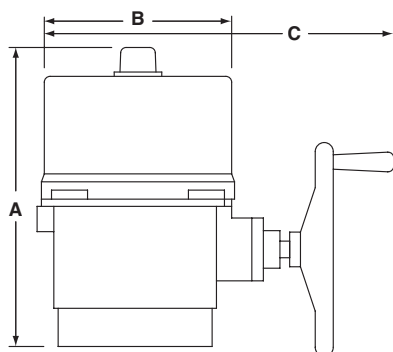
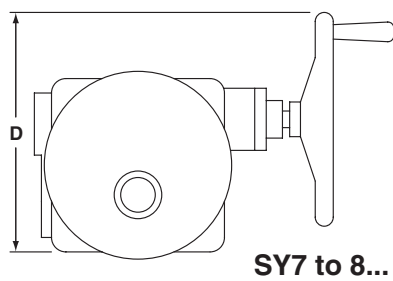
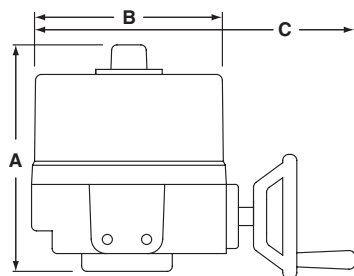
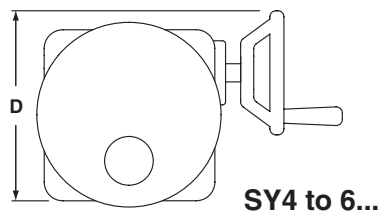
110 VAC											
	SY1	SY2	SY3	SY4	SY5	SY6	SY7	SY8	SY9	SY10	SY12
	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps
wire gauge	0.6	0.7	0.7	2.4	2.3	2.2	1.7	2.6	3.4	4.0	3.4
MAX Distance between Actuator and Supply (feet)											
18	1287	1103	1103	322	336	351	454	297	227	193	227
16	2042	1750	1750	511	533	557	721	471	360	306	360
14	3253	2788	2788	813	849	887	1148	751	574	488	574
12	5167	4429	4429	1292	1348	1409	1824	1192	912	775	912
10	8218	7044	7044	2054	2144	2241	2900	1896	1450	1233	1450
8	13072	11205	11205	3268	3410	3565	4614	3017	2307	1961	2307

220 VAC											
	SY1	SY2	SY3	SY4	SY5	SY6	SY7	SY8	SY9	SY10	SY12
	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps
wire gauge	0.4	0.4	0.4	1.1	1.0	1.1	0.8	1	1.1	1	2.0
MAX Distance between Actuator and Supply (feet)											
18	3701	3701	3701	1346	1480	1346	1851	1057	1346	1057	740
16	5871	5871	5871	2135	2348	2135	3935	1677	2135	1677	1174
14	9352	9352	9352	3401	3741	3401	4676	2672	3401	2672	1870
12	14854	14854	14854	5402	5942	5402	7427	4244	5402	4244	2971
10	23627	23627	23627	8592	9451	8592	11813	6750	8592	6750	4725
8	37583	37583	37583	13666	15033	13666	18791	10738	13666	10738	7517

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.

# SY... Series Non-Spring Return Actuator

## Dimensions



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]
SY1	6.10 [155]	3.94 [100]	4.25 [108]	8mm	-
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]

## Standard Actuation (Average Assembly Weights)

					ACTUATOR								
					NON-SPRING RETURN				SPRING RETURN		ELECTRONIC FAIL-SAFE		
					AMB(X)	GMB(X)	2*GMB(X)	PR	AF...	2*AF...	GK...	2*GK...	PKR...
FULL RATED MODELS	2-WAY	Size	Valve	Max GPM	COP								
		2"	F650HD	118	200	13 lbs.				14 lbs.			
		2.5"	F665HD	184	200	13 lbs.							
		3"	F680HD	264	200		15 lbs.			24 lbs.	161 lbs.	32 lbs.	
		4"	F6100HD	470	200			30 lbs.	35 lbs.	25 lbs.			37 lbs.
		5"	F6125HD	734	200				39 lbs.				41 lbs.
		6"	F6150HD	1,058	200				43 lbs.				45 lbs.
		8"	F6200L	1,880	200				55 lbs.				57 lbs.
		10"	F6250L	2,738	200				75 lbs.				77 lbs.
		12"	F6300L	4,230	200				110 lbs.				111 lbs.
	3-WAY	2"	F750HD	118	200	44 lbs.				46 lbs.			
		2.5"	F765HD	184	200		55 lbs.				65 lbs.	56 lbs.	
		3"	F780HD	264	200			72 lbs.					
		4"	F7100HD	470	200			122 lbs.	126 lbs.			74 lbs.	
		5"	F7125HD	734	200				157 lbs.			124 lbs.	128 lbs.
		6"	F7150HD	1,058	200				191 lbs.				159 lbs.
		8"	F7200L	1,880	200				266 lbs.				193 lbs.
		10"	F7250L	2,738	200				421 lbs.				268 lbs.
		12"	F7300L	4,230	200				586 lbs.				423 lbs.
													588 lbs.

**Max GPM** = Maximum US gallons of water (gpm) per minute, at room temperature, that will flow through the fully open valve without exceeding design velocity limits.

**COP** = Close-Off Pressure stated in psi. This is the maximum differential pressure the valve will close-off against while maintaining a bubble tight seal.

All SY series actuators are NEMA 4X rated and include 2 auxiliary switches and a heater.

## HD Series Industrial Actuation (Average Assembly Weights)

					ACTUATOR							
					NON-SPRING RETURN							
					PR...	SY4...	SY6...	SY7...	SY8...	SY10...	SY12...	
FULL RATED MODELS	2-WAY	Size	Valve	Max GPM	COP							
		2"	F650HD	118	200	16 lbs.						
		2.5"	F665HD	184	200	16 lbs.						
		3"	F680HD	264	200	16 lbs.						
		4"	F6100HD	470	200	26 lbs.						
		5"	F6125HD	734	200	30 lbs.						
		6"	F6150HD	1058	200	34 lbs.						
		12"	F6300HD	4230	200		122 lbs.					
	3-WAY	14"	F6350HD	5758	150		131 lbs.					
		16"	F6400HD	7520	150			197 lbs.				
		18"	F6450HD	9518	150				272 lbs.			
		20"	F6500HD	11750	150					241 lbs.		
		24"	F6600HD	16921	150						332 lbs.	
		2"	F750HD	118	200	45 lbs.						
		2.5"	F765HD	184	200	57 lbs.						
		3"	F780HD	264	200	64 lbs.						
		4"	F7100HD	470	200	114 lbs.						
		5"	F7125HD	734	200	143 lbs.						
		6"	F7150HD	1058	200	177 lbs.						
		12"	F7300HD	4230	200		603 lbs.					
		14"	F7350HD	5758	150			785 lbs.				
		16"	F7400HD	7520	150				1140 lbs.			
		18"	F7450HD	9518	150					1408 lbs.		
		20"	F7500HD	11750	150					1599 lbs.		
		24"	F7600HD	16921	150						2419 lbs.	

**Max GPM** = Maximum US gallons of water (gpm) per minute, at room temperature, that will flow through the fully open valve without exceeding design velocity limits.

**COP** = Close-Off Pressure stated in psi. This is the maximum differential pressure the valve will close-off against while maintaining a bubble tight seal.

All SY series actuators are NEMA 4X rated and include 2 auxiliary switches and a heater.

# Customize Products

## Default and MFT Programming Codes



				CONTROL			
ACTUATOR TYPE		CONFIGURATION DESCRIPTION	CODE	CONTROL INPUT	FEEDBACK POSITION	RUNNING TIME**	
Standard Actuator Series: AR, AM, GR, GM, GKR, AFR, AF, DKR	-MFT	P-10001*	A01*	2-10 VDC	2-10 VDC	150 seconds	
		P-10002	A02	0.5-10 VDC	0-10 VDC	150 seconds	
		P-10003	A03	2-10 VDC	0-5.10 VDC	150 seconds	
		P-10019	A19	2-10 VDC	2-10 VDC	100 seconds	
		P-10028	A28	0.5-10 VDC	0.5-10 VDC	100 seconds	
		P-10063	A63	0.5-4.5 VDC	0.5- 4.5 VDC	150 seconds	
		P-10064	A64	5.5-10 VDC	5.5-10.0 VDC	150 seconds	
		P-20002	W02	0.02 to 5.00 seconds PWM	2-10 VDC	150 seconds	
		P-20003	W03	0.10 to 25.50 seconds PWM	2-10 VDC	150 seconds	
		P-30001	F01	Floating Point	2-10 VDC	150 seconds	
		P-40002	J02	On/Off	2-10 VDC	150 seconds	
PR Series	-3, -T	N/A	L01*	On/Off	N/A	35 seconds	
		N/A	L02	On/Off	N/A	60 seconds	
	-MFT	NC	L05*	2-10 VDC	2-10 VDC	35 seconds	
		NC	L06	2-10 VDC	2-10 VDC	60 seconds	
		NC	L09	0.5-10 VDC	0.5-10 VDC	35 seconds	
		NC	L0A	0.5-10 VDC	0.5-10 VDC	60 seconds	
		NC	L0D	4-20 mA	2-10 VDC	35 seconds	
		NC	L0E	4-20 mA	2-10 VDC	60 seconds	
		NO	L0H	2-10 VDC	2-10 VDC	35 seconds	
		NO	L0J	2-10 VDC	2-10 VDC	60 seconds	
		NO	L0M	0.5-10 VDC	0.5-10 VDC	35 seconds	
		NO	L0R	4-20 mA	2-10 VDC	35 seconds	
	PKR Series	NC-FC	L21	On/Off	2-10 VDC	35 seconds	
		NC-FO	L25	On/Off	2-10 VDC	35 seconds	
		NO-FC	L29	On/Off	2-10 VDC	35 seconds	
		NO-FO	L2D	On/Off	2-10 VDC	35 seconds	
		NC-FC	L31*	2-10 VDC	2-10 VDC	35 seconds	
		NC-FO	L35	2-10 VDC	2-10 VDC	35 seconds	
		NO-FC	L39	2-10 VDC	2-10 VDC	35 seconds	
		NO-FO	L3D	2-10 VDC	2-10 VDC	35 seconds	
		NC-FC	L41	0.5-10 VDC	0.5-10 VDC	35 seconds	
NC-FO		L45	0.5-10 VDC	0.5-10 VDC	35 seconds		
NO-FC		L49	0.5-10 VDC	0.5-10 VDC	35 seconds		
NO-FO		L4D	0.5-10 VDC	0.5-10 VDC	35 seconds		
NC-FC		L51	4-20 mA	2-10 VDC	35 seconds		
NC-FO		L55	4-20 mA	2-10 VDC	35 seconds		
NO-FC		L59	4-20 mA	2-10 VDC	35 seconds		
NO-FO		L5D	4-20 mA	2-10 VDC	35 seconds		
NO-FO		L5E	4-20 mA	2-10 VDC	60 seconds		
SY Series		-MFT	Loss of Signal Stop	ACE*	2-10 VDC	2-10 VDC	Varies (15-20 nom)
			Loss of Signal Stop	ACF	0.5-10 VDC	0.5-10 VDC	Varies (15-20 nom)
	Loss of Signal Stop		ACG	4-20 mA	4-20 mA	Varies (15-20 nom)	
	Loss of Signal Open		ACJ	2-10 VDC	2-10 VDC	Varies (15-20 nom)	
	Loss of Signal Open		ACK	0.5-10 VDC	0.5-10 VDC	Varies (15-20 nom)	
	Loss of Signal Open		ACL	4-20 mA	4-20 mA	Varies (15-20 nom)	
	Loss of Signal Close		ACN	2-10 VDC	2-10 VDC	Varies (15-20 nom)	
	Loss of Signal Close		ACP	0.5-10 VDC	0.5-10 VDC	Varies (15-20 nom)	
	Loss of Signal Close		ACR	4-20 mA	4-20 mA	Varies (15-20 nom)	

\*Default configuration

\*\*More running times available upon request

800-543-9038 USA

866-805-7089 CANADA

203-791-8396 LATIN AMERICA / CARIBBEAN

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### Storage of Butterfly Valve Assemblies

- Assemblies must be stored indoors, protected from the elements.
- Materials received on job sites that have long installation lead times should receive extra protection from construction damage.
- Resilient seats must be protected from abrasion, cutting and nicking, as this will damage the liner and may cause flange area leaks.
- Electric actuators cannot be stored in wet, damp or caustic areas.
- Do not store construction material on top of valve assemblies.

### Installation Practices

- HD series butterfly valves are designed to be installed between ANSI 125/150 flat-faced, raised face, slip-on or weld neck flanges.
- Valve should be installed a minimum of 10 pipe diameters from upstream or downstream elbows, strainers, pumps, etc.
- For chilled water, condenser water or hot water applications, the valve should be installed with the stem in a vertical orientation, with the actuator mounted above the valve.
- For applications in which there is a possibility of sediment in the flow, the valve should be installed with the stem in a horizontal position and the bottom of the disc should close FROM the downstream side, rather than from the upstream side.
- Make sure the flange faces are clean and free of rust, scale and debris to prevent damage to the liner face.
- Do NOT use flange gaskets on HD series BFM valves. (Fig. 1a)
- Follow the recommended flange bolting sequence. (Fig. 8, pg. 16)

### Installation using Welded Flanges

- Mount flanges on both sides of valve body and install bolts to properly align valve body and both flanges.
- Install the valve with the disc in the "Almost Closed" position (Fig. 1)
- Do not use any flange gaskets (Fig. 1a)
- Make sure the valve liner and flange internal diameters are in alignment. (Fig. 2)
- Take valve body / flange pair assembly and align with piping ends.
- TACK weld the flanges to the piping in several places. (Fig. 3a)  
Do NOT seam weld at this time!
- Remove the lug bolts and carefully remove the valve body from the flanges.
- Seam weld the entire flange / piping connection for both flanges. (Fig 3b)
- Let the piping components cool completely before re-inserting the valve body. (Fig. 4)

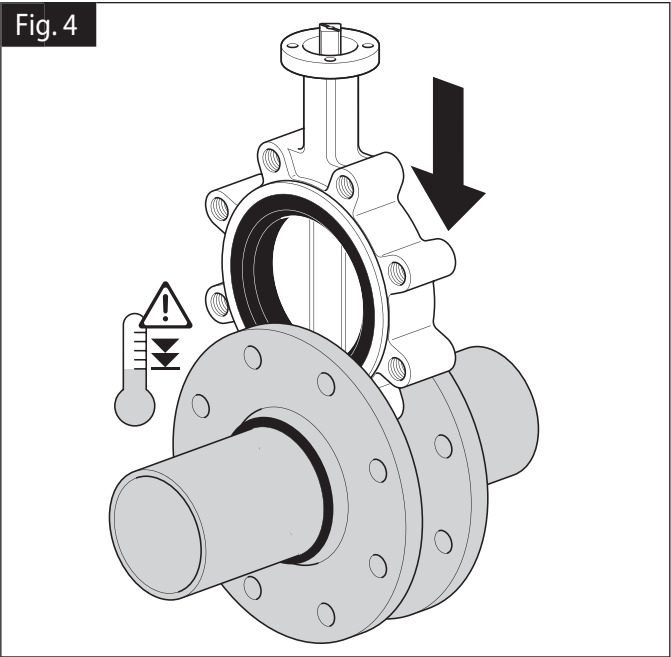
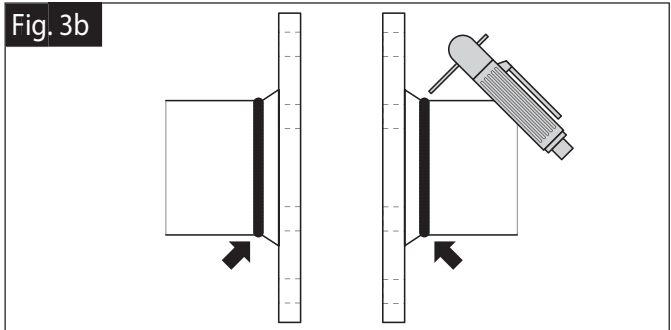
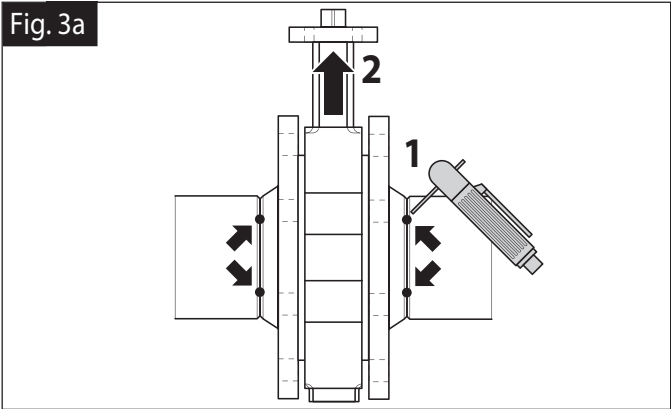
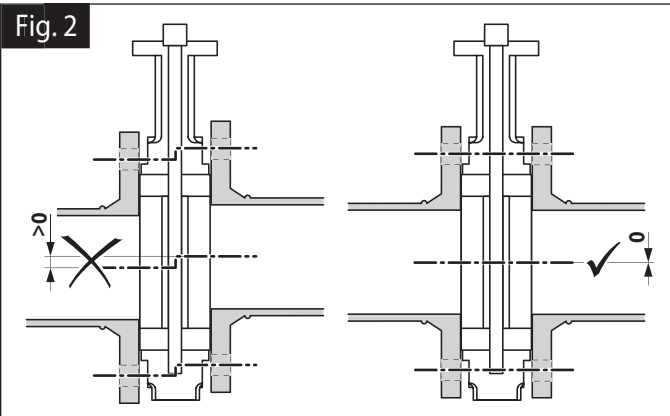
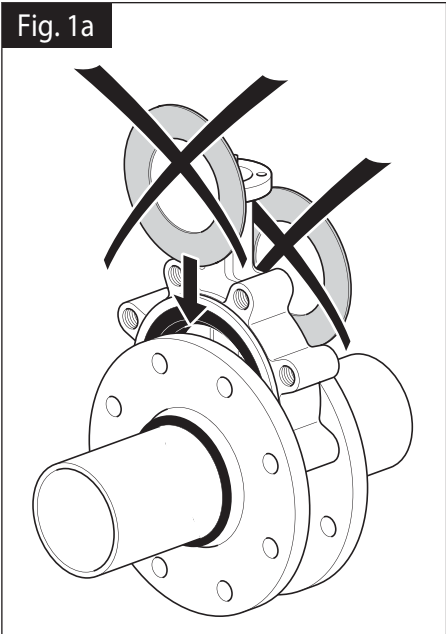
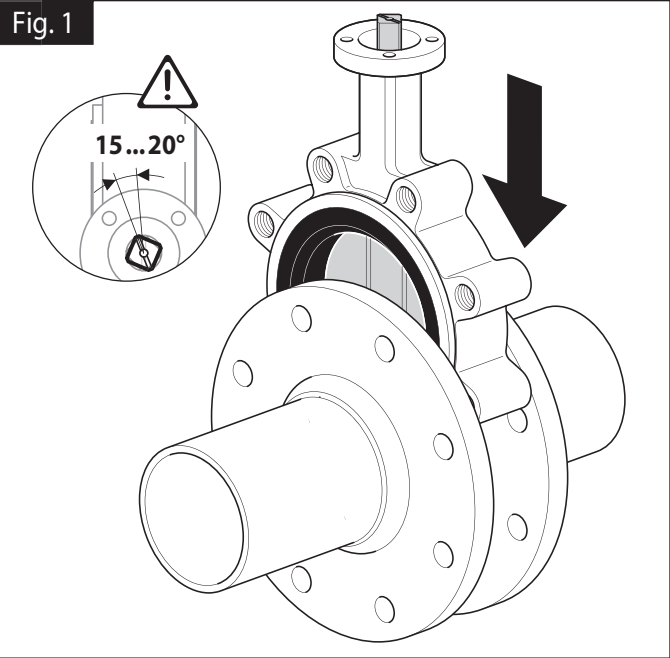
**WARNING!** Seam welding with the valve body installed between the flanges can damage the liner due to heat migration through the flange to the valve body.

#### Max Torque for Bolts

Valve Size	Bolt Size	Max Torque [ft-lbs]
2" - 4"	5/8"	70
5" - 8"	3/4"	120
10" - 12"	7/8"	200
14" - 16"	1"	240
18" - 20"	1 1/8"	380
24" - 30"	1 1/4"	520
32" - 48"	1 1/2"	800
54" - 60"	1 3/4"	1800



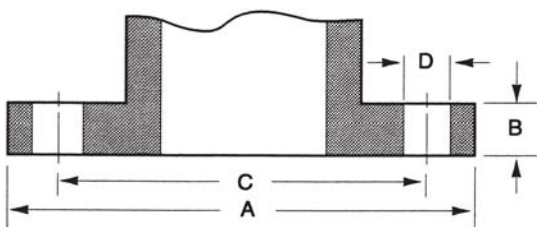
HD Series Butterfly Valves



### FLANGE BOLTING RECOMMENDATIONS

#### Flange Detail for ANSI B16.5 Pipe Flanges

Nominal Pipe Size	FLANGES		DRILLING		BOLTING	
	A Flange Diameter	B Flange Thickness	C Diameter of Bolt Circle	D Diameter of Bolt Holes	Number of Bolts	Diameter of Bolts
2"	6"	3/4"	4 3/4"	3/4"	4	5/8"
2 1/2"	7"	7/8"	5 1/2"	3/4"	4	5/8"
3"	7 1/2"	15/16"	6"	3/4"	4	5/8"
4"	9"	15/16"	7 1/2"	3/4"	8	5/8"
5"	10"	15/16"	8 1/2"	7/8"	8	3/4"
6"	11"	1"	9 1/2"	7/8"	8	3/4"
8"	13 1/2"	1 1/8"	11 3/4"	7/8"	8	3/4"
10"	16"	1 3/16"	14 3/4"	1"	12	7/8"
12"	19"	1 1/4"	17"	1"	12	7/8"
14"	21"	1 3/8"	18 3/4"	1 1/8"	12	1"
16"	23 1/2"	1 7/16"	21 1/4"	1 1/8"	16	1"
18"	25"	1 5/8"	22 3/4"	1 1/4"	16	1 1/8"
20"	27 1/2"	1 11/16"	25"	1 1/4"	20	1 1/8"
24"	32"	1 7/8"	29 1/2"	1 3/8"	20	1 1/4"



#### PRE-INSTALLATION PROCEDURE

1. Remove any protective flange covers from the valve.
2. Inspect the valve to be certain the waterway is free from dirt and foreign matter. Be certain the adjoining pipeline is free from any foreign material such as rust and pipe scale or welding slag that could damage the seat and disc sealing surfaces.
3. Any actuator should be mounted on the valve prior to installation to facilitate proper alignment of the disc in the valve seat.
4. Check the valve identification tag for materials, and operating pressure to be sure they are correct for the application.



**WARNING!** Personal injury or property damage may result if the valve is installed where service conditions could exceed the valve ratings.

5. Check the flange bolts or studs for proper size, threading, and length.
6. These valves are designed to be installed between ASME/ANSI Class 125/150 flanges.
7. Carefully follow installation using welded flanges on page 82 of this document.
8. Follow ASME flange alignment standards:  
SECTION 335.1.1 ALIGNMENT
  - a. PIPING DISTORTIONS: Any distortion of piping to bring into alignment for joint assembly which introduces a detrimental strain in equipment or piping components is prohibited.
  - b. FLANGE JOINTS: Before bolting up, flange faces shall be aligned to the design plane within 1/16"/ft measured across any diameter; flange bolt holes shall be aligned within 1/8" maximum offset.
9. When observed during assembly, the flange faces shall be parallel within 1 degree, and the force required to align pipe axes shall not exceed 10 lb/ft per inch of NF bolts and nuts shall be fully engaged.

### FLANGE BOLTING RECOMMENDATIONS

#### Lug Valves, 2"-30", ANSI 125/150 Bolt Pattern

Valve Size	Thread Size	Number Required	Bolt Length Semi-Lug Butterfly (inches)
2"	5/8 - 11	4	1 1/4
2 1/2"	5/8 - 11	4	1 1/2
3"	5/8 - 11	4	1 1/2
4"	5/8 - 11	8	1 3/4
5"	3/4 - 10	8	1 3/4
6"	3/4 - 10	8	2
8"	3/4 - 10	8	2 1/4
10"	7/8 - 9	12	2 1/4
12"	7/8 - 9	12	2 1/2
14"	1 - 8	12	2 3/4
16"	1 - 8	16	2 3/4
18"	1 1/8 - 7	16	3 1/2
20"	1 1/8 - 7	20	4 1/4
24"	1 1/4 - 7	20	4 3/4
30"	1 1/4 - 7	24	4 1/2

# Installation

## HD Series Butterfly Valves

### Valve Installation Procedure

Position the connecting pipe flanges in the line to insure proper alignment prior to valve installation. Spread the pipe flanges apart enough to allow the valve body to be located between the flanges without actually contacting the flange surfaces. Exercise particular care in handling the valve so as to prevent possible damage to the disc or seat faces.

**Note:** Actuator must be mounted at or above pipe center line for all actuator types. (Fig. 6)

1. When installing in Victaulic piping systems, use Victaulic 41 series flange nipples. 741 flanges not recommended without the use of adapter rings.
2. HD-Series Butterfly valves are designed to be installed between ANSI 125/150 flat-faced, raised face, slip-on or weld neck flanges.
3. Do NOT use flange gaskets on HD-Series Butterfly valves.
4. For Lug style valves:
  - a. Place the valve between the flanges.
  - b. Install all bolts between the valve and the mating flanges.
 Hand tighten bolts as necessary. (Fig. 7)
5. Before completing the tightening of any bolts, the valve should be centered between the flanges and then carefully opened and closed to insure free, unobstructed disc movement.
6. Using the sequence, (Fig. 8) tighten the flange bolts evenly to assure uniform compression. In assembling flange joints, the resilient seating surface shall be uniformly compressed. (Fig. 5)
7. If an actuator is to be operated, electricity should be connected to the unit in accordance with the local electrical codes.
8. Cycle the valve to the fully open position, then back to the fully closed position, checking the actuator travel stop settings for proper disc alignment. The valve should be operated to assure that no binding is taking place. If no power is available, use the manual handwheel.
9. The valve is now ready for operation.

Fig. 5

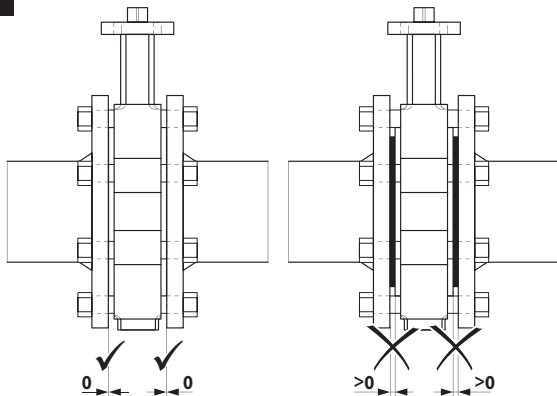


Fig. 6

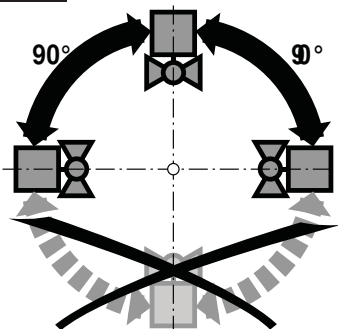


Fig. 9

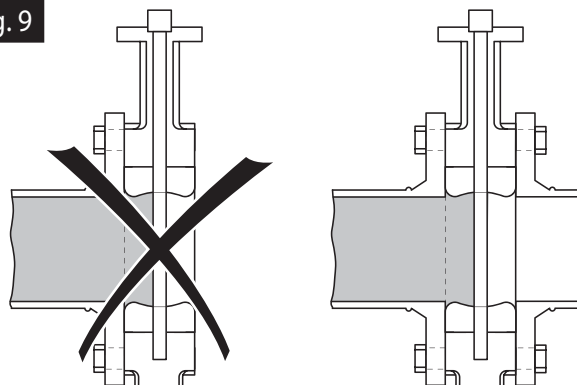


Fig. 7

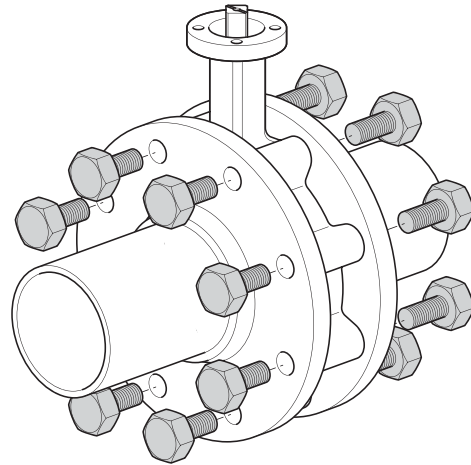
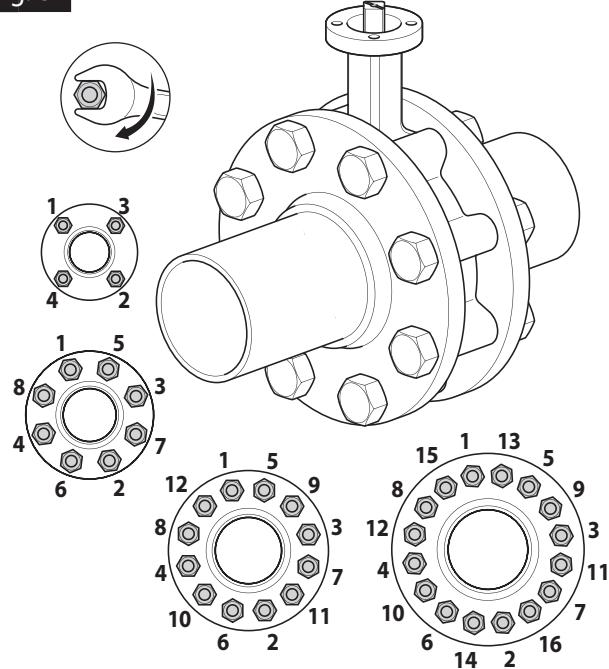


Fig. 8



### INSTALLATION NOTES

1. Follow previously described pre-installation and installation procedures.
2. To achieve the full close-off pressure of the HD series, a flange is required on the open or down stream side of the valve (Fig. 9)

### Maintenance Instructions

#### Safety Precautions

Before removing the valve from the line or loosening any bolts, it is important to verify the following conditions:

1. Be sure the line is depressurized and drained.
2. Be sure of the pipeline media. Proper care should be taken for protection against toxic and/or flammable fluids.
3. Never remove the valve without an Operator (Manual or Automatic) already attached to the valve shaft.
4. Never remove the Operator from the valve while the valve is in the pipeline under pressure.
5. Always be sure that the disc is cracked approximately 5° off of the closed position before removing the valve.

#### General Maintenance

The following periodic preventative maintenance practices are recommended for all Butterfly Valves.

1. Operate the valve from full open to full closed to assure operability.
2. Check flange bolting, actuator mounts and hangers for evidence of loosening and correct as needed.
3. Inspect the valve and surrounding area for previous or existing leakage at flange faces or shaft connections.
4. Check piping and/or wiring to actuators and related equipment for looseness and correct as needed.
5. If not in use, exercise the butterfly valve (full open and close) at least once a month.

### L Series

### Ductile Butterfly Valves

Technical Data	
Service	chilled, hot water, 60% glycol
Flow characteristic	F6 modified equal percentage
	F7 linear
Controllable flow range	90°
Sizes	8" to 12"
Type of end fitting	for use with ANSI Class 125/150 flanges
Materials	
Body	ductile iron ASTM A536
Body finish	epoxy powder coated
Disc	304 stainless steel
Seat	EPDM
Shaft	416 stainless steel
O-ring	EPDM
Bushings	Steel, PTFE, Bronze
Media temperature range	-4°F to 250°F [-20°C to 120°C]
Body pressure rating	232 psi
Close-off pressure	200 psi
Rangeability	10:1 (for 30° to 70° range)
Maximum velocity	12 FPS
Leakage	0%
Warranty	5 Years

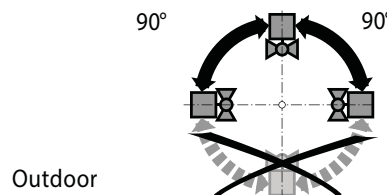
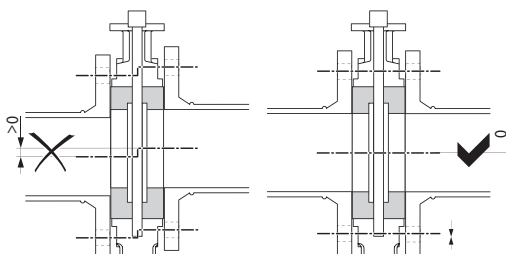
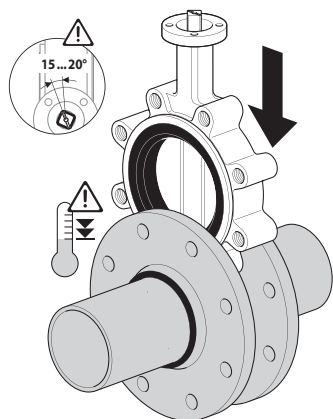
#### Smart Heating

When the actuator is idle; the onboard temperature and humidity sensors and logic within the actuator activate heating elements when needed to prevent condensation within the housing. The heater switches on when the ambient temperature drops below 50°F (10°C) or the relative humidity is higher than 65% and the temperature is below 86°F (30°C).

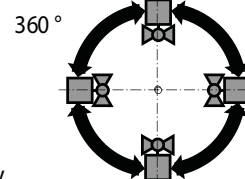
#### Self-adjusting End Stops

The intelligent self-adjusting end stops close the valve based on torque or travel over the entire lifespan of the valve.

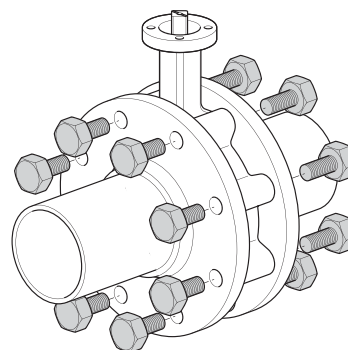
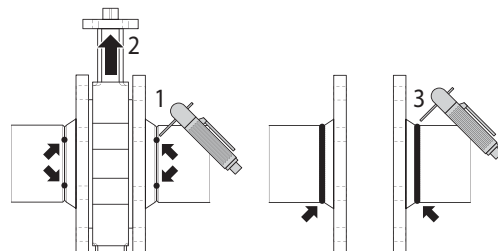
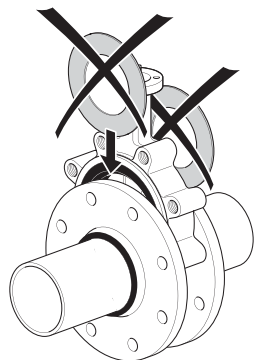
#### Installation Recommendations

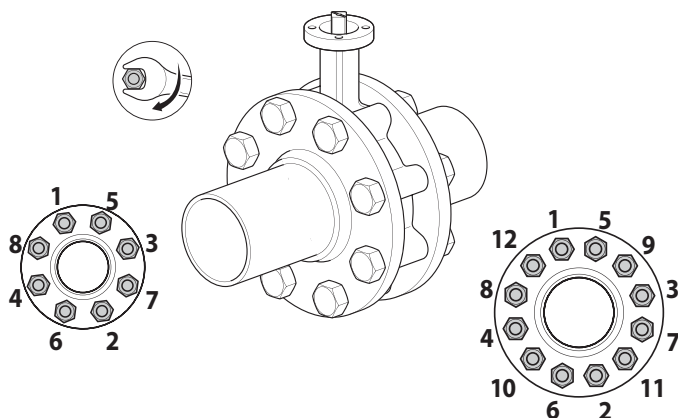


Outdoor



Indoor Only





## Max Torque for Bolts

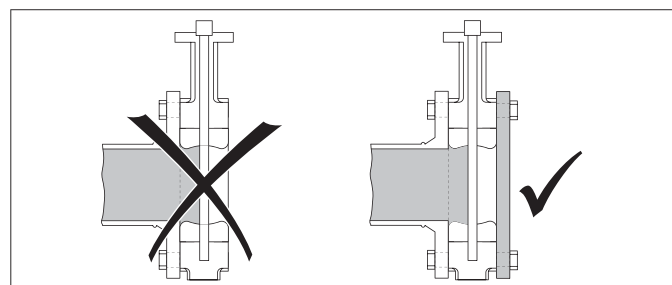
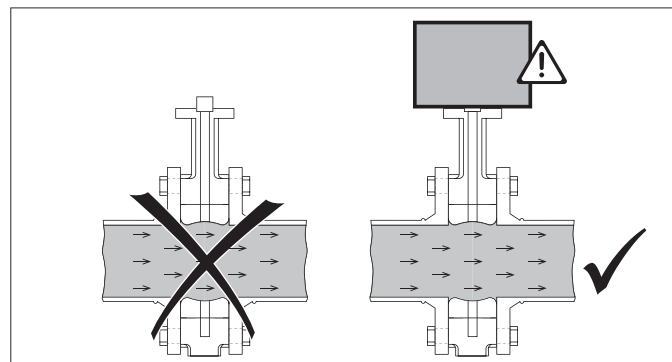
Valve Size	Bolt Size	Max Torque [ft-lbs]
8"	3/4-10"	120
10"-12"	7/8-9"	200

## Valve Installation Procedure

Position the connecting pipe flanges in the line to insure proper alignment prior to valve installation. Spread the pipe flanges apart enough to allow the valve body to be located between the flanges without actually contacting the flange surfaces. Exercise particular care in handling the valve so as to prevent possible damage to the disc or seat faces.

**Note: Actuator must be mounted at or above pipe center line for all actuator types.**

- When installing in Victaulic piping systems, use Victaulic 41 series flange nipples. 741 flanges not recommended without the use of adapter rings.
- L-Series Butterfly valves are designed to be installed between ANSI 125/150 flat-faced, raised face, slip-on or weld neck flanges.
- Do NOT use flange gaskets on L-Series Butterfly valves.
- For Lug style valves:
  - Place the valve between the flanges.
  - Install all bolts between the valve and the mating flanges. Hand tighten bolts as necessary.
- Before completing the tightening of any bolts, the valve should be centered between the flanges and then carefully opened and closed to insure free, unobstructed disc movement.
- Using the sequence, tighten the flange bolts evenly to assure uniform compression. In assembling flange joints, the resilient seating surface shall be uniformly compressed.
- If an actuator is to be operated, electricity should be connected to the unit in accordance with the local electrical codes.
- Cycle the valve to the fully open position, then back to the fully closed position, checking the actuator travel stop settings for proper disc alignment. The valve should be operated to assure that no binding is taking place. If no power is available, use the manual handwheel.
- The valve is now ready for operation.



## General Maintenance

The following periodic preventative maintenance practices are recommended for all Butterfly Valves.

- Operate the valve from full open to full closed to assure operability.
- Check flange bolting, actuator mounts and hangers for evidence of loosening and correct as needed.
- Inspect the valve and surrounding area for previous or existing leakage at flange faces or shaft connections.
- Check piping and/or wiring to actuators and related equipment for looseness and correct as needed.
- If not in use, exercise the butterfly valve (full open and close) at least once a month.

## Safety Precautions

Before removing the valve from the line or loosening any bolts, it is important to verify the following conditions:

- Be sure the line is depressurized and drained.
- Be sure of the pipeline media. Proper care should be taken for protection against toxic and/or flammable fluids.
- Never remove the valve without an Operator (Manual or Automatic) already attached to the valve shaft.
- Never remove the Operator from the valve while the valve is in the pipeline under pressure.
- Always be sure that the disc is cracked approximately 5° off of the closed position before removing the valve.

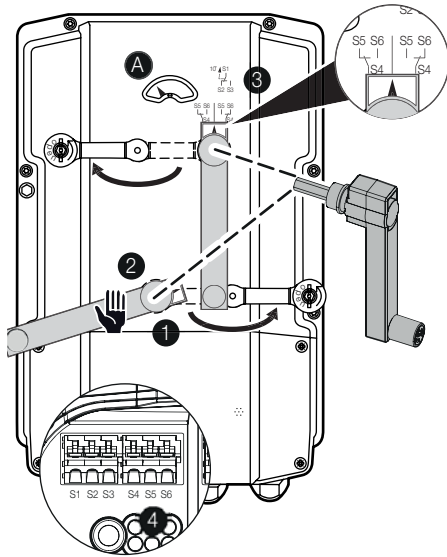
## Storage of Butterfly Valve Assemblies

- Assemblies must be stored indoors, protected from the elements.
- Materials received on job sites that have long installation lead times should receive extra protection from construction damage.
- Valve faces must be protected from abrasion, cutting and nicking, as this will damage the face and may cause flange area leaks.
- Electric actuators cannot be stored in wet, damp or caustic areas.
- Do not store construction material on top of valve assemblies.

### Auxiliary Switch Setup for PR and PKR Actuators

The setting of the auxiliary switches work like the S2A module.

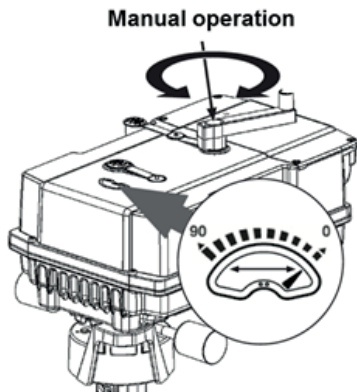
The first auxiliary switch is fixed at 10°, the second auxiliary switch can be set between 0° and 90°. A YouTube® video is available to further help explain the auxiliary switch settings.



- 1 **Remove power**
- 2 **Gear disengagement**  
Opening the manual override cover and adjust the hand crank.
- 3 **Manual override control**  
Turn the hand crank until the desired switched position **A** is indicated and then remove the crank.
- 4 **Auxiliary switch**  
Opening the auxiliary switch adjustment cover and adjust the hand crank.  
Turn the crank until the arrow points to the vertical line.
- 5 **Terminals**  
Connect continuity tester to S4 + S5 or S4 + S6.  
If the auxiliary switch should switch in the opposite direction, rotate the hand crank 180°.

### Manual Override Function for PR and PKR Actuator

The PR actuator offers a hand crank connection. When the hand crank is placed correctly then the actuator is disengaged.



When handcrank is connected to actuator,  
the motor & signal control will be disabled  
After removing the handcrank, the actuator  
drives to its control signal



### Sensor Monitoring with MFT Models of PR and PKR Actuators

The PR actuator with BACnet interface and the PKR electronic fail-safe actuator offer 2 passive sensor inputs.

PT1000 (linear 3.890hm/°C)	NI1000 (linear 5.70hm/°C)	NTC10k Typ2 B3970
Without sensor failure	Without sensor failure	Without sensor failure
Ohm [Ω] failure = 3%	Ohm [Ω] failure = 3%	Ohm [Ω] failure = 7%
±10° accuracy	±10° accuracy	±3° accuracy

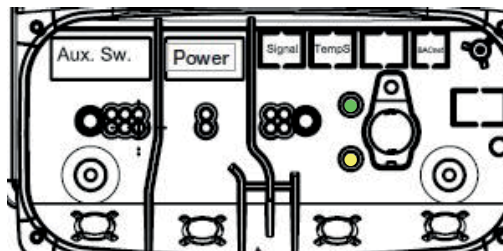
Sequence of the LED lights:

Green LED status indicator light sequence:

On: operation ok, no faults

Blinking: fail-safe mechanism is active

Off: fault is detected or not in operation/capacitors charging



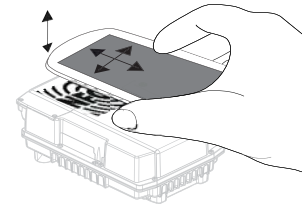
Charge and bridge time of the PKR:

The initial charge time is 20 seconds with a settable delay or bridge time of 0-10 seconds for brown out interruptions.




# Commissioning with Near Field Communication (NFC)



The PR actuator with Near Field Communication (NFC) allows for easy commissioning, programming and troubleshooting directly from your smartphone, even when the actuator is not powered. Settings can also be changed with the ZTH-US handheld tool.



The following table shows the factory settings and settings that can be changed with NFC and ZTH-US.

Values & Settings	Factory Setting	Manual	Power On 	Power Off 	Power On 
Running time setting [30-120 s]	35 s	-	RW	RW	RW
Max angle of rotation	100%	-	RW	RW	RW
Actuator Position [0-100%]	-	Position Indicator	R	-	R
Setting for auxiliary switch s2 [0-90°]	85%	Hand crank	-	-	-
Display of input signal voltage (Power supply)	-	-	R	-	-
Valve Setting [Regular, 8", 10", 12"]	Type specific	-	RW	RW	-
Override Control (Force Position)	-	Hand crank	RW	-	RW
Location String	-	-	RW	RW	-
Control [Floating Point, On/Off, 0.5 - 10V, 2 - 10V, 4 - 20 mA]	2..10V	-	RW	RW	RW
Feedback Mode [2 - 10V, 0.5 - 10V, inverted]	2..10V	-	RW	RW	RW
Feedback Mode [DC variable]	-	-	-	-	RW
Control Signal [DC variable]	-	-	-	-	RW
Control Signal Fail Position [None, On/Off]	None	-	RW	RW	-
Hybrid Mode - Setpoint [MP-Bus, Analog]	Bus	-	RW	RW	-
Bus Setting [MP-Bus, BACnet]	MP, PP	-	RW	RW	-
Power Off Position [0 - 100%]	0%	-	RW	RW	RW
Power Fail Delay [0 - 10 s]	2 s	-	RW	RW	RW

[R=reading; W=writing]

## General information

**Date:** 3. April 2017  
**Vendor Name:** BELIMO Automation AG  
**Vendor ID:** 423  
**Product Name:** Rotary actuator for butterfly valves  
**Product Model Number:** BACMFT for xy,  
 e.g. PRBUP-MFT-T, PKRBUP-MFT-T  
**Applications Software Version:** 02.04.0000  
**Firmware Revision:** 07.03.0002  
**BACnet Protocol Revision:** 1.12  
**Product Description:**  
 Actuator for butterfly valves providing two sensor inputs  
**BACnet Standard Device Profile:** BACnet Application Specific Controller (B-ASC)  
**BACnet Interoperability Building Blocks supported:**  
 Data Sharing - ReadProperty-B (DS-RP-B)  
 Data Sharing - ReadPropertyMultiple-B (DS-RPM-B)  
 Data Sharing - WriteProperty-B (DS-WP-B)  
 Data Sharing - Write Property Multiple-B (DS-WPM-B)  
 Data Sharing - COV-B (DS-COV-B)  
 Device Management - DynamicDeviceBinding-B (DM-DDB-B)  
 Device Management - DynamicObjectBinding-B (DM-DOB-B)  
 Device Management - DeviceCommunicationControl-B (DM-DCC-B)  
**Segmentation Capability:** No  
**Data Link Layer Options:** MS/TP master,  
 baud rates: 9'600, 19'200, 38'400, 76'800, 115'200  
**Device Address Binding:** No static device binding supported  
**Networking Options:** None  
**Character Sets Supported:** ISO 10646 (UTF-8)  
**Gateway Options:** None  
**Network Security Options:** Non-secure Device

## PICS

(continued)

### Standard objects

The device provides datapoints for common operation as well as datapoints for parameterization.

Datapoint	BACnet Object
Relative Setpoint in %	AO [1]
Override Control	MO [1]
Relative Position in %	AI [1]
Absolute Position in °	AI [2]
Analog Setpoint in %	AI [6]
Sensor 1 Type	MV [220]
Sensor 1 as analog value	AI [20]
Sensor 2 Type	MV [221]
Sensor 2 as analog value	AI [21]
Summary Status	BI [101]
Command: Initiate Function	MV [120]
Max Setpoint in %	AV [98]
Bus Watchdog in s	AV [130]

### Object processing

Object type	Optional properties	Writeable properties
Analog Input	Description COV_Increment	COV_Increment
Analog Output	Description COV_Increment	COV_Increment Present_Value Relinquish_Default
Analog Value	Description	Present_Value
Binary Input	Description Active_Text Inactive_Text	
Device	Description Location Active_COV_Subscription	Object_Identifier Object_Name (max. 32 char) Location (max. 64 char) Description (max. 64 char) APDU_Timeout Number_Of_APDU_Retries Max_Master Max_Info_Frames
Multi-state Output	Description State_Text	Present_Value Relinquish_Default
Multi-state Value	Description State_Text	Present_Value

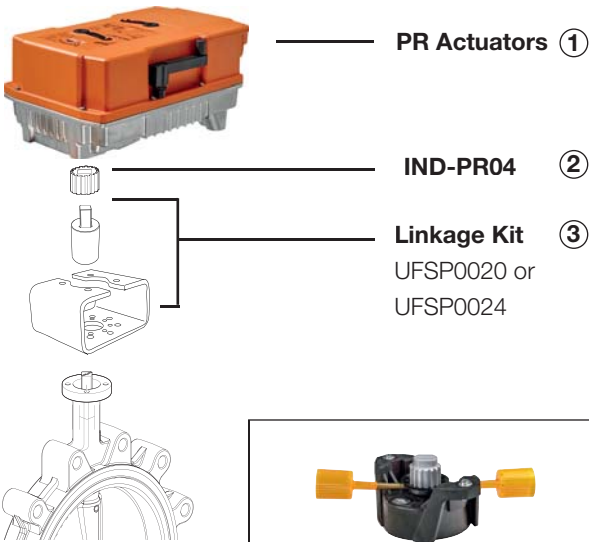
- The device does not support the CreateObject and DeleteObject service.
- The specified maximum length of writable strings is based on single-byte characters.
- No support of COV subscription on Analog Value objects.



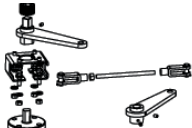
### Service processing

- The device supports DeviceCommunicationControl service. No password is required.
- Max. 6 active COV subscriptions with lifetime up to 8 h supported

Object Name	Object Type / Instance	Description	Values	Default
<i>Device_Name</i>	Device [x]			
SpRel	Analog Output [1]	Relative Setpoint in %  If analog control is enabled, the Present_Value is not evaluated and Out_of_Service is TRUE and.	0 - 100	0
Override	Multi-state Output[1]	Override Control  Override control is possible in analog or digital control. Min/Mid are not supported by the device and interpreted as 0%	None Open Close Min Mid Max	None
RelPos	Analog Input [1]	Relative Position in %  If the gear is disengaged, it is signaled in the Status_Flags:OVERRIDDEN=TRUE.	0 - 100	-
AbsPos	Analog Input [2]	Absolute Position in °  If the gear is disengaged, it is signaled in the Status_Flags:OVERRIDDEN=TRUE.	0 - 90	-
SpAnalog	Analog Input [6]	Analog Setpoint in %  The Present_Value represents the relative value calculated from the analog signal (3-point, 0-10 V, 4-20 mA).  If analog control is disabled, the Present_Value is not updated and Out_of_Service is TRUE and.	-10, 0 - 100, 110%	-
Sens1Type	Multi-state Value [220]	Sensor 1 Type  The sensor input T1 supports passive temperature sensors only. The measured signal is provided by Sens1Analog either as resistance value (Passive 1K, Passive 20K) or as converted temperature (PT1000, NI1000, NTC10K) in °C or °F.	None - Passive_1K Passive_20K - PT1000_C NI1000_C NTC10K_C PT1000_F NI1000_F NTC10K_F	None
Sens1Analog	Analog Input [20]	Sensor 1 as analog value in Ω or °C/°F	200 - 50 kΩ -50 - 200°C -60 - 400°F	-
Sens2Type	Multi-state Value [221]	Sensor 2 Type, according Sens1Type	...	None
Sens2Analog	Analog Input [21]	Sens1Analog, according Sens1Analog	...	-
SummaryStatus	Binary Input [101]	Summary Status	None Fault	-
Command	Multi-state Value [120]	Initiate Function	None - Test Reset	-
MaxSp	Analog Value [98]	Max setpoint in %	20 - 100	-
BusWatchdog	Analog Value [130]	Timeout for Bus Watchdog in s  0s = watchdog deactivated  If neither the Present_Value for AO[1] nor MV[1] is updated within the period, the Priority_Array of both objects is cleared and the Relinquish_Default becomes valid.	0 - 3600	0

PR actuators can be used for retrofitting competitor butterfly valves that require under 1400 in-lbs. Until released, contact Technical Support for a custom linkage. 1, 2, and 3 are required to retrofit. Refer below for required parts for custom retrofit.



Valve Size	Valve Series									
		2-way Valve Linkage with Position Indicator			2-way Valve Linkage without Position Indicator			3-way Valve Linkage without Position Indicator		
4" - 6"	HD	IND-PR01			IND-PR02			UFLK6924		
8"	HD	Not Available - Use SY Series*			Not Available - Use SY Series*			Not Available - Use SY Series*		
8", 10", 12"	L	IND-PR03			IND-PR04			UFLK6925		
10", 12"	HD	Not Available - Use SY Series*			Not Available - Use SY Series*			Not Available - Use SY Series*		

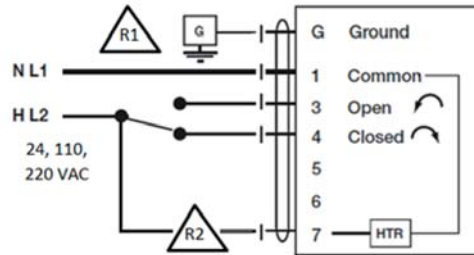
\* Contact Technical Support for details.

In case an SY3 on/off is replaced with a PR actuator, the following changes are needed.

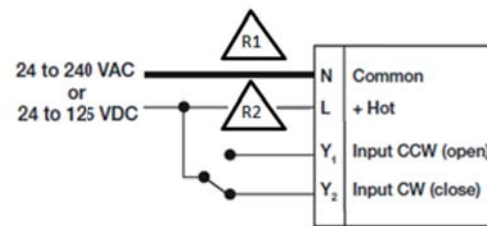
The SY is a 3-wire device and the PR actuator is a 4-wire device and additional wiring changes to the auxiliary switches are required. See below.

### Ground power and control signal wiring revisions.

Replace an SY series on/off control actuator with a PR, PKR series actuator with noted R1, R2 revisions. See table 1 for terminal cross reference



SY On/Off Wiring (original)  
(see submittal document for details)



PR, PKR On/Off Wiring (replacement)  
(see submittal document for details)



Revision 1: Abandon SY ground wire. PR and PKR actuators are UL Class II devices and do not require grounding.



Revision 2: Relocate SY hot wire #7 (heater) to PR and PKR actuator terminal L. Terminal L must be always hot. Smart heater is integrated for PR, PKR models and requires no additional wiring connections.

On/Off Control Wiring Cross Reference		
Series	SY	PR/PKR
Terminal	G	none
	1	N
	3	Y1
	4	Y2
	5	-
	6	-
	7	L

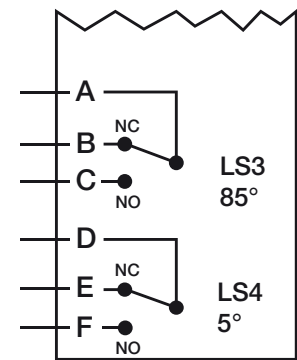
Table 1



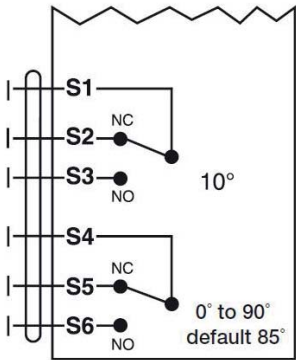
# Auxiliary Switch Wiring Modifications for PR Replacement of SY Actuators

Refer to table 2 for terminal cross reference.

When travel setpoint is achieved the SPDT normally open (NO) contact becomes closed. For example; when the original SY actuator travel is 85° the A-C contact is closed. When PR, PKR actuator travel is 85° (default) the S4-S6 contact is closed.










**SY Series (original)**  
See submittal document for details





**PR, PKR Series (replacement)**  
See submittal document for details

Auxiliary Switch Wiring Cross Reference		
Series	SY	PR/PKR
SPDT (Normal)	Terminal	
Com	A	S4
NC	B	S5
NO	C	S6
Com	D	S1
NC	E	S3
NO	F	S2

**Table 2**

NON-SPRING RETURN							ELECTRONIC FAIL-SAFE			SPRING RETURN
PROGRAMMING TOOLS		AM/ AR	GM/ GR	DR	PR	SY	DK	PKR	GK	AF
	<b>MFT-P</b> Belimo MFT configuration software (V3.X), includes PC-Tool software (interface cables [ZTH US] not included). Physical copy of software. Free download also available at <a href="http://www.belimo.us/americas/mft.html">www.belimo.us/americas/mft.html</a>	•	•	•		•	•		•	•
	<b>Near Field Communication (NFC) App</b> Allows fast programming, commissioning, and troubleshooting even when the actuator is not powered. Available through Google Play				•			•		
INTERFACES, CABLES										
	<b>ZTH US</b> Handheld interface module that allows field programming. Includes ZK1-GEN, ZK2-GEN, and ZK6-GEN cables	•	•	•	•	•	•	•	•	•
	<b>ZK1-GEN</b> Cable for use with ZTH US to connect to new generation non-spring return actuator via diagnostic/programming socket	•	•	•			•		•	
	<b>ZK2-GEN</b> Cable for use with ZTH US to connect with spring return and non-spring return actuators not equipped with diagnostic/ programming socket	•	•							
	<b>ZK6-GEN</b> Cable for use with ZTH US to connect to SY actuator via RJ11 port					•				
	<b>ZTH-BT-NFC</b> Bluetooth® to NFC converter for temporary wireless operation of Belimo devices with an NFC interface.	Available on NFC Labeled Actuators Only								



BATTERY BACKUP		NON-SPRING RETURN		
		AM/AR	GM/GR/DR	SY
  	<b>NSV24 US</b> Battery backup module	•	•	
	<b>NSV-BAT</b> 12VDC 1.2 AH battery (2 required)	•	•	
	<b>EXT-NSV-B03-120*</b> Battery backup system, SY4 - SY6 120 VAC, on/off actuators			•
	<b>EXT-NSV-B04-120*</b> Battery backup system, SY4 - SY6 120 VAC, MFT actuators			•
	<b>EXT-NSV-B05-120*</b> Battery backup system, SY7 - SY12 120 VAC, on/off actuators			•
	<b>EXT-NSV-B06-120*</b> Battery backup system, SY7 - SY12 120 VAC, MFT actuators			•
	<b>EXT-NSV-B13-24*</b> Battery backup system, SY4 - SY5 24 VAC, on/off actuators			•
	<b>EXT-NSV-B14-24*</b> Battery backup system, SY4 - SY5 24 VAC, MFT actuators			•
	<b>EXT-NSV-B23-230*</b> Battery backup system, SY4 - SY6 230 VAC, on/off actuators			•
	<b>EXT-NSV-B24-230*</b> Battery backup system, SY4 - SY6 230 VAC, MFT actuators			•
	<b>EXT-NSV-B25-230*</b> Battery backup system, SY7 - SY12 230 VAC, on/off actuators			•
	<b>EXT-NSV-B26-230*</b> Battery backup system, SY7 - SY12 230 VAC, MFT actuators			•

NOTE: Each NSV24 US requires 2 NSV-BAT.

\*All EXT part numbers are not returnable.



		NON-SPRING RETURN ACTUATORS				ELECTRONIC FAIL-SAFE	SPRING RETURN ACTUATORS
WEATHER SHIELDS		AM	GM/GR	DR	SY	DK/DKR	AF
	<b>ZS-BFV-20*</b> For GM, GK actuators on F6, F7, HD		•	•		•	
	<b>ZS-BFV-30*</b> For AF actuators on F6, F7, HD						•
	<b>ZS-BFV-60*</b> For dual GM, GK actuators on F6 HD		•				
	<b>ZS-BFV-70*</b> For dual AF series on F6 HD						•
	<b>ZS-BFV-80*</b> For dual AF series on F6 HD						•
	<b>ZS-BFV-90*</b> Dual AF, GM, GK series for F7 HD		•				•
*Cannot be used with direct mount actuators.							
ELECTRIC DISCONNECT							
	<b>H0A-120V</b> Local electric disconnect for SY2-SY12 110/230V - 2 position				•		
	<b>H0A-120VMFT</b> Local electric disconnect for SY2-SY12 110/230V - modulating				•		
	<b>H0A-24V</b> Local electric disconnect for SY2-SY12 24V - 2 position				•		
	<b>H0A-24VMFT</b> Local electric disconnect for SY2-SY12 24V - modulating				•		
AUXILIARY SWITCHES & POTENTIOMETERS							
	<b>SY-1000-FB01</b> Feedback potentiometer 1000 Ω, 2 position, factory installed option only				•		
	<b>SY-1000-FB02</b> Feedback potentiometer 1000 Ω, modulating (models Syx...-P, -SR or MFT), factory installed option only				•		
	<b>S1A</b> Auxiliary switch 1x SPDT, 3A (0.5A inductive) @ 250 VAC	•	•	•			
	<b>S2A</b> Auxiliary switch 2x SPDT, 3A (0.5A inductive) @ 250 VAC	•	•	•			
	<b>P140A GR</b> Feedback potentiometer 140 Ω	•	•	•			
	<b>P500A GR</b> Feedback potentiometer 500 Ω	•	•	•			
	<b>P1000A GR</b> Feedback potentiometer 1000 Ω	•	•	•			
	<b>P2800A GR</b> Feedback potentiometer 2800 Ω	•	•	•			
	<b>P5000A GR</b> Feedback potentiometer 5000 Ω	•	•	•			
	<b>P10000A GR</b> Feedback potentiometer 10000 Ω	•	•	•			
HOUSING							
	<b>ZS-T</b> Terminal cover for NEMA 2 (-T models)			•		•	
HAND CRANK		PR				PKR	
	<b>ZG-HND PR</b> Replacement hand crank for PR and PKR actuators		•			•	
800-543-9038 USA		866-805-7089 CANADA			203-791-8396 LATIN AMERICA / CARIBBEAN		

		VALVE	
MANUAL HANDLES		HD	L
	<b>F650HD+HND01</b> 2" HD series valve with manual handle ductile iron, 200 psi close-off, C <sub>v</sub> 115	•	
	<b>F665HD+HND01</b> 2½" HD series valve with manual handle ductile iron, 200 psi close-off, C <sub>v</sub> 196	•	
	<b>F680HD+HND01</b> 3" HD series valve with manual handle ductile iron, 200 psi close-off, C <sub>v</sub> 302	•	
	<b>F6100HD+HND02</b> 4" HD series valve with manual handle ductile iron, 200 psi close-off, C <sub>v</sub> 600	•	
	<b>F6125HD+HND02</b> 5" HD series valve with manual handle ductile iron, 200 psi close-off, C <sub>v</sub> 1022	•	
	<b>F6150HD+HND02</b> 6" HD series valve with manual handle ductile iron, 200 psi close-off, C <sub>v</sub> 1579	•	
GEAR OPERATORS			
	<b>F650HD+GW01</b> 2" HD series valve with manual gear operator ductile iron, 200 psi close-off, C <sub>v</sub> 115	•	
	<b>F665HD+GW01</b> 2½" HD series valve with manual gear operator ductile iron, 200 psi close-off, C <sub>v</sub> 196	•	
	<b>F680HD+GW01</b> 3" HD series valve with manual gear operator ductile iron, 200 psi close-off, C <sub>v</sub> 302	•	
	<b>F6100HD+GW02</b> 4" HD series valve with manual gear operator ductile iron, 200 psi close-off, C <sub>v</sub> 600	•	
	<b>F6125HD+GW02</b> 5" HD series valve with manual gear operator ductile iron, 200 psi close-off, C <sub>v</sub> 1022	•	
	<b>F6150HD+GW02</b> 6" HD series valve with manual gear operator ductile iron, 200 psi close-off, C <sub>v</sub> 1579	•	
	<b>F6200L+ZDGN-S150</b> 8" L series valve with manual gear operator ductile iron, 200 psi close-off, C <sub>v</sub> 3136		•
	<b>F6250L+ZDGN-S150</b> 10" L series valve with manual gear operator ductile iron, 200 psi close-off, C <sub>v</sub> 5340		•
	<b>F6300L+ZDGN-S150</b> 12" L series valve with manual gear operator ductile iron, 200 psi close-off, C <sub>v</sub> 5340		•
	<b>F6350HD+GW04</b> 14" HD series valve with manual gear operator ductile iron, 150 psi close-off, C <sub>v</sub> 11917	•	
	<b>F6400HD+GW05</b> 16" HD series valve with manual gear operator ductile iron, 150 psi close-off, C <sub>v</sub> 16388	•	
	<b>F6450HD+GW06</b> 18" HD series valve with manual gear operator ductile iron, 150 psi close-off, C <sub>v</sub> 21705	•	
	<b>F6500HD+GW07</b> 20" HD series valve with manual gear operator ductile iron, 150 psi close-off, C <sub>v</sub> 27908	•	
	<b>F6600HD+GW08</b> 24" HD series valve with manual gear operator ductile iron, 150 psi close-off, C <sub>v</sub> 43116	•	

## Does the PR actuator make an adaptation during the first commissioning?

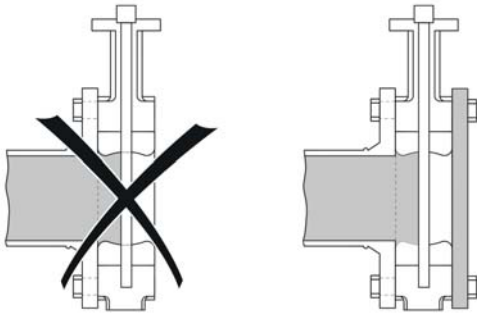
The PR actuator comes with an integrated potentiometer, therefore an adaptation is not necessary. The actuator always knows its position.

## Is it allowed to mount the PR actuator upside down?

Yes, for indoor applications only.

## Can the new 8" and 12" butterfly valves also be used for dead-end service?

The new butterfly valves can only be used with a closed counter-flange for dead-end service.



## Can the new butterfly valves also be used for district heating and cooling applications or for ANSI 250/300 applications?

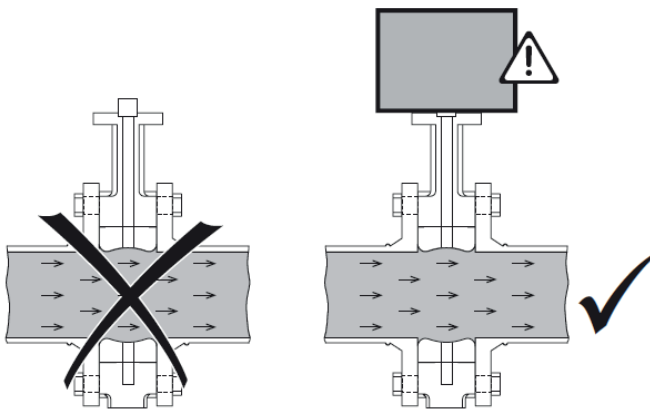
The new butterfly valves are not suitable for these applications, due to longer pipes and the high pressure drops associated with them. These valves are ANSI 125/150 type flanges.

## Can we motorize an existing F6200HD butterfly valve with a PR actuator?

The PR actuator is NOT available for the F6200HD butterfly valve. The reason is that the SY3 actuator has a nominal torque of 150 Nm but can shortly develop a higher torque. The PR actuator has a constant 160 Nm torque. If a replacement for a SY3 is needed, the SY3 is still available until end of 2018 and afterwards a SY4 can be delivered as a replacement.

## Is it possible for a butterfly valve to be installed in the line without an actuator?

Yes, but not for long periods of time. The butterfly valve may not be operated without an actuator or gear operator if there is flow in the line. In the absence of an actuator or gear operator, the butterfly valve might close and cause damage (water hammer).



## Why is there no possibility to use the PC-Tool for parameterization?

The future tool for parameterization is the Belimo Assistant App. In a long term perspective the PC-Tool will not be supported.

## I. General

1.1. The following Terms and Conditions of Sale ("Terms") apply to the sale of products described in this Product Guide ("Products"). As used herein, "Seller" or "Belimo" refers to Belimo Aircontrols (USA) Inc., or Belimo Aircontrols (CAN) Inc., Belimo Aircontrols (LA) Inc., or Belimo Automation AG as applicable, and "Client" refers to the individual or business entity that purchases the Products from Seller. These Terms shall apply unless the parties mutually agree to different terms and memorialize such agreement in writing signed by both Client and Seller. In case Seller's delivery includes Software and accompanying documentation, the terms of the license agreement are applicable in addition to these Terms. However, in case of disputes arising out of the Software, the license agreement shall prevail.

## II. Price

2.1. The Seller's price for Products (the "Price") is net, F.O.B. Point of Origin, and is calculated in US currency for sales made by Belimo Aircontrols (USA), Inc. and calculated in Canadian currency for sales made by Belimo Aircontrols (CAN) Inc., and Brazilian currency for sales made by Belimo Automation AG to Clients in Brazil.

2.2. The Price, unless otherwise agreed upon, does not include freight and packaging (wooden crates, pallets, etc), the costs of which will be charged to Client at cost for each shipment and shall be payable with payment of the Price.

2.3. Orders for Products with a net value of less than US \$300 (CAN \$300) will be subject to a US \$20 (CAN \$20) handling fee (the "Handling Fee"). The Handling Fee will not be charged for orders of Products with a net value equal to or greater than US \$300 (CAN \$300) or for Products ordered through Seller's eCommerce ordering system at: [www.belimo.com](http://www.belimo.com).

2.4. Seller reserves the right to make partial deliveries of orders of Products, each of which deliveries may be invoiced separately by Seller.

2.5. The Price does not include charges for wiring diagrams, installation, and commissioning, which will be charged to Client separately and will be payable on demand.

## III. Payment

3.1. Invoices are payable in US currency for sales made by Belimo Aircontrols (USA), Inc., in Canadian currency for sales made by Belimo Aircontrols (CAN) Inc. and in Brazilian currency for sales made by Belimo Automation AG on behalf of Brazil. Invoices are due no later than 30 days from the date of invoice, without any deductions.

3.2. If Client maintains an outstanding balance for 45 days or more after the date of invoice, Client may be subject to restricted shipments of Products. A Client may also be required to pay for all future deliveries of Products on a cash-on-delivery or approved credit card only basis.

## IV. Title and Risk

4.1. Title to all Products shall remain with Seller and shall not pass to Client until Seller has received full payment for the Products.

## V. Damage or Loss in Transit

5.1. Seller assumes no liability for damage or loss of shipment of Products, which risk shall at all times remain with the carrier. All shipments must be unpacked and examined by Client immediately upon receipt. Any external evidence of loss or damage must be noted on the freight bill accompanying the shipment of Products or carrier's receipt and signed by the carrier's agent at the time of delivery. Failure to do so will result in the carrier's refusal to honor any claim relating to damage of Products. Client must also notify Seller within 5 days of such damage by providing Seller with a copy of the freight bill or damage report so that Seller can file a claim for loss or damage in transit with the carrier. If the damage does not become apparent until the shipment is unpacked, Client must make a request for inspection by the carrier's agent and file with the carrier within 15 days after receipt of product and notify Seller of the same.

## VI. Delivery

6.1. Seller undertakes to make every attempt to adhere to its stated delivery parameters and to make a timely delivery of the Products but does not guarantee any delivery specifications. Each contract entered into for the purchase of Products is not cancelable nor is Seller liable for any direct or indirect losses that may arise, for any reason whatsoever, due to Seller's failure to meet any stated or assumed delivery schedules.

## VII. Inventory Overstock

7.1. If Client has an overstock of Product inventory, such Products received by Client cannot be returned unless and until: (i) Client alerts Seller that it intends to return some overstock of Products, (ii) Seller agrees to accept such return, (iii) Client obtains a Return Material Authorization ("RMA") number from Seller for such return of such Products, and (iv) Client follows all return instructions provided by the Seller. The RMA number must be clearly written on the outside of all packaging for any returned overstock of Products.

7.2. Only such Products returned in original packaging and shipped to Seller at Client's cost may be accepted for return under this Section. Client is also responsible for payment of a restocking charge for all returned overstocked Products in an amount no less than 20% of the invoice value of the Products ("Restocking Charges"). Returns that result from Seller errors and not overstocking will be credited in full and will not be subject to Restocking Charges.

7.3 Any Product received damaged or showing evidence of having been installed will be refused or assessed a higher restocking charge. Custom kits designed to a Client's unique specifications are not returnable.

7.4 If Client requests product to be returned to them, the Client will be responsible for return shipping charges. See specific product literature for exclusions or exceptions.

## VIII. Limited Warranty

### VIII.A 5-year Limited Warranty

8.1. Products that are listed in this Product Guide as carrying a 5-year warranty to a location in the United States, Canada, or Latin America shall carry a 5-year warranty. The 5-year warranty is unconditional for the first two years from the date of sale of the Products to Client. After the first two years from the date of Sale, the warranty coverage shall not apply to damage to Products not resulting from normal wear and tear (e.g. negligence, misuse, or failure to maintain). Product specific terms of warranty with regard to warranty period or conditions of warranty may apply to certain specified Products as stated in the documentation for those Products.

### VIII.B 2-year Conditional Warranty

8.2. Products that are listed in this Product Guide as carrying a 2-year warranty to a location in the United States, Canada, or Latin America shall carry a 2-year warranty. The 2-year warranty is conditional from the date of sale of the Products to Client, and the warranty coverage shall not apply to damage to Products not resulting from normal wear and tear (e.g. negligence, misuse, or failure to maintain). Product specific terms of warranty with regard to warranty period or conditions of warranty may apply to certain specified Products as stated in the documentation for those Products.

### VIII.C Limitations

8.3. Seller's warranties hereunder shall be null and void in the event of any: (a) modification or unauthorized repairs of Products by Client; (b) unauthorized incorporation or integration of Products into or with Client's equipment; (c) use of Products in an unauthorized manner; or (d) damage to Products not caused by Seller.

### VIII.D Remedies

8.4 If a defect arises and a Return Material Authorization ("RMA") is issued as provided in Section 8.5, Seller will, at its option and to the extent permitted by law, either (1) repair the Product at no charge, using new or refurbished replacement parts or (2) replace the Product with a new Product. In the event of such a defect, to the extent permitted by law, these are Client's sole and exclusive remedies.

8.5 Products received by Client cannot be returned unless: (i) Client alerts Seller that it intends to return such Products, (ii) Seller agrees to accept the return of such Products, (iii) Client obtains a RMA number from Seller for the return of such Products, and (iv) Client follows all return instructions provided by the Seller. Client shall promptly notify Seller of Products' alleged defect and provide Seller with other evidence and documentation reasonably requested by Seller. The RMA number must be clearly written on the outside of all packaging for any returned Products. Only Products returned to the proper location as instructed by Seller and identified with an RMA number will be considered for credit.

8.6. In addition, Seller will only accept for return Products returned in original packaging. All returned Products must be shipped to Seller at Client's cost. Such returned Products must be received within one year from original sale date to Client, in as-new condition, adequate for resale as new Products to qualify for credit. Client will be responsible for payment of a restocking charge for all returned Products in an amount no less than 20% of the invoice value of the Products ("Restocking Charges"). Product received damaged or showing evidence of having been installed will be refused or assessed a higher restocking charge. Custom kits designed to a Client's unique specifications are not returnable. If Client requests repaired product to be returned to them, Client will be responsible for return shipping charges. See specific product literature for exclusions or exceptions.

8.7. Returns that result from Seller's breach of these Terms will be credited in full and will not be subject to Restocking Charges.

8.8. Seller-authorized support technicians are available for troubleshooting before any shipments to Seller. The contact information for Belimo customer service is listed on the back page of Belimo's Product Guide and Price List (PGPL) or may be found at [www.belimo.com](http://www.belimo.com).

8.9. If a problem cannot be resolved over the phone, an RMA number will be issued by Seller for return of the Products. Prior to returning any Products under a warranty, Client must obtain an RMA number from Seller, along with shipping instructions for the return. The RMA number must be clearly written on the outside of the box containing the returned Products. Only Products returned to the proper location and identified with an RMA number will be accepted by the Seller.

8.10. All returned Products should be packaged appropriately to prevent further damage. Seller reserves the right to refuse any returned material if improperly packaged or labeled (e.g. without an RMA number). Products returned without proper RMA documentation will void Seller's warranty. Seller is not responsible for charges that Client may incur as a result of the removal or replacement of Products.

8.11. Repaired or replacement Products are shipped from Seller via ground shipment. Other shipping methods are available at the sole expense of the Client.

8.12. Repaired, replaced or exchanged Products will carry a warranty for a period of time equal to the greater of: (i) the remainder of the original 5-year warranty or 2-year warranty that was applicable to the repaired, replaced or exchanged Products, or (ii) six months, effective from the date the repaired, exchanged or replaced Products are shipped by Seller (the "Replacement Warranty Period").

8.13. If Seller determines that Product under warranty is to be replaced, Seller may elect to send a replacement in advance of receiving the returned item. For industrial-type products, such as butterfly valves, a purchase order is required. The purchase order will be credited upon the receipt and verification by Seller of the returned defective Products. For industrial-type products, an invoice will be issued and shall be due and payable if the returned Products are not received by Seller within 60 days from the date that the replacement Products are shipped. Additional charges may apply if the nature of the problem has been misrepresented by Client.

8.14. New Products ordered in an attempt to circumvent the warranty process may NOT be reimbursed if, upon receipt of returned Products, it is determined that the defect in the returned Products is actually field related, or the Products have been returned for cosmetic reasons only.

## IX. No Warranty for Non-HVAC Application; Services

9.1. All Seller warranties shall extend only to HVAC use of the Products. If Products are used in non-HVAC applications (e.g., aircraft, industrial processes, etc.), Seller's warranties shall not cover such Products. Client will be solely responsible for any damage to or malfunction of Products or for any damage resulting from such use of Products.

9.2 Both the conditional and unconditional warranties hereunder cover the Products only, and do NOT cover labor associated with the troubleshooting, removal or replacement of such Products.

## X. Liability Disclaimer

10.1. These Terms constitute the entire understanding and agreement between Seller and Client regarding the warranties that cover Products and supersedes all previous understandings, agreements, communications and representations. Seller shall not be responsible for and Client does not have any right to make any claim for damage that occurs to any property other than Products. Seller shall in no way be responsible for any costs incurred by Client in the determination of the causes of damage to any of Client's property, for expert opinions, or for any punitive or special, incidental or consequential damages of any kind whatsoever. Seller's warranty is extended to the Client only and is non-transferrable.

10.2. Seller shall not be liable for any damage resulting from or contributed by Client or third parties acting within the scope of responsibility of Client or such third party when:

1. Products are used for non-HVAC applications, such as in aircrafts, industrial processes, etc.;
2. Client uses the Products without complying with applicable law or institutional regulations or Belimo data and installation sheets or Client uses the Products without following good industry practice;
3. Products are used by personnel who have not received suitable instruction;
4. Products are modified or repaired without the written approval of Seller; or
5. Client's design and/or system integration is insufficient.

When requested to do so, Client shall immediately release Seller in full from any possible third party claims resulting in connection with the circumstances listed above. This also applies to claims in connection with product liability.

10.3. If Client becomes aware that any third party has made or appears likely to make any claim regarding Products (including, without limitation, regarding Product defects or rights infringed by Products), then Client shall immediately inform Seller and afford to Seller all assistance that Seller may require to enforce its rights and defend such claim.

## XI. Proper Law and Jurisdiction

11.1. All sales of Products under these Terms and the warranties described herein shall be governed by the laws of the State of Connecticut, and the parties agree to submit to the exclusive jurisdiction of the Federal and state courts located in the State of Connecticut with respect to any dispute arising from the subject matter hereof. The parties hereby waive all rights to a jury trial in connection with any claims relating to the subject matter hereof. All causes of action arising out of or connected the sales of Products under these Terms shall be resolved individually, with no right by a party to participate in a representative capacity, or as a member of any class action.

## XII. Privacy and Data

12.1 Seller places great value on the implementation of lawful data processing to protect your personal data. Seller is obliged to process your personal data in accordance with applicable law. We are dependent on the services of a third party for the provision of our services. Seller has obligated the third party to process your data only in connection with the services agreed with Seller, to ensure the same level of data protection as Seller, and to not pass on your data to other third parties without your consent. When processing your data and transferring your data to third parties, Seller will use reasonable commercial efforts to provide an appropriate level of data protection and that appropriate organizational and technical measures are implemented to protect your personal data. More detailed information on our data protection guidelines is available from the following Internet address: [www.belimo.com/privacy](http://www.belimo.com/privacy).