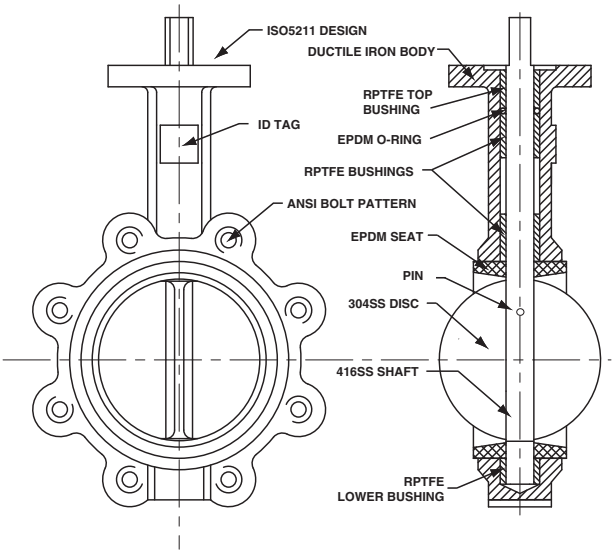
HD(U) Series Valves
HVAC Service Butterfly Valves
2-way and 3-way Assemblies

Belimo resilient seat HD(U)... 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
- Two Models to suit the application:
  - HDU Series provides economical HVAC solutions up to 50 psi close-off with a 200 psi body rating
  - HD Series provides full-rated close-off to 200 psi (2”–12”) or 150 psi (14”–30”)
- 2-way and 3-way applications



BELIMO

Standard Actuation (Average Assembly Weights)

					ACTUATOR				
					NON-SPRING RETURN			SPRING RETURN	
	Size	Valve	Max GPM	COP	AMB(X)	GMB(X)	2*GMB(X)	AF...	2*AF...
UNDERCUT MODELS 2-WAY	2”	F650HDU	118	50	13 lbs.			14 lbs.	
	2.5”	F665HDU	184	50	13 lbs.			14 lbs.	
	3”	F680HDU	264	50	13 lbs.				25 lbs.
	4”	F6100HDU	470	50		24 lbs.			34 lbs.
	5”	F6125HDU	734	50		29 lbs.			39 lbs.
	6”	F6150HDU	1058	50			43 lbs.		
UNDERCUT MODELS 3-WAY	2”	F750HDU	118	50	44 lbs.			46 lbs.	
	2.5”	F765HDU	184	50	56 lbs.				65 lbs.
	3”	F780HDU	264	50		62 lbs.			72 lbs.
	4”	F7100HDU	470	50			122 lbs.		
	5”	F7125HDU	734	50			152 lbs.		
	6”	F7150HDU	1058	50			186 lbs.		

					NON-SPRING RETURN			SPRING RETURN	
	Size	Valve	Max GPM	COP	AMB(X)	GMB(X)	2*GMB(X)	AF...	2*AF...
FULL RATED MODELS 2-WAY	2”	F650HD	118	200	13 lbs.			14 lbs.	
	2.5”	F665HD	184	200	13 lbs.				24 lbs.
	3”	F680HD	264	200		15 lbs.			25 lbs.
	4”	F6100HD	470	200			30 lbs.		
FULL RATED MODELS 3-WAY	2”	F750HD	118	200	44 lbs.			46 lbs.	
	2.5”	F765HD	184	200		55 lbs.			65 lbs.
	3”	F780HD	264	200			72 lbs.		
	4”	F7100HD	470	200			122 lbs.		

Industrial Actuation (Average Assembly Weights)

					ACTUATOR NON-SPRING RETURN			
		Size	Valve	Max GPM	COP	SY1...	SY2...	SY3...	SY4...
UNDERCUT MODELS	2-WAY	2”	F650HDU	118	50	14 lbs.			
		2.5”	F665HDU	184	50	14 lbs.			
		3”	F680HDU	264	50	15 lbs.			
		4”	F6100HDU	470	50		46 lbs.		
		5”	F6125HDU	734	50		50 lbs.		
		6”	F6150HDU	1058	50		54 lbs.		
		8”	F6200HDU	1880	50			62 lbs.	
		10”	F6250HDU	2938	50			79 lbs.	
		12”	F6300HDU	4230	50			98 lbs.	
	3-WAY	2”	F750HDU	118	50	46 lbs			
		2.5”	F765HDU	184	50	55 lbs.			
		3”	F780HDU	264	50		84 lbs.		
		4”	F7100HDU	470	50		134 lbs.		
		5”	F7125HDU	734	50		163 lbs.		
		6”	F7150HDU	1058	50		197 lbs.		
		8”	F7200HDU	1880	50			273 lbs.	
		10”	F7250HDU	2938	50				452 lbs.
		12”	F7300HDU	4230	50				603 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.

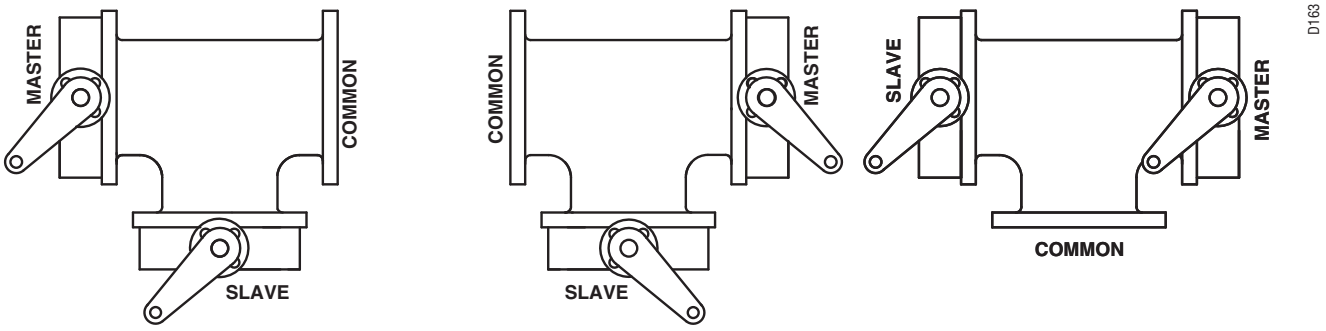
COP = Close-Off Pressure stated in psi. This is the maximum differential pressure the valve will close-off against while maintaining a bubble tight seal.

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

						ACTUATOR NON-SPRING RETURN							
		Size	Valve	Max GPM	COP	SY2...	SY3...	SY4...	SY6...	SY7...	SY8...	SY10...	SY12...
FULL RATED MODELS	2-WAY	2”	F650HD	118	200	36 lbs.							
		2.5”	F665HD	184	200	36 lbs.							
		3”	F680HD	264	200	36 lbs.							
		4”	F6100HD	470	200	46 lbs.							
		5”	F6125HD	734	200	50 lbs.							
		6”	F6150HD	1058	200		54 lbs.						
		8”	F6200HD	1880	200			86 lbs.					
		10”	F6250HD	2938	200			103 lbs.					
		12”	F6300HD	4230	200			122 lbs.					
		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.	
		30”	F6750HD	26438	150								833 lbs.
	3-WAY	2”	F750HD	118	200	65 lbs.							
		2.5”	F765HD	184	200	77 lbs.							
		3”	F780HD	264	200	84 lbs.							
		4”	F7100HD	470	200	134 lbs.							
		5”	F7125HD	734	200	163 lbs.							
		6”	F7150HD	1058	200		197 lbs.						
		8”	F7200HD	1880	200			297 lbs.					
		10”	F7250HD	2938	200			452 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.	

Butterfly Valve Selection-Velocity Chart

HDU/HD Series Valves



CONFIG CODE	ON/OFF OR MOD@2VDC MASTER VALVE IS	MASTER VALVE @ FAIL
X10	OPEN	NON-FAIL
X11	OPEN	OPEN
X12	OPEN	CLOSED
X13	CLOSED	NON-FAIL
X14	CLOSED	OPEN
X15	CLOSED	CLOSED

CONFIG CODE	ON/OFF OR MOD@2VDC MASTER VALVE IS	MASTER VALVE @ FAIL
X20	OPEN	NON-FAIL
X21	OPEN	OPEN
X22	OPEN	CLOSED
X23	CLOSED	NON-FAIL
X24	CLOSED	OPEN
X25	CLOSED	CLOSED

CONFIG CODE	ON/OFF OR MOD@2VDC MASTER VALVE IS	MASTER VALVE @ FAIL
X30	OPEN	NON-FAIL
X31	OPEN	OPEN
X32	OPEN	CLOSED
X33	CLOSED	NON-FAIL
X34	CLOSED	OPEN
X35	CLOSED	CLOSED

X Specifies Bi-Directional Flow Capability

Notes:

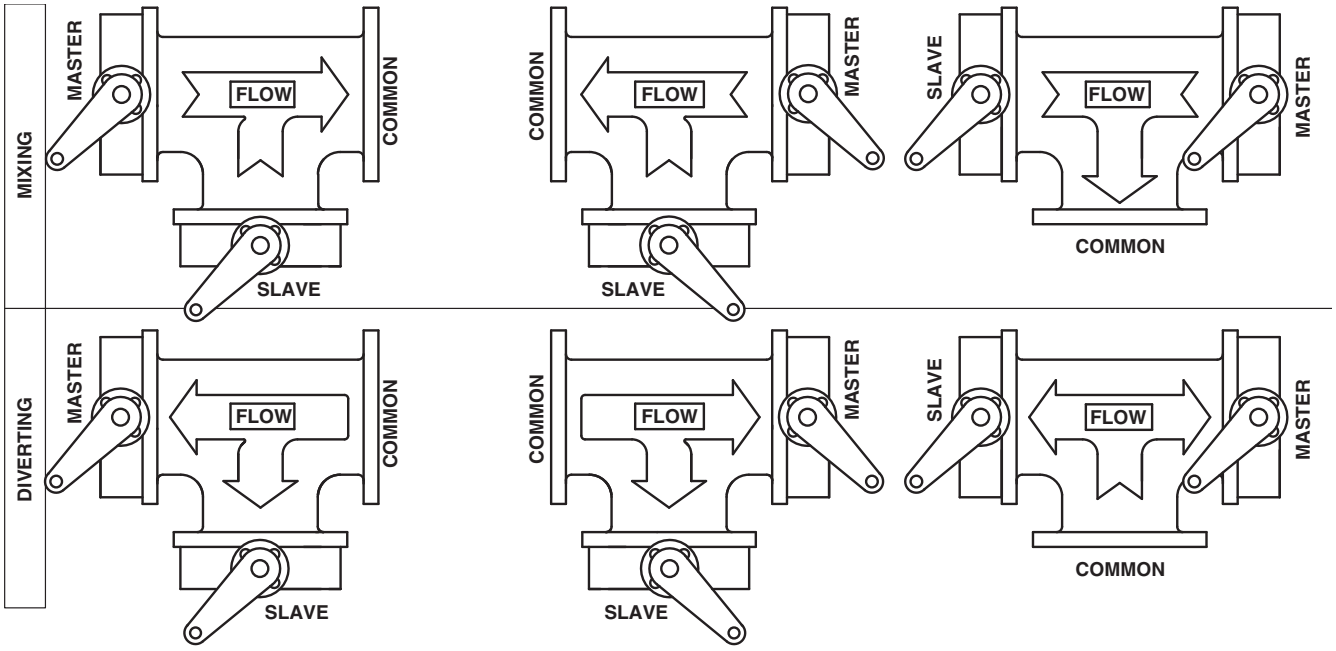
1. Slave Valve operates inversely of the Master Valve.
2. The Master Valve is always located on the run.
3. The Slave Valve may also have an actuator if required (Direct Coupled).
4. On/Off actuator normal position is a function of field logic.
5. Proportional actuator normal position is a function of the CCW/CW
6. All 3-way assemblies are designed for 90 degree actuator rotation.

Flow in Std Weight Pipe (Fluid Velocity in GPM). Use with Resilient Seat BF Valves.

Size	2 FPS	4 FPS	6 FPS	8 FPS	10 FPS	12 FPS	14 FPS ×	16 FPS ×
2”	19	39	59	78	98	117	137	157
2½”	30	61	92	122	153	184	214	245
3”	44	88	132	176	220	264	308	353
4”	78	157	235	313	392	470	548	627
5”	122	245	367	490	612	734	857	979
6”	176	352	529	705	881	1058	1234	1410
8”	313	627	940	1253	1567	1880	2193	2507
10”	490	979	1469	1958	2448	2738	3427	3917
12”	705	1410	2115	2820	3525	4230	4935	5640
14”	959	1919	2879	3838	4798	5758	6717	7677
16”	1253	2507	3760	5013	6267	7520	8774	10027
18”	1586	3173	4759	6345	7931	9518	11104	12690
20”	1958	3917	5875	7834	9792	11750	13709	15668
24”	2820	5640	8460	11280	14100	16921	19741	22561
30”	4406	8813	13220	17625	22032	26438	30845	35251

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.
If the maximum recommended velocity is exceeded, the valve may be damaged and/or the torque increased potentially exceeding the actuators capacity.

150 SHP/300 SHP Series Valves – SHP Series Valves are Flow Direction Specific



CONFIG CODE	ON/OFF OR MOD@2VDC MASTER VALVE IS	MASTER VALVE @ FAIL
M(D)10	OPEN	NON-FAIL
M(D)11	OPEN	OPEN
M(D)12	OPEN	CLOSED
M(D)13	CLOSED	NON-FAIL
M(D)14	CLOSED	OPEN
M(D)15	CLOSED	CLOSED

CONFIG CODE	ON/OFF OR MOD@2VDC MASTER VALVE IS	MASTER VALVE @ FAIL
M(D)20	OPEN	NON-FAIL
M(D)21	OPEN	OPEN
M(D)22	OPEN	CLOSED
M(D)23	CLOSED	NON-FAIL
M(D)24	CLOSED	OPEN
M(D)25	CLOSED	CLOSED

CONFIG CODE	ON/OFF OR MOD@2VDC MASTER VALVE IS	MASTER VALVE @ FAIL
M(D)30	OPEN	NON-FAIL
M(D)31	OPEN	OPEN
M(D)32	OPEN	CLOSED
M(D)33	CLOSED	NON-FAIL
M(D)34	CLOSED	OPEN
M(D)35	CLOSED	CLOSED

M Specifies MIXING, D Specifies DIVERTING

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. Proportional actuator normal position is a function of the CCW/CW swit
6. All 3-way assemblies are designed for 90 degree actuator rotation.

Flow in Std Weight Pipe (Fluid Velocity in GPM). Use with SHP Series BF Valves.

SIZE	4 FPS	8 FPS	12 FPS	16 FPS	20 FPS	24 FPS	28 FPS	32 FPS	36 FPS×
2”	39	78	118	157	196	235	274	313	353
2½”	61	122	184	245	306	367	428	490	551
3”	88	176	264	353	441	529	617	705	793
4”	157	313	470	627	783	940	1097	1253	1410
5”	245	490	734	979	1224	1469	1714	1958	2203
6”	352	705	1058	1410	1763	2115	2468	2820	3173
8”	627	1253	1880	2507	3133	3760	4387	5013	5640
10”	979	1958	2938	3917	4896	5875	6854	7834	8813
12”	1410	2820	4230	5640	7050	8460	9870	11280	12690
14”	1919	3838	5738	7677	9596	11515	13435	15354	17273
16”	2507	5013	7520	10027	12534	15040	17547	20054	22561
18”	3173	6345	9518	12690	15863	19036	22208	25381	28553
20”	3917	7834	11750	15667	19584	23501	27418	31334	35251
24”	5640	11280	16921	22561	28201	33841	39481	45121	50762
30”	8813	17625	26438	35251	44064	52877	61689	70502	79315

It is not recommended to exceed 32 feet per second through high performance butterfly valves.
Velocities greater than 32 fps may damage the valve.

Butterfly Valve Nomenclature

F6	50	HD	SY2	-24	MFT	
Valve F6 = 2-way F7 = 3-way	**Valve Size** 50-750 = 2" to 30"	**Trim Material** **HDU** = Stainless Disc, Cast Ductile Iron Full Lug Body, EPDM Liner, Bubble Tight Close-Off to 50 psi **HD** = Stainless Disc, Cast Ductile Iron Full Lug Body, EPDM Liner, Bubble Tight Close-Off to 200 psi (2" to 12"), 150 psi (14"+) **-150SHP** = ANSI Class 150, Stainless Disc, Cast Steel Full Lug Body, RPTFE Seat, Bubble Tight Close-off up to 285 psi **-300SHP** = ANSI Class 150, Stainless Disc, Cast Steel Full Lug Body, RPTFE Seat, Bubble Tight Close-off up to 600 psi	**Actuator Type** Non-Spring Return DR... GR... GMB(X) SY... Electronic Fail-Safe GK... Spring Return AF...	**Power Supply** -24 = 24 VAC/DC -110 = 110/120 VAC -120 = 120 VAC -230 = 230 VAC	**Control** Blank = On/Off -3-X1 = On/Off, Floating Point MFT or MFT-X1 = Multi-Function Technology	-S = Built-in Auxiliary Switch

ORDERING EXAMPLE

1. Choose the valve actuator combination.

F650HD+SY2-24MFT

2. Specify preference or configuration.

3. **For MFT orders only - select programming code (consult factory)**

+NO **+Tagging (if needed)**

4. Does order require tagging?

Tagging: Valves may be tagged per customer specification. ($10.00 per tag)

Example:
Chiller 1
3rd Floor East

Part number for tagging: 99981-00101

5. Complete Ordering Example:

F650HD+SY2-24MFT+NO +ACE

Consult factory

2-way Preference

Non-Spring Return, 2 Pos.		Set Up Required Field Logic Determines Normal Position
Non-Spring Return, Modulating	NC	(Normally Closed) 1 VDC/2 VDC/4mA = Closed
Non-Spring Return, Modulating	NO	(Normally Open) 1 VDC/2 VDC/4mA = Open
Spring Return	NO/FO	(Normally Open/Fail Open) Field Logic Determines Normal Position Spring Fails Valve OPEN
Spring Return	NC/FC	(Normally Closed/Fail Closed) Field Logic Determines Normal Position Spring Fails Valve CLOSED
Spring Return	NO/FO	(Normally Open/Fail Open) 1 VDC/2 VDC/4mA = Open Spring Fails Valve OPEN
Spring Return	NC/FC	(Normally Open/Fail Closed) 1 VDC/2 VDC/4mA = Open Spring Fails Valve CLOSED
Spring Return	NC/FO	(Normally Closed/Fail Open) 1 VDC/2 VDC/4mA = Closed Spring Fails Valve OPEN
Spring Return	NC/FC	(Normally Closed/Fail Closed) 1 VDC/2 VDC/4mA = Closed Spring Fails Valve CLOSED

Set-Up **3-way Configuration**

Non-Spring Return, 2 Pos.		No Set Up Required Field Logic Determines Normal Position
Non-Spring Return, Modulating	Specify Flow Pattern [10-35]	Master (Actuated) Valve NC (Normally Closed) 1 VDC/2 VDC/4mA = Closed
Non-Spring Return, Modulating	Specify Flow Pattern [10-35]	Master (Actuated) Valve NO (Normally Open) 1 VDC/2 VDC/4mA = Open
Spring Return, Modulating 2 Pos.	Specify Flow Pattern [10-35]	NO/FO (Normally Open/Fail Open) Field Logic Determines Normal Position Spring Fails Master Valve OPEN
Spring Return, Modulating 2 Pos.	Specify Flow Pattern [10-35]	NC/FC (Normally Closed/Fail Closed) Field Logic Determines Normal Position Spring Fails Master Valve CLOSED
Spring Return, Modulating 2 Pos.	Specify Flow Pattern [10-35]	NO/FO (Normally Open/Fail Open) 1 VDC/2 VDC/4mA = Master Valve Open Spring Fails Master Valve OPEN
Spring Return, Modulating 2 Pos.	Specify Flow Pattern [10-35]	NO/FC (Normally Open/Fail Closed) 1 VDC/2 VDC/4mA = Maser Valve Open Spring Fails Master Valve CLOSED
Spring Return, Modulating 2 Pos.	Specify Flow Pattern [10-35]	NC/FO (Normally Closed/Fail Open) 1 VDC/2 VDC/4mA = Master Valve Closed Spring Fails Master Valve OPEN
Spring Return, Modulating 2 Pos.	Specify Flow Pattern [10-35]	NC/FC (Normally Closed/Fail Closed) 1 VDC/2 VDC/4mA = Master Valve Closed Spring Fails Master Valve CLOSED

F6…HDU Butterfly Valves 2”–12” Ductile Iron Lug Body Resilient Seat, 304 Stainless Disc

- **50 psi bubble tight shut-off**
- **Long stem design allows for 2” insulation**
- **Valve face-to-face dimensions comply with API 609 & MSS-SP-67**
- **Completely assembled and tested, ready for installation**

Application

These valves are designed to meet the needs of HVAC and commercial applications requiring bubble tight shut-off for liquids. Typical applications include chiller isolation, cooling tower isolation, change-over systems, large air handler coil control, bypass and process control applications. The large C_v values provide for an economical control valve solution for larger flow applications. Designed for use in Victaulic piping systems when mated to Victaulic 41 series flange nipples.

Jobsite Note

Valves should be stored in a weather protected area prior to construction. Complete installation recommendations can be found in Belimo’s Installation and Maintenance Instructions for F6/F7…HD/HDU Butterfly Valves.

Technical Data	
Service	chilled, hot water, 60% glycol
Flow characteristic	modified equal percentage
Action	90° rotation
Sizes	2” 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
Upper bushing	RPTFE
Middle bushings	RPTFE
Lower bushing	RPTFE
Media temperature range	-22°F to 250°F [-30°C to 120°C]
Operation ambient temperature range	-22°F to 122°F [-30°C to 50°C]
Body pressure rating	ASME/ANSI Class 125/150 (200 psi at -30°F to 275°F)
Close-off pressure	50 psi
Rangeability	10:1 (for 30° to 70° range)
Maximum velocity	12 FPS

		Valve Nominal Size		Type	Suitable Actuators			
C_v 90°	C_v 60°	IN	DN [mm]	2-way	Spring	Non-Spring		
115	44	2”	50	F650HDU	AF Series	AM Series		SY Series
196	75	2½”	65	F665HDU				
302	116	3”	80	F680HDU			GM	
600	230	4”	100	F6100HDU				
1022	392	5”	125	F6125HDU				
1579	605	6”	150	F6150HDU				
3136	1202	8”	200	F6200HDU				
5340	2047	10”	250	F6250HDU				
8250	3062	12”	300	F6300HDU				

			MOD								ON/OFF
Valve	Size	C_v	10°	20°	30°	40°	50°	60°	70°	80°	90°
F650HDU	2”	115	.06	3	7	15	27	44	70	105	115
F665HDU	2½”	196	.10	6	12	25	45	75	119	178	196
F680HDU	3”	302	.20	9	18	39	70	116	183	275	302
F6100HDU	4”	600	.30	17	36	78	139	230	364	546	600
F6125HDU	5”	1022	.50	29	61	133	237	392	620	930	1022
F6150HDU	6”	1579	.80	45	95	205	366	605	958	1437	1579
F6200HDU	8”	3136	2	89	188	408	727	1202	1903	2854	3136
F6250HDU	10”	5340	3	151	320	694	1237	2047	3240	4859	5340
F6300HDU	12”	8250	4	234	495	1072	1911	3062	5005	7507	8250

F6…HDU Butterfly Valves 2"–12" Ductile Iron Lug Body Resilient Seat, 304 Stainless Disc

Maximum Dimensions (Inches)

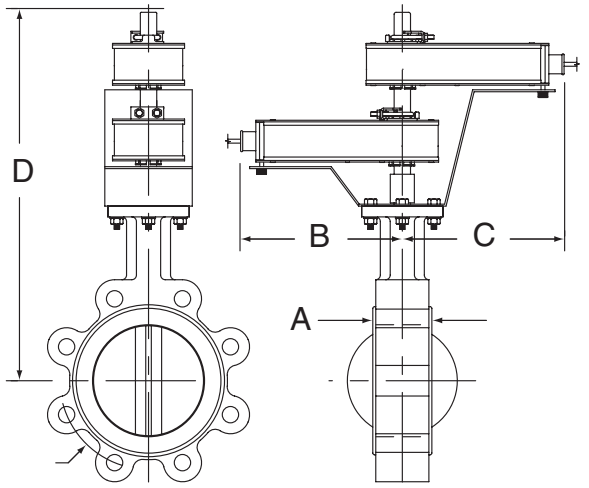
Valve	Size	C_V 90°	C_V 60°	A	B	C	D(Max)	BHC	No. of Holes	Lug Bolt	Actuator	Close-Off (PSI)	
F650HDU	2"	115	44	1.65	9.00	9.00	19.50	4.75	4	5/8-11UNC	AF	50	Fail Safe
F665HDU	2½"	196	75	1.76	9.00	9.00	20.00	5.50	4	5/8-11UNC		50	
F680HDU	3"	302	116	1.78	9.00	9.00	20.50	6.00	4	5/8-11UNC	2*AF	50	
F6100HDU	4"	600	230	2.05	9.00	9.00	21.00	7.50	8	5/8-11UNC		50	
F6125HDU	5"	1022	392	2.14	9.00	9.00	22.00	8.50	8	3/4-10UNC		50	
F650HDU	2"	115	44	1.65	7.00	7.00	15.00	4.75	4	5/8-11UNC	AMB(X)	50	Non-Fail Safe
F665HDU	2½"	196	75	1.76	7.00	7.00	15.50	5.50	4	5/8-11UNC		50	
F680HDU	3"	302	116	1.78	7.00	7.00	16.00	6.00	4	5/8-11UNC		50	
F6100HDU	4"	600	230	2.05	8.00	8.00	17.00	7.50	8	5/8-11UNC	GMB(X)	50	
F6125HDU	5"	1022	392	2.14	8.00	8.00	17.50	8.50	8	3/4-10UNC		50	
F6150HDU	6"	1579	605	2.19	8.00	8.00	22.50	9.50	8	3/4-10UNC	GMB(X)	50	
F650HDU	2"	115	44	1.65	4.25	4.25	15.50	4.75	4	5/8-11UNC	SY1…	50	
F665HDU	2½"	196	75	1.76	4.25	4.25	16.00	5.50	4	5/8-11UNC		50	
F680HDU	3"	302	116	1.78	4.25	4.25	16.25	6.00	4	5/8-11UNC		50	
F6100HDU	4"	600	230	2.05	8.00	13.00	22.00	7.50	8	5/8-11UNC	SY2…	50	
F6125HDU	5"	1022	392	2.14	8.00	13.00	22.50	8.50	8	3/4-10UNC		50	
F6150HDU	6"	1579	605	2.19	8.00	13.00	23.00	9.50	8	3/4-10UNC		50	
F6200HDU	8"	3136	1202	2.37	8.00	13.00	24.25	11.75	8	3/4-10UNC	SY3…	50	
F6250HDU	10"	5340	2047	2.58	8.00	13.00	25.50	14.25	12	7/8-9UNC		50	
F6300HDU	12"	8250	3062	3.01	8.00	13.00	27.25	17.00	12	7/8-9UNC		50	

Dimension "A" is compressed, add .125" for relaxed state.
AF, AM and GM maximum actuator ambient temperature is 122°F.
SY maximum actuator ambient temperature is 150°F.
Model SY1… does not have handwheel - override is via 8mm wrench on bottom side of actuator.

Application Notes

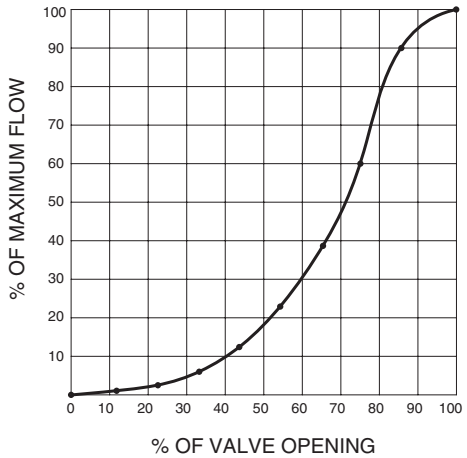
1. Valves are rated at 50 psi differential pressure in the closed position.
2. Valves are furnished with lugs tapped for use with ANSI Class 125/150 flanges. Installation flanges and hardware are not included.
3. 2-way assemblies are furnished assembled and tested, ready for installation.
4. Dimension "D" allows for actuator removal without the need to remove the valve from the pipe.
5. Weather shields are available, dimensional data upon request.
6. Dual actuated valves have actuators mounted on a common valve shaft.
7. Belimo SY Series actuators are NEMA 4X rated.

Dimensions



BF2WUDIM

Flow Pattern



- **50 psi bubble tight shut-off**
- **Long stem design allows for 2" insulation**
- **Valve face-to-face dimensions comply with API 609 & MSS-SP-67**
- **Completely assembled and tested, ready for installation**
- **Tees comply with ASME/ANSI B16.1 Class 125 flanges**

Application

These valves are designed to meet the needs of HVAC and commercial applications requiring bubble tight shut off for liquids. Typical applications include chiller isolation, cooling tower isolation, change-over systems, large air handler coil control, bypass and process control applications. The large C_v values provide for an economical control valve solution for larger flow applications. Designed for use in Victaulic piping systems when mated to Victaulic 41 series flange nipples.

Jobsite Note

Valves should be stored in a weather protected area prior to construction. Complete installation recommendations can be found in Belimo's Installation and Maintenance Instructions for F6/F7…HD/HDU Butterfly Valves.

Technical Data	
Service	chilled, hot water, 60% glycol
Flow characteristic	modified linear
Action	90° rotation
Sizes	2" to 12"
Type of end fitting	for use with ANSI 125/150 flanges
Materials	
Body	ductile iron ASTM A536
Body finish	epoxy powder finish
Disc	304 stainless steel
Seat	EPDM standard
Shaft	416 stainless steel
O-ring	EPDM
Upper bushing	RPTFE
Middle bushings	RPTFE
Lower bushing	RPTFE
Media temperature range	-22°F to 250°F [-30°C to 120°C]
Operation ambient temperature range	-22°F to 122°F [-30°C to 50°C]
Body pressure rating	ASME/ANSI Class 125/150 (200 psi at -30°F to 275°F)
Close-off pressure	50 psi
Rangeability	10:1 (for 30° to 70° range)
Maximum velocity	12 FPS

		Valve Nominal Size		Type	Suitable Actuators		
C_v 90°	C_v 60°	IN	DN [mm]	3-way	Spring	Non-Spring	
115	44	2"	50	F750HDU	AF Series	AM	SY Series
196	75	2½"	65	F765HDU		GM Series	
302	116	3"	80	F780HDU			
600	230	4"	100	F7100HDU			
1022	392	5"	125	F7125HDU			
1579	605	6"	150	F7150HDU			
3136	1202	8"	200	F7200HDU			
5340	2047	10"	250	F7250HDU			
8250	3062	12"	300	F7300HDU			

			MOD								ON/OFF
Valve	Size	C_v	10°	20°	30°	40°	50°	60°	70°	80°	90°
F750HDU	2"	115	.06	3	7	15	27	44	70	105	115
F765HDU	2½"	196	.10	6	12	25	45	75	119	178	196
F780HDU	3"	302	.20	9	18	39	70	116	183	275	302
F7100HDU	4"	600	.30	17	36	78	139	230	364	546	600
F7125HDU	5"	1022	.50	29	61	133	237	392	620	930	1022
F7150HDU	6"	1579	.80	45	95	205	366	605	958	1437	1579
F7200HDU	8"	3136	2	89	188	408	727	1202	1903	2854	3136
F7250HDU	10"	5340	3	151	320	694	1237	2047	3240	4859	5340
F7300HDU	12"	8250	4	234	495	1072	1911	3062	5005	7507	8250

F7…HDU Butterfly Valves 2”–12” Ductile Iron Lug Body Resilient Seat, 304 Stainless Disc

Maximum Dimensions (Inches)

Valve	Size	C_v 90°	A	B	C	D(Max)	BHC	No. of Holes	Lug Bolt	Actuator	Close-Off (PSI)	
F750HDU	2”	115	4.50	6.15	6.15	15.50	4.75	4	5/8-11UNC	AF	50	Fail Safe
F765HDU	2½”	196	5.00	6.76	6.76	16.00	5.50	4	5/8-11UNC	2*AF	50	Fail Safe
F780HDU	3”	302	5.50	7.28	7.28	16.25	6.00	4	5/8-11UNC	2*AF	50	Fail Safe
F750HDU	2”	115	4.50	6.15	6.15	15.50	4.75	4	5/8-11UNC	SY1…	50	
F765HDU	2½”	196	5.00	6.76	6.76	16.00	5.50	4	5/8-11UNC	SY1…	50	
F780HDU	3”	302	5.50	7.28	7.28	21.00	6.00	4	5/8-11UNC	SY2…	50	Non-Fail Safe
F7100HDU	4”	600	6.50	8.55	8.55	21.75	7.50	8	5/8-11UNC	SY2…	50	Non-Fail Safe
F7125HDU	5”	1022	7.50	9.64	9.64	22.25	8.50	8	3/4-10UNC	SY2…	50	Non-Fail Safe
F7150HDU	6”	1579	8.00	10.19	10.19	22.75	9.50	8	3/4-10UNC	SY2…	50	Non-Fail Safe
F7200HDU	8”	3136	9.00	11.37	11.37	24.25	11.75	8	3/4-10UNC	SY3…	50	Non-Fail Safe
F7250HDU	10”	5340	11.00	13.58	13.58	30.00	14.25	12	7/8-9UNC	SY4…	50	Non-Fail Safe
F7300HDU	12”	8250	12.00	15.01	15.01	32.00	17.00	12	7/8-9UNC	SY4…	50	Non-Fail Safe

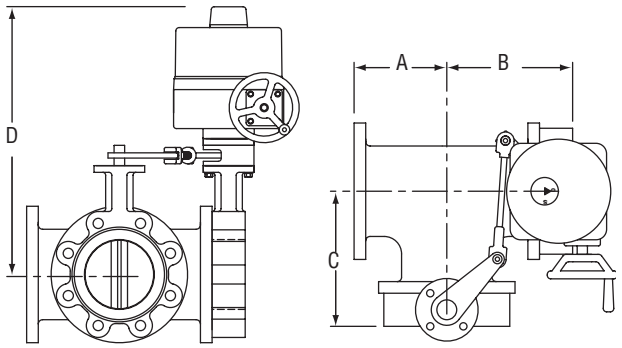
AF maximum actuator ambient temperature is 122°F.
SY... maximum actuator ambient temperature is 150°F.
Model SY1… does not have hand wheel-override is via 8mm wrench on bottom side of actuator.

Application Notes

1. Valves are rated at 50 psi differential pressure in the closed position.
2. Valves are furnished with lugs tapped for use with ANSI Class 125/150 flanges. Installation flanges and hardware are not included.
3. 3-way assemblies are furnished assembled and tested, ready for installation. **All 3-way assemblies require the customer to specify the 3-way configuration prior to order entry to guarantee correct placement of valves and actuators on the assembly.**
4. Dimension “D” allows for actuator removal without the need to remove the valve from the pipe.
5. Weather shields are available, dimensional data upon request.
6. Dual actuated valves have single actuators mounted on each valve shaft.
7. Bolts supplied are for shipping purposes only. Upon installation replace with an appropriate SAE grade 5 or better hardware.
8. Belimo SY Series actuators are NEMA 4X rated.

Dimensions

HS DWGP15



- **200 psi (2” to 12”) and 150 psi (14”-30”) bubble tight shut-off**
- **Long stem design allows for 2” insulation**
- **Valve face-to-face dimensions comply with API 609 & MSS-SP-67**
- **Completely assembled and tested, ready for installation**

Application

These valves are designed to meet the needs of HVAC and commercial applications requiring bubble tight shut-off for liquids. Typical applications include chiller isolation, cooling tower isolation, change-over systems, large air handler coil control, bypass and process control applications. The large C_v values provide for an economical control valve solution for larger flow applications. Designed for use in Victaulic piping systems when mated to Victaulic 41 series flange nipples.

Jobsite Note

Valves should be stored in a weather protected area prior to construction. Complete installation recommendations can be found in Belimo’s Installation and Maintenance Instructions for F6/F7…HD/HDU Butterfly Valves.

Technical Data	
Service	chilled, hot water, 60% glycol
Flow characteristic	modified equal percentage
Action	90° rotation
Sizes	2” to 30”
Type of end fitting	for use with ANSI 125/150 flanges
Materials	
Body	ductile iron ASTM A536
Body finish	epoxy powder coated
Disc	304 stainless steel
Seat	EPDM standard
Shaft	416 stainless steel
O-ring	EPDM
Upper bushing	RPTFE
Middle bushings	RPTFE
Lower bushing	RPTFE
Media temperature range	-22°F to 250°F [-30°C to 120°C]
Operation ambient temperature range	-22°F to 122°F [-30°C to 50°C]
Body pressure rating	ASME/ANSI Class 125/150 (200 psi at -30°F to 275°F)
Close-off pressure	200 psi (2”-12”), 150 psi (14”-30”)
Rangeability	10:1 (for 30° to 70° range)
Maximum velocity	12 FPS

		Valve Nominal Size		Type	Suitable Actuators			
C_v 90°	C_v 60°	IN	DN [mm]	2-way	Spring	Non-Spring		
115	44	2”	50	F650HD	AF Series	AM		SY Series
196	75	2½”	65	F665HD				
302	116	3”	80	F680HD			GM	
600	230	4”	100	F6100HD				
1022	392	5”	125	F6125HD				
1579	605	6”	150	F6150HD				
3136	1202	8”	200	F6200HD				
5340	2047	10”	250	F6250HD				
8250	3062	12”	300	F6300HD				
11917	4568	14”	350	F6350HD				
16388	6282	16”	400	F6400HD				
21705	8320	18”	450	F6450HD				
27908	10698	20”	500	F6500HD				
43116	16528	24”	600	F6600HD				
73426	28146	30”	750	F6750HD				

			MOD								ON/OFF
Valve	Size	C_v	10°	20°	30°	40°	50°	60°	70°	80°	90°
F650HD	2”	115	.06	3	7	15	27	44	70	105	115
F665HD	2-1/2”	196	.10	6	12	25	45	75	119	178	196
F680HD	3”	302	.20	9	18	39	70	116	183	275	302
F6100HD	4”	600	.30	17	36	78	139	230	364	546	600
F6125HD	5”	1022	.50	29	61	133	237	392	620	930	1022
F6150HD	6”	1579	.80	45	95	205	366	605	958	1437	1579
F6200HD	8”	3136	2	89	188	408	727	1202	1903	2854	3136
F6250HD	10”	5340	3	151	320	694	1237	2047	3240	4859	5340
F6300HD	12”	8250	4	234	495	1072	1911	3062	5005	7507	8250
F6350HD	14”	11917	6	338	715	1549	2761	4568	7230	10844	11917
F6400HD	16”	16388	8	464	983	2130	3797	6282	9942	14913	16388
F6450HD	18”	21705	11	615	1302	2822	5028	8320	13168	19752	21705
F6500HD	20”	27908	14	791	1674	3628	6465	10698	16931	25396	27908
F6600HD	24”	43116	22	1222	2587	5605	9989	16528	26157	39236	43116
F6750HD	30”	73426	37	2081	4405	9545	17011	28146	44545	66818	73426

F6…HD Butterfly Valves 2”–30” Ductile Iron Lug Body Resilient Seat, 304 Stainless Disc

Maximum Dimensions (Inches)

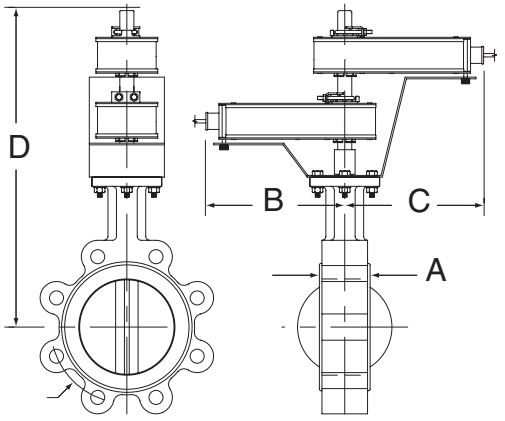
Valve	Size	C_V 90°	C_V 60°	A	B	C	D(Max)	BHC	No. of Holes	Lug Bolt	Actuator	Close-Off (PSI)	
F650HD	2”	115	44	1.65	9.00	9.00	19.50	4.75	4	5/8-11UNC	AF	200	Fail Safe
F665HD	2½”	196	75	1.76	9.00	9.00	20.00	5.50	4	5/8-11UNC	2*AF	200	
F680HD	3”	302	116	1.78	9.00	9.00	20.50	6.00	4	5/8-11UNC		200	
F650HD	2”	115	44	1.65	7.00	7.00	15.00	4.75	4	5/8-11UNC	AMB(X)	200	Non-Fail Safe
F665HD	2½”	196	75	1.76	7.00	7.00	15.50	5.50	4	5/8-11UNC		200	
F680HD	3”	302	116	1.78	8.00	8.00	16.00	6.00	4	5/8-11UNC	GMB(X)	200	
F6100HD	4”	600	230	2.05	8.00	8.00	21.00	7.50	8	5/8-11UNC	2*GMB(X)	200	
Valve	**Size**	**C_V 90°**	**C_V 60°**	**A(Max)**	**B (Max)**	**C (Max)**	**D(Max)**	**BHC**	**No. of Holes**	**Lug Bolt**	**Actuator**	**Close-Off (PSI)**	
F650HD	2”	115	44	1.65	8.00	13.00	20.25	4.75	4	5/8-11UNC	SY2…	200	Non-Fail Safe
F665HD	2½”	196	75	1.76	8.00	13.00	20.75	5.50	4	5/8-11UNC		200	
F680HD	3”	302	116	1.78	8.00	13.00	21.00	6.00	4	5/8-11UNC		200	
F6100HD	4”	600	230	2.05	8.00	13.00	21.75	7.50	8	5/8-11UNC		200	
F6125HD	5”	1022	392	2.14	8.00	13.00	22.25	8.50	8	3/4-10UNC		200	
F6150HD	6”	1579	605	2.19	8.00	13.00	22.75	9.50	8	3/4-10UNC	SY3…	200	
F6200HD	8”	3136	1202	2.37	12.00	15.00	29.00	11.75	8	3/4-10UNC	SY4…	200	
F6250HD	10”	5340	2047	2.58	12.00	15.00	30.00	14.25	12	7/8-9UNC		200	
F6300HD	12”	8250	3062	3.01	12.00	15.00	32.00	17.00	12	7/8-9UNC		200	
F6350HD	14”	11917	4568	3.02	12.00	15.00	33.00	18.75	12	1-8UNC	SY5…	150	
F6400HD	16”	16388	6282	3.39	12.00	15.00	34.50	21.25	16	1-8UNC	SY6…†	150	
F6450HD	18”	21705	8320	4.13	14.00	21.00	39.25	22.75	16	1 1/8-7UNC	SY8…†	150	
F6500HD	20”	27908	10698	5.00	14.00	21.00	41.50	25.00	20	1 1/8-7UNC		150	
F6600HD	24”	43116	16528	5.94	14.00	22.00	53.25	29.50	20	1 1/4-7UNC	SY11…†	150	
F6750HD	30”	73426	28146	6.57	14.00	22.00	57.50	36.00	28	1 1/4-7UNC	SY12…†	150	

Dimension “A” is compressed, add .125” for relaxed state.
†SY6 and larger available in 110/220 VAC versions only.
AF, AM and GM maximum actuator ambient temperature is 122°F.
SY... maximum actuator ambient temperature is 150°F.

Application Notes

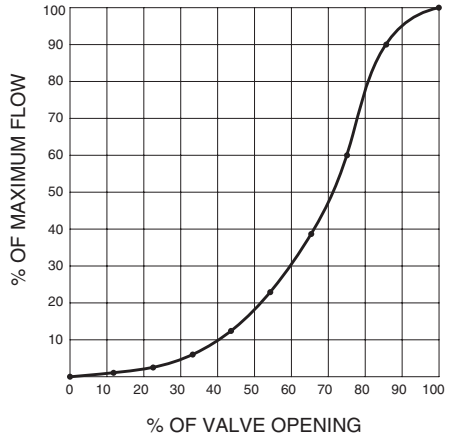
1. Valves are rated at 200 psi differential pressure in the closed position (SY... 150 psi 14”+).
2. Valves are furnished with lugs tapped for use with ANSI Class 125/150 flanges. Installation flanges and hardware are not included.
3. 2-way assemblies are furnished assembled and tested, ready for installation.
4. Dimension “D” allows for actuator removal without the need to remove the valve from the pipe.
5. Weather shields are available, dimensional data upon request.
6. Dual actuated valves have actuators mounted on a common valve shaft.
7. Belimo SY Series actuators are NEMA 4X rated.

Dimensions

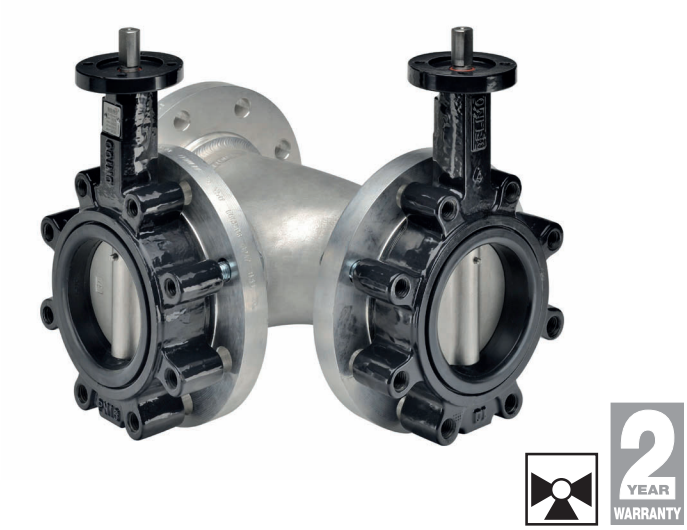


BF2WUDMM

Flow Pattern



F7…HD Butterfly Valves 2”–24” Ductile Iron Lug Body Resilient Seat, 304 Stainless Disc



- **200 psi (2” to 12”) and 150 psi (14”-30”) bubble tight shut-off**
- **Long stem design allows for 2” insulation**
- **Valve face-to-face dimensions comply with API 609 & MSS-SP-67**
- **Completely assembled and tested, ready for installation**
- **Tees comply with ASME/ANSI B16.1 Class 125 flanges**

Application

These valves are designed to meet the needs of HVAC and commercial applications requiring bubble tight shut off for liquids. Typical applications include chiller isolation, cooling tower isolation, change-over systems, large air handler coil control, bypass and process control applications. The large C_v values provide for an economical control valve solution for larger flow applications. Designed for use in Victaulic piping systems when mated to Victaulic 41 series flange nipples. Fail safe operation is possible with NSV-SY series battery backup systems.

Jobsite Note

Valves should be stored in a weather protected area prior to construction. Complete installation recommendations can be found in Belimo’s Installation and Maintenance Instructions for F6/F7…HD/HDU Butterfly Valves.

Technical Data	
Service	chilled, hot water, 60% glycol
Flow characteristic	modified linear
Action	90° rotation
Sizes	2” to 24”
Type of end fitting	for use with ANSI 125/150 flanges
Materials:	
Body	ductile iron ASTM A536
Body finish	epoxy powder coated
Disc	304 stainless steel
Seat	EPDM standard
Shaft	416 stainless steel
O-ring	EPDM
Upper bushing	RPTFE
Middle bushings	RPTFE
Lower bushing	RPTFE
Media temperature range	-22°F to 250°F [-30°C to 120°C]
Operation ambient temperature range	-22°F to 122°F [-30°C to 50°C]
Body pressure rating	ASME/ANSI Class 125/150 (200 psi at -30°F to 275°F)
Close-off pressure	200 psi (2”-12”), 150 psi (14”-24”)
Rangeability	10:1 (for 30° to 70° range)
Maximum Velocity	12 FPS

		Valve Nominal Size		Type	Suitable Actuators			
C_v 90°	C_v 60°	IN	DN [mm]	2-way	Spring	Non-Spring		
115	44	2”	50	F750HD	AF Series	AM	GM Series	SY Series
196	75	2½”	65	F765HD				
302	116	3”	80	F780HD				
600	230	4”	100	F7100HD				
1022	392	5”	125	F7125HD				
1579	605	6”	150	F7150HD				
3136	1202	8”	200	F7200HD				
5340	2047	10”	250	F7250HD				
8250	3062	12”	300	F7300HD				
11917	4568	14”	350	F7350HD				
16388	6282	16”	400	F7400HD				
21705	8320	18”	450	F7450HD				
27908	10698	20”	500	F7500HD				
43116	16528	24”	600	F7600HD				

			MOD								ON/OFF
Valve	Size	C_v	10°	20°	30°	40°	50°	60°	70°	80°	90°
F750HD	2”	115	.06	3	7	15	27	44	70	105	115
F765HD	2½”	196	.10	6	12	25	45	75	119	178	196
F780HD	3”	302	.20	9	18	39	70	116	183	275	302
F7100HD	4”	600	.30	17	36	78	139	230	364	546	600
F7125HD	5”	1022	.50	29	61	133	237	392	620	930	1022
F7150HD	6”	1579	.80	45	95	205	366	605	958	1437	1579
F7200HD	8”	3136	2	89	188	408	727	1202	1903	2854	3136
F7250HD	10”	5340	3	151	320	694	1237	2047	3240	4859	5340
F7300HD	12”	8250	4	234	495	1072	1911	3062	5005	7507	8250
F7350HD	14”	11917	6	338	715	1549	2761	4568	7230	10844	11917
F7400HD	16”	16388	8	464	983	2130	3797	6282	9942	14913	16388
F7450HD	18”	21705	11	615	1302	2822	5028	8320	13168	19752	21705
F7500HD	20”	27908	14	791	1674	3628	6465	10698	16931	25396	27908
F7600HD	24”	43116	22	1222	2587	5605	9989	16528	26157	39236	43116

F7…HD Butterfly Valves 2”–24” Ductile Iron Lug Body Resilient Seat, 304 Stainless Disc

Maximum Dimensions (Inches)

Valve	Size	C_v 90°	A	B	C	D(Max)	BHC	No. of Holes	Lug Bolt	Actuator	Close-Off (PSI)	
F750HD	2”	115	4.50	6.15	6.15	20.25	4.75	4	5/8-11UNC	AF	200	Fail Safe
F765HD	2½”	196	5.00	6.76	6.76	20.75	5.50	4	5/8-11UNC	2*AF	200	Fail Safe
F750HD	2”	115	4.50	6.15	6.15	20.25	4.75	4	5/8-11UNC	SY2…	200	Non-Fail Safe
F765HD	2½”	196	5.00	6.76	6.76	20.75	5.50	4	5/8-11UNC	SY2…	200	Non-Fail Safe
F780HD	3”	302	5.50	7.28	7.28	21.00	6.00	4	5/8-11UNC	SY2…	200	Non-Fail Safe
F7100HD	4”	600	6.50	8.55	8.55	21.75	7.50	8	5/8-11UNC	SY2…	200	Non-Fail Safe
F7125HD	5”	1022	7.50	9.64	9.64	22.25	8.50	8	3/4-10UNC	SY3…	200	Non-Fail Safe
F7150HD	6”	1579	8.00	10.19	10.19	22.75	9.50	8	3/4-10UNC	SY3…	200	Non-Fail Safe
F7200HD	8”	3136	9.00	11.37	11.37	29.00	11.75	8	3/4-10UNC	SY4…	200	Non-Fail Safe
F7250HD	10”	5340	11.00	13.58	13.58	30.00	14.25	12	7/8-9UNC	SY4…	200	Non-Fail Safe
F7300HD	12”	8250	12.00	15.01	15.01	32.00	17.00	12	7/8-9UNC	SY5…	200	Non-Fail Safe
F7350HD	14”	11917	14.00	17.02	17.02	33.00	18.75	12	1-8UNC	SY6…†	150	Non-Fail Safe
F7400HD	16”	16388	15.00	18.39	18.39	38.50	21.25	16	1-8UNC	SY7…†	150	Non-Fail Safe
F7450HD	18”	21705	16.50	20.63	20.63	39.50	22.75	16	1 1/8-7UNC	SY9…†	150	Non-Fail Safe
F7500HD	20”	27908	18.00	23.00	23.00	41.50	25.00	20	1 1/8-7UNC	SY9…†	150	Non-Fail Safe
F7600HD	24”	43116	22.00	27.9	27.9	53.25	29.50	20	1 1/4-7UNC	SY12…†	150	Non-Fail Safe

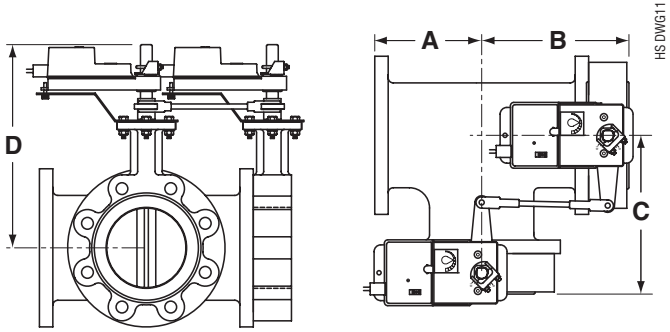
AF maximum actuator ambient temperature is 122°F.
SY... maximum actuator ambient temperature is 150°F.
†SY6 and larger available in 110/220 VAC versions only.

Application Notes

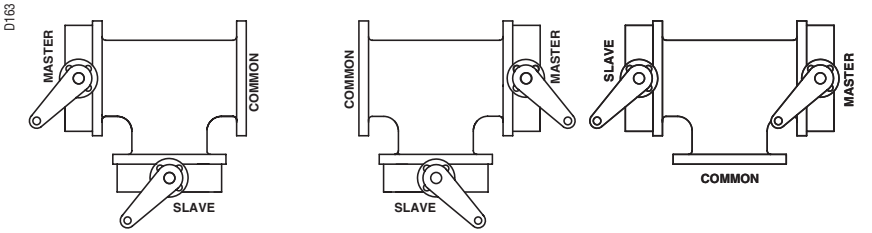
1. Valves are rated at 200 psi differential pressure in the closed position.
2. Valves are furnished with lugs tapped for use with ANSI Class 125/150 flanges. Installation flanges and hardware are not included.
3. 3-way assemblies are furnished assembled and tested, ready for installation. **All 3-way assemblies require the customer to specify the 3-way configuration prior to order entry to guarantee correct placement of valves and actuators on the assembly.**
4. Dimension “D” allows for actuator removal without the need to remove the valve from the pipe.
5. Belimo SY Series actuators are NEMA 4X rated.
5. Weather shields are available, dimensional data upon request.
6. Dual actuated valves have single actuators mounted on each valve shaft.
7. Bolts supplied are for shipping purposes only. Upon installation replace with an appropriate SAE grade 5 or better hardware.

⚠ **Note:** For tee configuration, please refer to page 4.

Dimensions



3-Way Configuration Codes



CONFIG CODE	ON/OFF OR MOD@2VDC MASTER VALVE IS	MASTER VALVE @ FAIL
X10	OPEN	NON-FAIL
X11	OPEN	OPEN
X12	OPEN	CLOSED
X13	CLOSED	NON-FAIL
X14	CLOSED	OPEN
X15	CLOSED	CLOSED

CONFIG CODE	ON/OFF OR MOD@2VDC MASTER VALVE IS	MASTER VALVE @ FAIL
X20	OPEN	NON-FAIL
X21	OPEN	OPEN
X22	OPEN	CLOSED
X23	CLOSED	NON-FAIL
X24	CLOSED	OPEN
X25	CLOSED	CLOSED

CONFIG CODE	ON/OFF OR MOD@2VDC MASTER VALVE IS	MASTER VALVE @ FAIL
X30	OPEN	NON-FAIL
X31	OPEN	OPEN
X32	OPEN	CLOSED
X33	CLOSED	NON-FAIL
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. Proportional actuator normal position is a function of the CCW/CW switch.
6. All 3-way assemblies are designed for 90 degree actuator rotation.

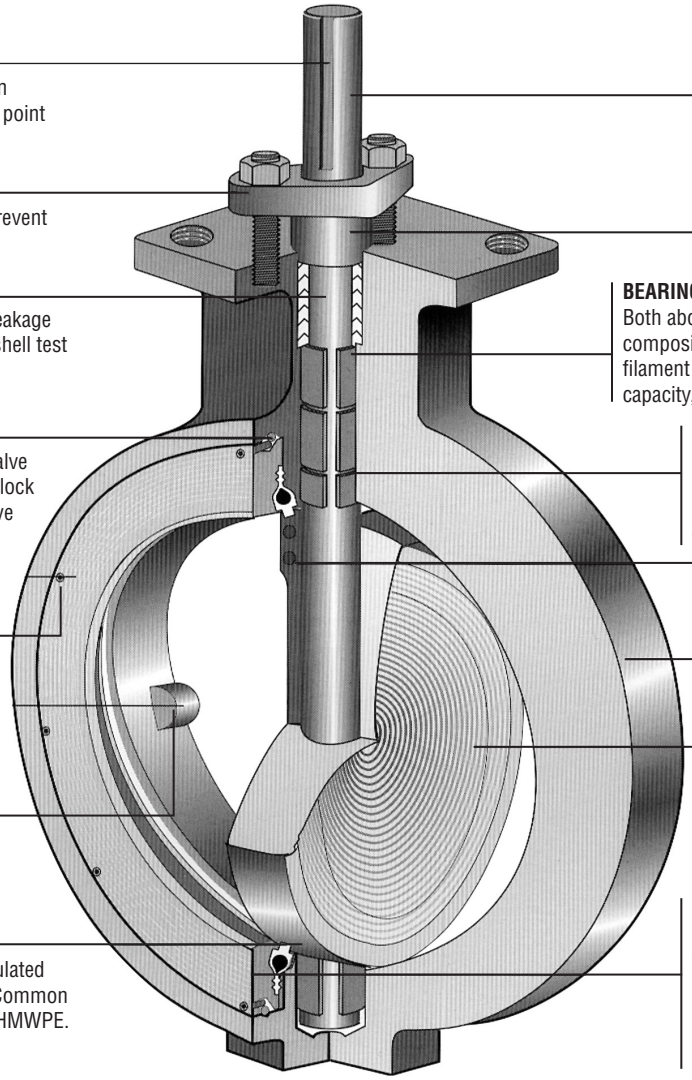
ORDERING INFORMATION

Please note that HD series BF valves over 18” and ALL sizes 3-way tee assemblies ordered with *Configuration Codes 30-35* are special order/custom built and are *NOT* returnable.

Belimo SHP... Series Butterfly Valves are designed for use in ANSI Class 150 and ANSI Class 300 piping systems and are supplied in standard lug style body designs.

Valve Design Features

- Unique seat and disc design provides Bi-Directional bubble tight shutoff at rated pressure/temperatures
- The Soft Seat design creates a self-energized seal in vacuum-to-low pressure applications
- Under high pressure conditions, the seat is also designed to permit, confine and direct movement of the seat against the disc edge, up to the full ANSI Class 150 or 300 Cold Working Pressures
- The Soft Seat is designed for high services with minimal wear and low torque
- Seat replacement is a simple operation, requiring no special tools
- Valve Body is Full Lug type cast in Carbon Steel
- Disc is cast in CF8M Stainless Steel
- Shaft is 17-4pH Stainless for superior strength
- Soft Seat is RPTFE for increased wear resistance and low torque
- Top Mounted Gland Flange easily accessible without removing actuator or mounting brackets



KEY
Square key valve-to-operator connection provides an externally controlled failure point upon over-torquing.

GLAND FLANGE
Applies load against packing gland to prevent external leakage. Fully adjustable.

PACKING
Chevron design TFE prevents external leakage out valve neck to full ANSI hydrostatic shell test pressures (150% of C.W.P.).

WEDGE RING
Stainless steel band wedged between valve body and retainer ring by set screws to lock seat and retainer ring in position on valve sizes 2" through 30". Socket head cap screws are used on valve sizes 36" and larger.

SET SCREWS
Cone point screws force wedge ring outward to lock seat retainer in position on valve sizes 2" through 30". Socket head cap screws are used on valve sizes 36" and larger.

OVERTRAVEL STOP
Prevents disc from rotating into wrong quadrant.

SOFT-SEAT
Patented bidirectional seat with encapsulated elastomeric o-ring core for resiliency. Common seat materials include TFE, RTFE and UHMWPE.

BLOW OUT PROOF SHAFT
Solid shaft provides alignment and rigid support for disc.

PACKING GLAND
Separate part from gland flange, preventing uneven load distribution against packing.

BEARINGS
Both above and below the disc, bearings are of composite design: PTFE bonded to epoxy-glass filament wound ring. Used to align shaft, with high capacity, low wear and low friction coefficient.

DISC SPACERS
Disc is centered by use of thrust spacers around shaft in sizes 2" to 5". Disc position stops or thrust bolt arrangements are used for larger valve sizes.

WEDGE PINS
Provide positive mechanical attachment of disc to shaft.

BODY
ANSI B16.34 design in either wafer or lug configuration.

DISC
360° uninterrupted spherical edge for sealing. Profile is designed for maximum flow and equal percentage control.

RETAINER RING
Retains seat in valve. Standard surface finish is 125 to 200 AARH and is compatible with both standard gaskets and spiral wound gasket designs. Outside diameter is recessed within gasket sealing surface to prevent external leakage.

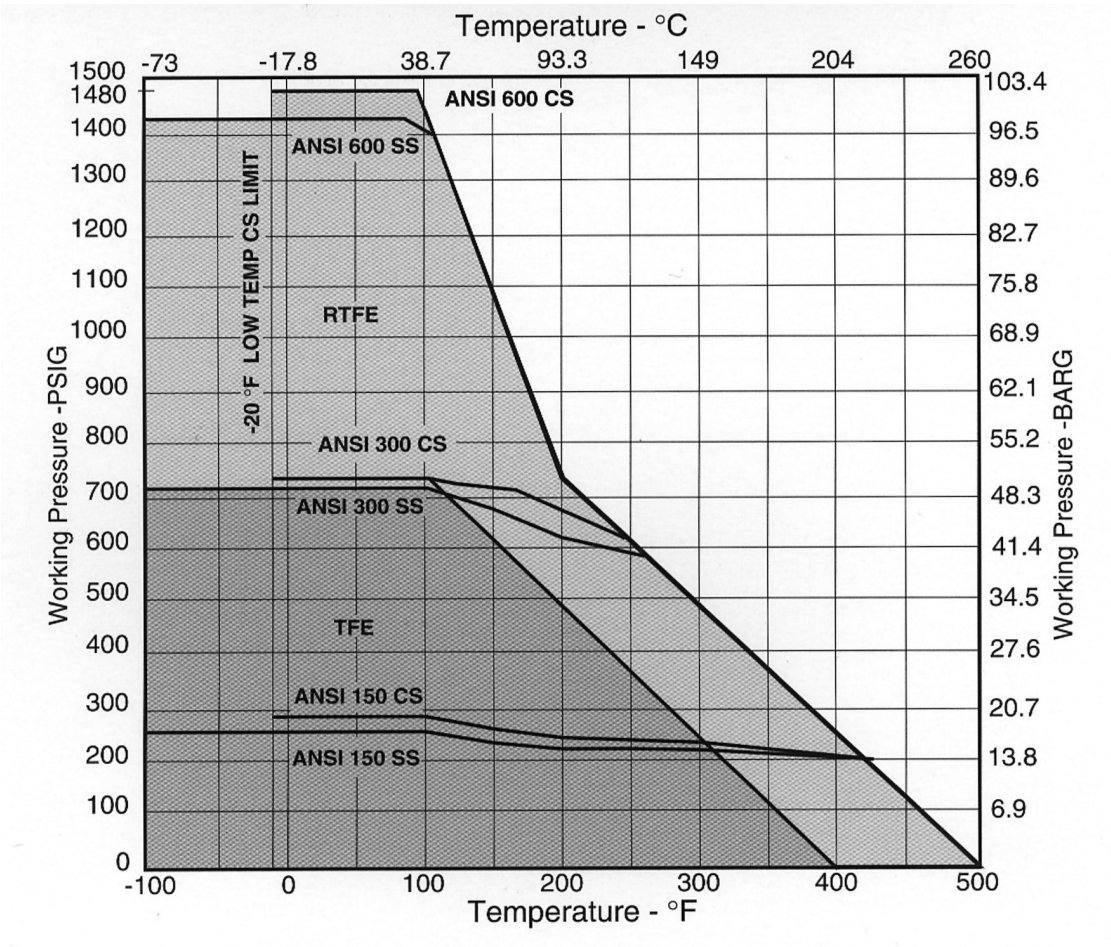
Pressure/Temperature Ratings

As temperature increases, the pressure retaining capability of materials decreases. The graph below illustrates the pressure/temperature ratings of the Belimo ANSI Class 150 and Class 300 valves.

The heavy lines define the ratings of the carbon steel and stainless steel valve body (or "shell") in conformance to ANSI B16.34. The shaded areas define the ratings of the PTFE and RPTFE Seat materials.

Seat ratings are based on differential pressure with the disc in the fully closed position.

ANSI B16.34 Body and Flowseal Soft Pressure - Temperature Ratings



Steam Service

RPTFE seated valves are rated for 50 psi saturated steam.

Average Assembly Weights

					Non-Spring Return		Spring Return	
		Size	Valve Model	Max GPM	COP	Actuator	Weight	2*AF	Weight
ANSI 150	2-way	2”	F650-150SHP	313	150			2*AF24 US	**24 lbs.**
					285	GMB(X)24…	**18 lbs.**		
		2.5”	F665-150SHP	490	150			2*AF24 US	**24 lbs.**
					285	GMB(X)24…	**18 lbs.**		
		3”	F680-150SHP	705	150			2*AF24 US	**26 lbs.**
					285	GMB(X)24…	**20 lbs.**		
					150			2*AF24 US	**38 lbs.**
		4”	F6100-150SHP	1253	150	GMB(X)24…	**32 lbs.**		
					285	2*GMB(X)24…	**40 lbs.**		
	3-way	2”	F750-150SHP	313	285	2*GMB(X)24…	**67 lbs.**		
		2.5”	F765-150SHP	490	285	2*GMB(X)24…	**78 lbs.**		
		3”	F780-150SHP	705	285	2*GMB(X)24…	**88 lbs.**		
		4”	F7100-150SHP	1253	150	2*GMB(X)24…	**135 lbs.**		
ANSI 300	2-way	2”	F650-300SHP	313	150			2*AF24 US	**24 lbs.**
					285	GMB(X)24…	**18 lbs.**		
		2.5”	F665-300SHP	490	150			2*AF24 US	**24 lbs.**
					285	GMB(X)24…	**18 lbs.**		
		3”	F680-300SHP	705	150			2*AF24 US	**30 lbs.**
					285	GMB(X)24…	**24 lbs.**		
					150			2*AF24 US	**37 lbs.**
		4”	F6100-300SHP	1253	150	GMB(X)24…	**31 lbs.**		
					285	2*GMB(X)24…	**39 lbs.**		
	3-way	2”	F750-300SHP	313	285	2*GMB(X)24…	**89 lbs.**		
		2.5”	F765-300SHP	490	285	2*GMB(X)24…	**109 lbs.**		
		3”	F780-300SHP	705	285	2*GMB(X)24…	**132 lbs.**		
		4”	F7100-300SHP	1253	150	2*GMB(X)24…	**185 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.

Average Assembly Weights

		Size	Valve Model	Max GPM	COP	Non-Spring Return SY2-*	Weight
ANSI 150	2-way	2”	F650-150SHP	313	285	SY2-110	**39 lbs.**
		2.5”	F665-150SHP	490	285	SY2-110	**39 lbs.**
		3”	F680-150SHP	705	285	SY2-110	**41 lbs.**
		4”	F6100-150SHP	1253	285	SY2-110	**53 lbs.**
		5”	F6125-150SHP	1958	285	SY2-110	**58 lbs.**
		6”	F6150-150SHP	2820	285	SY2-110	**63 lbs.**
		8”	F6200-150SHP	5013	150	SY3-110	**76 lbs.**
					285	SY4-110	**100 lbs.**
		10”	F6250-150SHP	7834	285	SY4-110	**146 lbs.**
		12”	F6300-150SHP	11280	150	SY4-110	**182 lbs.**
					285	SY5-110	**182 lbs.**
		14”	F6350-150SHP	15354	150	SY5-110	**238 lbs.**
					285	SY7-110	**269 lbs.**
		16”	F6400-150SHP	20054	285	SY7-110	**336 lbs.**
		18”	F6450-150SHP	25381	150	SY7-110	**391 lbs.**
					285	SY8-110	**391 lbs.**
		20”	F6500-150SHP	31334	150	SY8-110	**500 lbs.**
					285	SY9-110	**544 lbs.**
		24”	F6600-150SHP	45121	150	SY10-110	**832 lbs.**
		30”	F6750-150SHP	70502	100	SY12-110	**1255 lbs.**
	3-way	2”	F750-150SHP	313	285	SY2-110	**82 lbs.**
		2.5”	F765-150SHP	490	285	SY2-110	**93 lbs.**
		3”	F780-150SHP	705	285	SY2-110	**103 lbs.**
		4”	F7100-150SHP	1253	285	SY2-110	**162 lbs.**
		5”	F7125-150SHP	1958	285	SY3-110	**195 lbs.**
		6”	F7150-150SHP	2820	285	SY3-110	**234 lbs.**
		8”	F7200-150SHP	5013	285	SY4-110	**355 lbs.**
		10”	F7250-150SHP	7834	150	SY4-110	**585 lbs.**
					285	SY5-110	**585 lbs.**
		12”	F7300-150SHP	11280	150	SY5-110	**785 lbs.**
					285	SY7-110	**819 lbs.**
		14”	F7350-150SHP	15354	285	SY7-110	**1118 lbs.**
		16”	F7400-150SHP	20054	150	SY7-110	**1469 lbs.**
					150	SY9-110	**1523 lbs.**
		18”	F7450-150SHP	25381	150	SY8-110	**1783 lbs.**
					285	SY10-110	**1831 lbs.**
		20”	F7500-150SHP	31334	150	SY9-110	**2351 lbs.**
					285	SY11-110	**2351 lbs.**
		24”	F7600-150SHP	45121	150	SY12-110	**3722 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.

Average Assembly Weights

					Non-Spring Return	
		Size	Valve Model	Max GPM	COP	Actuator	Weight
ANSI 300	2-way	2”	F650-300SHP	313	600	SY2-110	**39 lbs.**
		2.5”	F665-300SHP	490	600	SY2-110	**39 lbs.**
		3”	F680-300SHP	705	600	SY2-110	**45 lbs.**
		4”	F6100-300SHP	1253	600	SY2-110	**52 lbs.**
		5”	F6125-300SHP	1958	285	SY2-110	**58 lbs.**
					600	SY3-110	**58 lbs.**
		6”	F6150-300SHP	2820	285	SY2-110	**77 lbs.**
					600	SY3-110	**77 lbs.**
		8”	F6200-300SHP	5013	150	SY3-110	**108 lbs.**
					600	SY4-110	**132 lbs.**
					285	SY4-110	**170 lbs.**
		10”	F6250-300SHP	7834	400	SY5-110	**170 lbs.**
					600	SY7-110	**201 lbs.**
					150	SY4-110	**254 lbs.**
		12”	F6300-300SHP	11280	285	SY5-110	**254 lbs.**
					600	SY7-110	**285 lbs.**
					150	SY5-110	**379 lbs.**
		14”	F6350-300SHP	15354	400	SY7-110	**410 lbs.**
					600	SY8-110	**410 lbs.**
					150	SY7-110	**487 lbs.**
		16”	F6400-300SHP	20054	285	SY8-110	**487 lbs.**
					400	SY9-110	**531 lbs.**
					600	SY10-110	**531 lbs.**
					150	SY7-110	**603 lbs.**
					285	SY8-110	**603 lbs.**
		18”	F6450-300SHP	25381	400	SY9-110	**647 lbs.**
					600	SY11-110	**647 lbs.**
					150	SY8-110	**821 lbs.**
		20”	F6500-300SHP	31334	285	SY10-110	**865 lbs.**
					400	SY11-110	**865 lbs.**
		24”	F6600-300SHP	45121	150	SY10-110	**1150 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.

Average Assembly Weights

		Size	Valve Model	Max GPM	COP	Non-Spring Return Actuator	Non-Spring Return Weight
ANSI 300	3-way	2”	F750-300SHP	313	400	SY2-110	**104 lbs.**
					600	SY3-110	**104 lbs.**
		2.5”	F765-300SHP	490	400	SY2-110	**124 lbs.**
					600	SY3-110	**124 lbs.**
		3”	F780-300SHP	705	400	SY2-110	**147 lbs.**
					600	SY3-110	**147 lbs.**
		4”	F7100-300SHP	1253	285	SY2-110	**222 lbs.**
					600	SY3-110	**222 lbs.**
		5”	F7125-300SHP	1958	285	SY3-110	**274 lbs.**
					600	SY4-110	**301 lbs.**
		6”	F7150-300SHP	2820	285	SY3-110	**366 lbs.**
					600	SY4-110	**392 lbs.**
		8”	F7200-300SHP	5013	400	SY4-110	**579 lbs.**
					600	SY5-110	**579 lbs.**
					150	SY4-110	**897 lbs.**
		10”	F7250-300SHP	7834	285	SY5-110	**897 lbs.**
					600	SY7-110	**931 lbs.**
					150	SY5-110	**1301 lbs.**
		12”	F7300-300SHP	11280	400	SY7-110	**1335 lbs.**
					600	SY8-110	**1335 lbs.**
					150	SY7-110	**1927 lbs.**
		14”	F7350-300SHP	15354	400	SY8-110	**1927 lbs.**
					600	SY10-110	**1975 lbs.**
					150	SY7-110	**2461 lbs.**
		16”	F7400-300SHP	20054	285	SY9-110	**2510 lbs.**
					400	SY10-110	**2510 lbs.**
					600	SY12-110	**2510 lbs.**
					150	SY8-110	**3063 lbs.**
		18”	F7450-300SHP	25381	285	SY10-110	**3111 lbs.**
					400	SY11-110	**3111 lbs.**
					150	SY9-110	**4096 lbs.**
		20”	F7500-300SHP	31334	285	SY12-110	**4096 lbs.**
		24”	F7600-300SHP	45121	150	SY12-110	**6049 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.

F6 ANSI Class 150
Reinforced Teflon Seat, 316 Stainless Disc

- **Bubble tight shut-off to ANSI Class 150 Standards**
- **Long stem design allows for 2" insulation minimum**
- **Valve Face-to-face dimensions comply with API 609 & MSS-SP-68**
- **Designed to be installed between ASME/ANSI B16.5 Flanges**
- **Completely assembled and tested, ready for installation**

Application

These valves are designed to meet the needs of HVAC and Commercial applications requiring positive shut-off for liquids at higher pressures and temperatures. Typical applications include chiller isolation, cooling tower isolation, change-over systems, large air handler coil control, bypass and process control applications. The large C_V values provide for an economical control valve solution for larger flow applications.

Technical Data	
Media service	chilled, hot water, 60% glycol, steam to 50 psi
Valve service	double dead end service
Flow characteristic	modified equal percentage, unidirectional
Recommended install	SUS (Seat Up Stream)
Action	quarter turn, mechanically limited
Sizes	2" to 24"
Type of end fitting	for use with ASME/ANSI B16.5 flanges
Materials	
Body	carbon steel full lug
Disc	316 stainless steel
Seat	RPTFE
Shaft	17-4 PH stainless
Gland seal	PTFE
Bushings	glass backed PTFE
Media temperature range	ANSI Class 150 limitations
Operation ambient temperature range	-22°F to 122°F [-30°C to 50°C]
Body pressure rating	ASME/ANSI Class 150 limitations
Close-off pressure	ANSI Class 150 to 285 psi @ 100°F
Rangeability	10:1 (for 30 deg to 70 deg range)
Maximum velocity	32 FPS

C_V 90°	C_V 60°	Valve Nominal Size IN	Type ANSI 150 2-way	Suitable Actuators Spring	Non-Spring	
102	56	2"	F650-150SHP	AF Series	GM Series	SY Series
146	80	2½"	F665-150SHP			
228	125	3"	F680-150SHP			
451	248	4"	F6100-150SHP			
714	392	5"	F6125-150SHP			
1103	607	6"	F6150-150SHP			
2064	1135	8"	F6200-150SHP			
3517	1934	10"	F6250-150SHP			
4837	2660	12"	F6300-150SHP			
6857	3592	14"	F6350-150SHP			
9287	4865	16"	F6400-150SHP			
11500	3270	18"	F6450-150SHP			
14420	7590	20"	F6500-150SHP			
22050	11550	24"	F6600-150SHP			
34388	18012	30"	F6750-150SHP			

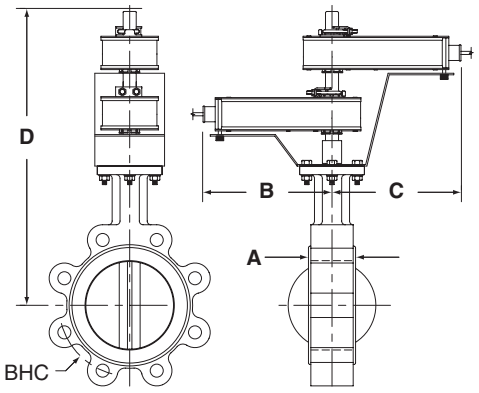
			MOD								ON/OFF
Valve	Size	C_V	10°	20°	30°	40°	50°	60°	70°	80°	90°
F650-150SHP	2"	102	1.50	6.10	14	26	39	56	77	99	102
F665-150SHP	2.5"	146	2.20	8.80	20	37	55	80	110	142	146
F680-150SHP	3"	228	3.40	14	32	57	87	125	171	221	228
F6100-150SHP	4"	451	6.80	27	63	114	171	248	338	437	451
F6125-150SHP	5"	714	11	43	100	180	271	393	536	693	714
F6150-150SHP	6"	1103	17	66	154	278	419	607	827	1070	1103
F6200-150SHP	8"	2064	31	124	289	520	784	1135	1548	2002	2064
F6250-150SHP	10"	3517	53	211	492	886	1336	1934	2638	3411	3517
F6300-150SHP	12"	4837	73	290	677	1219	1838	2660	3628	4692	4837
F6350-150SHP	14"	6857	103	411	960	1728	2606	3771	5143	6651	6857
F6400-150SHP	16"	9287	139	557	1300	2340	3529	5108	6965	9008	9287
F6450-150SHP	18"	11400	171	684	1596	2873	4332	6270	8550	11058	11400
F6500-150SHP	20"	14420	216	865	2019	3634	5480	7931	10815	13987	14420
F6600-150SHP	24"	22050	331	1323	3087	5557	8379	12128	16538	21389	22050
F6750-150SHP	30"	34388	491	1965	4585	8253	12445	18012	24563	32750	34388

F6 ANSI Class 150
Reinforced Teflon Seat, 316 Stainless Disc

Maximum Dimensions (Inches)

Valve	Size	C_v 90°	A	B	C	D(Max)	BHC	No. of Holes	Lug Bolt	Actuator	Close-Off (PSI)	
F650-150SHP	2”	102	1.75	9.00	9.00	19.50	4.75	4	5/8-11	2*AF	150	Fail Safe
F665-150SHP	2.5”	146	1.88	9.00	9.00	20.00	5.50	4	5/8-11		150	
F680-150SHP	3”	228	1.92	9.00	9.00	20.50	6.00	4	5/8-11		150	
F6100-150SHP	4”	451	2.13	9.00	9.00	21.00	7.50	8	5/8-11		150	
F650-150SHP	2”	102	1.75	9.00	9.00	19.50	4.75	4	5/8-11	GM	285	Non-Fail Safe
F665-150SHP	2.5”	146	1.88	9.00	9.00	20.00	5.50	4	5/8-11		285	
F680-150SHP	3”	228	1.92	9.00	9.00	20.50	6.00	4	5/8-11		285	
F6100-150SHP	4”	451	2.13	9.00	9.00	21.00	7.50	8	5/8-11		150	
F6100-150SHP	4”	451	2.13	9.00	9.00	21.00	7.50	8	5/8-11	2*GM	285	
F650-150SHP	2”	102	1.75	8.00	8.00	22.25	4.75	4	5/8-11 UNC	SY2…	285	
F665-150SHP	2.5”	146	1.88	8.00	8.00	22.75	5.50	4	5/8-11 UNC		285	
F680-150SHP	3”	228	1.92	8.00	8.00	23.00	6.00	4	5/8-11 UNC		285	
F6100-150SHP	4”	451	2.13	8.00	8.00	23.75	7.50	8	5/8-11 UNC		285	
F6125-150SHP	5”	714	2.25	8.00	8.00	24.25	8.50	8	3/4-10 UNC		285	
F6150-150SHP	6”	1103	2.29	8.00	8.00	24.75	9.50	8	3/4-10 UNC		285	
F6200-150SHP	8”	2064	2.50	12.00	12.00	32.00	11.75	8	3/4-10 UNC	SY3…	150	
										SY4…	285	
F6250-150SHP	10”	3517	2.81	12.00	12.00	33.00	14.25	12	7/8-9 UNC	SY4…	285	
F6300-150SHP	12”	4837	3.23	12.00	12.00	35.00	17.00	12	7/8-9 UNC	SY4…	150	
										SY5…	285	
F6350-150SHP	14”	6857	3.62	14.00	14.00	36.00	18.75	12	1-8 UNC	SY5…	150	
										SY7…	285	
										SY7…	150	
F6400-150SHP	16”	9287	4.00	14.00	14.00	37.50	21.25	16	1-8 UNC	SY8…	285	
F6450-150SHP	18”	11400	4.50	14.00	14.00	42.25	22.75	16	1 1/8-8 UNC	SY7…	150	
										SY8…	285	
F6500-150SHP	20”	14420	5.00	14.00	14.00	49.50	25.00	20	1 1/8-8 UNC	SY8…	150	
										SY10…	285	
F6600-150SHP	24”	22050	6.06	14.00	14.00	56.25	29.50	20	1 1/4-8 UNC	SY10…	150	
F6750-150SHP	30”	34388	6.75	14.00	14.00	66.58	36.00	28	1 1/4-8 UNC	SY12…	125	

Dimensions

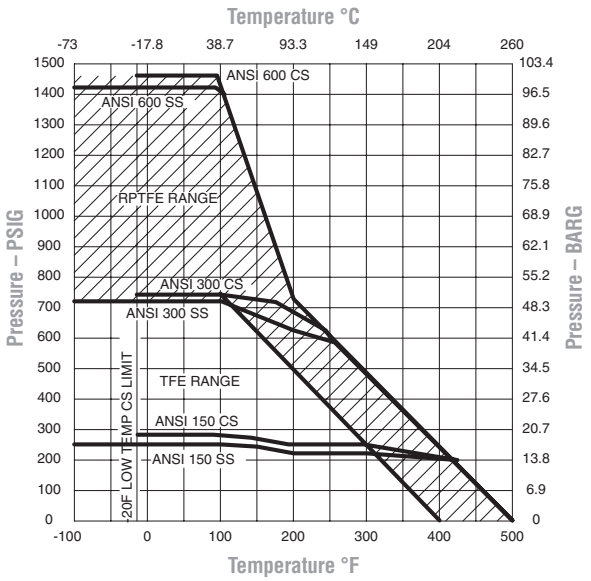


Dimension “A” does not include flange gaskets. (2 required per valve)

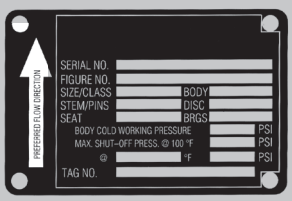
Application Notes

1. Valves are rated at 285 psi differential pressure in the closed position @ 100°F media temperature.
2. Valves are furnished with lugs tapped for use between ANSI Class 125/150 flanges conforming to ANSI B16.5 Standards.
3. 2-way assemblies are furnished assembled, calibrated and tested, ready for installation.
4. Dimension “D” allows for actuator(s) removal without the need to remove the valve from the pipe.
5. Weather shields are available, dimensional data furnished upon request.
6. Flange gaskets (2 required, not provided with valve) MUST be used between valve and ANSI flange.
7. Flange bolts are not included with the valve. These are furnished by others.

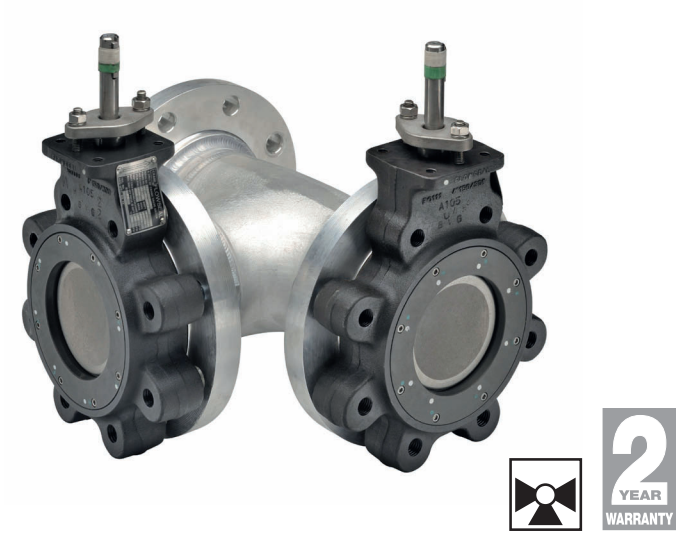
Pressure/temperature chart for ANSI class butterfly valves.



SHP series valves have a preferred flow direction.



F7 ANSI Class 150
Reinforced Teflon Seat, 316 Stainless Disc



- **Bubble tight shut-off to ANSI Class 150 Standards**
- **Long stem design allows for 2" insulation minimum**
- **Valve Face-to-face dimensions comply with API 609 & MSS-SP-68**
- **Designed to be installed between ASME/ANSI B16.5 Flanges**
- **Completely assembled and tested, ready for installation**
- **Tees comply with ASME/ANSI B16.1 Class 125 Flanges**

Application

These valves are designed to meet the needs of HVAC and Commercial applications requiring positive shut-off for liquids at higher pressures and temperatures. Typical applications include chiller isolation, cooling tower isolation, change-over systems, large air handler coil control, bypass and process control applications. The large C_V values provide for an economical control valve solution for larger flow applications.

Technical Data	
Media service	chilled, hot water, 60% glycol, steam to 50 psi
Valve service	double dead end service
Flow characteristic	modified linear, unidirectional
Recommended install	SUS (Seat Up Stream)
Action	quarter turn, mechanically limited
Sizes	2" to 24"
Type of end fitting	for use with ASME/ANSI B16.5 flanges
Materials	
Body	carbon steel full lug
Disc	316 stainless steel
Seat	RPTFE
Shaft	17-4 PH stainless
Gland seal	PTFE
Bushings	glass backed PTFE
Media temperature range	ANSI Class 150 limitations
Operation ambient temperature range	-22°F to 122°F [-30°C to 50°C]
Body pressure rating	ASME/ANSI Class 150 limitations
Close-off pressure	ANSI Class 150 to 285 psi @ 100°F
Rangeability	10:1 (for 30 deg to 70 deg range)
Maximum velocity	32 FPS

C_V 90°	C_V 60°	Valve Nominal Size IN	Type ANSI 150 3-way	Suitable Actuators Spring	Non-Spring	
102	56	2"	F750-150SHP	AF Series	GM Series	SY Series
146	80	2½"	F765-150SHP			
228	125	3"	F780-150SHP			
451	248	4"	F7100-150SHP			
714	392	5"	F7125-150SHP			
1103	607	6"	F7150-150SHP			
2064	1135	8"	F7200-150SHP			
3517	1934	10"	F7250-150SHP			
4837	2660	12"	F7300-150SHP			
6857	3592	14"	F7350-150SHP			
9287	4865	16"	F7400-150SHP			
11500	3270	18"	F7450-150SHP			
14420	7590	20"	F7500-150SHP			
22050	11550	24"	F7600-150SHP			

						MOD				ON/OFF
Valve	Size	C_V	10°	20°	30°	40°	50°	60°	70°	80°	90°
F750-150SHP	2"	102	1.50	6.10	14	26	39	56	77	99	102
F765-150SHP	2.5"	146	2.20	8.80	20	37	55	80	110	142	146
F780-150SHP	3"	228	3.40	14	32	57	87	125	171	221	228
F7100-150SHP	4"	451	6.80	27	63	114	171	248	338	437	451
F7125-150SHP	5"	714	11	43	100	180	271	393	536	693	714
F7150-150SHP	6"	1103	17	66	154	278	419	607	827	1070	1103
F7200-150SHP	8"	2064	31	124	289	520	784	1135	1548	2002	2064
F7250-150SHP	10"	3517	53	211	492	886	1336	1934	2638	3411	3517
F7300-150SHP	12"	4837	73	290	677	1219	1838	2660	3628	4692	4837
F7350-150SHP	14"	6857	103	411	960	1728	2606	3771	5143	6651	6857
F7400-150SHP	16"	9287	139	557	1300	2340	3529	5108	6965	9008	9287
F7450-150SHP	18"	11400	171	684	1596	2873	4332	6270	8550	11058	11400
F7500-150SHP	20"	14420	216	865	2019	3634	5480	7931	10815	13987	14420
F7600-150SHP	24"	22050	331	1323	3087	5557	8379	12128	16538	21389	22050

F7 ANSI Class 150
Reinforced Teflon Seat, 316 Stainless Disc

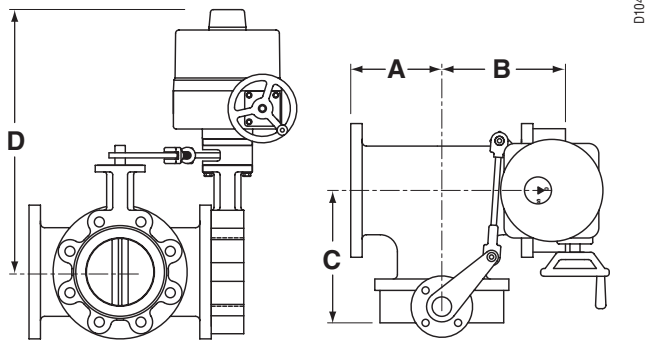
Maximum Dimensions (Inches)

Valve	Size	C_v 90°	A	B	C	D(Max)	BHC	No. of Holes	Lug Bolt	Actuator	Close-Off (PSI)
F750-150SHP	2”	102	4.50	6.38	6.38	16.50	4.75	4	5/8-11	GMB(X)	150
F765-150SHP	2.5”	146	5.00	6.88	6.88	17.00	5.50	4	5/8-11		150
F780-150SHP	3”	228	5.50	7.56	7.56	17.50	6.00	4	5/8-11		150
F7100-150SHP	4”	451	6.50	8.63	8.63	18.00	7.50	8	5/8-11		150
F750-150SHP	2”	102	4.50	6.38	6.38	16.50	4.75	4	5/8-11	2*GMB(X)	285
F765-150SHP	2.5”	146	5.00	6.88	6.88	17.00	5.50	4	5/8-11		285
F780-150SHP	3”	228	5.50	7.56	7.56	17.50	6.00	4	5/8-11		285
F750-150SHP	2”	102	4.50	6.38	6.38	22.25	4.75	4	5/8-11 UNC	SY2…	285
F765-150SHP	2.5”	146	5.00	6.88	6.88	22.75	5.50	4	5/8-11 UNC		285
F780-150SHP	3”	228	5.50	7.56	7.56	23.00	6.00	4	5/8-11 UNC		285
F7100-150SHP	4”	451	6.50	8.63	8.63	23.75	7.50	8	5/8-11 UNC		285
F7125-150SHP	5”	714	7.50	9.75	9.75	24.25	8.50	8	3/4-10 UNC	SY3…	285
F7150-150SHP	6”	1103	8.00	10.25	10.25	24.75	9.50	8	3/4-10 UNC		285
F7200-150SHP	8”	2064	9.00	11.50	11.50	32.00	11.75	8	3/4-10 UNC	SY4…	150
F7250-150SHP	10”	3517	11.00	13.81	13.81	33.00	14.25	12	7/8-9 UNC	SY4…	150
										SY5…	285
F7300-150SHP	12”	4837	12.00	15.81	15.81	35.00	17.00	12	7/8-9 UNC	SY5…	150
										SY7…	285
F7350-150SHP	14”	6857	14.00	17.62	17.62	36.00	18.75	12	1-8 UNC	SY7…	285
F7400-150SHP	16”	9287	15.00	19.00	19.00	37.50	21.25	16	1-8 UNC	SY7…	150
										SY9…	285
F7450-150SHP	18”	11400	16.50	21.00	21.00	42.25	22.75	16	1 1/8-8 UNC	SY8…	150
										SY10…	285
F7500-150SHP	20”	14420	18.00	23.00	23.00	49.50	25.00	20	1 1/8-8 UNC	SY9…	150
										SY11…	285
F7600-150SHP	24”	22050	22.00	28.06	28.06	56.25	29.50	20	1 1/4-8 UNC	SY12…	150

Non-Fail Safe

Dimensions

D104



Dimensions “A, B and C” do not include flange gaskets. (3 required per valve)

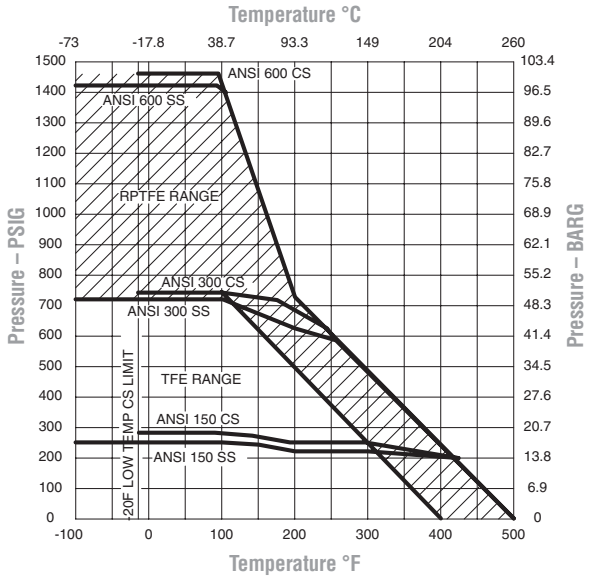
Application Notes

1. Valves are rated at 285 psi differential pressure in the closed position @ 100°F media temperature.
2. Valves are furnished with lugs tapped for use between ANSI Class 125/150 flanges conforming to ANSI B16.5 Standards.
3. 3-way assemblies are furnished assembled with Tee, calibrated and tested, ready for installation. All 3-way assemblies require the customer to specify the 3-way configuration code prior to order entry to guarantee correct placement of valves and actuator(s) on the assembly.
4. Dimension “D” allows for actuator(s) removal without the need to remove the valve from the pipe.
5. Weather shields are available, dimensional data furnished upon request.
6. Dual actuated valves have single actuators mounted on each valve shaft.
7. Flange gaskets (3 required, not provided with valve) MUST be used between valve and ANSI flange.
8. Flange bolts are not included with the valve. These are furnished by others.

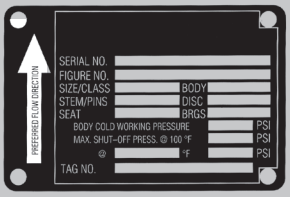
⚠ **Note:** For tee configuration, please refer to page 5.

Pressure/temperature chart for ANSI class butterfly valves.

BF14_A



SHP series valves have a preferred flow direction.



PreferredFlowrate

F6 ANSI Class 300
Reinforced Teflon Seat, 316 Stainless Disc

- **Bubble tight shut-off to ANSI Class 300 Standards**
- **Long stem design allows for 2" insulation minimum**
- **Valve Face-to-face dimensions comply with API 609 & MSS-SP-68**
- **Designed to be installed between ASME/ANSI B16.5 Flanges**
- **Completely assembled and tested, ready for installation**

Application

These valves are designed to meet the needs of HVAC and Commercial applications requiring positive shut-off for liquids at higher pressures and temperatures. Typical applications include chiller isolation, cooling tower isolation, change-over systems, large air handler coil control, bypass and process control applications. The large C_V values provide for an economical control valve solution for larger flow applications.

Technical Data	
Media service	chilled, hot water, 60% glycol, steam to 50 psi
Valve service	double dead end service
Flow characteristic	modified equal percentage, unidirectional
Recommended install	SUS (Seat Up Stream)
Action	quarter turn, mechanically limited
Sizes	2" to 24"
Type of end fitting	for use with ASME/ANSI B16.5 flanges
Materials	
Body	carbon steel full lug
Disc	316 stainless steel
Seat	RPTFE
Shaft	17-4 PH stainless
Gland seal	PTFE
Bushings	glass backed PTFE
Media temperature range	ANSI Class 300 limitations
Operation ambient temperature range	-22°F to 122°F [-30°C to 50°C]
Body pressure rating	ASME/ANSI Class 300 limitations
Close-off pressure	ANSI Class 300 to 725 psi @ 100°F
Rangeability	10:1 (for 30 deg to 70 deg range)
Maximum velocity	32 FPS

C_V 90°	C_V 60°	Valve Nominal Size IN	Type ANSI 300 2-way	Suitable Actuators Spring	Non-Spring	
100	52	2"	F650-300SHP	AF Series	GM Series	SY Series
143	75	2½"	F665-300SHP			
223	117	3"	F680-300SHP			
435	228	4"	F6100-300SHP			
688	361	5"	F6125-300SHP			
1041	546	6"	F6150-300SHP			
1911	1001	8"	F6200-300SHP			
3194	1673	10"	F6250-300SHP			
4428	2319	12"	F6300-300SHP			
5702	2986	14"	F6350-300SHP			
8243	3988	16"	F6400-300SHP			
9712	5088	18"	F6450-300SHP			
10658	5775	20"	F6500-300SHP			
16205	8855	24"	F6600-300SHP			

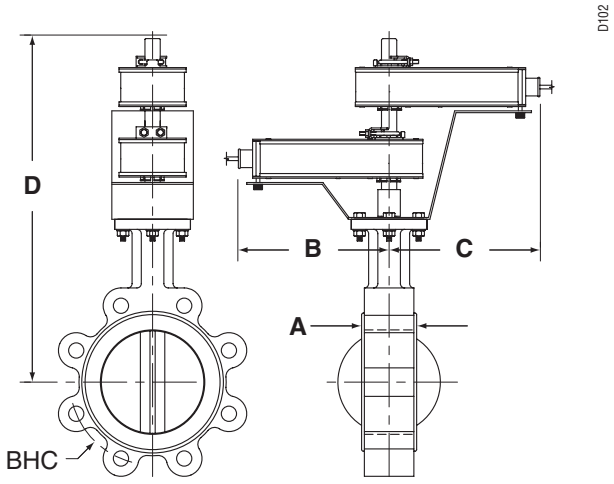
			MOD								ON/OFF
Valve	Size	C_V	10°	20°	30°	40°	50°	60°	70°	80°	90°
F650-300SHP	2"	100	1.40	6.00	13	24	36	52	71	95	100
F665-300SHP	2.5"	143	2.10	8.00	19	34	52	75	102	136	143
F680-300SHP	3"	223	3.20	13	30	53	81	117	159	212	223
F6100-300SHP	4"	435	6.20	25	58	104	157	228	310	414	435
F6125-300SHP	5"	688	10	40	92	165	248	361	491	655	688
F6150-300SHP	6"	1041	15	60	139	250	377	546	744	992	1041
F6200-300SHP	8"	1911	27	109	255	459	692	1001	1365	1820	1911
F6250-300SHP	10"	3194	46	183	426	767	1156	1673	2282	3042	3194
F6300-300SHP	12"	4428	63	253	590	1063	1602	2319	3163	4217	4428
F6350-300SHP	14"	5702	81	326	760	1368	2063	2986	4072	5430	5702
F6400-300SHP	16"	8243	109	435	1015	1827	2755	3988	5438	7850	8243
F6450-300SHP	18"	9712	139	555	1295	2331	3515	5088	6938	9250	9712
F6500-300SHP	20"	10658	158	630	1470	2646	3990	5775	7875	10150	10658
F6600-300SHP	24"	16205	242	966	2254	4057	6118	8855	12075	16100	16205

F6 ANSI Class 300
Reinforced Teflon Seat, 316 Stainless Disc

Maximum Dimensions (Inches)

Valve	Size	C_V 90°	A	B	C	D(Max)	BHC	No. of Holes	Lug Bolt	Actuator	Close-Off (PSI)	
F650-300SHP	2”	100	1.75	9.00	9.00	19.50	5.00	8	5/8-11 UNC	2*AF	150	Fail Safe
F665-300SHP	2.5”	143	1.88	9.00	9.00	20.00	5.88	8	3/4-10 UNC		150	
F680-300SHP	3”	223	1.92	9.00	9.00	20.50	6.63	8	3/4-10 UNC		150	
F6100-300SHP	4”	435	2.13	9.00	9.00	21.00	7.88	8	3/4-10 UNC		150	
F650-300SHP	2”	100	1.75	9.00	9.00	19.50	5.00	8	5/8-11 UNC	GMB(X)	285	Non-Fail Safe
F665-300SHP	2.5”	143	1.88	9.00	9.00	20.00	5.88	8	3/4-10 UNC		285	
F680-300SHP	3”	223	1.92	9.00	9.00	20.50	6.63	8	3/4-10 UNC		285	
F6100-300SHP	4”	435	2.13	9.00	9.00	21.00	7.88	8	3/4-10 UNC		150	
F650-300SHP	2”	100	1.75	9.00	9.00	19.50	5.00	8	5/8-11 UNC	2*GMB(X)	600	
F665-300SHP	2.5”	143	1.88	9.00	9.00	20.00	5.88	8	3/4-10 UNC		600	
F680-300SHP	3”	223	1.92	9.00	9.00	20.50	6.63	8	3/4-10 UNC		600	
F6100-300SHP	4”	435	2.13	9.00	9.00	21.00	7.88	8	3/4-10 UNC		400	
F650-300SHP	2”	100	1.75	8.00	8.00	22.25	4.75	8	5/8-11 UNC	SY2…	600	
F665-300SHP	2.5”	143	1.88	8.00	8.00	22.75	5.50	8	3/4-10 UNC		600	
F680-300SHP	3”	223	1.92	8.00	8.00	23.00	6.00	8	3/4-10 UNC		600	
F6100-300SHP	4”	435	2.13	8.00	8.00	23.75	7.50	8	3/4-10 UNC		600	
F6125-300SHP	5”	688	2.25	8.00	8.00	24.25	8.50	8	3/4-10 UNC	SY2…	285	
										SY3…	600	
F6150-300SHP	6”	1041	2.29	8.00	8.00	24.75	9.50	12	3/4-10 UNC	SY2…	285	
										SY3…	600	
F6200-300SHP	8”	1911	2.88	12.00	12.00	32.00	11.75	12	7/8-9 UNC	SY3…	150	
										SY4…	600	
										SY4…	285	
F6250-300SHP	10”	3194	3.25	12.00	12.00	33.00	14.25	16	1-8 UNC	SY5…	400	
										SY7…	600	
										SY4…	150	
F6300-300SHP	12”	4428	3.62	12.00	12.00	35.00	17.00	16	1 1/8-8 UNC	SY5…	285	
										SY7…	600	
										SY5…	150	
F6350-300SHP	14”	5702	4.62	14.00	14.00	36.00	18.75	20	1 1/8-8 UNC	SY7…	400	
										SY8…	600	
										SY7…	150	
F6400-300SHP	16”	8243	5.25	14.00	14.00	37.50	21.25	20	1 1/4-8 UNC	SY8…	285	
										SY9…	400	
										SY10…	600	
										SY7…	150	
F6450-300SHP	18”	9712	5.88	14.00	14.00	42.25	22.75	24	1 1/4-8 UNC	SY8…	285	
										SY9…	400	
										SY11…	600	
										SY8…	150	
F6500-300SHP	20”	10658	6.31	14.00	14.00	49.50	25.00	24	1 1/4-8 UNC	SY10…	285	
										SY11…	400	
F6600-300SHP	24”	16205	7.19	14.00	14.00	56.25	29.50	24	1 1/2-8 UNC	SY10…	150	

Dimensions

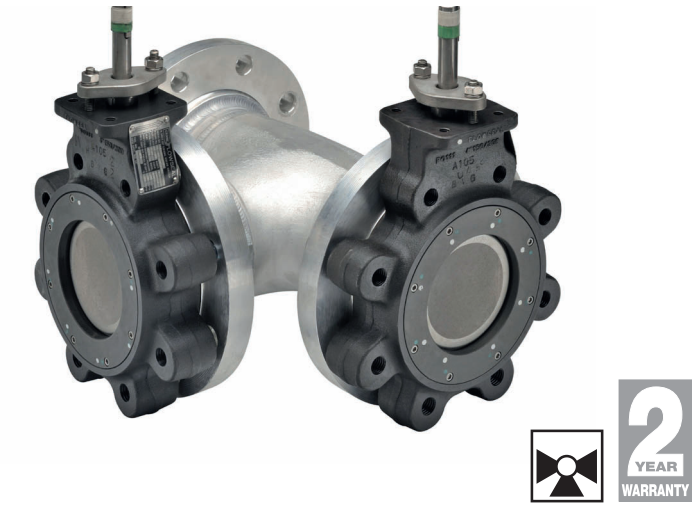


Dimension “A” does not include flange gaskets. (2 required per valve)

Application Notes

1. Valves are rated at 725 psi differential pressure in the closed position @ 100°F media temperature.
2. Valves are furnished with lugs tapped for use between ANSI Class 250/300 flanges conforming to ANSI B16.5 Standards.
3. 2-way assemblies are furnished assembled, calibrated and tested, ready for installation.
4. Dimension “D” allows for actuator(s) removal without the need to remove the valve from the pipe.
5. Weather shields are available, dimensional data furnished upon request.
6. Dual actuated valves have actuators mounted on a single common shaft.
7. Flange gaskets (2 required, not provided with valve) MUST be used between valve and ANSI flange.
8. Flange bolts are not included with the valve. These are furnished by others.

F7 ANSI Class 300
Reinforced Teflon Seat, 316 Stainless Disc



- **Bubble tight shut-off to ANSI Class 300 Standards**
- **Long stem design allows for 2" insulation minimum**
- **Valve Face-to-face dimensions comply with API 609 & MSS-SP-68**
- **Designed to be installed between ASME/ANSI 16.5 Flanges**
- **Completely assembled and tested, ready for installation**
- **Tees comply with ASME/ANSI 16.5 Class 250/300 Flanges**

Application

These valves are designed to meet the needs of HVAC and Commercial applications requiring positive shut-off for liquids at higher pressures and temperatures. Typical applications include chiller isolation, cooling tower isolation, change-over systems, large air handler coil control, bypass and process control applications. The large C_V values provide for an economical control valve solution for larger flow applications.

		Valve Nominal Size	Type	Suitable Actuators		
C_V 90°	C_V 60°	IN	ANSI 150 3-way	Spring	Non-Spring	
100	52	2"	F750-300SHP	AF Series	GM Series	SY Series
143	75	2½"	F765-300SHP			
223	117	3"	F780-300SHP			
435	228	4"	F7100-300SHP			
688	361	5"	F7125-300SHP			
1041	546	6"	F7150-300SHP			
1911	1001	8"	F7200-300SHP			
3194	1673	10"	F6250-300SHP			
4428	2319	12"	F7300-300SHP			
5702	2986	14"	F7350-300SHP			
8243	3988	16"	F7400-300SHP			
9712	5088	18"	F7450-300SHP			
10658	5775	20"	F7500-300SHP			
16205	8855	24"	F7600-300SHP			

Technical Data	
Media service	chilled, hot water, 60% glycol, steam to 50 psi
Valve service	double dead end service
Flow characteristic	modified linear, unidirectional
Recommended install	SUS (Seat Up Stream)
Action	quarter turn, mechanically limited
Sizes	2" to 24"
Type of end fitting	for use with ASME/ANSI B16.5 flanges
Materials	
Body	carbon steel full lug
Disc	316 stainless steel
Seat	RPTFE
Shaft	17-4 PH stainless
Gland seal	PTFE
Bushings	glass backed PTFE
Media temperature range	ANSI Class 300 limitations
Operation ambient temperature range	-22°F to 122°F [-30°C to 50°C]
Body pressure rating	ASME/ANSI Class 300 limitations
Close-off pressure	ANSI Class 300 to 725 psi @ 100°F
Rangeability	10:1 (for 30 deg to 70 deg range)
Maximum velocity	32 FPS

						MOD				ON/OFF
Valve	Size	C_V	10°	20°	30°	40°	50°	60°	70°	80°	90°
F750-300SHP	2"	100	1.40	6.00	13	24	36	52	71	95	100
F765-300SHP	2.5"	143	2.10	8.00	19	34	52	75	102	136	143
F780-300SHP	3"	223	3.20	13	30	53	81	117	159	212	223
F7100-300SHP	4"	435	6.20	25	58	104	157	228	310	414	435
F7125-300SHP	5"	688	10	40	92	165	248	361	491	655	688
F7150-300SHP	6"	1041	15	60	139	250	377	546	744	992	1041
F7200-300SHP	8"	1911	27	109	255	459	692	1001	1365	1820	1911
F7250-300SHP	10"	3194	46	183	426	767	1156	1673	2282	3042	3194
F7300-300SHP	12"	4428	63	253	590	1063	1602	2319	3163	4217	4428
F7350-300SHP	14"	5702	81	326	760	1368	2063	2986	4072	5430	5702
F7400-300SHP	16"	8243	109	435	1015	1827	2755	3988	5438	7850	8243
F7450-300SHP	18"	9712	139	555	1295	2331	3515	5088	6938	9250	9712
F7500-300SHP	20"	10658	158	630	1470	2646	3990	5775	7875	10150	10658
F7600-300SHP	24"	16205	242	966	2254	4057	6118	8855	12075	16100	16205

F7 ANSI Class 300
Reinforced Teflon Seat, 316 Stainless Disc

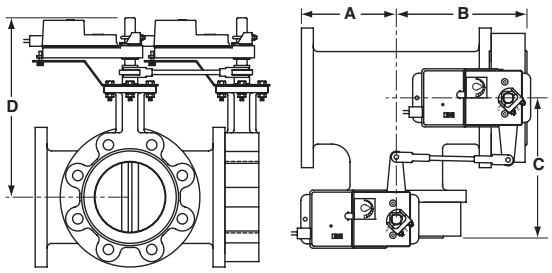
Maximum Dimensions (Inches)

Valve	Size	C_v 90°	A	B	C	D(Max)	BHC	No. of Holes	Lug Bolt	Actuator	Close-Off (PSI)
F750-300SHP	2”	100	5.00	6.75	6.75	15.50	5.00	8	5/8-11 UNC	2*GMB(X)	285
F765-300SHP	2.5”	143	5.50	7.38	7.38	16.00	5.88	8	3/4-10 UNC		285
F780-300SHP	3”	223	6.00	7.92	7.92	16.25	6.63	8	3/4-10 UNC		285
F7100-300SHP	4”	435	7.00	9.13	9.13	18.00	7.88	8	3/4-10 UNC		150
F750-300SHP	2”	100	5.00	6.75	6.75	22.25	4.75	8	5/8-11 UNC	SY2…	400
										SY3…	600
F765-300SHP	2.5”	143	5.50	7.38	7.38	22.75	5.50	8	3/4-10 UNC	SY2…	400
										SY3…	600
F780-300SHP	3”	223	6.00	7.92	7.92	23.00	6.00	8	3/4-10 UNC	SY2…	400
										SY3…	600
F7100-300SHP	4”	435	7.00	9.13	9.13	23.75	7.50	8	3/4-10 UNC	SY2…	285
										SY3…	600
F7125-300SHP	5”	688	8.00	10.25	10.25	24.25	8.50	8	3/4-10 UNC	SY3…	285
										SY4…	600
F7150-300SHP	6”	1041	8.50	10.79	10.79	24.75	9.50	12	3/4-10 UNC	SY3…	285
										SY4…	600
F7200-300SHP	8”	1911	10.00	12.88	12.88	32.00	11.75	12	7/8-9 UNC	SY4…	400
										SY5…	600
										SY4…	150
F7250-300SHP	10”	3194	11.50	14.75	14.75	33.00	14.25	16	1-8 UNC	SY5…	285
										SY7…	600
										SY5…	150
F7300-300SHP	12”	4428	13.00	16.62	16.62	35.00	17.00	16	1 1/8-8 UNC	SY7…	400
										SY8…	600
										SY7…	150
F7350-300SHP	14”	5200	15.00	19.62	19.62	36.00	18.75	20	1 1/8-8 UNC	SY8…	400
										SY10…	600
										SY7…	150
F7400-300SHP	16”	8243	16.50	21.75	21.75	37.50	21.25	20	1 1/4-8 UNC	SY9…	285
										SY10…	400
										SY12…	600
										SY8…	150
F7450-300SHP	18”	9712	18.00	23.88	23.88	42.25	22.75	24	1 1/4-8 UNC	SY10…	285
										SY11…	400
F7500-300SHP	20”	10568	19.50	25.81	25.81	49.50	25.00	24	1 1/4-8 UNC	SY9…	150
										SY12…	285
F7600-300SHP	24”	16205	22.5	29.69	29.69	56.25	29.50	24	1 1/2-8 UNC	SY12…	150

Non-Fail Safe

Dimensions

D101



Dimensions “A, B and C” do not include flange gaskets. (3 required per valve)

Application Notes

1. Valves are rated at 725 psi differential pressure in the closed position @ 100°F media temperature.
2. Valves are furnished with lugs tapped for use between ANSI Class 250/300 flanges conforming to ANSI B16.5 Standards.
3. 3-way assemblies are furnished assembled with Tee, calibrated and tested, ready for installation. All 3 way assemblies require the customer to specify the 3-way configuration code prior to order entry to guarantee correct placement of valves and actuator(s) on the assembly.
4. Dimension “D” allows for actuator(s) removal without the need to remove the valve from the pipe.
5. Weather shields are available, dimensional data furnished upon request.
6. Dual actuated valves have single actuators mounted on each valve shaft.
7. Flange gaskets (3 required, not provided with valve) MUST be used between valve and ANSI flange.
8. Flange bolts are not included with the valve. These are furnished by others.

⚠ **Note:** For tee configuration, please refer to page 5.

F6…HD Butterfly Valves 2”–30” Ductile Iron Lug Body

Resilient Seat, 304 Stainless Disc with Manual Handle or Gear Wheel Operator

- **200 psi (2” to 12”) and 150 psi (14”-30”) bubble tight shut-off**
- **Long stem design allows for 2” insulation**
- **Valve face-to-face dimensions comply with API 609 & MSS-SP-67**
- **Completely assembled and tested, ready for installation**

Application

These valves are designed to meet the needs of HVAC and commercial applications requiring bubble tight shut-off for liquids. Typical applications include chiller isolation, cooling tower isolation, change-over systems, large air handler coil control, bypass and process control applications. Designed for use in Victaulic piping systems when mated to Victaulic 41 series flange nipples.

Jobsite Note

Valves should be stored in a weather protected area prior to construction. Complete installation recommendations can be found in Belimo’s Installation and Maintenance Instructions for F6/F7…HD/HDU Butterfly Valves.

Technical Data	
Service	chilled, hot water, 60% glycol
Flow characteristic	modified equal percentage
Action	90° rotation
Sizes	2” to 30”
Type of end fitting	for use with ANSI 125/150 flanges
Materials	
Body	ductile iron ASTM A536
Disc	304 stainless steel
Seat	EPDM standard
Shaft	416 stainless steel
O-ring	EPDM
Upper bushing	RPTFE
Middle bushings	RPTFE
Lower bushing	RPTFE
Handle material	mild steel
Gear operator materials	
Housing	ductile iron
Gears	hardened steel
Media temperature range	-22°F to 250°F [-30°C to 120°C]
Operation ambient temperature range	-22°F to 122°F [-30°C to 50°C]
Body pressure rating	ASME/ANSI Class 125/150 (200 psi at -30°F to 275°F)
Close-off pressure	200 psi (2”-12”), 150 psi (14”-30”)
Rangeability	10:1 (for 30° to 70° range)
Maximum velocity	12 FPS

Valve Nominal Size				Type	Manual Operators	
C_V 90°	C_V 60°	IN	DN [mm]	2-way		
115	44	2”	50	F650HD	Handle	Gear Wheel OP
196	75	2½”	65	F665HD		
302	116	3”	80	F680HD		
600	230	4”	100	F6100HD		
1022	392	5”	125	F6125HD		
1579	605	6”	150	F6150HD		
3136	1202	8”	200	F6200HD		
5340	2047	10”	250	F6250HD		
8250	3062	12”	300	F6300HD		
11917	4568	14”	350	F6350HD		
16388	6282	16”	400	F6400HD		
21705	8320	18”	450	F6450HD		
27908	10698	20”	500	F6500HD		
43116	16528	24”	600	F6600HD		
73426	28146	30”	750	F6750HD		

Valve	Size	C_V	10°	20°	30°	40°	50°	60°	70°	80°	90°
F650HD	2”	115	0.06	3	7	15	27	44	70	105	115
F665HD	2-1/2”	196	0.1	6	12	25	45	75	119	178	196
F680HD	3”	302	0.2	9	18	39	70	116	183	275	302
F6100HD	4”	600	0.3	17	36	78	139	230	364	546	600
F6125HD	5”	1022	0.5	29	61	133	237	392	620	930	1022
F6150HD	6”	1579	0.8	45	95	205	366	605	958	1437	1579
F6200HD	8”	3136	2	89	188	408	727	1202	1903	2854	3136
F6250HD	10”	5340	3	151	320	694	1237	2047	3240	4859	5340
F6300HD	12”	8250	4	234	495	1072	1911	3062	5005	7507	8250
F6350HD	14”	11917	6	338	715	1549	2761	4568	7230	10844	11917
F6400HD	16”	16388	8	464	983	2130	3797	6282	9942	14913	16388
F6450HD	18”	21705	11	615	1302	2822	5028	8320	13168	19752	21705
F6500HD	20”	27908	14	791	1674	3628	6465	10698	16931	25396	27908
F6600HD	24”	43116	22	1222	2587	5605	9989	16528	26157	39236	43116
F6750HD	30”	73426	37	2081	4405	9545	17011	28146	44545	66818	73426

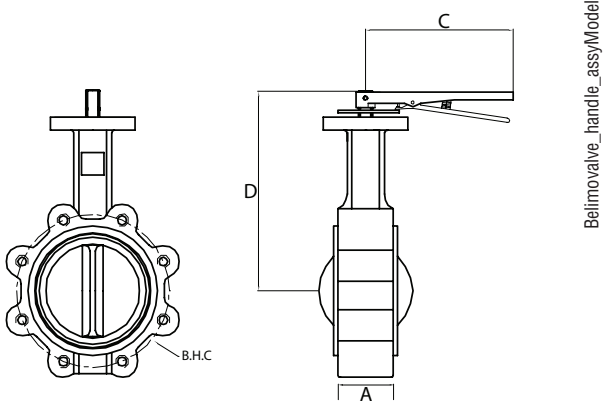
F6…HD Butterfly Valves 2”–30” Ductile Iron Lug Body

Resilient Seat, 304 Stainless Disc with Manual Handle or Gear Wheel Operator

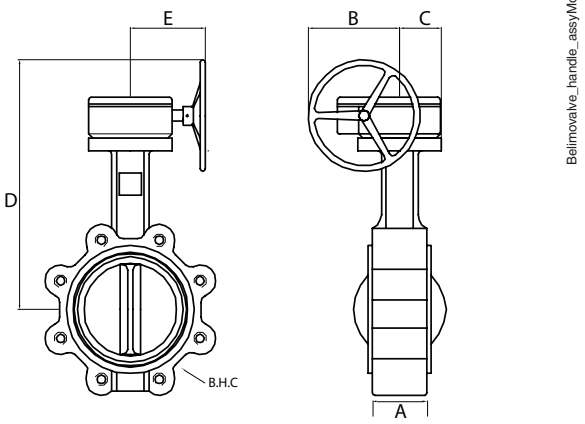
Maximum Dimensions (Inches)

Valve	Size	Cv 90°	Cv 60°	A	B	C	D	E	BHC	No. of Holes	Lug Bolt	Operator	Close-Off (PSI)	Wt. lbs (kg)
F650HD	2”	115	44	1.69	n/a	10.44	7.68	n/a	4.75	4	5/8-11UNC	**HND01**	200	11.2 [5.1]
F665HD	2½”	196	75	1.81	n/a	10.44	8.27	n/a	5.5	4	5/8-11UNC	**HND01**	200	13.2 [6.0]
F680HD	3”	302	116	1.81	n/a	10.44	8.54	n/a	6	4	5/8-11UNC	**HND01**	200	13.2 [6.1]
F6100HD	4”	600	230	2.06	n/a	11.81	9.45	n/a	7.5	8	5/8-11UNC	**HND02**	200	19.2 [8.7]
F6125HD	5”	1022	392	2.19	n/a	11.81	9.76	n/a	8.5	8	3/4-10UNC	**HND02**	200	24.2 [11.0]
F6150HD	6”	1579	605	2.19	n/a	11.81	10.2	n/a	9.5	8	3/4-10UNC	**HND02**	200	29.2 [13.2]
F6200HD	8”	3136	1202	2.38	n/a	14.06	11.93	n/a	11.75	8	3/4-10UNC	**HND03**	200	43.4 [19.7]
Valve	**Size**	**Cv 90°**	**Cv 60°**	**A**	**B**	**C**	**D**	**E**	**BHC**	**No. of Holes**	**Lug Bolt**	**Operator**	**Close-Off (PSI)**	**Wt. lbs (kg)**
F650HD	2”	115	44	1.69	4.70	2.10	10.71	6.45	4.75	4	5/8-11UNC	**GW01**	200	19 [8.6]
F665HD	2½”	196	75	1.81	4.70	2.10	11.22	6.45	5.5	4	5/8-11UNC	**GW01**	200	21 [9.5]
F680HD	3”	302	116	1.81	4.70	2.10	11.50	6.45	6	4	5/8-11UNC	**GW01**	200	21 [9.5]
F6100HD	4”	600	230	2.06	4.70	2.10	12.17	6.45	7.5	8	5/8-11UNC	**GW02**	200	27 [12.2]
F6125HD	5”	1022	392	2.19	4.70	2.10	12.72	6.45	8.5	8	3/4-10UNC	**GW02**	200	32.[14.5]
F6150HD	6”	1579	605	2.19	4.70	2.10	13.19	6.45	9.5	8	3/4-10UNC	**GW02**	200	37 [16.7]
F6200HD	8”	3136	1202	2.38	8.20	3.10	17.50	9.20	11.75	8	3/4-10UNC	**GW03**	200	58 [26.3]
F6250HD	10”	5340	2047	2.69	8.20	3.10	18.72	9.20	14.25	12	7/8-9UNC	**GW03**	200	83 [37.6]
F6300HD	12”	8250	3062	3.06	13.00	3.10	20.55	9.20	17	12	7/8-9UNC	**GW04**	200	130.0 [59.0]
F6350HD	14”	11917	4568	3.06	13.00	3.10	21.77	9.20	18.75	12	1-8UNC	**GW04**	150	179.5 [81.4]
F6400HD	16”	16388	6282	4.00	13.00	5.00	25.69	11.40	21.25	16	1-8UNC	**GW05**	150	270 [122.4]
F6450HD	18”	21705	8320	4.50	13.00	5.00	26.56	11.40	22.75	16	1 1/8-7UNC	**GW06**	150	314 [142.4]
F6500HD	20”	27908	10698	5.00	15.50	6.80	32.99	11.40	25	20	1 1/8-7UNC	**GW07**	150	477 [216.5]
F6600HD	24”	43116	16528	6.06	16.20	6.80	36.22	12.20	29.5	20	1 1/4-7UNC	**GW08**	150	725 [329.0]
F6750HD	30”	73426	28146	6.50	17.70	8.10	40.55	13.80	36	28	1 1/4-7UNC	**GW09**	150	1253 [568.1]

Dimensions Manual Handle



Dimensions Gear Wheel



Dimension “A” is compressed, add 0.125” for relaxed state.

Application Notes

1. Valves are rated at 200 psi differential pressure in the closed position (SY... 150 psi 14”+).
2. Valves are furnished with lugs tapped for use with ANSI Class 125/150 flanges. Installation flanges and hardware are not included.
3. 2-way assemblies are furnished assembled and tested, ready for installation.

F6 ANSI Class 150

Reinforced PTFE Seat, 316 Stainless Disc with Manual Handle or Gear Wheel Operator

- **Bubble tight shut-off to ANSI Class 150 Standards**
- **Long stem design allows for 2" insulation minimum**
- **Valve face-to-face dimensions comply with API 609 & MSS-SP-68**
- **Designed to be installed between ASME/ANSI B16.5 Flanges**
- **Completely assembled and tested, ready for installation**

Application

These valves are designed to meet the needs of HVAC and Commercial applications requiring positive shut-off for liquids at higher pressures and temperatures. Typical applications include chiller isolation, cooling tower isolation, change-over systems, large air handler coil control, bypass and process control applications.

Jobsite Note

Valves should be stored in a weather protected area prior to construction. Complete installation recommendations can be found in Belimo's Installation and Maintenance Instructions for F6/F7…HD/HDU Butterfly Valves.

Technical Data	
Media service	chilled, hot water, 60% glycol, steam to 50 psi
Valve service	double dead end service
Flow characteristic	modified equal percentage, unidirectional
Recommended install	SUS (Seat Up Stream)
Action	quarter turn, mechanically limited
Sizes	2" to 24"
Type of end fitting	for use with ASME/ANSI B16.5 flanges
Materials	
Body	carbon steel full lug
Disc	316 stainless steel
Seat	RPTFE
Shaft	17-4 PH stainless
Gland seal	PTFE
Bushings	glass backed PTFE
Handle Material	ductile iron
Gear Operator Materials	
Housing	ductile iron
Gears	hardened steel
Media temperature range	ANSI Class 150 limitations
Operation ambient temperature range	-22°F to 122°F [-30°C to 50°C]
Body pressure rating	ASME/ANSI Class 150 limitations
Close-off pressure	ANSI Class 150 to 285 psi @ 100°F
Rangeability	10:1 (for 30 deg to 70 deg range)
Maximum velocity	32 FPS

		Valve Nominal Size		Type	Manual Operators	
C_v 90°	C_v 60°	IN	DN [mm]	ANSI 150 2-way		
102	56	2"	50	F650-150SHP	Handle	Gear Wheel OP
146	80	2½"	65	F665-150SHP		
228	125	3"	80	F680-150SHP		
451	248	4"	100	F6100-150SHP		
714	392	5"	125	F6125-150SHP		
1103	607	6"	150	F6150-150SHP		
2064	1135	8"	200	F6200-150SHP		
3517	1934	10"	250	F6250-150SHP		
4837	2660	12"	300	F6300-150SHP		
6857	3592	14"	350	F6350-150SHP		
9287	4865	16"	400	F6400-150SHP		
11500	3270	18"	450	F6450-150SHP		
14420	7590	20"	500	F6500-150SHP		
22050	11550	24"	600	F6600-150SHP		
34388	18012	30"	750	F6750-150SHP		

Valve	Size	C_v	10°	20°	30°	40°	50°	60°	70°	80°	90°
F650-150SHP	2"	102	1.5	6.1	14	26	39	56	77	99	102
F665-150SHP	2.5"	146	2.2	8.8	20	37	55	80	110	142	146
F680-150SHP	3"	228	3.4	14	32	57	87	125	171	221	228
F6100-150SHP	4"	451	7	27	63	114	171	248	338	437	451
F6125-150SHP	5"	714	11	43	100	180	271	393	536	693	714
F6150-150SHP	6"	1103	17	66	154	278	419	607	827	1070	1103
F6200-150SHP	8"	2064	31	124	289	520	784	1135	1548	2002	2064
F6250-150SHP	10"	3517	53	211	492	886	1336	1934	2638	3411	3517
F6300-150SHP	12"	4837	73	290	677	1219	1838	2660	3628	4692	4837
F6350-150SHP	14"	6857	103	411	960	1728	2606	3771	5143	6651	6857
F6400-150SHP	16"	9287	139	557	1300	2340	3529	5108	6965	9008	9287
F6450-150SHP	18"	11400	171	684	1596	2873	4332	6270	8550	11058	11400
F6500-150SHP	20"	14420	216	865	2019	3634	5480	7931	10815	13987	14420
F6600-150SHP	24"	22050	331	1323	3087	5557	8379	12128	16538	21389	22050
F6750-150SHP	30"	34388	491	1965	4585	8253	12445	18012	24563	32750	34388

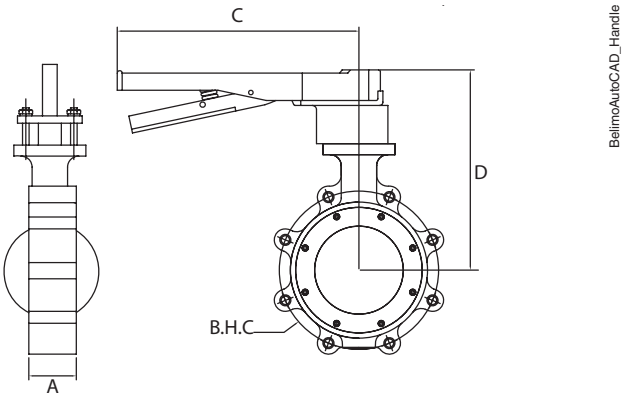
F6 ANSI Class 150

Reinforced PTFE Seat, 316 Stainless Disc with Manual Handle or Gear Wheel Operator

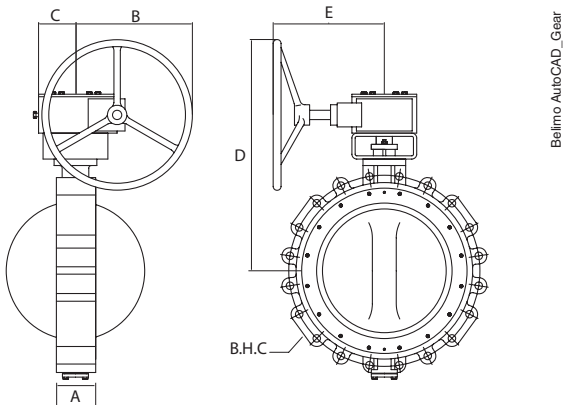
Maximum Dimensions (Inches)

Valve	Size	Cv 90°	A	B	C	D	E	BHC	No. of Holes	Lug Bolt	Operator	Wt. lbs (kg)	Close-Off (PSI)
F650-150SHP	2”	102	1.75	n/a	10.90	9.50	n/a	4.75	4	5/8-11 UNC	**HND05**	18 [8.2]	ANSI Class 150 Limitations
F665-150SHP	2.5”	146	1.88	n/a	10.90	9.50	n/a	5.5	4	5/8-11 UNC	**HND05**	18 [8.2]	
F680-150SHP	3”	228	1.92	n/a	10.90	10.50	n/a	6	4	5/8-11 UNC	**HND06**	20 [9.1]	
F6100-150SHP	4”	451	2.13	n/a	10.90	11.10	n/a	7.5	8	5/8-11 UNC	**HND06**	32 [14.5]	
F6125-150SHP	5”	714	2.25	n/a	15.10	12.00	n/a	8.5	8	3/4-10 UNC	**HND07**	38 [17.2]	
F6150-150SHP	6”	1103	2.29	n/a	15.00	11.30	n/a	9.5	8	3/4-10 UNC	**HND07**	46 [20.9]	
F6200-150SHP	8”	2064	2.5	n/a	24.10	12.40	n/a	11.75	8	3/4-10 UNC	**HND08**	59 [26.8]	
Valve	**Size**	**Cv 90°**	**A**	**B**	**C**	**D**	**E**	**BHC**	**No. of Holes**	**Lug Bolt**	**Operator**	**Wt. lbs (kg)**	**Close-Off (PSI)**
F650-150SHP	2”	102	1.75	6.41	2.50	11.60	6.50	4.75	4	5/8-11 UNC	**GW10**	25 [11.3]	ANSI Class 150 Limitations
F665-150SHP	2.5”	146	1.88	6.41	2.50	11.60	6.50	5.5	4	5/8-11 UNC	**GW10**	25 [11.3]	
F680-150SHP	3”	228	1.92	6.41	2.50	12.30	6.50	6	4	5/8-11 UNC	**GW11**	28 [12.7]	
F6100-150SHP	4”	451	2.13	6.41	2.50	13.00	6.50	7.5	8	5/8-11 UNC	**GW11**	38 [17.2]	
F6125-150SHP	5”	714	2.25	6.41	2.50	14.30	6.50	8.5	8	3/4-10 UNC	**GW12**	48 [21.8]	
F6150-150SHP	6”	1103	2.29	6.41	3.20	14.50	6.50	9.5	8	3/4-10 UNC	**GW12**	49 [22.2]	
F6200-150SHP	8”	2064	2.5	6.41	3.20	15.15	6.50	11.75	8	3/4-10 UNC	**GW13**	58 [26.3]	
F6250-150SHP	10”	3517	2.81	6.41	3.20	15.95	6.50	14.25	12	7/8-9 UNC	**GW15**	112 [50.8]	
F6300-150SHP	12”	4837	3.23	9.23	4.40	18.05	6.50	17	12	7/8-9 UNC	**GW17**	163 [73.9]	
F6350-150SHP	14”	6857	3.62	9.23	4.40	21.50	11.38	18.75	12	1-8 UNC	**GW19**	215 [97.5]	
F6400-150SHP	16”	9287	4	15.23	4.40	30.70	12.50	21.25	16	1-8 UNC	**GW21**	285 [129.3]	
F6450-150SHP	18”	11400	4.5	12.23	4.40	29.50	15.00	22.75	16	1 1/8-8 UNC	**GW23**	355 [161.0]	
F6500-150SHP	20”	14420	5	13.66	6.50	30.70	15.50	25	20	1 1/8-8 UNC	**GW25**	500 [226.8]	
F6600-150SHP	24”	22050	6.06	16.66	6.90	37.40	17.50	29.5	20	1 1/4-8 UNC	**GW27**	820 [371.9]	
F6750-150SHP	30”	34388	6.75	17.75	7.25	40.50	19.50	36	28	1 1/4-8 UNC	**GW29**	1350 [612.3]	

Dimensions Manual Handle



Dimensions Gear Wheel

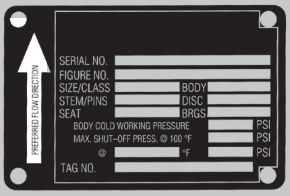


Dimension “A” does not include flange gaskets. (2 required per valve)

Application Notes

1. Valves are rated at 285 psi differential pressure in the closed position @ 100°F media temperature.
2. Valves are furnished with lugs tapped for use between ANSI Class 125/150 flanges conforming to ANSI B16.5 Standards.
3. 2-way assemblies are furnished assembled and ready for installation.
4. Flange gaskets (2 required, not provided with valve) MUST be used between valve and ANSI flange.
5. Flange bolts are not included with the valve. These are furnished by others.

SHP series valves have a preferred flow direction.



- **Bubble tight shut-off to ANSI Class 300 Standards**
- **Long stem design allows for 2" insulation minimum**
- **Valve face-to-face dimensions comply with API 609 & MSS-SP-68**
- **Designed to be installed between ASME/ANSI B16.5 Flanges**
- **Completely assembled and tested, ready for installation**

Application

These valves are designed to meet the needs of HVAC and Commercial applications requiring positive shut-off for liquids at higher pressures and temperatures. Typical applications include chiller isolation, cooling tower isolation, change-over systems, large air handler coil control, bypass and process control applications.

Jobsite Note

Valves should be stored in a weather protected area prior to construction. Complete installation recommendations can be found in Belimo's Installation and Maintenance Instructions for F6/F7…HD/HDU Butterfly Valves.

Technical Data	
Media service	chilled, hot water, 60% glycol, steam to 50 psi
Valve service	double dead end service
Flow characteristic	modified equal percentage, unidirectional
Recommended install	SUS (Seat Up Stream)
Action	quarter turn, mechanically limited
Sizes	2" to 24"
Type of end fitting	for use with ASME/ANSI B16.5 flanges
Materials	
Body	carbon steel full lug
Disc	316 stainless steel
Seat	RPTFE
Shaft	17-4 PH stainless
Gland seal	PTFE
Bushings	glass backed PTFE
Handle Material	ductile iron
Gear Operator Materials	
Housing	ductile iron
Gears	hardened steel
Media temperature range	ANSI Class 300 limitations
Operation ambient temperature range	-22°F to 122°F [-30°C to 50°C]
Body pressure rating	ASME/ANSI Class 300 limitations
Close-off pressure	ANSI Class 300 to 725 psi @ 100°F
Rangeability	10:1 (for 30 deg to 70 deg range)
Maximum velocity	32 FPS

		Valve Nominal Size		Type	Manual Operators	
C_v 90°	C_v 60°	IN	DN [mm]	ANSI 300 2-way		
100	52	2"	50	F650-300SHP	Handle	Gear Wheel OP
143	75	2½"	65	F665-300SHP		
223	117	3"	80	F680-300SHP		
435	228	4"	100	F6100-300SHP		
688	361	5"	125	F6125-300SHP		
1041	546	6"	150	F6150-300SHP		
1911	1001	8"	200	F6200-300SHP		
3194	1673	10"	250	F6250-300SHP		
4428	2319	12"	300	F6300-300SHP		
5702	2986	14"	350	F6350-300SHP		
8243	3988	16"	400	F6400-300SHP		
9712	5088	18"	450	F6450-300SHP		
10658	5775	20"	500	F6500-300SHP		
16205	8855	24"	600	F6600-300SHP		

Valve	Size	C_v	10°	20°	30°	40°	50°	60°	70°	80°	90°
F650-300SHP	2"	100	1.4	6	13	24	36	52	71	95	100
F665-300SHP	2.5"	143	2.1	8	19	34	52	75	102	136	143
F680-300SHP	3"	223	3.2	13	30	53	81	117	159	212	223
F6100-300SHP	4"	435	6.2	25	58	104	157	228	310	414	435
F6125-300SHP	5"	688	10	40	92	165	248	361	491	655	688
F6150-300SHP	6"	1041	15	60	139	250	377	546	744	992	1041
F6200-300SHP	8"	1911	27	109	255	459	692	1001	1365	1820	1911
F6250-300SHP	10"	3194	46	183	426	767	1156	1673	2282	3042	3194
F6300-300SHP	12"	4428	63	253	590	1063	1602	2319	3163	4217	4428
F6350-300SHP	14"	5702	81	326	760	1368	2063	2986	4072	5430	5702
F6400-300SHP	16"	8243	109	435	1015	1827	2755	3988	5438	7850	8243
F6450-300SHP	18"	9712	139	555	1295	2331	3515	5088	6938	9250	9712
F6500-300SHP	20"	10658	158	630	1470	2646	3990	5775	7875	10150	10658
F6600-300SHP	24"	16205	242	966	2254	4057	6118	8855	12075	16100	16205

F6 ANSI Class 300

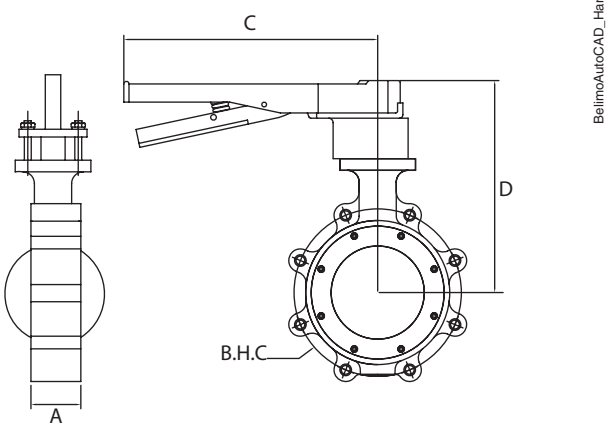
Reinforced PTFE Seat, 316 Stainless Disc with Manual Handle or Gear Wheel Operator

Maximum Dimensions (Inches)

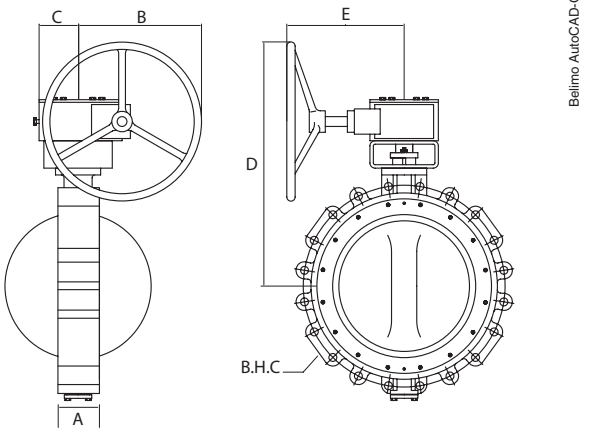
Valve	Size	Cv 90°	A	B	C	D	E	BHC	No. of Holes	Lug Bolt	Operator	Wt. lbs (kg)	Close-Off (PSI)
F650-300SHP	2”	100	1.75	n/a	10.90	9.50	n/a	4.75	8	5/8-11 UNC	**HND05**	15 [6.8]	ANSI Class 300 Limitations
F665-300SHP	2.5”	143	1.88	n/a	10.90	9.50	n/a	5.5	8	3/4-10 UNC	**HND05**	15 [6.8]	
F680-300SHP	3”	223	1.92	n/a	10.90	10.50	n/a	6	8	3/4-10 UNC	**HND06**	21 [9.5]	
F6100-300SHP	4”	435	2.13	n/a	10.90	11.10	n/a	7.5	8	3/4-10 UNC	**HND06**	29 [13.2]	
F6125-300SHP	5”	688	2.25	n/a	15.10	12.20	n/a	8.5	8	3/4-10 UNC	**HND07**	38 [17.2]	
F6150-300SHP	6”	1041	2.29	n/a	24.10	11.30	n/a	9.5	12	3/4-10 UNC	**HND07**	62 [28.1]	

Valve	Size	Cv 90°	A	B	C	D	E	BHC	No. of Holes	Lug Bolt	Operator	Wt. lbs (kg)	Close-Off (PSI)
F650-300SHP	2”	100	1.75	6.50	2.50	11.60	6.50	4.75	8	5/8-11 UNC	**GW10**	23 [10.4]	ANSI Class 300 Limitations
F665-300SHP	2.5”	143	1.88	6.50	2.50	11.60	6.50	5.5	8	3/4-10 UNC	**GW10**	23 [10.4]	
F680-300SHP	3”	223	1.92	6.50	2.50	12.30	6.50	6	8	3/4-10 UNC	**GW11**	29 [13.2]	
F6100-300SHP	4”	435	2.13	6.50	2.50	13.10	6.50	7.5	8	3/4-10 UNC	**GW11**	35 [15.9]	
F6125-300SHP	5”	688	2.25	6.50	2.50	14.30	6.50	8.5	8	3/4-10 UNC	**GW12**	41 [18.6]	
F6150-300SHP	6”	1041	2.29	6.50	2.50	14.80	6.50	9.5	12	3/4-10 UNC	**GW13**	63 [28.6]	
F6200-300SHP	8”	1911	2.88	6.50	2.50	15.90	6.50	11.75	12	7/8-9 UNC	**GW14**	93 [42.2]	
F6250-300SHP	10”	3194	3.25	9.23	4.40	19.60	12.50	14.25	16	1-8 UNC	**GW16**	150 [68.0]	
F6300-300SHP	12”	4428	3.62	9.23	4.40	23.00	15.00	17	16	1 1/8-8 UNC	**GW18**	230 [104.3]	
F6350-300SHP	14”	5702	4.62	15.23	4.40	30.40	12.50	18.75	20	1 1/8-8 UNC	**GW20**	360 [163.3]	
F6400-300SHP	16”	8243	5.25	15.23	4.40	31.90	12.50	21.25	20	1 1/4-8 UNC	**GW22**	435 [197.3]	
F6450-300SHP	18”	9712	5.88	16.66	6.50	34.20	17.50	22.75	24	1 1/4-8 UNC	**GW24**	610 [276.7]	
F6500-300SHP	20”	10658	6.31	16.66	6.50	37.70	17.50	25	24	1 1/4-8 UNC	**GW26**	915 [415.0]	
F6600-300SHP	24”	16205	7.19	20.75	7.30	42.80	19.50	29.5	24	1 1/2-8 UNC	**GW28**	1200 [544.3]	

Dimensions Manual Handle



Dimensions Gear Wheel

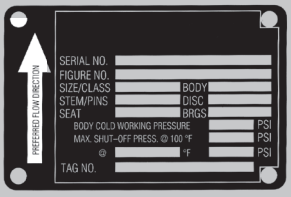


Dimension “A” does not include flange gaskets. (2 required per valve)

Application Notes

1. Valves are rated at 725 psi differential pressure in the closed position @ 100°F media temperature.
2. Valves are furnished with lugs tapped for use between ANSI Class 250/300 flanges conforming to ANSI B16.5 Standards.
3. 2-way assemblies are furnished assembled and ready for installation.
4. Flange gaskets (2 required, not provided with valve) MUST be used between valve and ANSI flange.
5. Flange bolts are not included with the valve. These are furnished by others.

SHP series valves have a preferred flow direction.

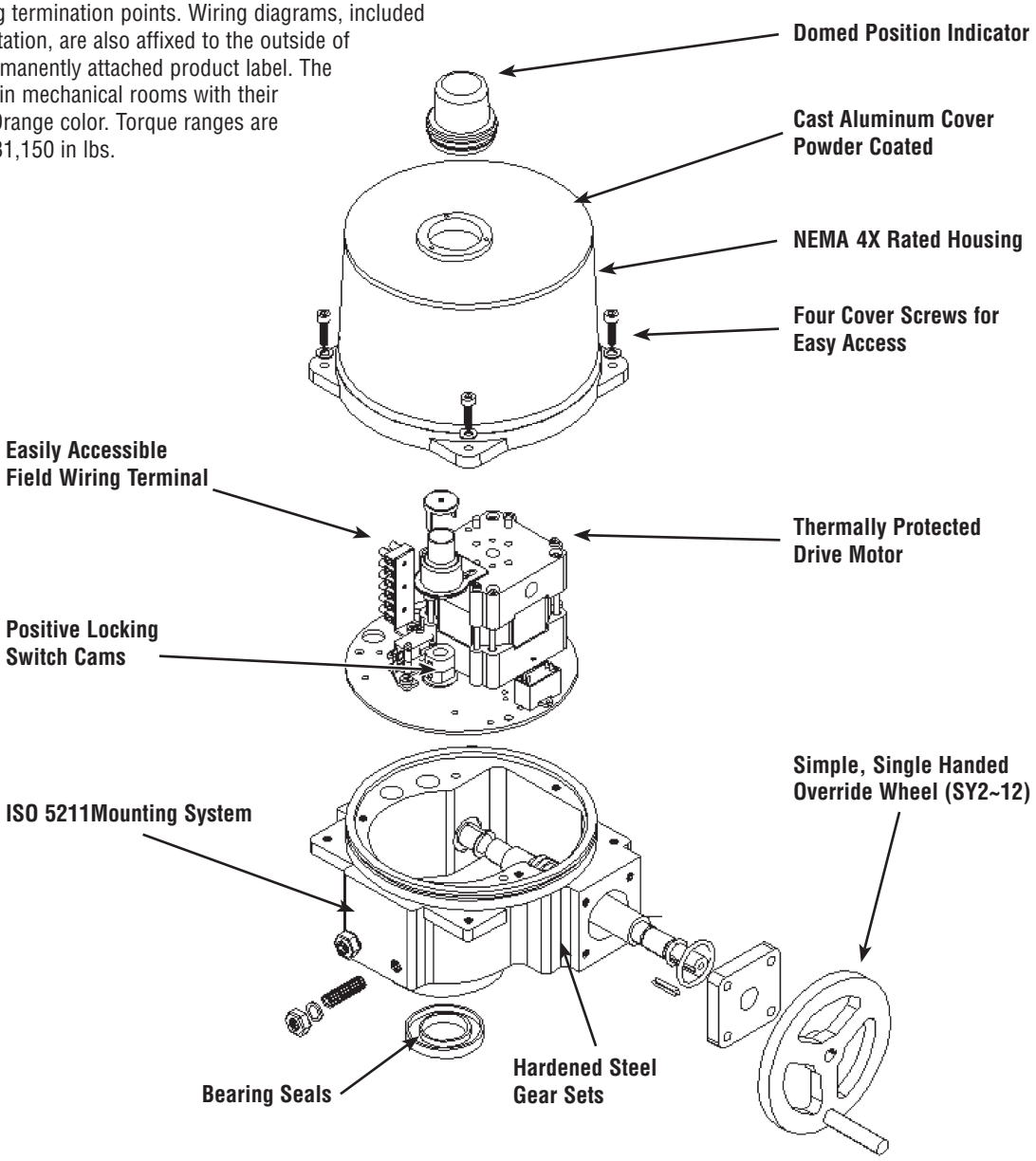


SY Series Actuators

Belimo's SY series electric actuators have been designed to mate with our HD(U) and SHP… series butterfly valves and other quarter turn valve applications.

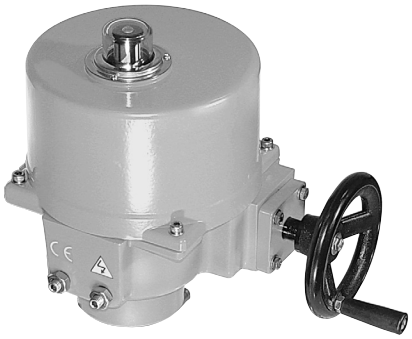
The patented gear drive mechanism provides for efficient, smooth operation while allowing easy manual override at any time. Drawing upon years of experience in the actuation industry, we have incorporated the most desirable features into the SY product range.

All units have NEMA 4X ratings, easily visible position indicators, international standard ISO5211 mounting systems, internal thermal motor overload protection, heater, dual auxiliary Form C switches, and easily accessible wiring termination points. Wiring diagrams, included in all printed documentation, are also affixed to the outside of the housing on the permanently attached product label. The units are easily visible in mechanical rooms with their characteristic Belimo Orange color. Torque ranges are available from 310 to 31,150 in lbs.



SY...24 Series Non-Spring Return Actuator

Technical Data - 24 VAC



Application:

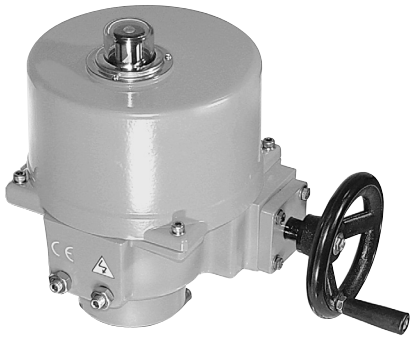
The SY actuators are NEMA 4X rated and designed to meet the needs of HVAC and Commercial applications. Offered on Belimo standard and high performance valve series, these actuators are available for on/off and modulating applications.

Depending on the application, they are available in 24 VAC/ VDC, 120 VAC and 230 VAC.

Technical Data	
Electrical connection	½" conduit connector, screw terminals
Overload protection	thermally protected 135°C cut-out
Motor protection	H Class insulation (SY-1), F Class (SY-2…5)
Gear train	high alloy steel gear sets, self locking
Operating range	(SY…-24) on/off, floating point (SY...24MFT) 2-10 VDC, 4-20mA, 0-10 VDC
Sensitivity	(SY…24MFT) 0.4mA/200mV
Reversal hysteresis	(SY…24MFT)1.0mA/500mV
Feedback	(SY…24MFT) 2-10 VDC
Angle of rotation	90°
Direction of rotation	reversible
Position indication	top mounted domed indicator
Internal humidity control	resistive heating element
Auxiliary switches	(2) SPDT, 10A 250 VAC factory set for 5° and 85° change of state
Ambient temperature	-22°F to +150°F [-30°C to +65°C]
Humidity range	up to 95%
Housing type	IP67, NEMA 4X
Housing material	die cast aluminum alloy
Agency listings	ISO, CE, cCSAus

Power Supply 24 VAC/VDC 50/60Hz, single phase

Model	Torque	Speed	Power Consumption	Duty Cycle On/Off	Duty Cycle MFT	Override	Weight
SY1-24(P)	35Nm/310 in-lbs	15s	1.8A	30%	75%	8mm Wrench	2.0kg/4.9 lb.
SY2-24(MFT)	90Nm/801 in-lbs	15s	3.0A	30%	75%	Hand Wheel	11kg/24.5 lb.
SY3-24(MFT)	150Nm/1335 in-lbs	22s	3.0A	30%	75%	Hand Wheel	11kg/24.5 lb.
SY4-24(MFT)	400Nm/3560 in-lbs	16s	6.0A	30%	75%	Hand Wheel	22kg/48.5 lb.
SY5-24(MFT)	500Nm/4450 in-lbs	22s	6.5A	30%	75%	Hand Wheel	22kg/48.5 lb.



Application:

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

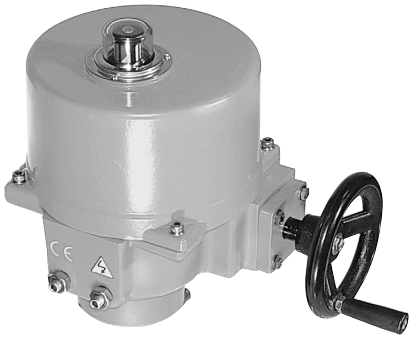
Technical Data	
Electrical connection	½" conduit connector, screw terminals
Overload protection	thermally protected 135°C cut-out
Motor protection	H Class insulation (SY-1), F Class (SY-2…12)
Gear train	high alloy steel gear sets, self locking
Operating range	(SY…-110) on/off, floating point (SY...120MFT) 2-10 VDC, 4-20mA, 0-10 VDC
Sensitivity	(SY…120MFT) 0.4mA/200mV
Reversal hysteresis	(SY…120MFT) 1.0mA/500mV
Feedback	(SY…120MFT) 2-10 VDC
Angle of rotation	90°
Direction of rotation	reversible
Position indication	top mounted domed indicator
Internal humidity control	resistive heating element
Auxiliary switches	(2) SPDT, 5A 250 VAC factory set for 5° and 85° change of state
Ambient temperature	-22°F to +150°F [-30°C to +65°C]
Humidity range	up to 95%
Housing type	IP67, NEMA 4X
Housing material	die cast aluminum alloy
Agency listings	ISO, CE, cCSAus

Power Supply **120 VAC 50/60Hz, single phase**

Model	Torque	Speed 60Hz	Speed 50Hz	Power Consumption	Duty Cycle		Override	Weight
					On/Off	Proportional		
SY1-110(P)	35Nm/310 in-lbs	12s	13s	0.5A	30%	75%	8mm Wrench	2.0kg/4.9 lb.
SY2-120(MFT)	90Nm/801 in-lbs	15s	17s	1.0A	30%	75%	Hand Wheel	11kg/24.5 lb.
SY3-120(MFT)	150Nm/1335 in-lbs	22s	26s	1.0A	30%	75%	Hand Wheel	11kg/24.5 lb.
SY4-120(MFT)	400Nm/3560 in-lbs	16s	18s	1.3A	30%	75%	Hand Wheel	22kg/48.5 lb.
SY5-120(MFT)	500Nm/4450 in-lbs	22s	25s	1.5A	30%	75%	Hand Wheel	22kg/48.5 lb.
SY6-120(MFT)	650Nm/5785 in-lbs	28s	31s	1.8A	30%	75%	Hand Wheel	22kg/48.5 lb.
SY7-120(MFT)	1000Nm/8900 in-lbs	46s	55s	3.2A	30%	75%	Hand Wheel	36kg/79.5 lb.
SY8-120(MFT)	1500Nm/13350 in-lbs	46s	55s	4.0A	30%	75%	Hand Wheel	36kg/79.5 lb.
SY9-120(MFT)	2000Nm/17800 in-lbs	58s	70s	3.2A	30%	50%	Hand Wheel	56kg/123.5 lb.
SY10-120(MFT)	2500Nm/22250 in-lbs	58s	70s	4.0A	30%	50%	Hand Wheel	56kg/123.5 lb.
SY11-120(MFT)	3000Nm/26700 in-lbs	58s	70s	3.0A	30%	50%	Hand Wheel	56kg/123.5 lb.
SY12-120(MFT)	3500Nm/31150 in-lbs	58s	70s	4.0A	30%	50%	Hand Wheel	56kg/123.5 lb.

SY...230 Series Non-Spring Return Actuator

Technical Data - 230 VAC



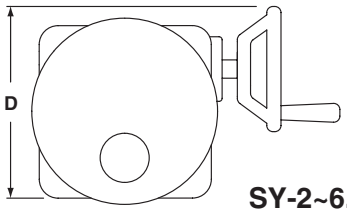
Application:

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

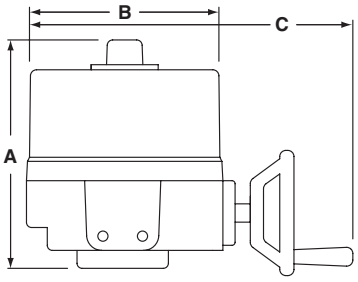
Technical Data	
Electrical connection	½" conduit connector, screw terminals
Overload protection	thermally protected 135°C cut-out
Motor protection	H Class insulation (SY-1), F Class (SY-2…12)
Gear train	high alloy steel gear sets, self locking
Operating range	(SY…-220) on/off, floating point (SY...230MFT) 2-10 VDC, 4-20mA, 0-10 VDC
Sensitivity	(SY…230MFT) 0.4mA/200mV
Reversal hysteresis	(SY…230MFT) 1.0mA/500mV
Feedback	(SY…230MFT) 2-10 VDC
Angle of rotation	90°
Direction of rotation	reversible
Position indication	top mounted domed indicator
Internal humidity control	resistive heating element
Auxiliary switches	(2) SPDT, 5A 250 VAC factory set for 5° and 85° change of state
Ambient temperature	-22°F to +150°F [-30°C to +65°C]
Humidity range	up to 95%
Housing type	IP67, NEMA 4X
Housing material	die cast aluminum alloy
Agency listings	ISO, CE, cCSAus

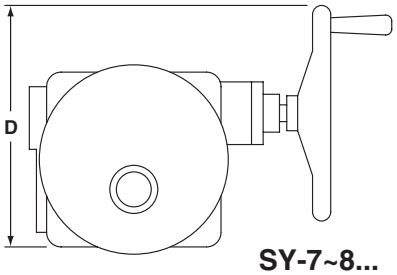
Power Supply 230 VAC 50/60Hz, single phase

Model	Torque	Speed 60Hz	Speed 50Hz	Power Consumption	Duty Cycle On/Off	Duty Cycle MFT	Override	Weight
SY1-220(P)	35Nm/310 in-lbs	12s	13s	0.3A	30%	75%	8mm Wrench	2.0kg/4.9 lb.
SY2-230(MFT)	90Nm/801 in-lbs	15s	17s	0.5A	30%	75%	Hand Wheel	11kg/24.5 lb.
SY3-230(MFT)	150Nm/1335 in-lbs	22s	26s	0.5A	30%	75%	Hand Wheel	11kg/24.5 lb.
SY4-230(MFT)	400Nm/3560 in-lbs	16s	18s	0.6A	30%	75%	Hand Wheel	22kg/48.5 lb.
SY5-230(MFT)	500Nm/4450 in-lbs	22s	25s	0.7A	30%	75%	Hand Wheel	22kg/48.5 lb.
SY6-230(MFT)	650Nm/5785 in-lbs	28s	31s	0.8A	30%	75%	Hand Wheel	22kg/48.5 lb.
SY7-230(MFT)	1000Nm/8900 in-lbs	46s	55s	1.6A	30%	75%	Hand Wheel	36kg/79.5 lb.
SY8-230(MFT)	1500Nm/13350 in-lbs	46s	55s	2.0A	30%	75%	Hand Wheel	36kg/79.5 lb.
SY9-230(MFT)	2000Nm/17800 in-lbs	58s	70s	1.6A	30%	50%	Hand Wheel	56kg/123.5 lb.
SY10-230(MFT)	2500Nm/22250 in-lbs	58s	70s	2.0A	30%	50%	Hand Wheel	56kg/123.5 lb.
SY11-230(MFT)	3000Nm/26700 in-lbs	58s	70s	1.6A	30%	50%	Hand Wheel	56kg/123.5 lb.
SY12-230(MFT)	3500Nm/31150 in-lbs	58s	70s	2.2A	30%	50%	Hand Wheel	56kg/123.5 lb.

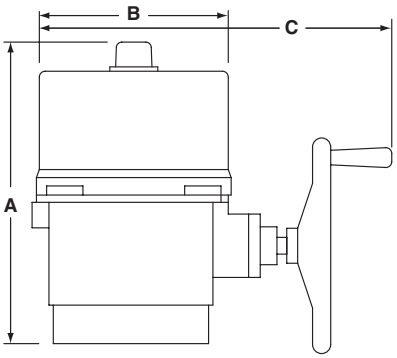


SY-2~6...

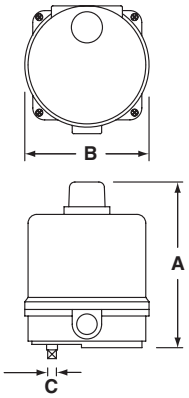


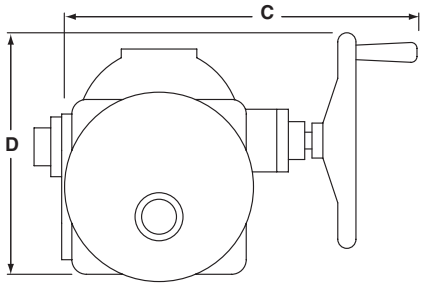


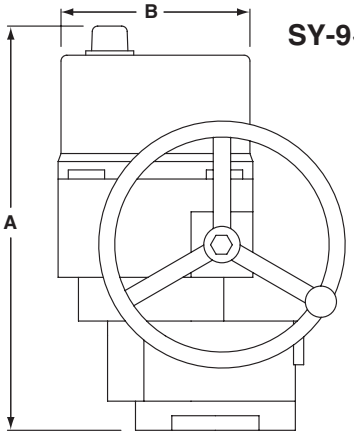
SY-7~8...



SY-1...







SY-9~12...

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	-
SY2~3	10.04 [255]	7.48 [190]	7.87 [200]	12.99 [330]	7.87 [200]
SY4~6	12.40 [315]	8.86 [225]	9.21 [234]	14.96 [380]	11.81 [300]
SY7~8	16.54 [420]	8.86 [225]	9.21 [234]	17.72 [450]	13.39 [340]
SY9~12	23.23 [590]	8.86 [225]	10.24 [260]	18.50 [470]	13.78 [350]

Note: ~ indicates range of actuator i.e., SY2~3 = SY-2 and SY-3

800-543-9038 USA
866-805-7089 CANADA
203-791-8396 LATIN AMERICA

Wire Size vs. Length of Run for SY Series Actuators

		SY1	SY2	SY3	SY4	SY5
24 VAC		Amps	Amps	Amps	Amps	Amps
	wire gauge	1.8	3	3	6	6.5
		MAX Distance between Actuator and Supply (feet)				
	18	92	55	55		
	16	144	87	87	43	40
	14	233	140	140	70	65
	12	357	214	214	107	99
	10	606	364	364	182	168
	8	905	543	543	271	250

		SY1	SY2	SY3	SY4	SY5	SY6	SY7	SY8	SY9	SY10	SY11	SY12
110 VAC		Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps
	wire gauge	0.5	1	1	1.3	1.5	1.8	3.2	4	3.2	4	3	4
		MAX Distance between Actuator and Supply (feet)											
	18	1515	758	758	583	505	421	237	189	237	189	253	189
	16	2381	1190	1190	916	794	661	372	298	372	298	397	298
	14	3846	1923	1923	1479	1282	1068	601	481	601	481	641	481
	12	5882	2941	2941	2262	1961	1634	919	735	919	735	980	735
	10	10000	5000	5000	3846	3333	2778	1563	1250	1563	1250	1667	1250
	8	14925	7463	7463	5741	4975	4146	2332	1866	2332	1866	2488	1866

		SY1	SY2	SY3	SY4	SY5	SY6	SY7	SY8	SY9	SY10	SY11	SY12
220 VAC		Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps
	wire gauge	0.3	0.5	0.5	0.6	0.7	0.8	1.6	2	1.6	2	1.6	2.2
		MAX Distance between Actuator and Supply (feet)											
	18	5051	3030	3030	2525	2165	1894	947	758	947	758	947	689
	16	7937	4762	4762	3968	3401	2976	1488	1190	1488	1190	1488	1082
	14	12821	7692	7692	6410	5495	4808	2404	1923	2404	1923	2404	1748
	12	19608	11765	11765	9804	8403	7353	3676	2941	3676	2941	3676	2674
	10	33333	20000	20000	16667	14286	12500	6250	5000	6250	5000	6250	4545
	8	49751	29851	29851	24876	21322	18657	9328	7463	9328	7463	9328	6784

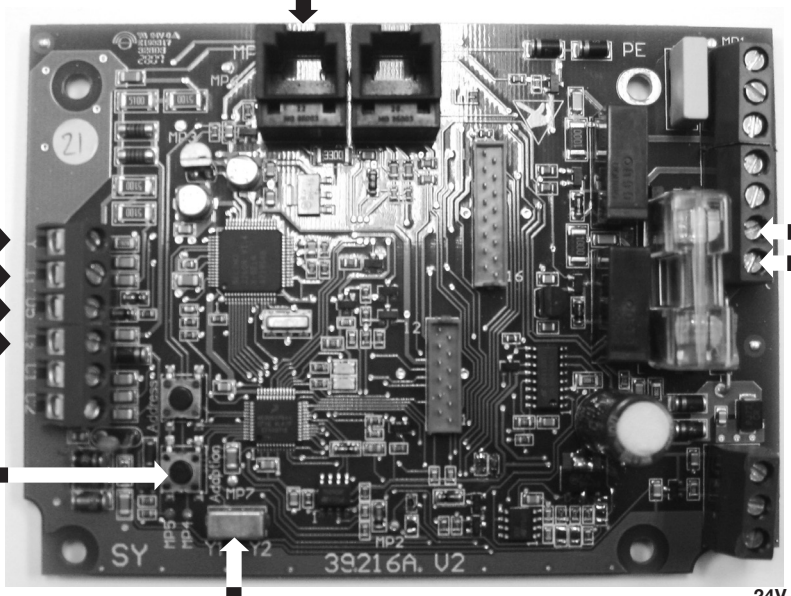
The NEC mandates that 24 VAC over 100 VA power requires CLASS 1 wiring conduit. Local codes may vary. Do NOT mix CLASS 1 & CLASS 2 circuits in the same conduit. Generally, 24 VAC actuators over 100 VA should be changed to 120 VAC models.

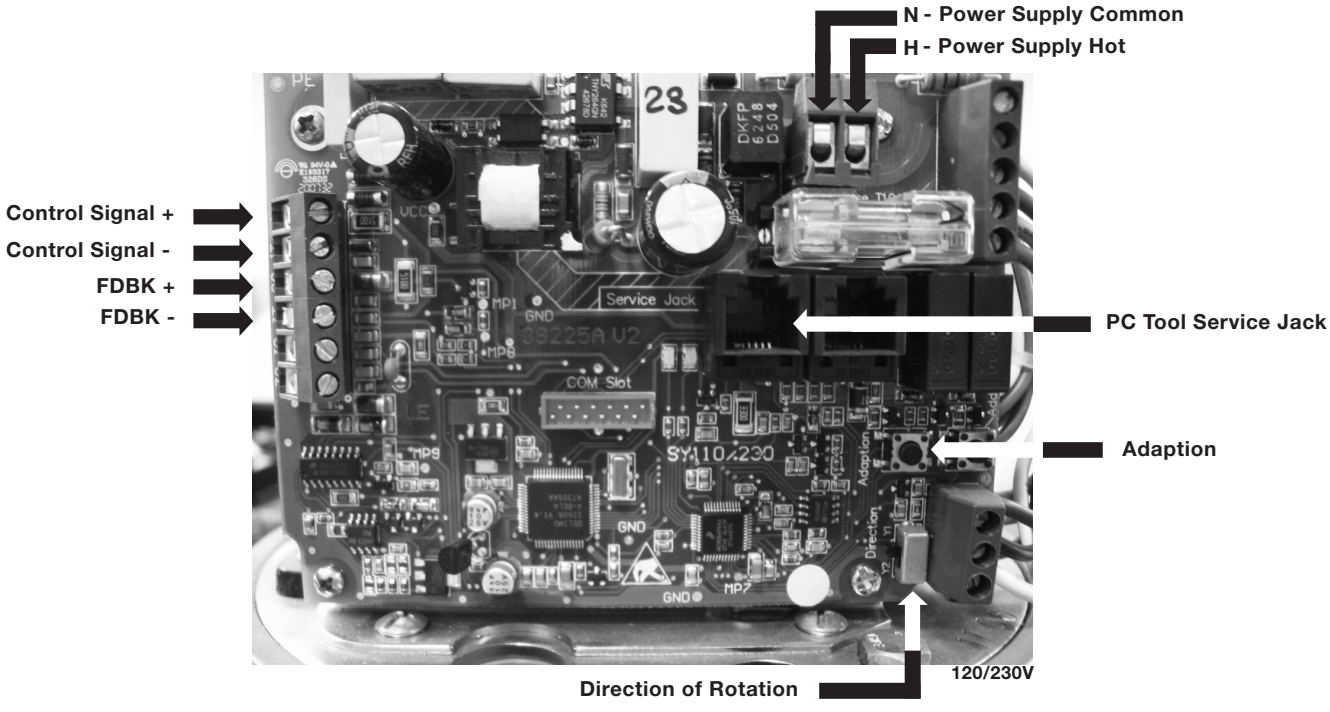
Actuators: SYx-MFT

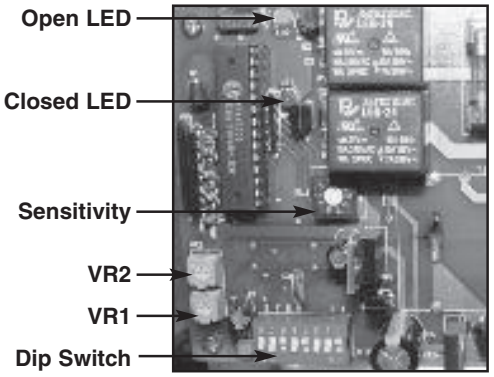
INSTALLATION NOTES

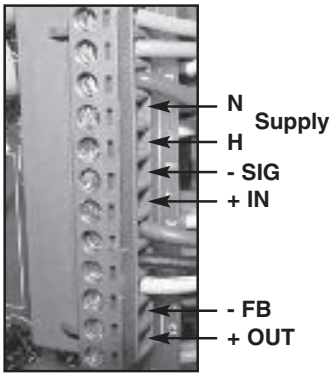
CAUTION

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









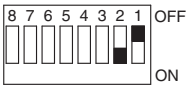
Sensitivity switchsetting is position #3 for factory default. To widen dead-band, select a higher number (up to 9).

INSTALLATION NOTES

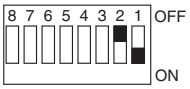
CAUTION

Notes:
1. Applicable to the SY1 and legacy SY2-12 actuators.
2. **Do not change sensitivity or dip switch settings with power applied!**
3. VR1 and VR2 are factory calibrated and should not be moved.
4. Motor CAMS have been factory calibrated and should not be moved.

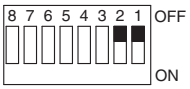
Dip Switch Settings



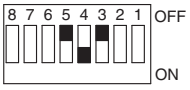
INPUT = 2-10 VDC



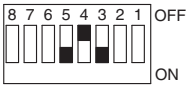
INPUT = 4-20mA



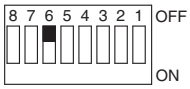
INPUT = 1-5 VDC



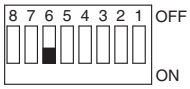
OUTPUT = 4-20mA



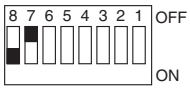
OUTPUT = 2-10 VDC



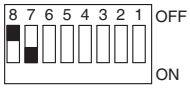
RESPONSE = DIRECT



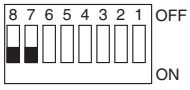
RESPONSE = REVERSE



LOSS OF SIGNAL = CLOSED (Direct Acting)
LOSS OF SIGNAL = OPEN (Reverse Acting)



LOSS OF SIGNAL = OPEN (Direct Acting)
LOSS OF SIGNAL = CLOSED (Reverse Acting)



LOSS OF SIGNAL = STOP

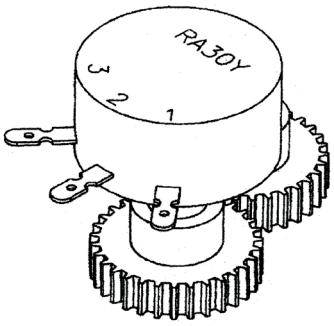
WARNING

Potentiometer (Factory Pre-set)

*On modulating actuators **DO NOT** master/slave using optional potentiometer.

For 2-position actuators with 1k feedback option
Potentiometer points 1, 2, 3 are wired to terminal blocks 8, 9, 10.
When a valve is closed: 8, 9 → 1k Ω
9, 10 → 0k Ω
When a valve is opened: 8, 9 → 0k Ω
9, 10 → 1k Ω

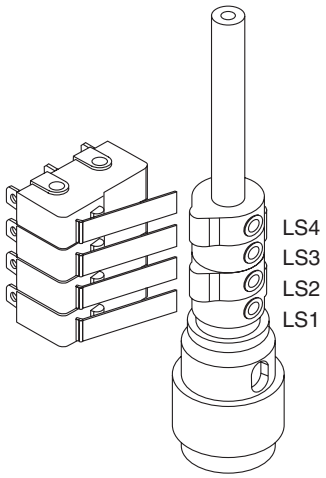
For modulating actuators with 1k feedback option*
Potentiometer points 1, 2, 3 are wired to terminal blocks 8, 9, 10.
When a valve is closed: 8, 9 → 1k Ω
9, 10 → 0k Ω
When a valve is opened: 8, 9 → 0k Ω
9, 10 → 1k Ω



⚠ ***CAUTION***

Electrical Travel Adjustment (Factory Pre-set)

SY-1



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

LS4
Auxiliary Switch for Closed Indication

LS3
Auxiliary Switch for Opened Indication

Factory pre-set and calibrated. Do not adjust - warranty voided

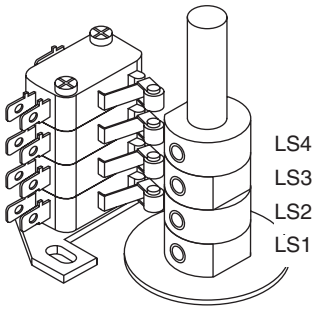
LS2 "CLOSE"
- Clockwise Decrease Closed Angle
- Counter-clockwise Increase Closed Angle

LS1 "OPEN"
- Clockwise Increase Opening Angle
- Counter-clockwise Decrease Opening Angle

⚠ ***CAUTION***

Electrical Travel Adjustment

SY-2-12



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

LS4
Auxiliary Switch for Closed Indication

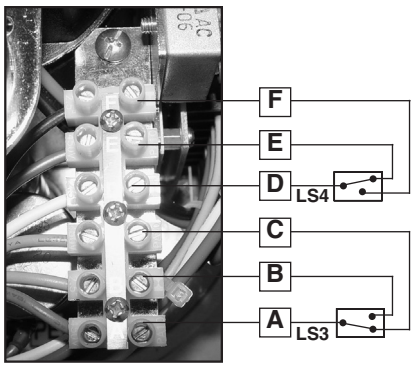
LS3
Auxiliary Switch for Opened Indication

Factory pre-set and calibrated. Do not adjust - warranty voided

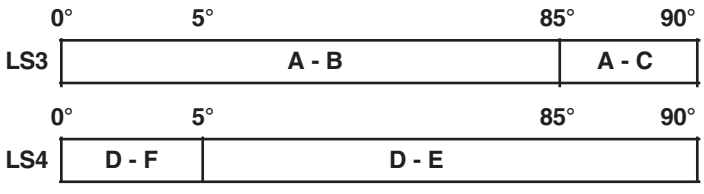
LS2 "CLOSE"
- Clockwise Decrease Closed Angle
- Counter-clockwise Increase Closed Angle

LS1 "OPEN"
- Clockwise Increase Opening Angle
- Counter-clockwise Decrease Opening Angle

⚠ ***WARNING***



Switches at left are shown with actuator fully open.



INSTALLATION NOTES

⚠ ***CAUTION***

Notes:

1. An adaption must be performed when the limit switches are adjusted. For the SYx-MFT actuators. This will calibrate the beginning and end stopping points. Press the adaption button for 3 seconds and release.

Wiring for Damper Actuators and Control Valves

On/Off, 24V, 120/230V

Actuators: SY1-24 SY1-110 SY2...12-110 SY2...12-220

W546

Hazard Identification

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

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

Indicates an action or condition that may cause irreversible damage to the actuator(s) or associated equipment.

Equipment damage!
Power consumption and input impedance must be observed.

NOTES SY1…5-24

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

- Isolation relays must be used in parallel connection of multiple actuators using a common control signal input.
- "H" cannot be connected to terminal #3 and #4 simultaneously.
- **Required:** Terminal #7 needs to be field wired to enable heater circuit.

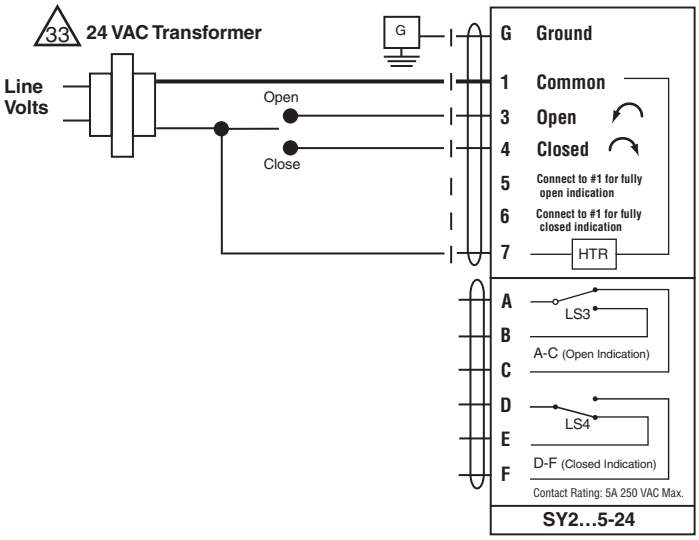
INSTALLATION NOTES

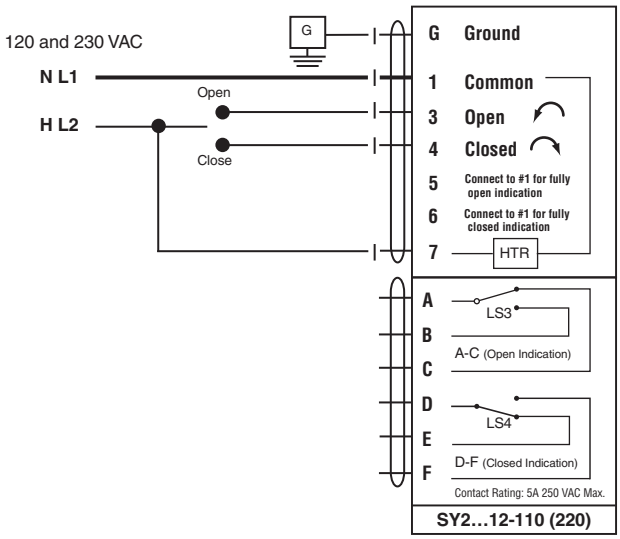
Observe class 1 and class 2 wiring restrictions.

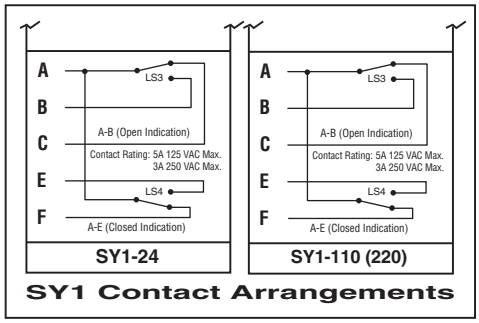
Transformer sizing = SY actuator draw X 1.25 (safety margin)
(Ex. SY2-24 requires 3.0A x 1.25 = 3.75A,
3.75A X 24 VAC = 90VA Transformer).

NOTES SY1…12-110 (220)

- **Caution:** Power Supply Voltage
- Isolation relays must be used in parallel connection of multiple actuators using a common control signal input.
- "H" (L2) cannot be connected to terminal #3 and #4 simultaneously.
- **Required:** Terminal #7 needs to be field wired to enable heater circuit.







Actuators: SY1-24P SY1-110P SY1-220P

W547

Hazard Identification

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

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

Indicates an action or condition that may cause irreversible damage to the actuator(s) or associated equipment.

Equipment damage!
Power consumption and input impedance must be observed.

INSTALLATION NOTES

Observe Class 1 and Class 2 wiring restrictions.

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

APPLICATION NOTES

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

36 Use of feedback is optional.

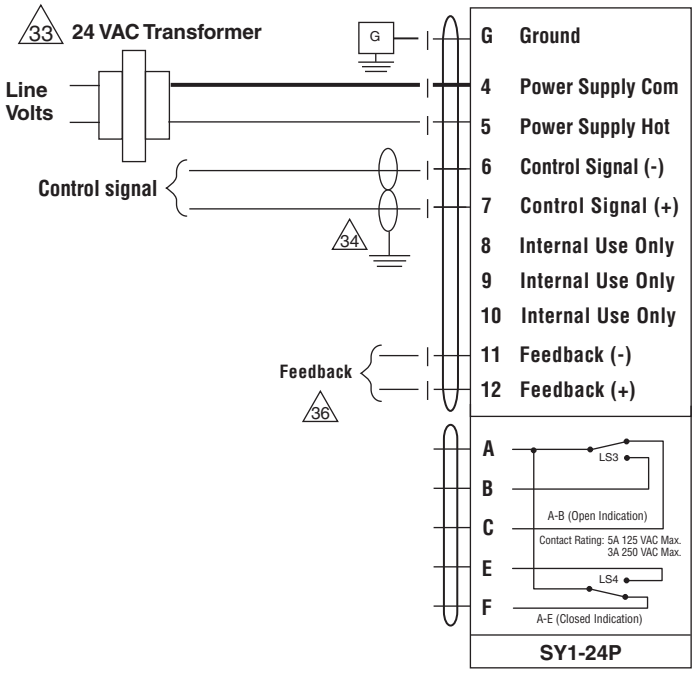
NOTES SY1...24P

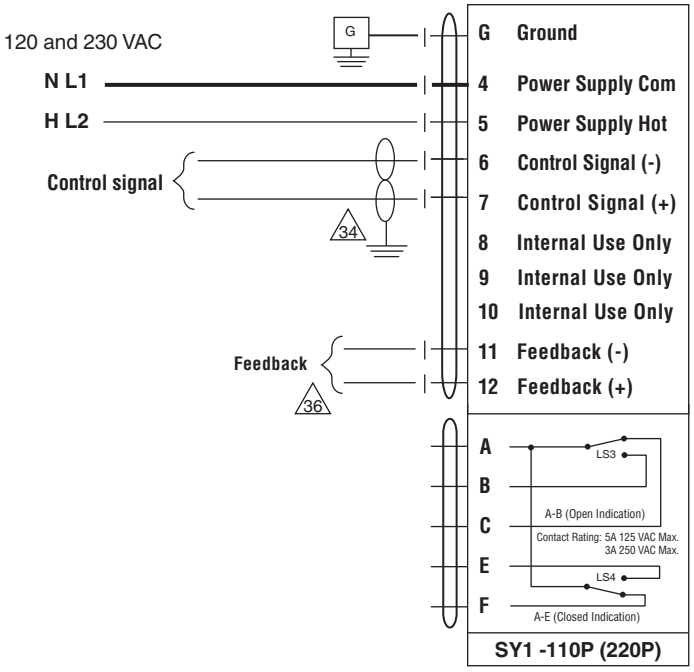
33 Each actuator should be powered by a single, isolated control transformer.

- Power supply Com/Neutral and Control Signal "–" wiring to a common is prohibited. Terminals 4 and 6 need to be wired separately.
- Do not change sensitivity or dip switch settings with power applied.

NOTES SY1...110P (220P)

- **Caution:** Power supply voltage.
- Power supply Com/Neutral and Control Signal "–" wiring to a common is prohibited. Terminals 4 and 6 need to be wired separately.
- Do not change sensitivity or dip switch settings with power applied.





Actuators: SY2...5-24MFT SY2...12-120MFT SY2...12-230MFT

Hazard Identification

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

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

Indicates an action or condition that may cause irreversible damage to the actuator(s) or associated equipment.

Equipment damage!
Power consumption and input impedance must be observed.

NOTES SY2...5-24MFT

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

- Power supply Com/Neutral and Control Signal "–" wiring to a common is prohibited.

INSTALLATION NOTES

Observe Class 1 and Class 2 wiring restrictions.

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

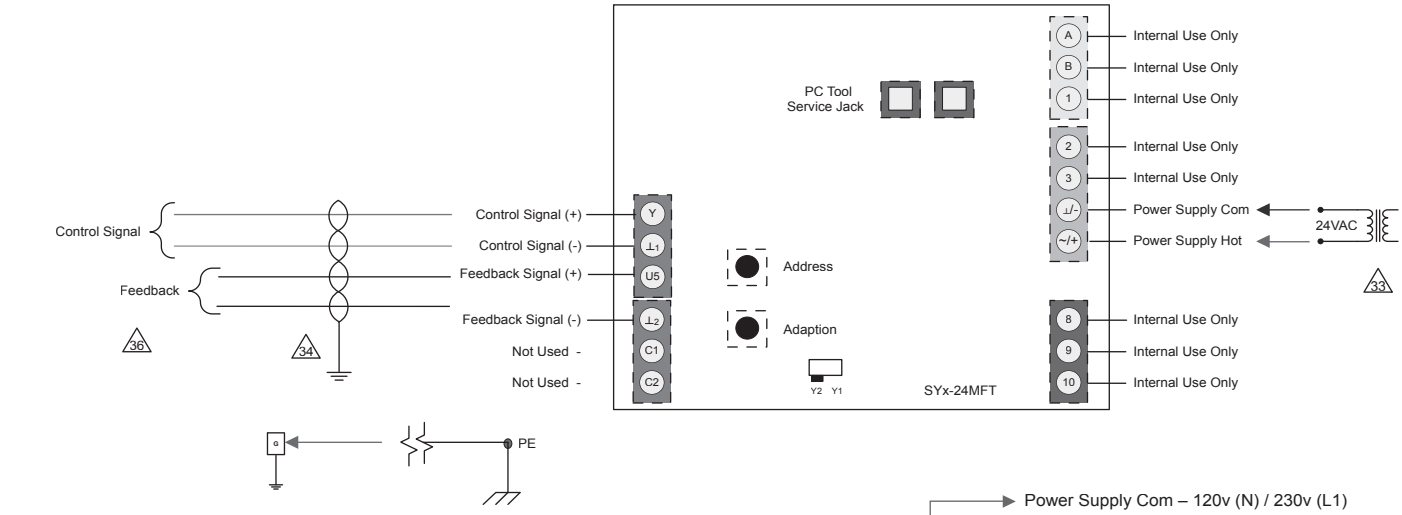
APPLICATION NOTES

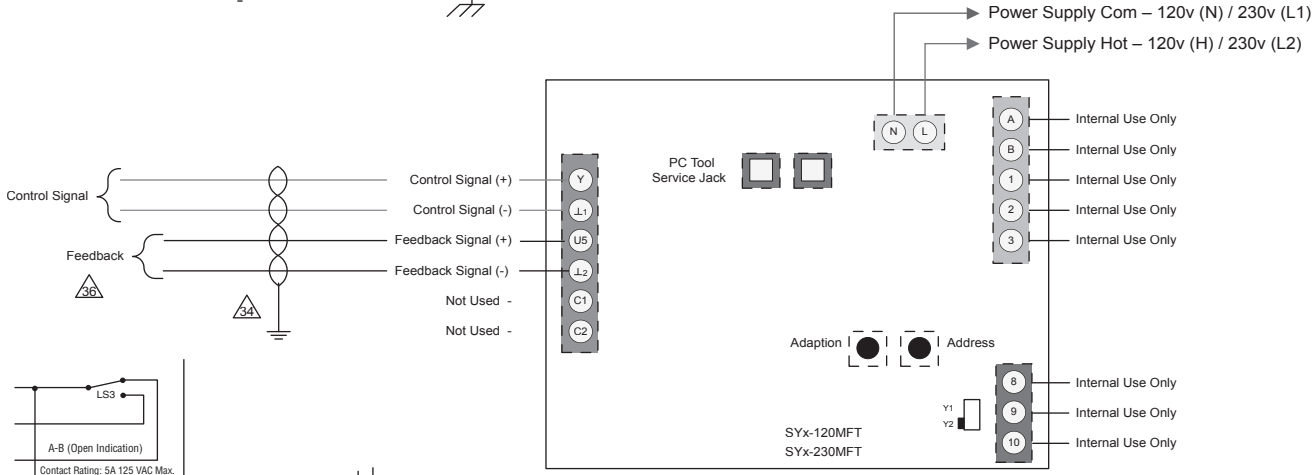
34 Ground shielded wire at control panel chassis. Tape back ground at actuator.

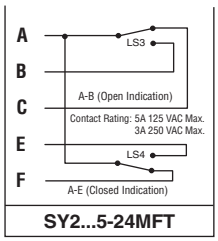
36 Use of feedback is optional.

NOTES SY2...12-120MFT (230MFT)

- **Caution:** Power supply voltage.







SY2...5-24MFT

SY2...12-120MFT (230MFT)

W547-2

W549

Actuators: SY1...5-24 SY1...12-110 SY1...12-220

Hazard Identification

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

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

Indicates an action or condition that may cause irreversible damage to the actuator(s) or associated equipment.

Equipment damage!
Power consumption and input impedance must be observed.

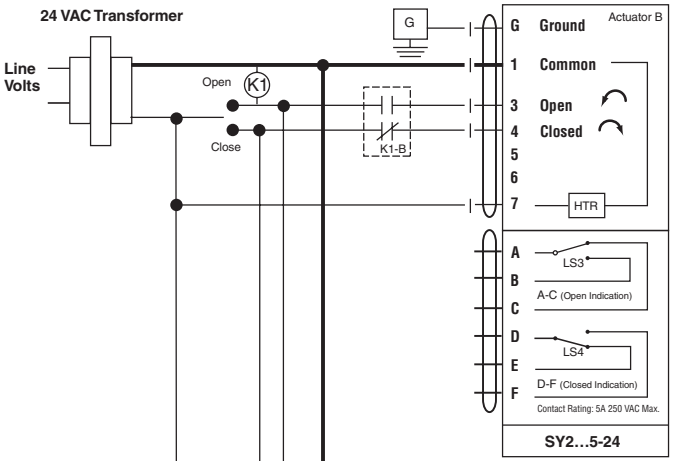
INSTALLATION NOTES

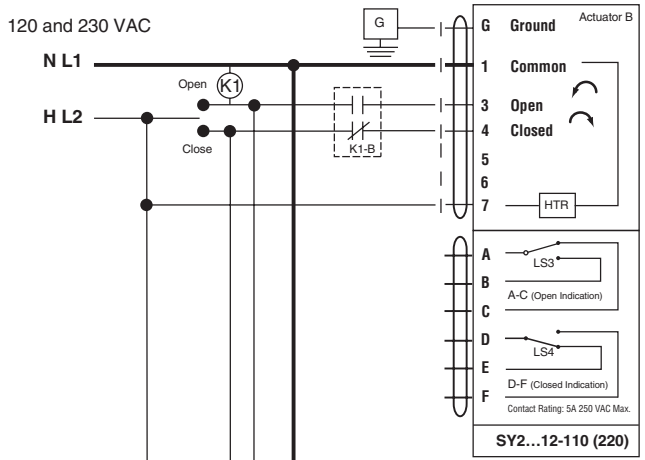
Observe class 1 and class 2 wiring restrictions.

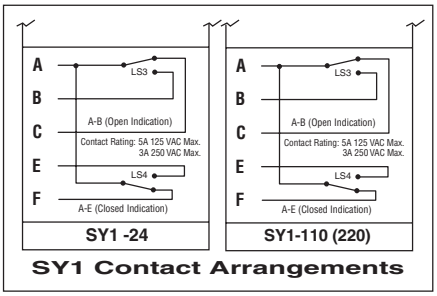
Transformer sizing = SY actuator draw X 1.25 (safety margin)
(Ex. SY2-24 requires 3.0A x 1.25 = 3.75A,
3.75A X 24 VAC = 90VA Transformer).

NOTES

- **Caution:** Power Supply Voltage.
- Isolation relays must be used in parallel connection of multiple actuators using a common control signal input.
- "H" (L2) cannot be connected to terminal #3 and #4 simultaneously.
- **Required:** Terminal #7 needs to be field wired to enable heater circuit.







Actuators: SY1-24P

W550

Hazard Identification

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

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

Indicates an action or condition that may cause irreversible damage to the actuator(s) or associated equipment.

Equipment damage!
Power consumption and input impedance must be observed.

INSTALLATION NOTES

Observe class 1 and class 2 wiring restrictions.

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

NOTES SY1-24P

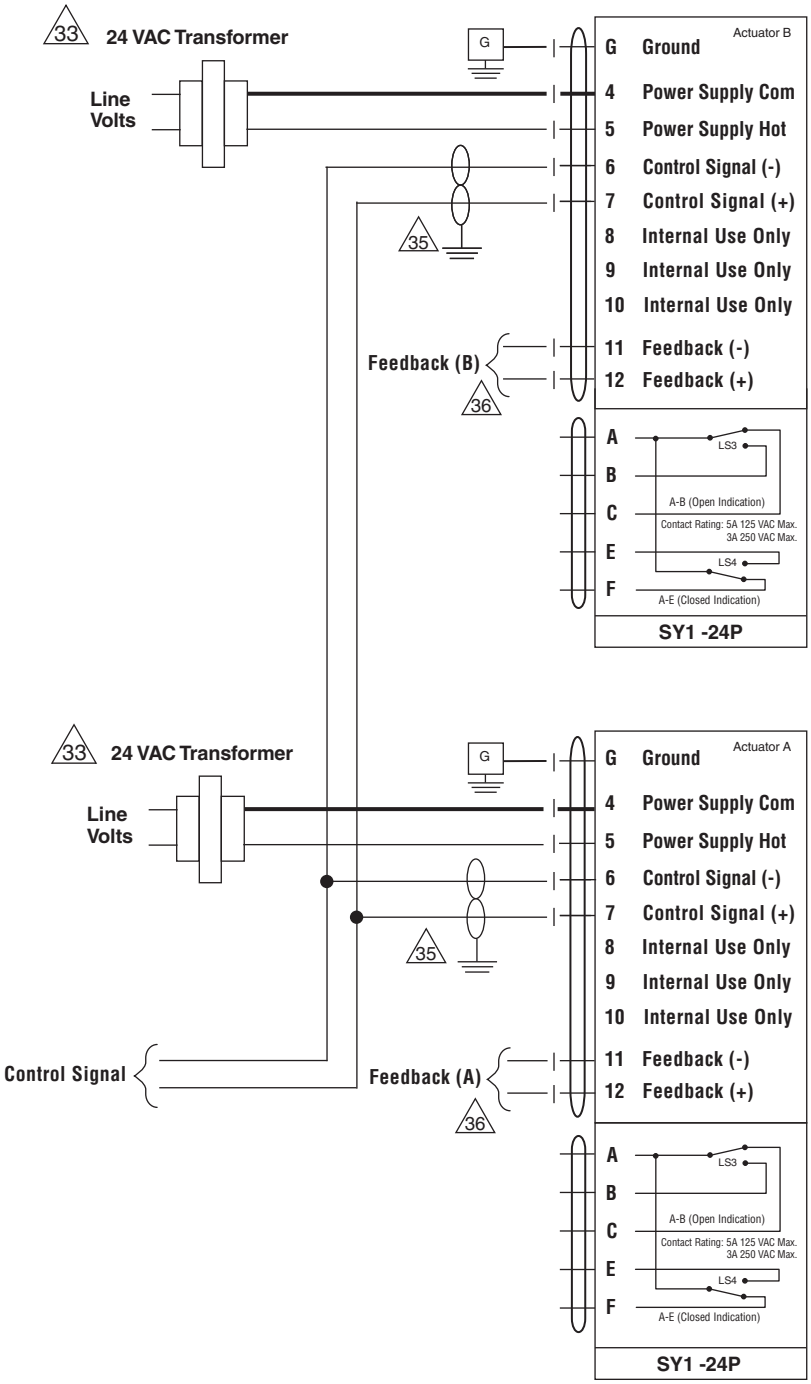
33 Each actuator should be powered by a single, isolated control transformer.

- **SY1-24P notes:** Power supply Com/Neutral and Control Signal "–" wiring to a common is prohibited. Terminals 4 and 6 need to be wired separately otherwise irreversible damage will occur.
- Do not change sensitivity or dip switch settings with power applied.

APPLICATION NOTES

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

36 Use of feedback is optional.



Actuators: SY2...5-24MFT

W550-2

Hazard Identification

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

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

Indicates an action or condition that may cause irreversible damage to the actuator(s) or associated equipment.

Equipment damage!
Power consumption and input impedance must be observed.

INSTALLATION NOTES

Observe class 1 and class 2 wiring restrictions.

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

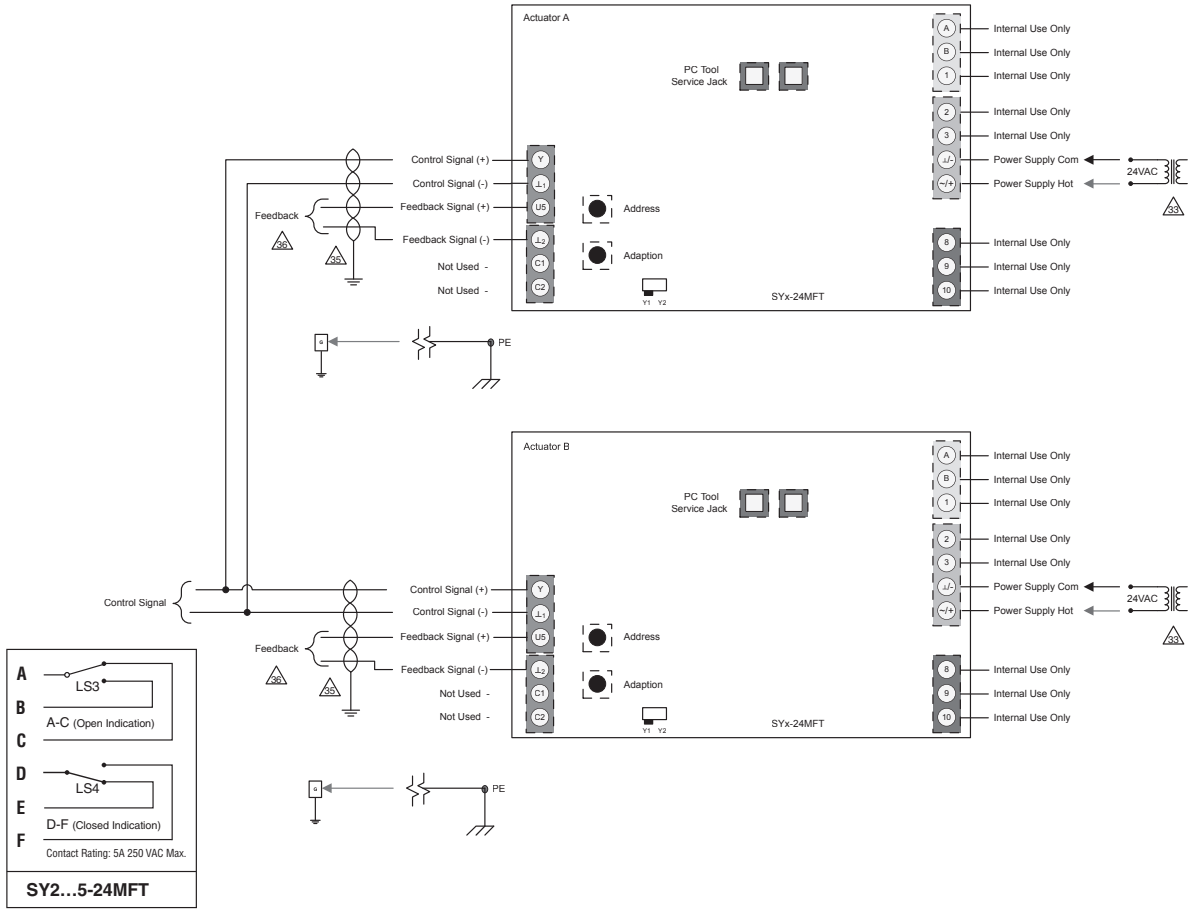
NOTES SY2...5-24MFT

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

APPLICATION NOTES

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

36 Use of feedback is optional.



Actuators: SY1-110P SY1-220P

W552-1

Hazard Identification

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

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

Indicates an action or condition that may cause irreversible damage to the actuator(s) or associated equipment.

Equipment damage!
Power consumption and input impedance must be observed.

INSTALLATION NOTES

Observe class 1 and class 2 wiring restrictions.

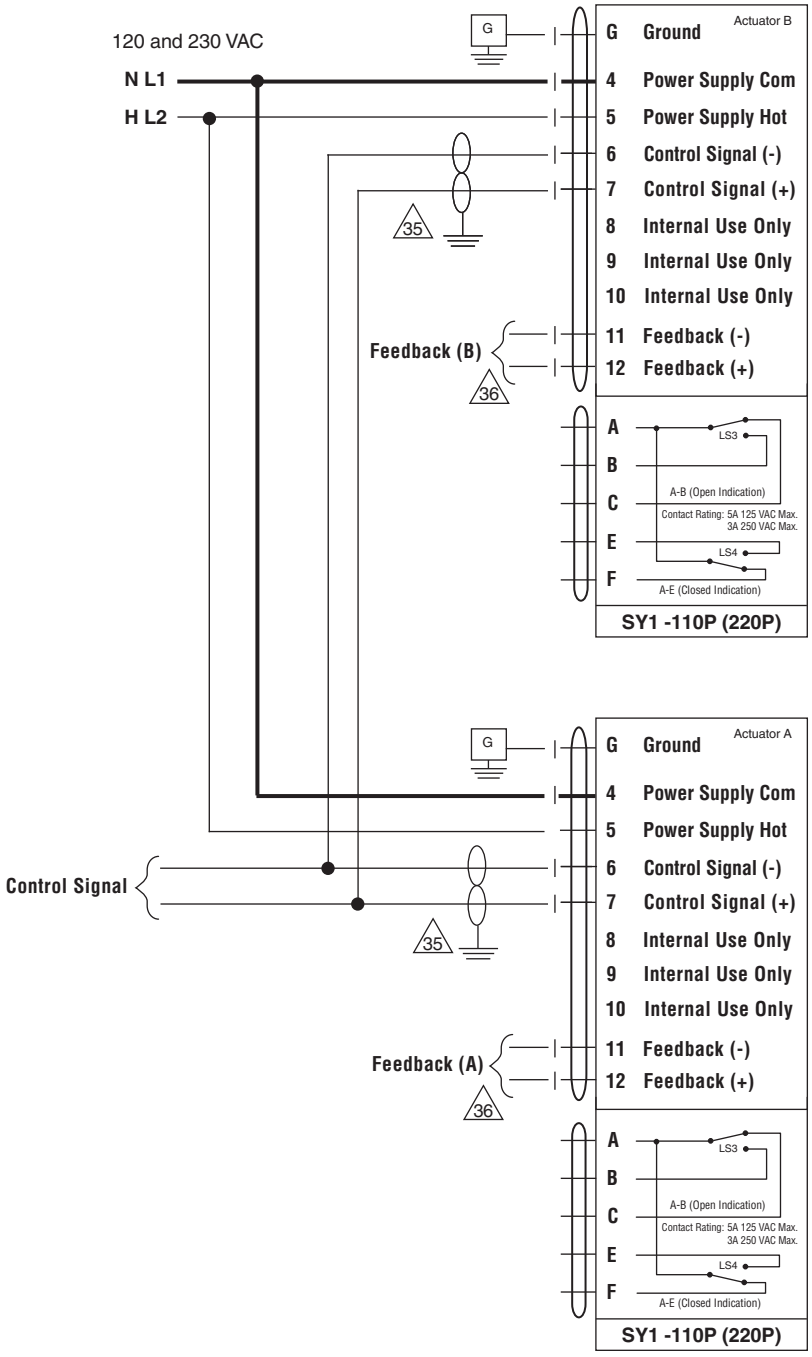
APPLICATION NOTES

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

△36 Use of feedback is optional.

NOTES SY1-110P (220P)

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



Actuators: SY2...12-120MFT SY2...12-230MFT

W552-2

Hazard Identification

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

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

Indicates an action or condition that may cause irreversible damage to the actuator(s) or associated equipment.

Equipment damage!
Power consumption and input impedance must be observed.

INSTALLATION NOTES

Observe class 1 and class 2 wiring restrictions.

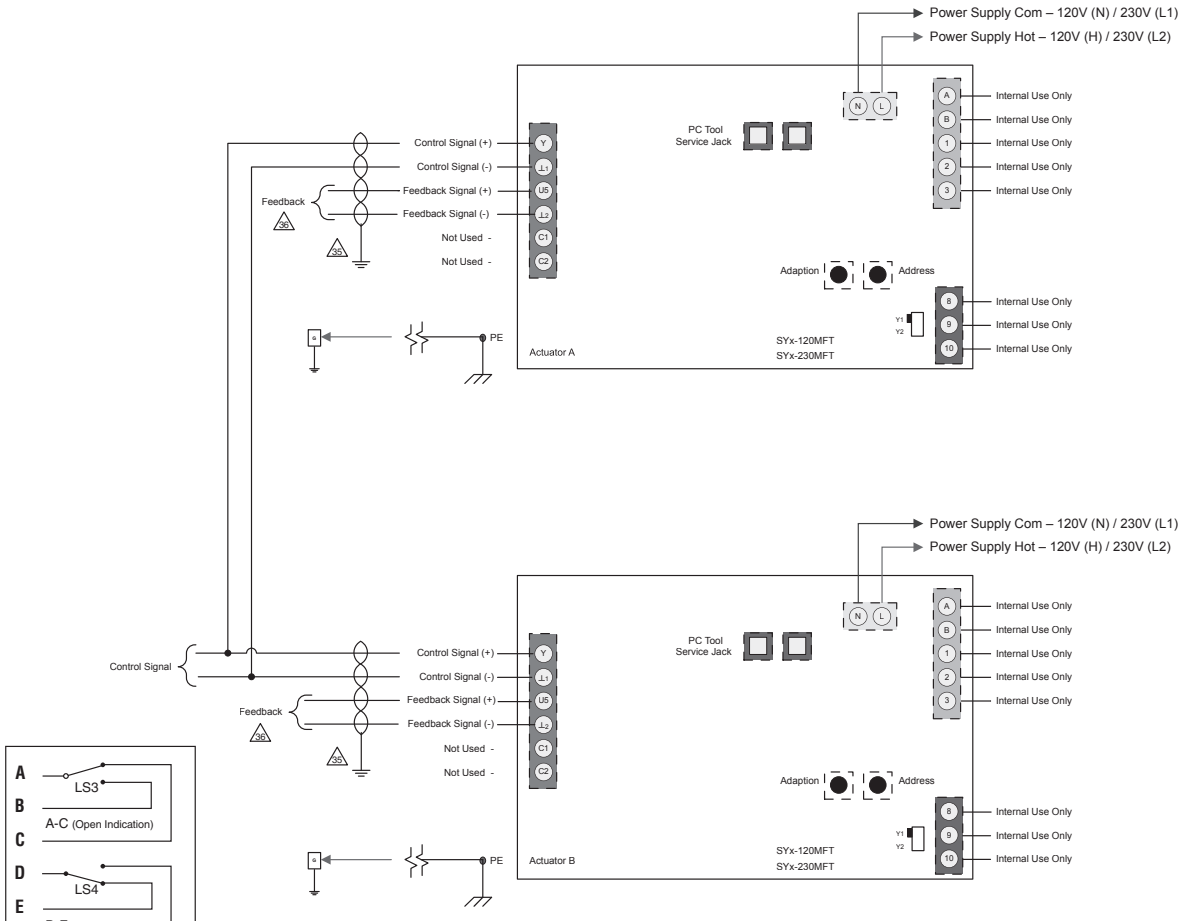
APPLICATION NOTES

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

36 Use of feedback is optional.

NOTES SY2...12-120MFT (230MFT)

- **Caution:** Power supply voltage.



BELIMO

2 YEAR WARRANTY

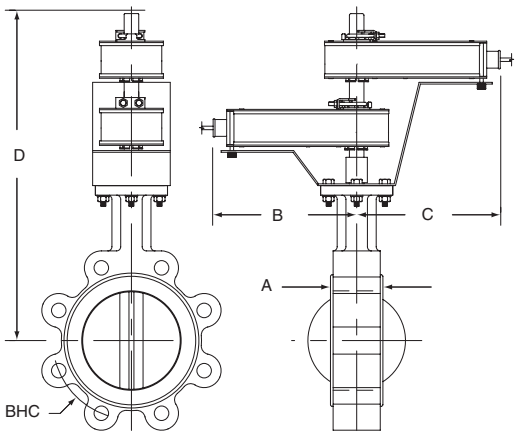
Models

AF24 US
AF24-S US w/built-in Aux. Switches
AF120 US
AF120-S US w/built-in Aux. Switches

Technical Data		
Control		on/off
Power consumption		
AF24(-S) US	running	5 W
	holding	1.5 W
AF120(-S) US	running	6 W
	holding	2.3 W
Transformer sizing		10 VA, class 2 power
Electrical connection		3 ft, 18 GA appliance cables (-S model has 2 cables) ½" conduit connector
Electrical protection		120 V actuators double insulated
Overload protection		electronic throughout 0° to 95° rotation
Angle of rotation		95°
Position indication		visual indicator
Manual override		hex crank
Running time	control	150 sec. independent of load
	spring	< 20 sec.
Ambient temperature		-22° F to 122° F [-30° C to 50° C]
Housing		NEMA 2 / IP54
Agency listings		UL 873, CSA C22.2 No. 24 certified, CE
Noise level		max. 45 dB(A)

AF…-S US	
Auxiliary switches	2 x SPDT, 7A (2.5A) @ 250 VAC, UL listed, one switch is fixed at +5°, one is adjustable 25° to 85° (double insulated)

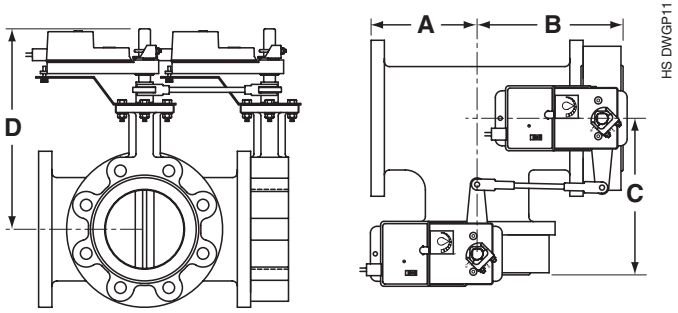
Dimensions with 2-Way Valve



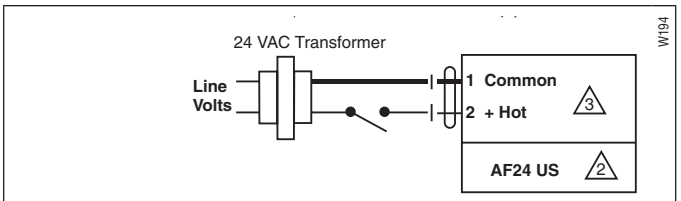
BF2WUDIM_A

Valve	Size	Dimensions (Inches) A	B	C	D(Max)	BHC	Fail Safe (psi) AF	2*AF
F650HD	2"	1.65	9.00	9.00	19.50	4.75	200	
F650HDU	2"	1.65	9.00	9.00	19.50	4.75	50	
F665HD	2½"	1.76	9.00	9.00	20.00	5.50		200
F665HDU	2½"	1.76	9.00	9.00	20.00	5.50	50	
F680HD	3"	1.78	9.00	9.00	20.50	6.00		200
F680HDU	3"	1.78	9.00	9.00	20.50	6.00		50
F6100HDU	4"	2.05	9.00	9.00	21.00	7.50		50
F6125HDU	5"	2.14	9.00	9.00	22.00	8.50		50
F650-150SHP	2"	1.75	9.00	9.00	19.50	4.75		150
F665-150SHP	2½"	1.88	9.00	9.00	20.00	5.50		150
F680-150SHP	3"	1.92	9.00	9.00	20.50	6.00		150
F6100-150SHP	4"	2.13	9.00	9.00	21.00	7.50		150
F650-300SHP	2"	1.75	9.00	9.00	19.50	5.00		150
F665-300SHP	2½"	1.88	9.00	9.00	20.00	5.88		150
F680-300SHP	3"	1.92	9.00	9.00	20.50	6.63		150
F6100-300SHP	4"	2.13	9.00	9.00	21.00	7.88		150

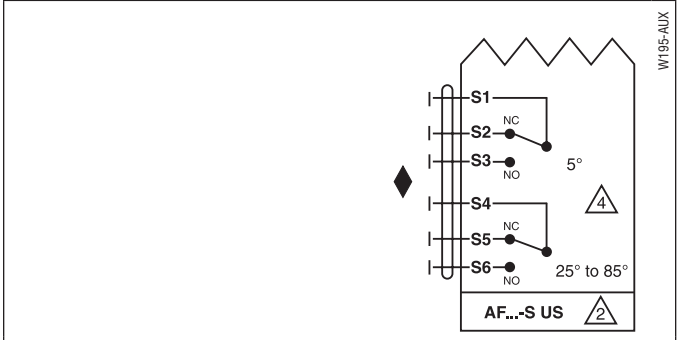
Dimensions with 3-Way Valve



		Dimensions (Inches)					Fail Safe (psi)	
Valve	Size	A	B	C	D(Max)	BHC	AF	2*AF
F750HD	2”	4.50	6.15	6.15	15.50	4.75	200	
F750HDU	2”	4.50	6.15	6.15	15.50	4.75	50	
F765HD	2½”	5.00	6.76	6.76	16.00	5.50		200
F765HDU	2½”	5.00	6.76	6.76	16.00	5.50		50
F780HDU	3”	5.50	7.28	7.28	16.25	6.00		50



On/Off Wiring



Auxiliary Switches

Wiring Diagrams

INSTALLATION NOTES

***CAUTION** Equipment damage!*

2 Actuators may be connected in parallel. Power consumption must be observed.

3 Actuators may also be powered by 24 VDC.

4 For end position indication, interlock control, fan startup, etc., AF24-S US incorporates two built-in auxiliary switches: 2 x SPDT, 7A (2.5A) @ 250 VAC, UL listed, one switch is fixed at +5°, one is adjustable 25° to 85°.

APPLICATION NOTES

♦ Meets cULus or UL and CSA requirements without the need of an electrical ground connection.

***WARNING** Live Electrical Components!*

During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.

AF Actuators, Multi-Function Technology

BELIMO

2 YEAR WARRANTY

MFT

Models

AFX24-MFT-X1
AFX24-MFT-S-X1 w/built-in Aux. Switches

Technical Data

Power supply	24 VAC, +/- 20%, 50/60 Hz 24 VDC, +20% / -10%
Power consumption♦ running	7.5 W
Power consumption♦ holding	3 W
Transformer sizing	10 VA (Class 2 power source)
Electrical connection	
AFX...	3 ft [1m] default, 10 ft [3m] or 16 ft [5m] 18 GA appliance or plenum cables, with or without 1/2" conduit connector **-S models:** two 3 ft [1m] default, 10 ft [3m] or 16 ft [5m] appliance cables with or without 1/2" conduit connectors
Overload protection	electronic throughout 0 to 95° rotation
Operating range Y*	2 to 10 VDC, 4 to 20 mA (default) variable (VDC, PWM, floating point, on/off)
Input impedance	100 kΩ for 2 to 10 VDC (0.1 mA) 500 Ω for 4 to 20 mA 1500 Ω for PWM, floating point and on/off control
Feedback output U*	2 to 10 VDC, 0.5 mA max
Torque	minimum 180 in-lb (20 Nm)
Direction of rotation* spring	reversible with cw/ccw mounting
Direction of rotation* motor	reversible with built-in switch
Mechanical angle of rotation*	95° (adjustable with mechanical end stop, 35° to 95°)
Running time spring	<20 sec @ -4°F to 122°F [-20° C to 50° C]; <60 sec @ -22°F [-30° C]
Running time motor*	150 seconds (default), variable (70 to 220 seconds)
Angle of Rotation adaptation	off (default)
Override control*	min position = 0% mid. position = 50% max. position = 100%
Position indication	visual indicator, 0° to 95° (0° is spring return position)
Manual override	5 mm hex crank (3/16" Allen), supplied
Humidity	max. 95% RH, non-condensing
Ambient temperature	-22 to 122° F (-30 to 50° C)
Storage temperature	-40 to 176° F (-40 to 80° C)
Housing	NEMA 2, IP54, Enclosure Type 2
Housing material	zinc coated metal and plastic casing
Noise level	≤40dB(A) motor @ 150 seconds, run time dependent ≤62dB(A) spring return
Agency listings †	cULus acc. to UL60730-1A/-2-14, CAN/CSA E60730-1:02, CE acc. to 2004/108/EC & 2006/95/EC
Quality standard	ISO 9001
Servicing	maintenance free
Weight	4.6 lbs. (1.9 kg), 4.9 lbs. (2 kg) with switch

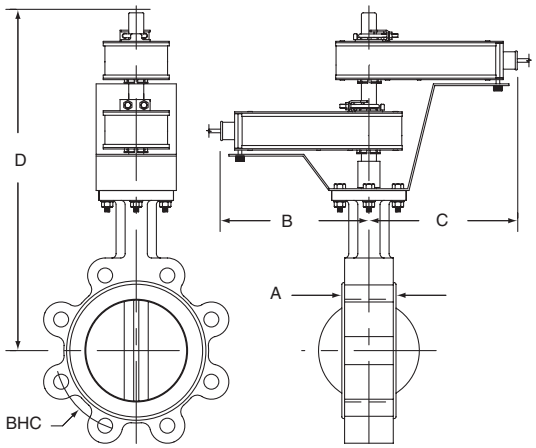
* Variable when configured with MFT options

† Rated Impulse Voltage 800V, Type of action 1.AA (1.AA.B for -S version), Control Pollution Degree 3.

♦ **Programmed for 70 sec motor run time. At 150 sec motor run time, transformer sizing is 8.5 VA and power consumption is 6 W running / 3 W holding.**

AFX24-MFT-S-X1	
Auxiliary switches	2 x SPDT 3A (0.5A) @ 250 VAC, UL approved one set at +10°, one adjustable 10° to 90°

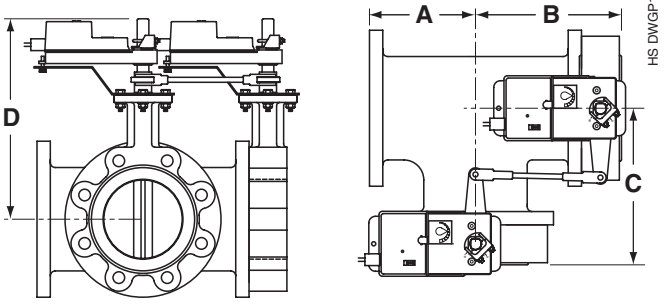
Dimensions with 2-Way Valve



BF2WUDIM_A

		Dimensions (Inches)					Fail Safe (psi)	
Valve	Size	A	B	C	D(Max)	BHC	AF	2*AF
F650HD	2"	1.65	9.00	9.00	19.50	4.75	200	
F650HDU	2"	1.65	9.00	9.00	19.50	4.75	50	
F665HD	2½"	1.76	9.00	9.00	20.00	5.50		200
F665HDU	2½"	1.76	9.00	9.00	20.00	5.50	50	
F680HD	3"	1.78	9.00	9.00	20.50	6.00		500
F680HDU	3"	1.78	9.00	9.00	20.50	6.00		50
F6100HDU	4"	2.05	9.00	9.00	21.00	7.50		50
F6125HDU	5"	2.14	9.00	9.00	22.00	8.50		50
F650-150SHP	2"	1.75	9.00	9.00	19.50	4.75		150
F665-150SHP	2½"	1.88	9.00	9.00	20.00	5.50		150
F680-150SHP	3"	1.92	9.00	9.00	20.50	6.00		150
F6100-150SHP	4"	2.13	9.00	9.00	21.00	7.50		150
F650-300SHP	2"	1.75	9.00	9.00	19.50	5.00		150
F665-300SHP	2½"	1.88	9.00	9.00	20.00	5.88		150
F680-300SHP	3"	1.92	9.00	9.00	20.50	6.63		150
F6100-300SHP	4"	2.13	9.00	9.00	21.00	7.88		150

Dimensions with 3-Way Valve



HS DWGP11

		Dimensions (Inches)					Fail Safe (psi)	
Valve	Size	A	B	C	D(Max)	BHC	AF	2*AF
F750HD	2"	4.50	6.15	6.15	15.50	4.75	200	
F750HDU	2"	4.50	6.15	6.15	15.50	4.75	50	
F765HD	2½"	5.00	6.76	6.76	16.00	5.50		200
F765HDU	2½"	5.00	6.76	6.76	16.00	5.50		50
F780HDU	3"	5.50	7.28	7.28	16.25	6.00		50

Wiring Diagrams

INSTALLATION NOTES

3 Actuators may also be powered by 24 VDC.

4 IN4004 or IN4007 diode (IN4007 supplied, Belimo part number 40155).

5 Triac A and B can also be contact closures.

6 Control signal may be pulsed from either the Hot (Source) or Common (Sink) 24 VAC line.

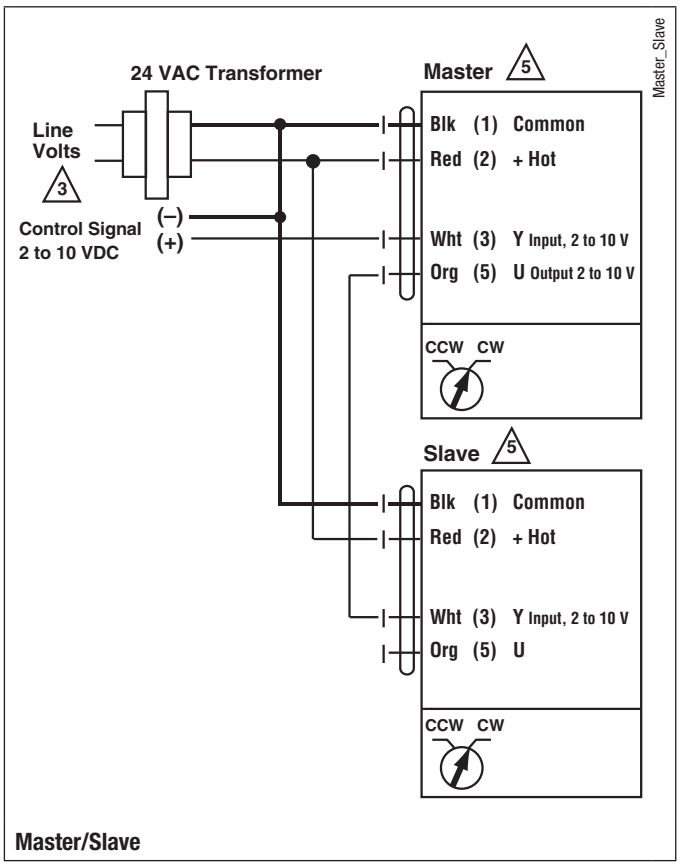
7 Position feedback cannot be used with Triac sink controller. The actuators internal common reference is not compatible.

APPLICATION NOTES

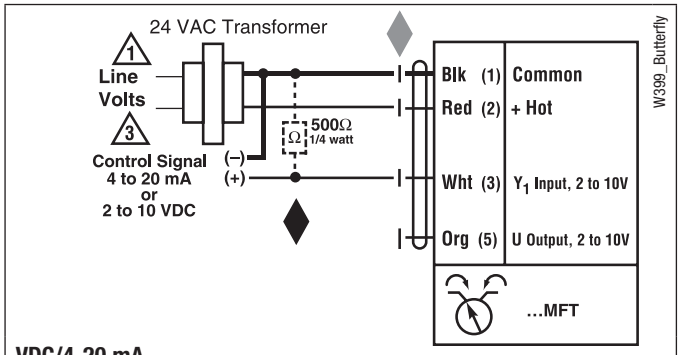
- The ZG-R01 500 Ω resistor converts the 4 to 20 mA control signal to 2 to 10 VDC, up to 2 actuators may be connected in parallel.
- Meets cULus or UL and CSA requirements without the need of an electrical ground connection.

WARNING Live Electrical Components!

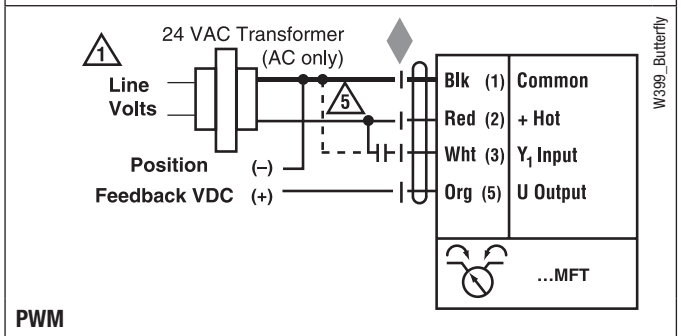
During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.



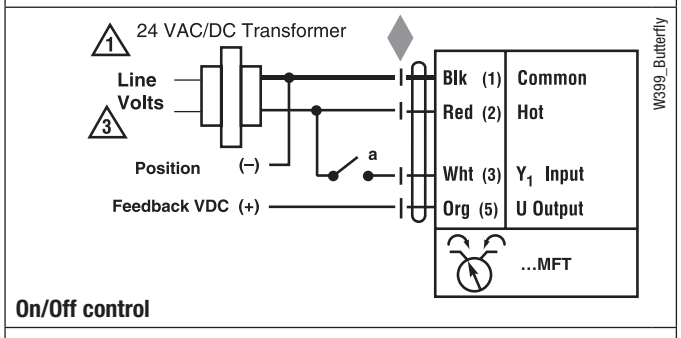
Master/Slave



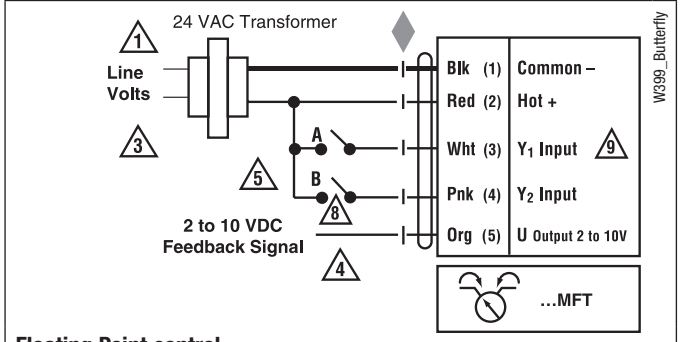
VDC/4-20 mA



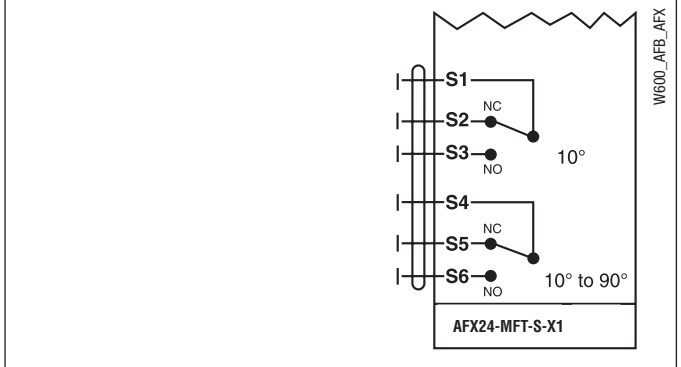
PWM



On/Off control



Floating Point control



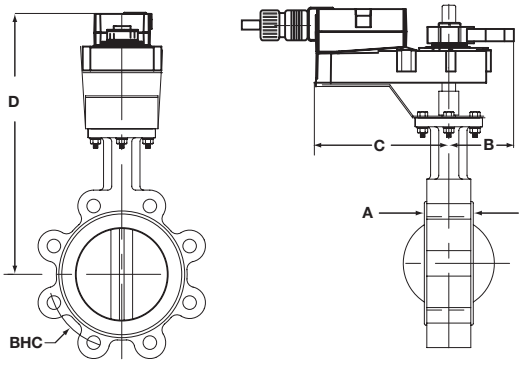
Auxiliary Switches for AFX24-MFT-S-X1

GKB24-3-X1 Actuators, On/Off, Floating Point

2 YEAR WARRANTY

Technical Data	GKB24-3-X1
Power supply	24VAC ±20% 50/60Hz 24VDC ±10%
Power consumption	12W (3W)
Transformer sizing	21VA (class 2 power source)
Electrical connection	18 GA plenum rated cable ½" conduit connector protected NEMA 2 (IP54) 3 ft [1m] 10 ft [3m] 16 ft [5m]
Overload protection	electronic throughout 0 to 95 rotation
Operation range Y	on/off, floating point
Input impedance	100kΩ (0.1 mA), 500Ω 1500Ω (floating point, on/off)
Feedback output U	2 to 10VDC, 0.5mA max, VDC variable
Angle of rotation	max. 95°, adjustable with mechanical stop electronically variable
Direction of rotation	reversible with ↷/↶ switch
Fail-safe position	adjustable with dial or tool 0 to 100% in 10% increments
Position indication	reflective visual indicator (snap-on)
Manual override	external push button
Running time normal operation fail-safe	 150 seconds (default), variable 90 to 150 seconds 35 seconds
Humidity	5 to 95% RH non-condensing (EN 60730-1)
Ambient temperature	-22°F to +122°F [-30°C to +50°C]
Storage temperature	-40°F to +176°F [-40°C to +80°C]
Housing	NEMA2, IP54, UL enclosure type 2
Housing material	UL94-5VA
Agency list	cULus acc. to UL 60730-1A/-2-14 CAN/CSA E60730-1:02 CE acc. to 2004/108/EEC and 2006/95/EC
Noise level	< 45dB(A)
Servicing	maintenance free
Quality standard	ISO 9001

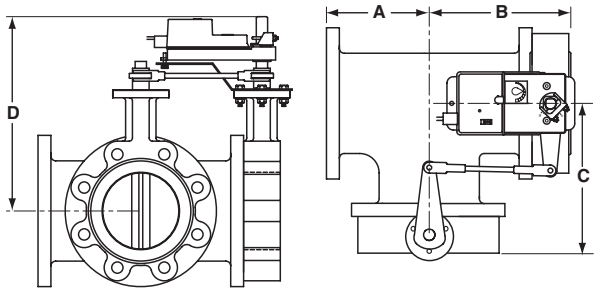
Dimensions with 2-Way Valve



AM_GM_LineRevised

Valve	Size	Dimensions (Inches) A	B	C	D(Max)	BHC	Non-Fail Safe (psi) GK
F680HD	3”	1.78	7.00	7.00	16.53	6.00	200
F6100HDU	4”	2.05	8.00	8.00	17.53	7.50	50
F6125HDU	5”	2.14	8.00	8.00	18.03	8.50	50
F650-150SHP	2”	1.75	9.00	9.00	20.03	4.75	285
F665-150SHP	2½”	1.88	9.00	9.00	20.53	5.50	285
F680-150SHP	3”	1.92	9.00	9.00	21.03	6.00	285
F6100-150SHP	4”	2.13	9.00	9.00	21.53	7.50	150
F650-300SHP	2”	1.75	9.00	9.00	20.03	5.00	285
F665-300SHP	2½”	1.88	9.00	9.00	20.53	5.88	285
F680-300SHP	3”	1.92	9.00	9.00	21.03	6.63	285
F6100-300SHP	4”	2.13	9.00	9.00	21.53	7.88	150

Dimensions with 3-Way Valve



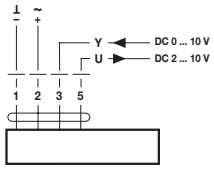
Single_Butterfly

Valve	Size	Dimensions (Inches) A	B	C	D(Max)	BHC	Non-Fail Safe (psi) GM
F765HD	2½”	5.00	6.70	6.70	16.53	5.50	200
F780HDU	3”	5.50	7.20	7.20	16.78	6.00	50
F750-150SHP	2”	4.50	6.25	6.25	17.03	4.75	150
F765-150SHP	2½”	5.00	6.88	6.88	17.53	5.50	150
F780-150SHP	3”	5.50	7.42	7.42	18.03	6.00	150
F7100-150SHP	4”	6.50	8.63	8.63	18.53	7.50	150

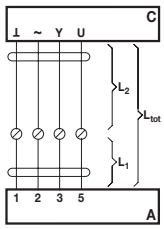
Electrical Installation

Wiring diagram

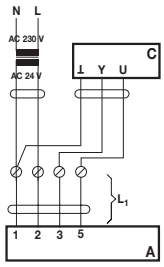
Note
- Connect via safety isolation transformer.
- Parallel connection of other actuators possible. Note performance data for supply.



Cable lengths



Note
When several actuators are connected in parallel, the maximum cable length must be divided by the number of actuators.



Note
There are no special restrictions on installation if the supply and data cable are routed separately.

Cable colors:
1 = black
2 = red
3 = white
5 = orange

A = Actuator
C = Control unit
L_1 = Belimo connecting cable, 1 m (4 x 0.75 mm²)
L_2 = Customer cable
L_{tot} = Maximum cable length

Cross section L_2 ⊥ / ~	Max. cable length $L_{tot} = L_1 + L_2$		Example for DC
	AC	DC	
0.75 mm²	≤30 m	≤5 m	1 m (L_1) + 4 m (L_2)
1.00 mm²	≤40 m	≤8 m	1 m (L_1) + 7 m (L_2)
1.50 mm²	≤70 m	≤12 m	1 m (L_1) + 11 m (L_2)
2.50 mm²	≤100 m	≤20 m	1 m (L_1) + 19 m (L_2)

A = Actuator
C = Control unit
L_1 = Belimo connecting cable, 1 m (4 x 0.75 mm²)

Wiring Diagrams

INSTALLATION NOTES

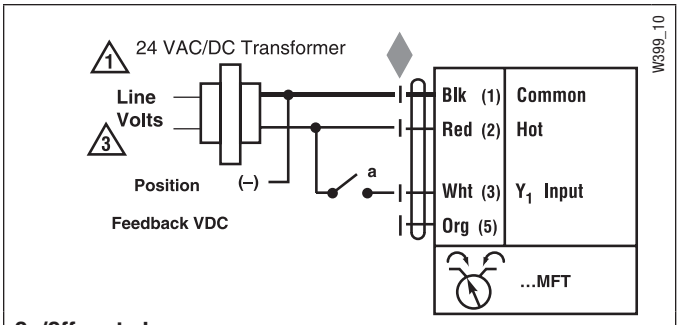
1. Provide overload protection and disconnect as required.
3. Actuators may also be powered by 24 VDC.
4. Position feedback cannot be used with Triac sink controller. The actuator internal common reference is not compatible.
5. Control signal may be pulsed from either the Hot (source) or the Common (sink) 24 VAC line.
8. Contact closures A & B also can be triacs. A & B should both be closed for triac source and open for triac sink.
9. For triac sink the common connection from the actuator must be connected to the hot connection of the controller.

APPLICATION NOTES

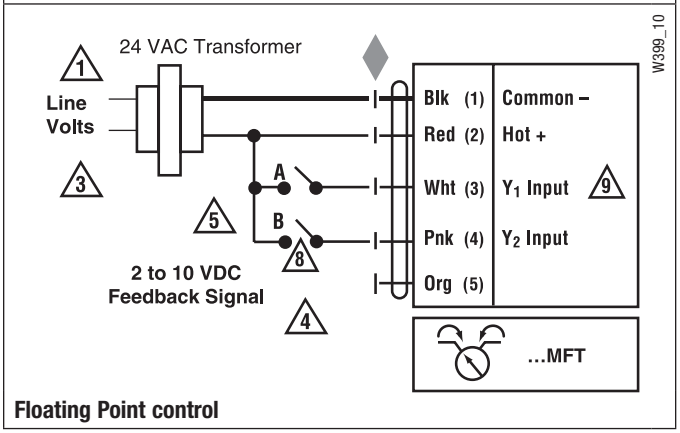
Meets UL requirements without the need of an electrical ground connection.

***WARNING** Live Electrical Components!*
During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.

NOTE: Wiring diagrams shown are for single actuator mounted solutions



On/Off control



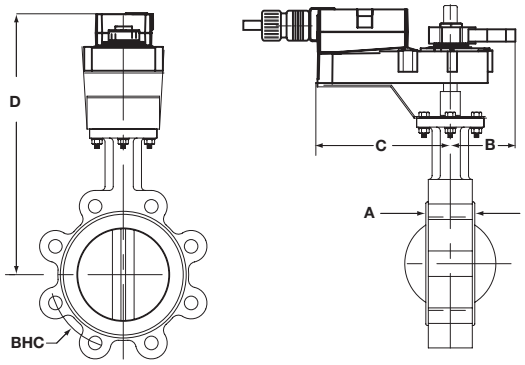
Floating Point control

GKX24-MFT-X1 Actuators, Multi-Function Technology

MFT CE LISTED 94 05 TEMP. IND. & REG. EQUIP. c UL us BRUSHLESS dc. motor

Technical Data	GKX24-MFT-X1
Power supply	24VAC ±20% 50/60Hz 24VDC ±10%
Power consumption	12W (3W)
Transformer sizing	21VA (class 2 power source)
Electrical connection	18 GA plenum rated cable ½" conduit connector protected NEMA 2 (IP54) 3 ft [1m] 10 ft [3m] 16 ft [5m]
Overload protection	electronic throughout 0 to 95 rotation
Operation range Y	2 to 10 VDC, 4 to 20mA (default) variable (VDC,PWM, floating point, on/off)
Input impedance	100kΩ (0.1 mA), 500Ω 1500Ω (PWM, floating point, on/off)
Feedback output U	2 to 10VDC, 0.5mA max, VDC variable
Angle of rotation	max. 95°, adjustable with mechanical stop electronically variable
Direction of rotation	reversible with ↷/↶ switch
Fail-safe position	adjustable with dial or tool 0 to 100% in 10% increments
Position indication	reflective visual indicator (snap-on)
Manual override	external push button
Running time normal operation fail-safe	 95 seconds (default), variable 90 to 150 seconds 35 seconds
Humidity	5 to 95% RH non-condensing (EN 60730-1)
Ambient temperature	-22°F to +122°F [-30°C to +50°C]
Storage temperature	-40°F to +176°F [-40°C to +80°C]
Housing	NEMA2, IP54, UL enclosure type 2
Housing material	UL94-5VA
Agency list	cULus acc. to UL 60730-1A/-2-14 CAN/CSA E60730-1:02 CE acc. to 2004/108/EEC and 2006/95/EC
Noise level	< 45dB(A)
Servicing	maintenance free
Quality standard	ISO 9001

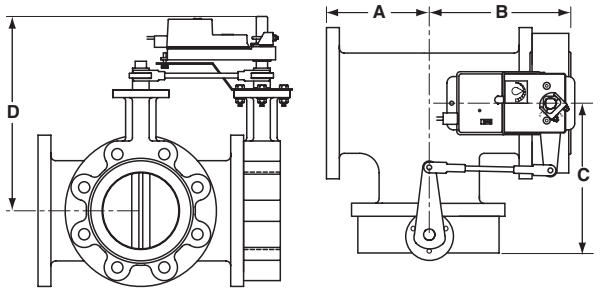
Dimensions with 2-Way Valve



AM_GM_LineRevised

Valve	Size	Dimensions (Inches) A	B	C	D(Max)	BHC	Non-Fail Safe (psi) GK
F680HD	3"	1.69	9.00	9.00	21.03	6.00	200
F6100HDU	4"	1.92	9.00	9.00	21.53	7.50	50
F6125HDU	5"	2.08	9.00	9.00	22.53	8.50	50
F650-150SHP	2"	1.75	9.00	9.00	20.03	4.75	285
F665-150SHP	2½"	1.88	9.00	9.00	20.53	5.50	285
F680-150SHP	3"	1.92	9.00	9.00	21.03	6.00	285
F6100-150SHP	4"	2.13	9.00	9.00	21.53	7.50	150
F650-300SHP	2"	1.75	9.00	9.00	20.03	5.00	285
F665-300SHP	2½"	1.88	9.00	9.00	20.53	5.88	285
F680-300SHP	3"	1.92	9.00	9.00	21.03	6.63	285
F6100-300SHP	4"	2.13	9.00	9.00	21.53	7.88	150

Dimensions with 3-Way Valve



Single_Butterfly

Valve	Size	Dimensions (Inches) A	B	C	D(Max)	BHC	Non-Fail Safe (psi) GK
F780HDU	3"	5.50	7.20	7.20	16.78	6.00	200
F750-150SHP	2"	4.50	6.25	6.25	17.03	4.75	150
F765-150SHP	2½"	5.00	6.88	6.88	17.53	5.50	150
F780-150SHP	3"	5.50	7.42	7.42	18.03	6.00	150

Wiring Diagrams

INSTALLATION NOTES

1 Provide overload protection and disconnect as required.

3 Actuators may also be powered by 24 VDC.

4 Position feedback cannot be used with Triac sink controller.
The actuator internal common reference is not compatible.

5 Control signal may be pulsed from either the Hot (source)
or the Common (sink) 24 VAC line.

8 Contact closures A & B also can be triacs.
A & B should both be closed for triac source and open for triac sink.

9 For triac sink the common connection from the actuator
must be connected to the hot connection of the controller.

APPLICATION NOTES

Meets UL requirements without the need of an electrical ground connection.

The ZG-R01 500 Ω resistor may be used.

***WARNING** Live Electrical Components!*
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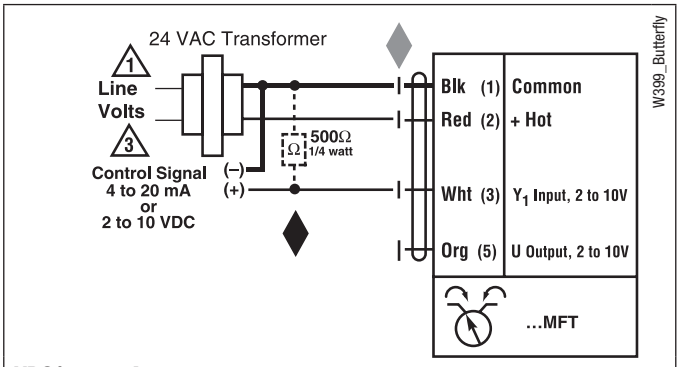
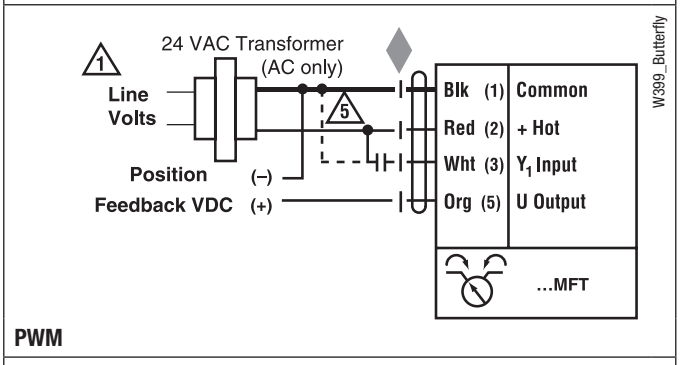
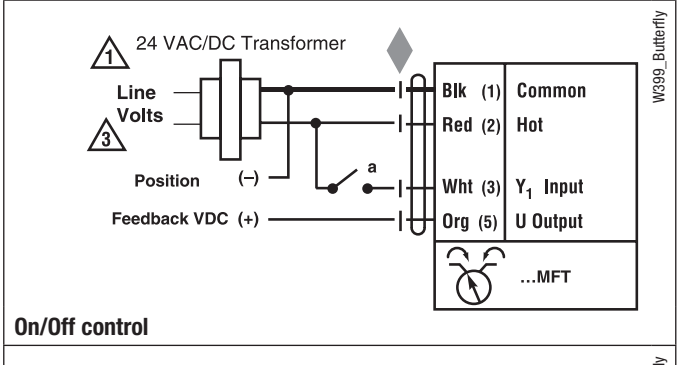
NOTE: Wiring diagrams shown are for single actuator mounted solutions



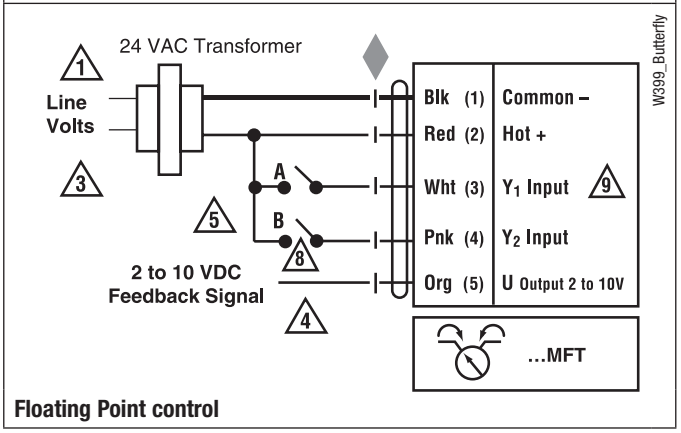
VDC/4-20 mA



PWM



On/Off control



Floating Point control

BELIMO

2 YEAR WARRANTY

CE LISTED 94 05 TEMP. IND. & REG. EQUIP. c UL us

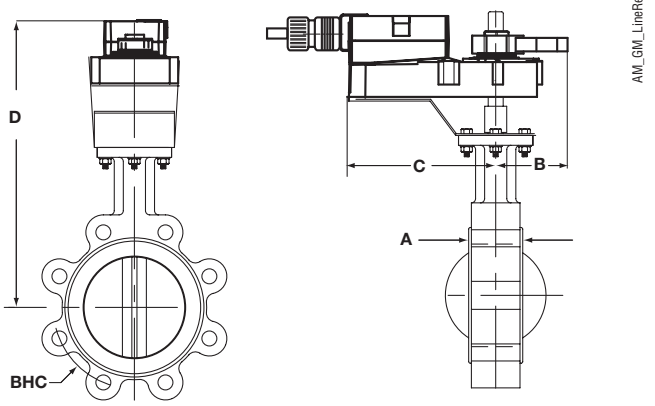
BRUSHLESS DC. motor

Models

AMB24-3-X1

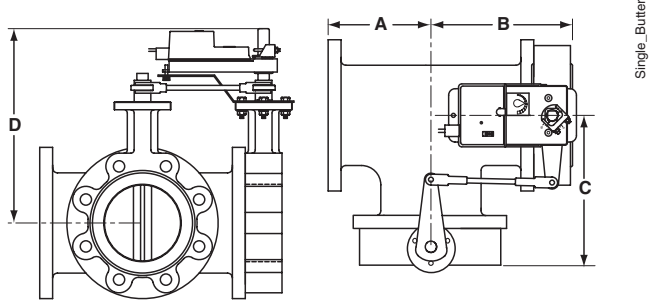
Technical Data	
Power supply	24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Power consumption running	2.0 W
holding	0.2 W
Transformer sizing	5.5 VA (class 2 power source)
Electrical connection	3 ft, 18 GA plenum rated cable ½" conduit connector
Overload protection	electronic throughout 0° to 95° rotation
Control	on/off, floating point
Input impedance	600 Ω
Angle of rotation	95°, adjustable with mechanical stop
Direction of rotation	reversible with protected ↷/↶ switch
Position indication	handle
Manual override	external push button
Running time	95 seconds
Humidity	5 to 95% RH non condensing (EN 60730-1)
Ambient temperature	-22°F to +122°F [-30°C to +50°C]
Storage temperature	-40°F to +176°F [-40°C to +80°C]
Housing	NEMA 2/IP54
Housing material	UL94-5VA
Agency listings†	cULus according to UL 60730-1A/-2-14, CAN/CSA E60730-1, CSA C22.2 No. 24-93, CE according to 89/336/EEC (and 2006/95/EC for line voltage and/or -S versions)
Noise level	<45dB(A)
Quality standard	ISO 9001

Dimensions with 2-Way Valve



Valve	Size	Dimensions (Inches) A	B	C	D(Max)	BHC	Non-Fail Safe (psi) HD	HDU
F650HD(U)	2"	1.65	7.00	7.00	15.00	4.75	200	50
F665HD(U)	2½"	1.76	7.00	7.00	15.50	5.50	200	50
F680HDU	3"	1.78	7.00	7.00	16.00	6.00		50

Dimensions with 3-Way Valve



Valve	Size	Dimensions (Inches) A	B	C	D(Max)	BHC	Non-Fail Safe (psi) HD	HDU
F750HD	2"	4.50	6.15	6.15	15.50	4.75	200	
F765HDU	2½"	5.00	6.76	6.76	16.00	5.50	200	50

Wiring Diagrams

INSTALLATION NOTES

⚠2 ***CAUTION** Equipment damage!*
Actuators may be connected in parallel.
Power consumption and input impedance must be observed.

⚠4 Actuators may also be powered by 24 VDC.

APPLICATION NOTES

♦ Meets cULus or UL and CSA requirements without the need of an electrical ground connection.

⚠ ***WARNING** Live Electrical Components!*
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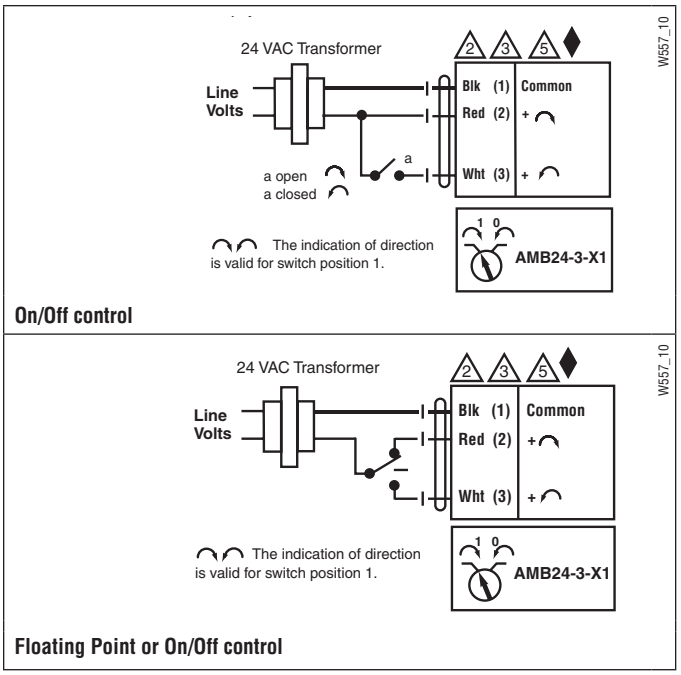
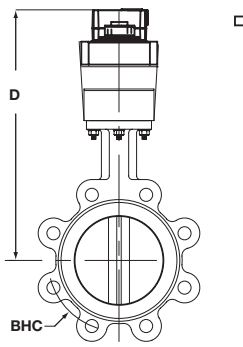


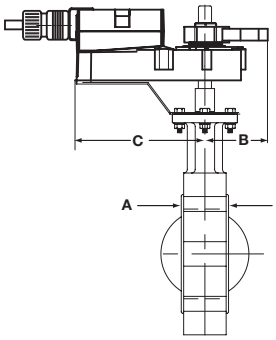
On/Off control

Floating Point or On/Off control

BELIMO

Dimensions with 2-Way Valve





AM_GM_LineRevised

Dimensions (Inches)

Valve	Size	A	B	C	D(Max)	BHC	Non-Fail Safe (psi)
F650HD(U)	2”	1.65	7.00	7.00	15.00	4.75	
F665HD(U)	2½”	1.76	7.00	7.00	15.50	5.50	
F680HDU	3”	1.78	7.00	7.00	16 .00	6.00	

2 YEAR WARRANTY

MFT CE LISTED 94 05 TEMP. IND. & REG. EQUIP. c UL us BRUSHLESS DC motor

Models

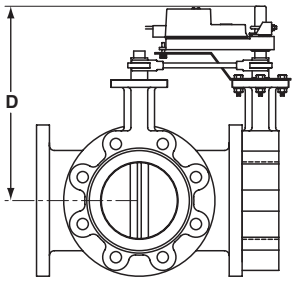
AMX24-MFT-X1

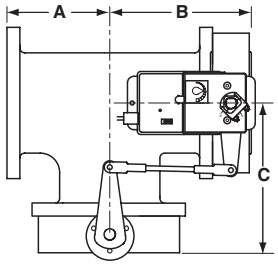
Technical Data

Power supply	24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Power consumption running	4 W
Power consumption holding	1.25 W
Transformer sizing	6 VA (class 2 power source)
Electrical connection	❑ 3 ft [1m] ❑ 10 ft [3m] ❑ 16 ft [5m] 18 GA plenum rated cable ½” conduit connector
Overload protection	electronic throughout 0° to 95° rotation
Operating range Y	2 to 10 VDC, 4 to 20 mA (default) Variable (VDC, PWM, Floating Point, On/Off)
Input impedance	100k Ω (0.1 mA), 500 Ω 1500 Ω (PWM, Floating Point, On/Off)
Feedback output U	2 to 10 VDC, 0.5 mA max VDC Variable
Angle of rotation	95° electronically variable
Direction of rotation	reversible with protected ↷/↶ switch
Position indication	handle
Manual override	external push button
Running time	150 seconds (default) variable (90 to 350 secs)
Humidity	5 to 95% RH non condensing (EN 60730-1)
Ambient temperature	-22°F to +122°F [-30°C to +50°C]
Storage temperature	-40°F to +176°F [-40°C to +80°C]
Housing	NEMA 2/IP54
Housing material	UL94-5VA
Agency listings†	cULus according to UL60730-1A/-2-14, CAN/CSA E60730-1, CSA C22.2 No. 24-93, CE according to 89/336/EEC
Noise level	<45dB(A)
Quality standard	ISO 9001

† Rated impulse voltage 4kV, Control pollution degree 3, Type of action 1

Dimensions with 3-Way Valve





Single_Butterfly

Dimensions (Inches) **Non-Fail Safe (psi)**

Valve	Size	A	B	C	D(Max)	BHC	HD	HDU
F750HD	2”	4.50	6.15	6.15	15.50	4.75	200	
F765HDU	2½”	5.00	6.76	6.76	16.00	5.50	200	50

Wiring Diagrams

INSTALLATION NOTES

△3 Actuators may also be powered by 24 VDC.

△4 Position feedback cannot be used with Triac sink controller.
The actuator internal common reference is not compatible.

△6 Control signal may be pulsed from either the Hot (source)
or the Common (sink) 24 VAC line.

△8 Contact closures A & B also can be triacs.
A& B should both be closed for triac source and open for triac sink.

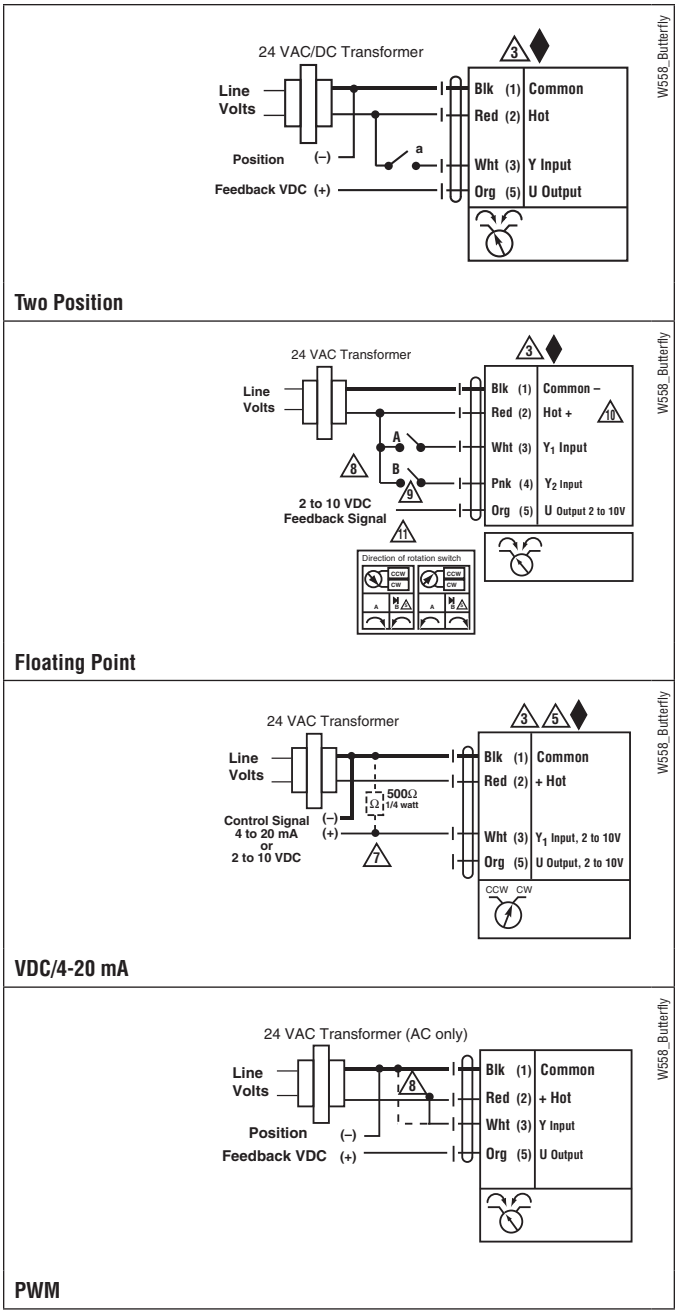
△9 For triac sink the common connection from the actuator
must be connected to the hot connection.

APPLICATION NOTES

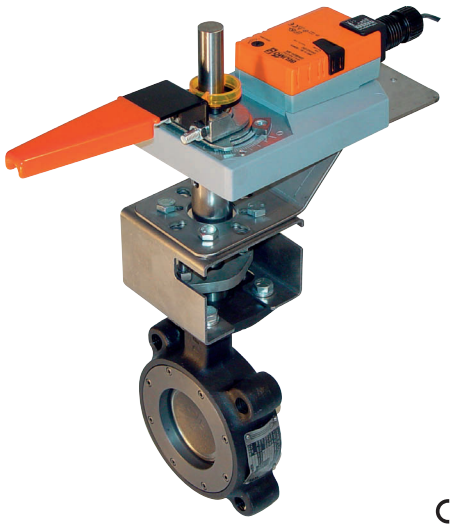
♦ The ZG-R01 500 Ω resistor converts the 4 to 10 mA control signal to 2 to 10 VDC, up to 2 actuators may be connected in parallel.

WARNING *Live Electrical Components!*

During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.



GMB24-3-X1 Actuators, On/Off, Floating Point



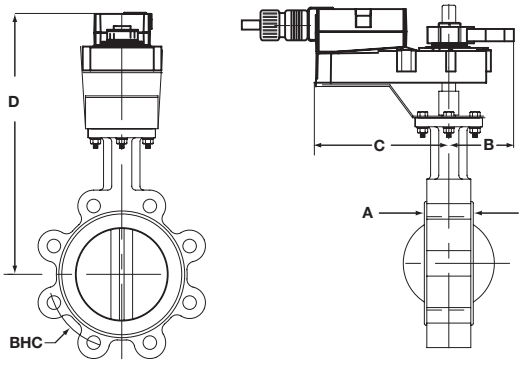
2 YEAR WARRANTY

Models

GMB24-3-X1

Technical Data		
Power supply		24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Power consumption	running	4.0 W
	holding	2 W
Transformer sizing		6 VA (class 2 power source)
Electrical connection		3 ft, 18 GA appliance cable, 1/2" conduit connector
Overload protection		electronic throughout 0 to 95° rotation
Control signal		On/Off, Floating Point
Input impedance		600 Ω
Angle of rotation		mechanically limited to 95°
Direction of rotation		reversible with switch A/B
Position indication		0 to 1 and reversible indicator
Running time		150 sec.
Humidity		5 to 95% RH non-condensing
Ambient temperature		-22°F to 122°F [-30°C to 50°C]
Storage temperature		-40°F to 176°F [-40°C to 80°C]
Housing		NEMA 2/IP54
Housing material		UL94-5VA (flammability rating)
Agency listings		cULus according to UL60730-1A/-2-14, CAN/CSA E60730-1, CSA C22.2 No.24-93, CE according to 89/336/EEC
Noise level		max. 45 dB (A)
Servicing		maintenance free
Quality standard		ISO 9001

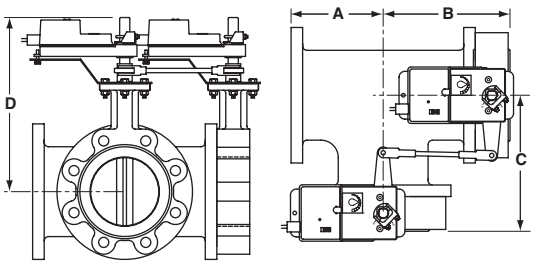
Dimensions with 2-Way Valve



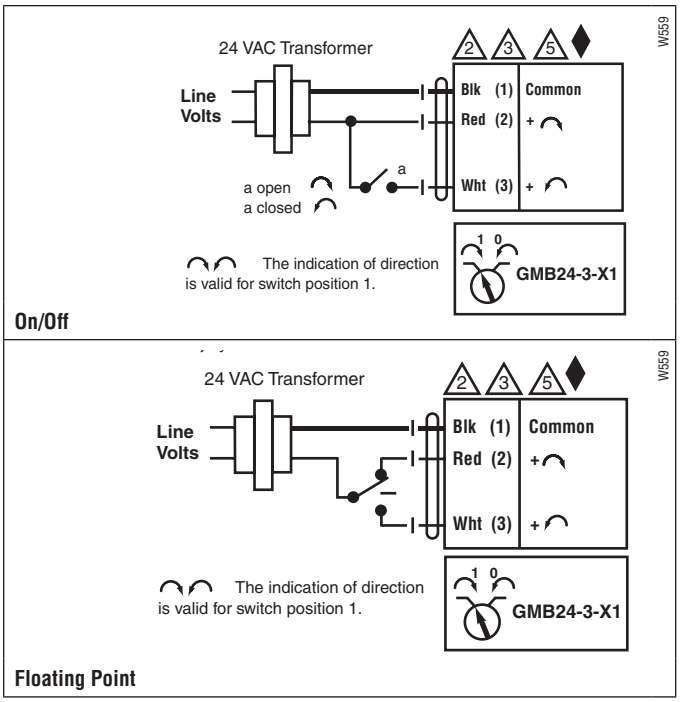
AM_GM_LineRevised

Valve	Size	Dimensions (Inches) A	B	C	D(Max)	BHC	Non-Fail Safe (psi) GM	2*GM
F680HD	3"	1.78	7.00	7.00	16.00	6.00	200	
F6100HD	4"	2.05	8.00	8.00	17.00	7.50		200
F6100HDU	4"	2.05	8.00	8.00	17.00	7.50	50	
F6125HDU	5"	2.14	8.00	8.00	17.50	8.50	50	
F6150HDU	6"	2.19	8.00	8.00	22.50	9.50		50
F650-150SHP	2"	1.75	9.00	9.00	19.50	4.75	285	
F665-150SHP	2½"	1.88	9.00	9.00	20.00	5.50	285	
F680-150SHP	3"	1.92	9.00	9.00	20.50	6.00	285	
F6100-150SHP	4"	2.13	9.00	9.00	21.00	7.50	150	285
F650-300SHP	2"	1.75	9.00	9.00	19.50	5.00	285	400
F665-300SHP	2½"	1.88	9.00	9.00	20.00	5.88	285	400
F680-300SHP	3"	1.92	9.00	9.00	20.50	6.63	285	400
F6100-300SHP	4"	2.13	9.00	9.00	21.00	7.88	150	285

Dimensions with 3-Way Valve



Valve	Size	Dimensions (Inches) A	B	C	D(Max)	BHC	Non-Fail Safe (psi) GM	2*GM
F765HD	2½"	5.00	6.70	6.70	16.00	5.50	200	
F780HD	3"	5.50	7.20	7.20	16.25	6.00		200
F780HDU	3"	5.50	7.20	7.20	16.25	6.00	50	
F7100HD	4"	6.50	8.45	8.45	17.00	7.50		200
F7100HDU	4"	6.50	8.45	8.45	17.00	7.50		50
F7125HDU	5"	7.50	9.60	9.60	17.50	8.50		50
F7150HDU	6"	8.00	10.08	10.08	18.00	9.50		50
F750-150SHP	2"	4.50	6.25	6.25	16.50	4.75	150	285
F765-150SHP	2½"	5.00	6.88	6.88	17.00	5.50	150	285
F780-150SHP	3"	5.50	7.42	7.42	17.50	6.00	150	285
F7100-150SHP	4"	6.50	8.63	8.63	18.00	7.50	150	
F750-300SHP	2"	5.00	6.75	6.75	15.50	5.00		285
F765-300SHP	2½"	5.50	7.38	7.38	16.00	5.88		285
F780-300SHP	3"	6.00	7.92	7.92	16.25	6.63		285
F7100-300SHP	4"	7.00	9.13	9.13	18.00	7.88		150



Wiring Diagrams

INSTALLATION NOTES

2 ***CAUTION** Equipment damage!*
Actuators may be connected in parallel.
Power consumption and input impedance must be observed.

3 Actuators may also be powered by 24 VDC.

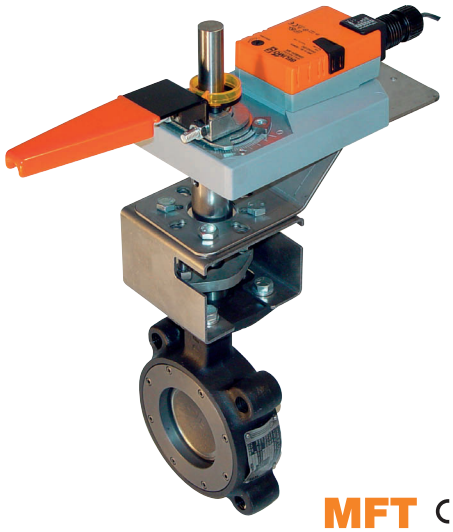
5 Actuators with plenum rated cable do not have numbers on wires; use color codes instead. Actuators with appliance cables are numbered.

APPLICATION NOTES

Meets cULus or UL and CSA requirements without the need of an electrical ground connection.

***WARNING** Live Electrical Components!*
During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.

GMX24-MFT-X1 Actuators, Multi-Function Technology



MFT CE LISTED 9405 TEMP.IND. & REG. EQUIP. c UL us

2 YEAR WARRANTY

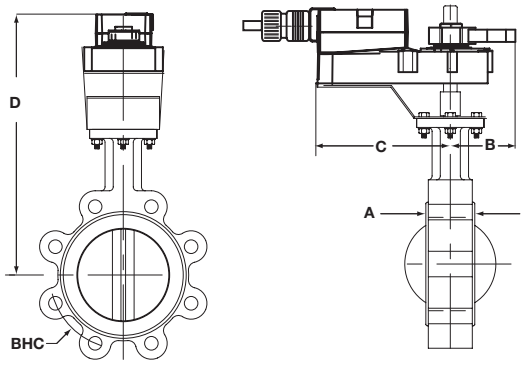
BRUSHLESS dc. motor

Models

GMX24-MFT-X1

Technical Data		
Power supply		24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Power consumption	running	4.5 W
	holding	2 W
Transformer sizing		7 VA (class 2 power source)
Electrical connection		3 ft, 18 GA appliance cable, 1/2" conduit connector
Overload protection		electronic throughout 0 to 95° rotation
Control signal		2 to 10 VDC, 4 to 20 mA (with 500 Ω, 1/4 W resistor) ZG-R01
Input impedance		100 k Ω for 2 to 10VDC (0.1 mA) 500 Ω for 4 to 20 mA 750 Ω for PWM 1500 Ω for on/off and floating point
Angle of rotation		mechanically limited to 95°
Direction of rotation		reversible with switch A/B
Position indication		0 to 1 and reversible indicator
Running time		150 sec.
Humidity		5 to 95% RH non-condensing
Ambient temperature		-22°F to 122°F [-30°C to 50°C]
Storage temperature		-40°F to 176°F [-40°C to 80°C]
Housing		NEMA 2/IP54
Housing material		UL94-5VA (flammability rating)
Agency listings		cULus according to UL60730-1A/-2-14, CAN/CSA E60730-1, CSA C22.2 No.24-93, CE according to 89/336/EEC
Noise level		max. 45 dB (A)
Servicing		maintenance free
Quality standard		ISO 9001

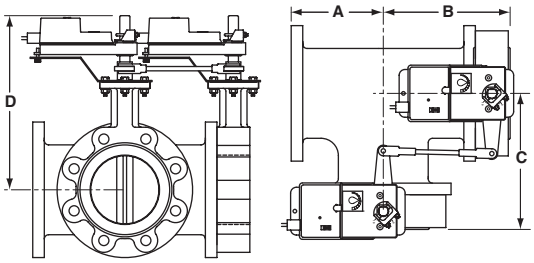
Dimensions with 2-Way Valve



AM_GM_LineRevised

Valve	Size	A	B	C	D(Max)	BHC	Dimensions (Inches) GM	Non-Fail Safe (psi) 2*GM
F680HD	3"	1.69	9.00	9.00	20.50	6.00	200	
F6100HD	4"	1.92	9.00	9.00	21.00	7.50		200
F6100HDU	4"	1.92	9.00	9.00	21.00	7.50	50	
F6125HDU	5"	2.08	9.00	9.00	22.00	8.50	50	
F6150HDU	6"	2.08	9.00	9.00	22.50	9.50		50
F650-150SHP	2"	1.75	9.00	9.00	19.50	4.75	285	
F665-150SHP	2½"	1.88	9.00	9.00	20.00	5.50	285	
F680-150SHP	3"	1.92	9.00	9.00	20.50	6.00	285	
F6100-150SHP	4"	2.13	9.00	9.00	21.00	7.50	150	285
F650-300SHP	2"	1.75	9.00	9.00	19.50	5.00	285	400
F665-300SHP	2½"	1.88	9.00	9.00	20.00	5.88	285	400
F680-300SHP	3"	1.92	9.00	9.00	20.50	6.63	285	400
F6100-300SHP	4"	2.13	9.00	9.00	21.00	7.88	150	285

Dimensions with 3-Way Valve



D101

Valve	Size	A	B	C	D(Max)	BHC	Dimensions (Inches) GM	Non-Fail Safe (psi) 2*GM
F765HD	2½"	5.00	6.70	6.70	16.00	5.50	200	
F780HD	3"	5.50	7.20	7.20	16.25	6.00		200
F780HDU	3"	5.50	7.20	7.20	16.25	6.00	50	
F7100HD	4"	6.50	8.45	8.45	17.00	7.50		200
F7100HDU	4"	6.50	8.45	8.45	17.00	7.50		50
F7125HDU	5"	7.50	9.60	9.60	17.50	8.50		50
F7150HDU	6"	8.00	10.08	10.08	18.00	9.50		50
F750-150SHP	2"	4.50	6.25	6.25	16.50	4.75	150	285
F765-150SHP	2½"	5.00	6.88	6.88	17.00	5.50	150	285
F780-150SHP	3"	5.50	7.42	7.42	17.50	6.00	150	285
F7100-150SHP	4"	6.50	8.63	8.63	18.00	7.50	150	
F750-300SHP	2"	5.00	6.75	6.75	15.50	5.00		285
F765-300SHP	2½"	5.50	7.38	7.38	16.00	5.88		285
F780-300SHP	3"	6.00	7.92	7.92	16.25	6.63		285
F7100-300SHP	4"	7.00	9.13	9.13	18.00	7.88		150

Wiring Diagrams

INSTALLATION NOTES

3 Actuators may also be powered by 24 VDC.

5 Actuators with plenum rated cable do not have numbers on wires; use color coded instead. Actuators with appliance rated cable use numbers.

8 Control signal may be pulsed from either the Hot (Source) or Common (Sink) 24 VAC line.

10 For triac sink the Common connection from the actuator must be connected to the Hot connection of the controller.

APPLICATION NOTES

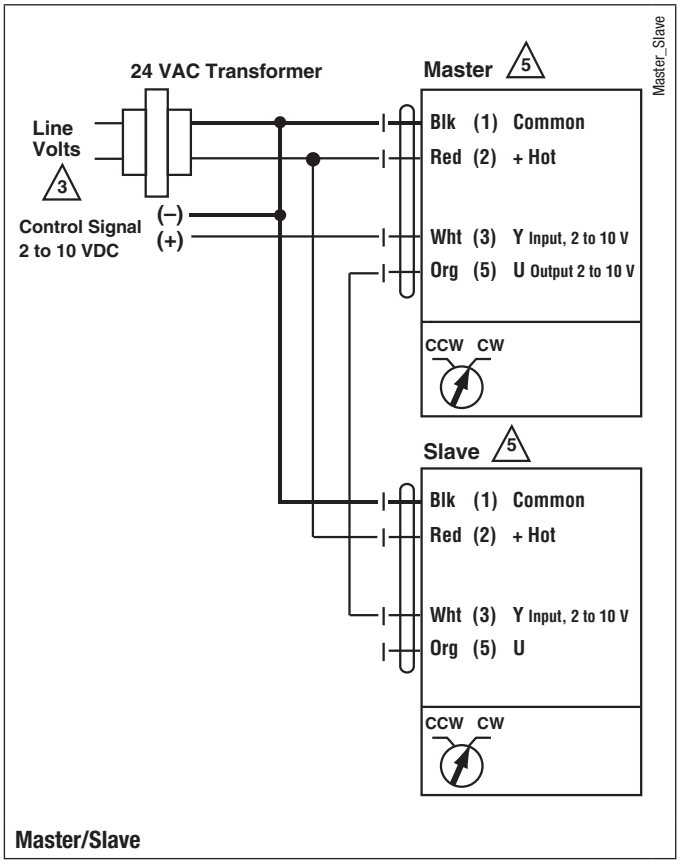
♦ Meets cULus or UL and CSA requirements without the need of an electrical ground connection.

9 Contact closures A & B also can be triacs. A & B should both be closed for triac source and open for triac sink.

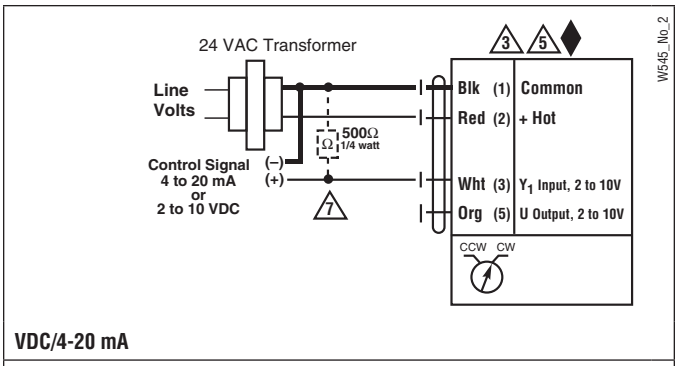
11 Position feedback cannot be used with a Triac sink controller. The actuator internal common reference is not compatible.

WARNING *Live Electrical Components!*

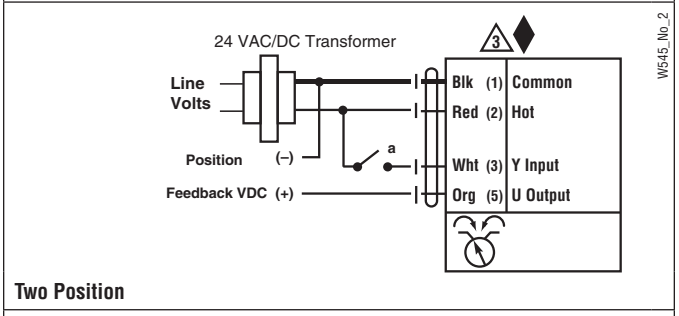
During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.



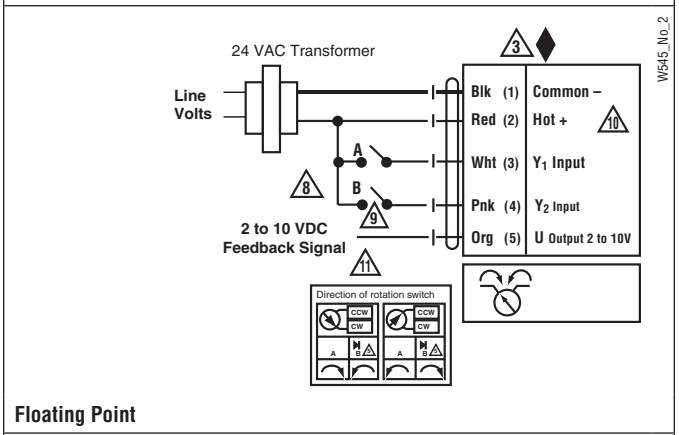
Master/Slave



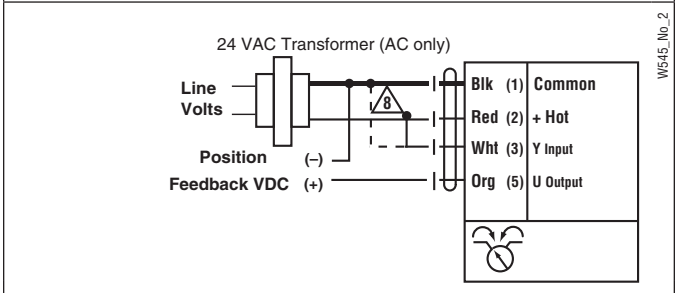
VDC/4-20 mA



Two Position

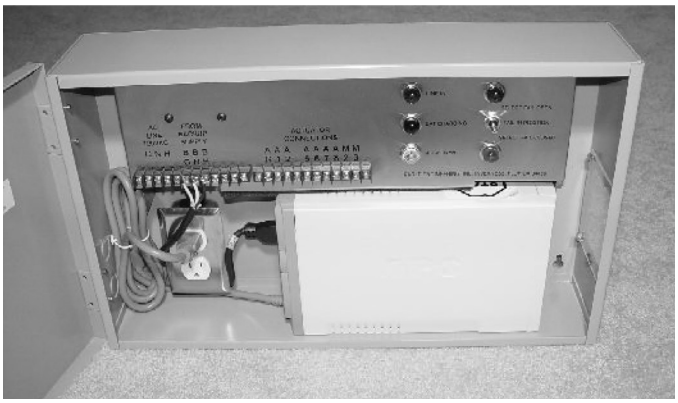


Floating Point



PWM

NSV-SY Battery Back-Up System
For Belimo SY Series Electric Actuators, 2 Position or Modulating



- **Provides Fail-Safe Operation for SY Series Industrial Electric Actuators, SY1 thru SY12.**
- **Field Selectable Fail Direction**
- **Readily Available Sealed Lead-Acid Battery Packs**
- **Provides 500% of Power Requirements for Full Load Cycle**
- **Key Lock Hinged Front Steel Controls Enclosure**

Application

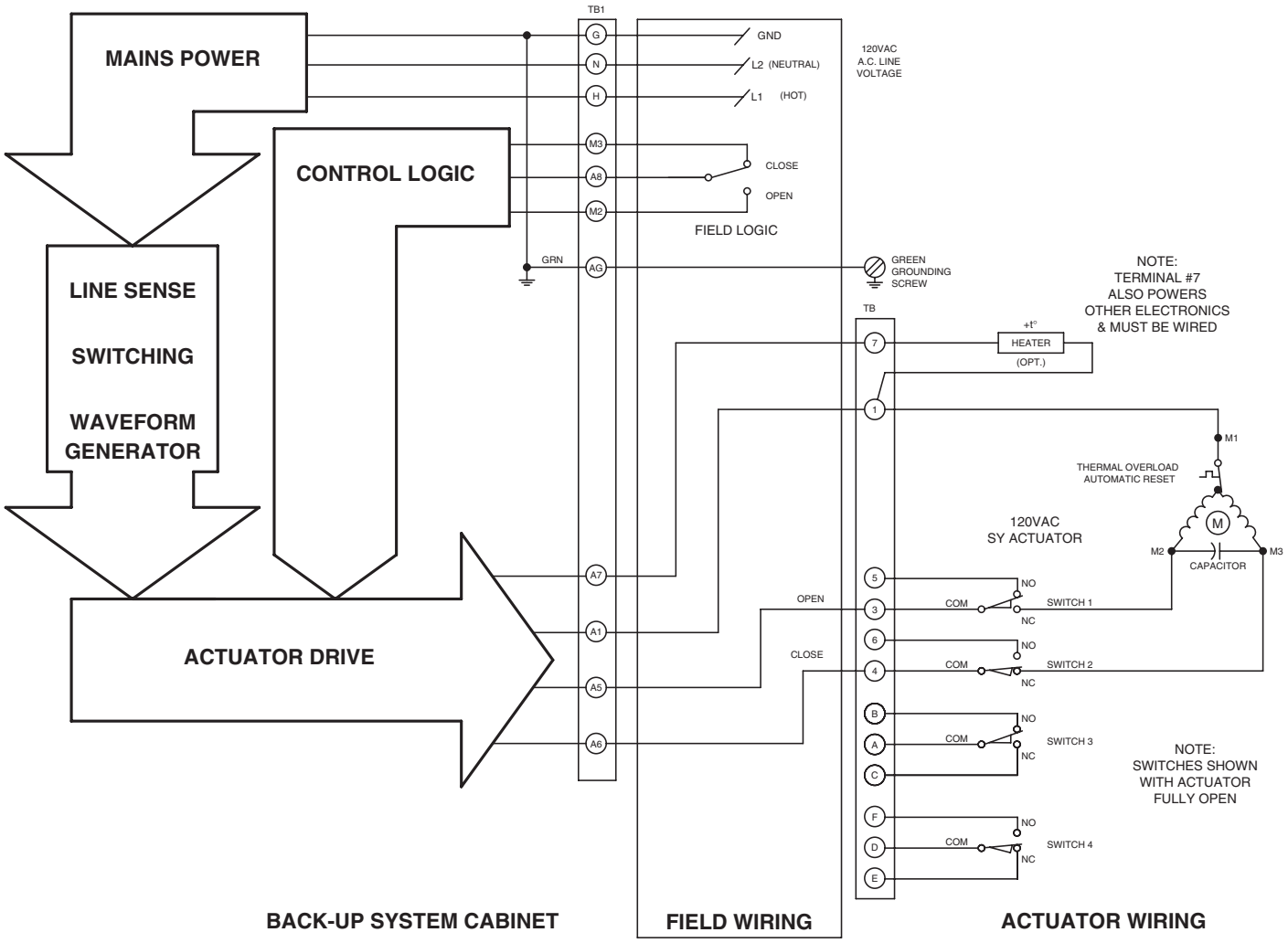
Typically, applications requiring fail-safe operation of actuated devices have had to rely on either the limited power of mechanical spring return actuators, or use costly high pressure pneumatic devices to provide fail-safe positioning. Model NSV series computer-grade UPS back-up systems designed for use with SY Series electric industrial quarter-turn actuators provides the power necessary to drive these actuators to a field selectable fail-safe position. The system consists of a painted steel key lock hinged door controls cabinet which houses the logic switching, all field wiring terminal points and a computer-grade back-up system. The back-up system is a component-level device which utilizes a replaceable spill-proof battery pack that can be readily purchased at most office-supply centers.

Safety in Numbers

The system is designed to provide at a minimum up to 500% of the power required to drive the various actuators through their full 90 degree rotation at full running amperage draws. However, when the actuators have reached their field-selectable end-of-travel positions, current draw drops to zero and the back-up system sits idle until either the time-out function integral to the battery is reached or the mains power returns, whichever occurs first.

Simple User Interface

Indicator lights visible through the viewport on the front and side of the control cabinet give status indication of mains power, back-up system charging and fail-safe operation. The NSV series is powered from building power and all power and logic interface wiring passes through the control cabinet. There are two different series produced, one is used for actuators which operate under 2 position or on/off control schemes, while the second series is used for actuators operating under proportional control schemes. Various models are available within these two series to provide the most cost effective and efficient means of providing fail-safe operation for these actuators.

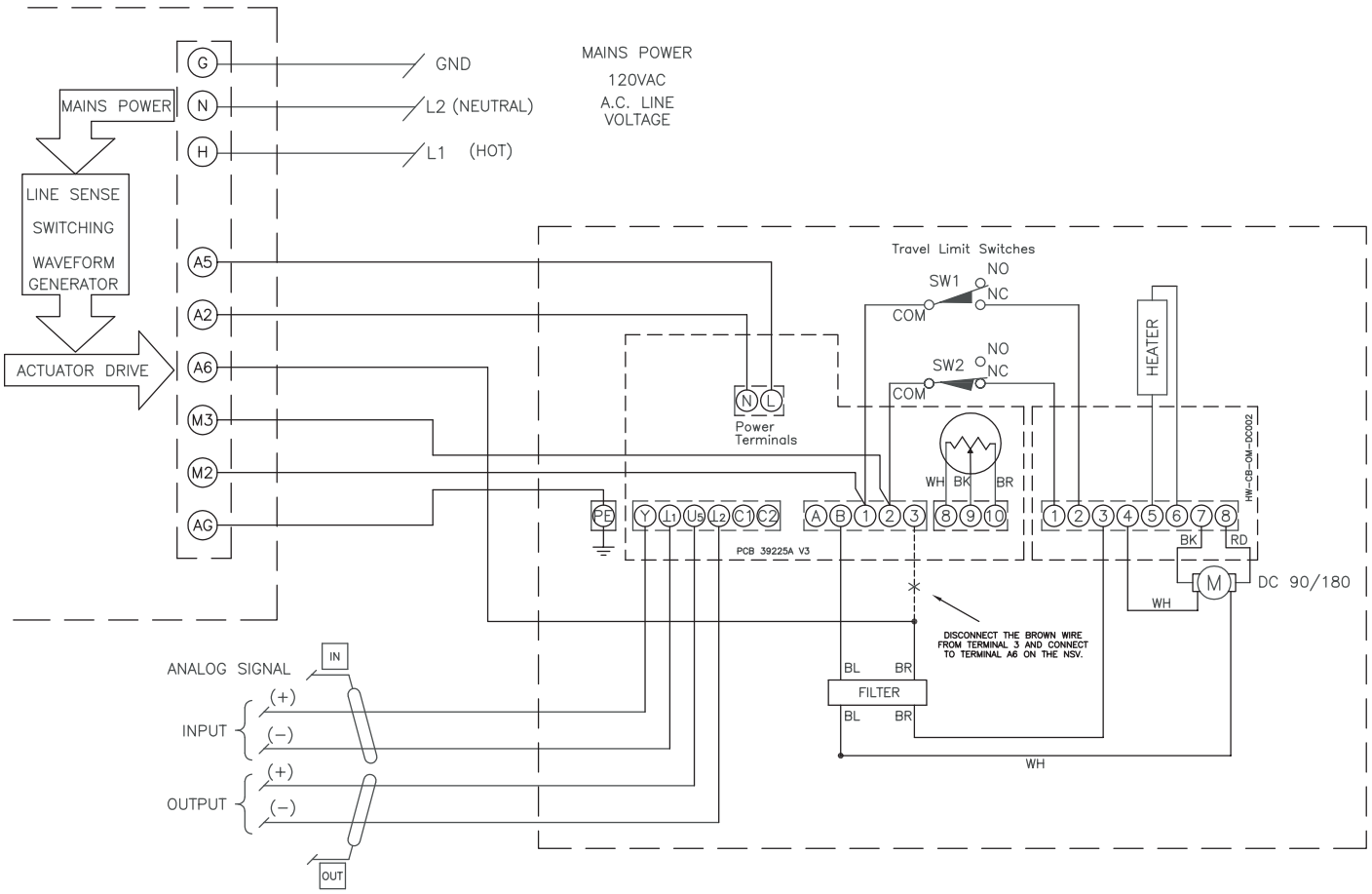


Sequence of Operation - 2 Position Control

The back up system is wired in series between the mains power and the actuator. Under normal operation, power supplied to TB1 H & N terminals will illuminate the green “LINE IN” indicator light and provide charging voltage to the battery system. While under mains power, the field select switch (or form A contacts) are enabled to control the positioning of the actuator. The end user can install a center-off switch for 3 point floating control, a SPDT toggle switch for 2 position control, or interface through an automation system’s form A contacts. Any method of operation will not affect the back up unit’s operation. While under mains power, the blue “BAT CHARGING” indicator light is illuminated while the yellow “B/U POWER” indicator light remains off. While under mains power, the position of the “FAIL POSITION SELECT” switch is irrelevant. Power is supplied through the interface cabinet and the actuator heater is enabled. No current is being drawn from the battery system during this mode of operation.

When the mains power is lost, charging power is no longer supplied to the battery system, and the green “LINE IN” indicator light is turned off. The battery system automatically generates modified-sine wave line voltage to provide power for the actuator. The blue “BAT CHARGING” indicator light is turned off, and the yellow “B/U POWER” indicator light is turned on. The “FAIL POSITION SELECT” switch becomes active, and depending on its position, drives the actuator either fully open or fully closed. During this mode of operation, the heater is NOT energized, and the position of any field interface switching is irrelevant. The battery system will provide ample power to drive the actuator more than 5 full torque cycles. However, once the actuator reaches its end-of-travel limit switch, power drain from the back-up system is reduced to the requirements of the yellow “B/U POWER” indicator light. After 15 minutes, the battery system turns itself off and waits for the mains power to return. The gear train design of the SY actuator provides automatic locking of the actuator position after the battery system shuts down. Normal operation is resumed when mains power returns.

NSV-SY Battery Back-Up System
For Belimo SY Series Electric Actuators, 2 Position or Modulating

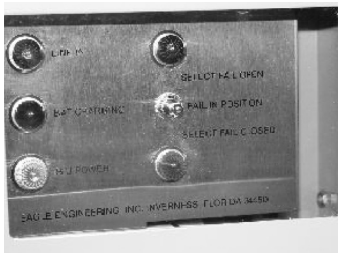


Sequence of Operation - Modulating Control

Note: This Model requires modification to SY-MFT Model interface wiring inside the SY actuator.

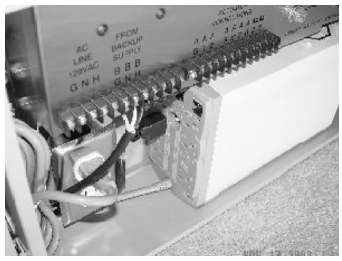
The back up system is wired in series between the mains power and the actuator. Under normal operation, power supplied to TB1 H & N terminals will illuminate the green “LINE IN” indicator light and provide charging voltage to the battery system. While mains power is present, the SY drive logic interface card is enabled and provides proportional positioning of the SY actuator in response to incoming signals from customer supplied field automation devices. While under mains power, the blue “BAT CHARGING” indicator light is illuminated while the yellow “B/U POWER” indicator light remains off. While under mains power, the position of the “FAIL POSITION SELECT” switch is irrelevant. Power is supplied through the interface cabinet and the actuator heater is enabled. All internal actuator controls are otherwise not affected by the backup system. All movement of the actuator is controlled by the automation control system. No current is being drawn from the battery system during this mode of operation.

When the mains power is lost, charging power is no longer supplied to the battery system, and the green “LINE IN” indicator light is turned off. The battery system automatically generates modified-sine wave line voltage to provide power for the actuator. The blue “BAT CHARGING” indicator light is turned off, and the yellow “B/U POWER” indicator light is turned on. The “FAIL POSITION SELECT” switch becomes active, and depending on its position, drives the actuator either fully open or fully closed. During this mode of operation the incoming proportional signal is irrelevant. The battery system will provide ample power to drive the actuator more than 5 full torque cycles. However, once the actuator reaches its end-of-travel limit switch, power drain from the back-up system is reduced to the requirements of the yellow “B/U POWER” indicator light. After 15 minutes, the battery system turns itself off and waits for the mains power to return. The gear train design of the SY actuator provides automatic locking of the actuator position after the battery system shuts down. Normal operation is resumed when mains power returns.

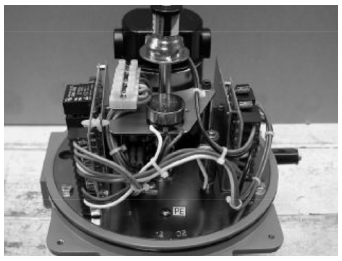


Key Access and Status Viewports

Battery System Status Indicators



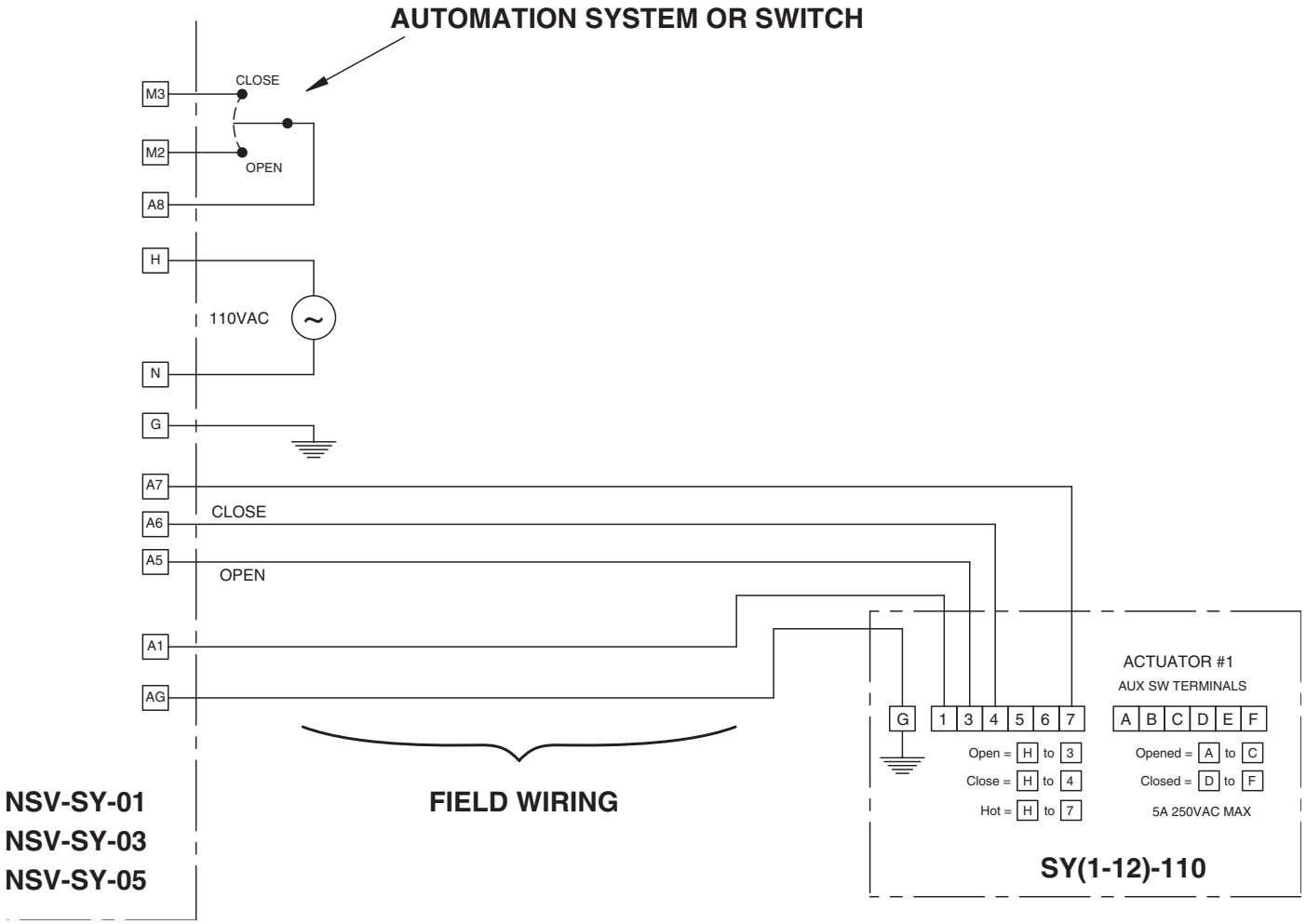
All Connections to
APC Backup are Modular



Connection to PCB Interface

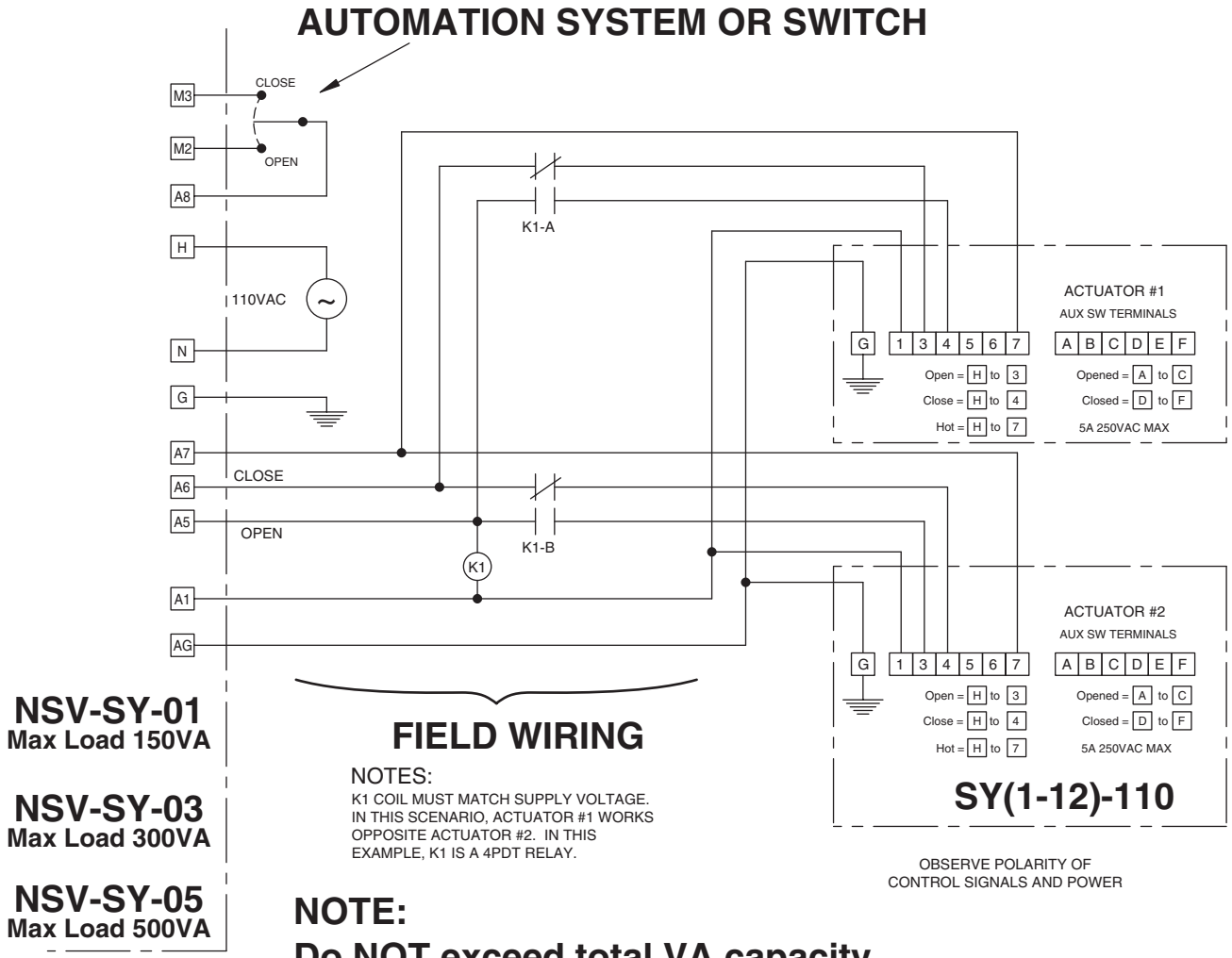
SIZING AND PERFORMANCE CHART

Actuator Model	Torque Output	Runtime (secs)	Draw (amps)	2 Position Model	Modulating Model	Runtime at 50% Capacity (minutes)	% Capacity Used at Full Runtime	Replacement Battery
SY1-110(P)	310	12	0.5	NSV-SY-01	NSV-SY-02	47	0.4%	RBC2
SY2-110(MFT)	801	15	1.0	NSV-SY-01	NSV-SY-02	35	0.7%	RBC2
SY3-110(MFT)	1335	22	1.0	NSV-SY-01	NSV-SY-02	35	1.0%	RBC2
SY4-110(MFT)	3560	16	1.3	NSV-SY-01	NSV-SY-02	19	1.4%	RBC2
SY5-110(MFT)	4450	22	1.5	NSV-SY-01	NSV-SY-02	17	2.2%	RBC2
SY6-110(MFT)	5785	28	1.85	NSV-SY-01	NSV-SY-02	17	2.7%	RBC2
SY7-110(MFT)	8900	46	3.2	NSV-SY-03	NSV-SY-04	5	15.3%	RBC2
SY8-110(MFT)	13350	46	4.0	NSV-SY-05	NSV-SY-06	15	5.1%	RBC32
SY9-110(MFT)	17800	58	3.2	NSV-SY-05	NSV-SY-06	24	4.0%	RBC32
SY10-110(MFT)	22250	58	4.0	NSV-SY-05	NSV-SY-06	15	6.4%	RBC32
SY11-110(MFT)	26700	58	3.0	NSV-SY-05	NSV-SY-06	25	3.9%	RBC32
SY12-110(MFT)	31150	58	4.0	NSV-SY-05	NSV-SY-06	15	6.4%	RBC32
SY1-24(P)	310	15	1.8	NSV-SY-11	NSV-SY-12	60	0.4%	RBC2
SY2-24(MFT)	801	15	3.0	NSV-SY-11	NSV-SY-12	40	0.6%	RBC2
SY3-24(MFT)	1335	22	3.0	NSV-SY-11	NSV-SY-12	40	0.9%	RBC2
SY4-24(MFT)	3560	16	6.0	NSV-SY-11	NSV-SY-12	20	1.3%	RBC2
SY5-24(MFT)	4450	22	6.5	NSV-SY-11	NSV-SY-12	19	1.9%	RBC2
SY1-220(P)	310	12	0.3	NSV-SY-21	NSV-SY-22	42	0.5%	RBC2
SY2-220(MFT)	801	15	0.5	NSV-SY-21	NSV-SY-22	36	0.7%	RBC2
SY3-220(MFT)	1335	22	0.5	NSV-SY-21	NSV-SY-22	36	1.0%	RBC2
SY4-220(MFT)	3560	16	0.6	NSV-SY-21	NSV-SY-22	22	1.2%	RBC2
SY5-220(MFT)	4450	22	0.7	NSV-SY-21	NSV-SY-22	19	1.9%	RBC2
SY6-220(MFT)	5785	28	0.8	NSV-SY-21	NSV-SY-22	17	2.7%	RBC2
SY7-220(MFT)	8900	46	1.6	NSV-SY-23	NSV-SY-24	6	12.8%	RBC32
SY8-220(MFT)	13350	46	2.0	NSV-SY-23	NSV-SY-24	4	19.2%	RBC32
SY9-220(MFT)	17800	58	1.6	NSV-SY-23	NSV-SY-24	6	16.1%	RBC32
SY10-220(MFT)	22250	58	2.0	NSV-SY-25	NSV-SY-26	18	5.4%	RBC32
SY11-220(MFT)	36700	58	1.6	NSV-SY-25	NSV-SY-26	26	3.7%	RBC32
SY12-220(MFT)	31150	58	2.2	NSV-SY-25	NSV-SY-26	15	6.4%	RBC32



Wiring diagram for a single on/off SY series 110vac actuator.

Building **mains power** is connected to G, N & H terminals. A control switch or dry contacts are connected between terminal A8 and M2 or M3 to control the positioning of the actuator under power. Terminals AG, A1, A5, A6 & A7 are connected to the SY actuator as shown. Observe wire size rules for longer wire runs.



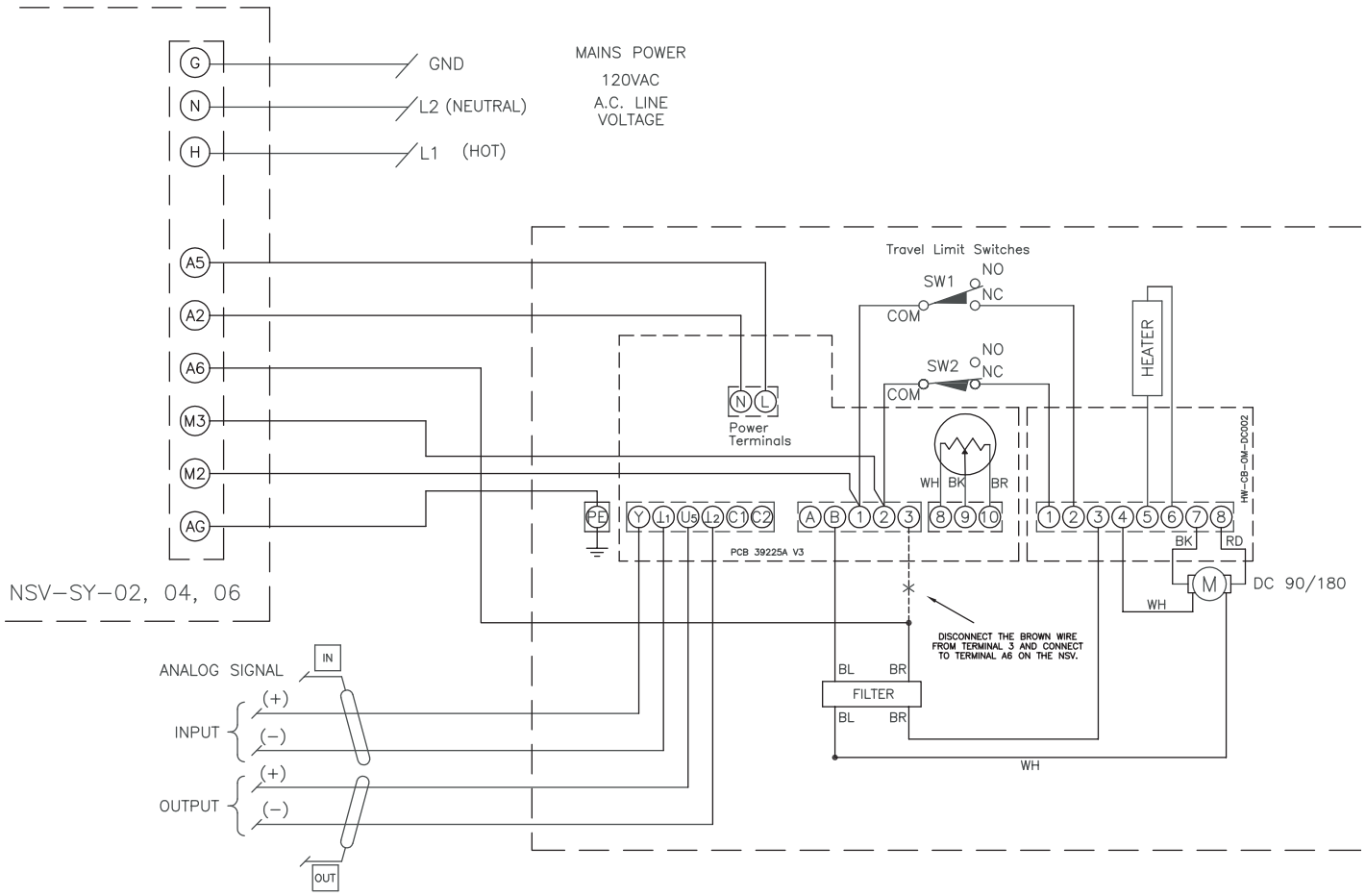
NOTE:
Do NOT exceed total VA capacity of NSV-SY backup system.

Wiring diagram for multiple on/off SY series 110vac actuators.

Do NOT exceed the Max Loads as stated above when connecting multiple actuators. Actuators connected in this manner operate in parallel from the common automation control switch and will fail-safe position together.

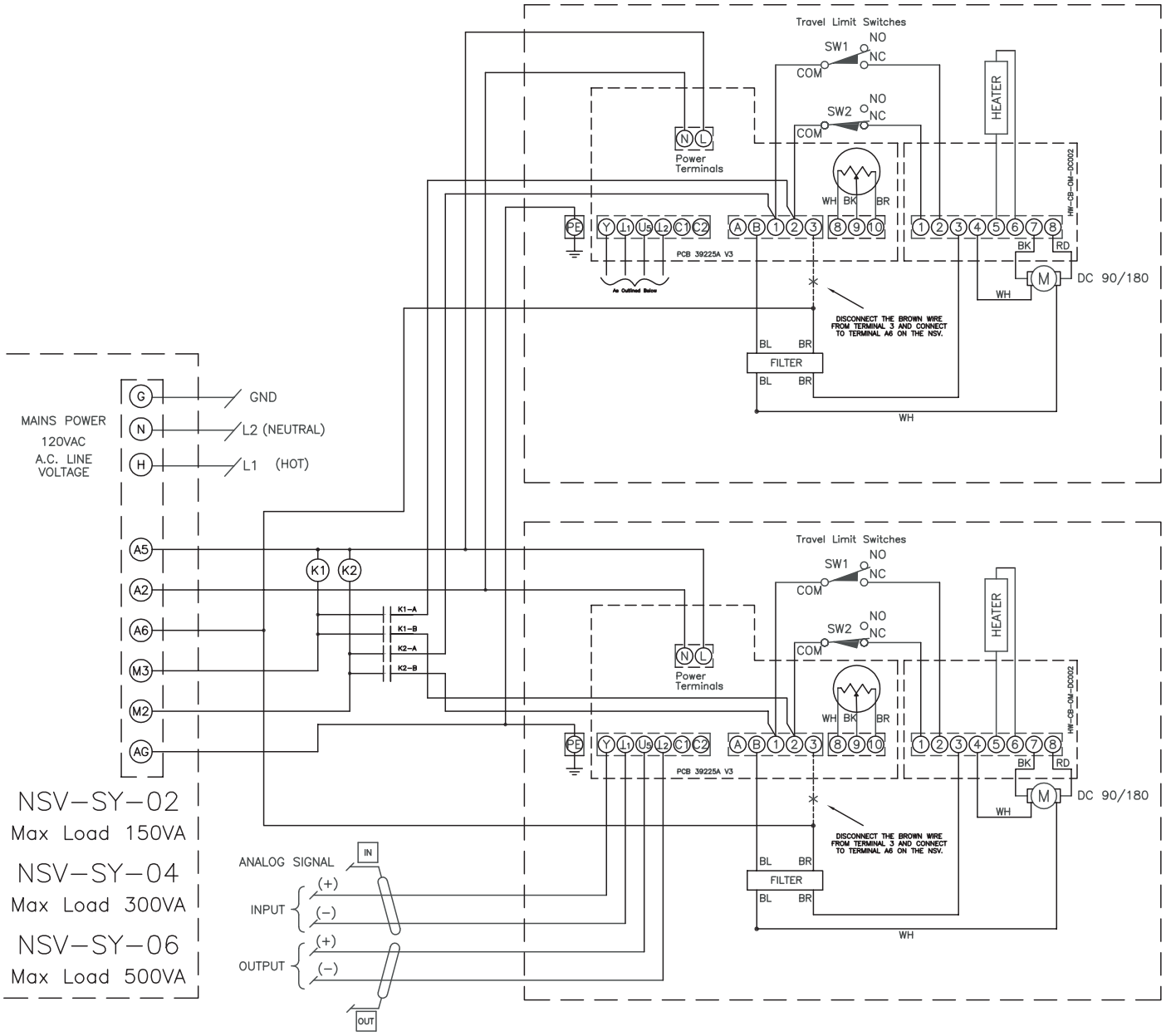
Building mains power is connected to G, N & H terminals. A control switch or dry contacts are connected between terminal A8 and M2 or M3 to control the positioning of the actuator under power. Terminals AG, A1, A5, A6 & A7 are connected to the SY actuator as shown. Observe wire size rules for longer wire runs.

NSV-SY Battery Back-Up System
Wiring Diagrams



Wiring diagram for a single proportional SY series 110vac actuator.

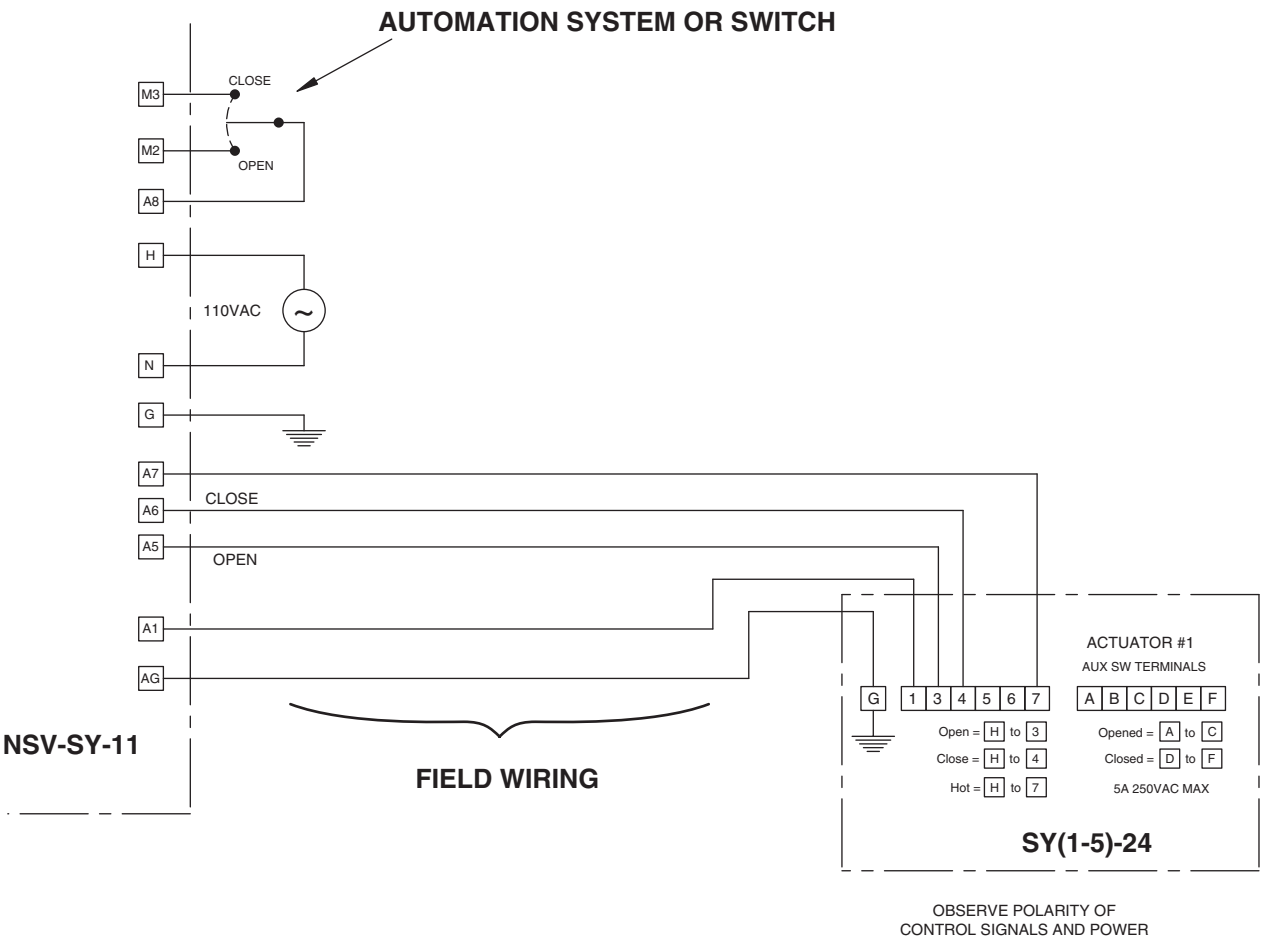
Building **mains power** is connected to G, N & H terminals. The control signal from the automation system is wired directly to the SY actuator. Terminals AG, A2, A5, A6, M2 & M3 are connected to the SY actuator as shown. Observe wire size rules for longer wire runs.



Wiring diagram for multiple proportional SY series 110vac actuators.

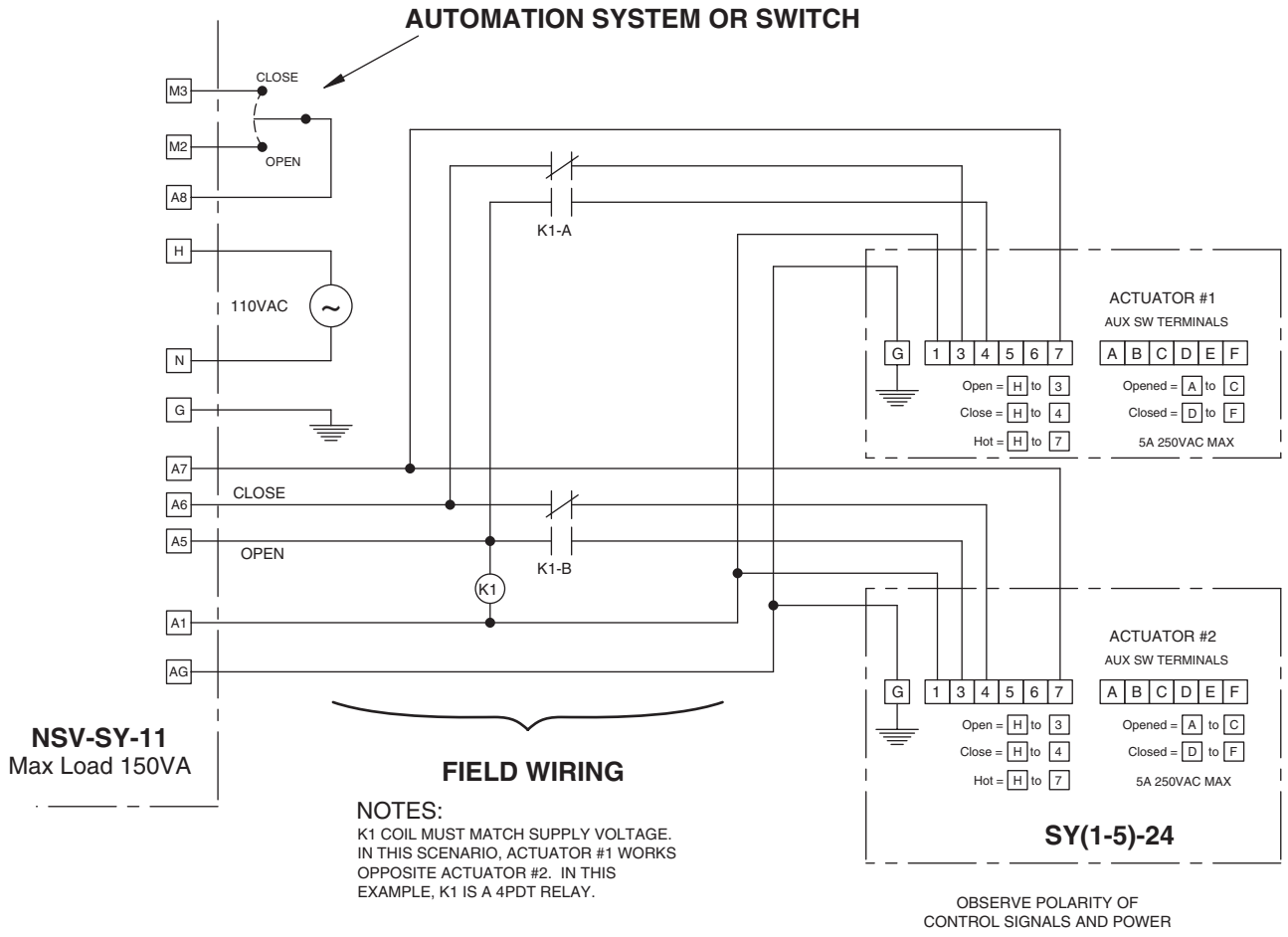
Do NOT exceed the Max Loads as stated above when connecting multiple actuators. Actuators connected in this manner operate in parallel from the common automation control signal and will fail-safe position together.

Building **mains power** is connected to G, N & H terminals. The control signal from the automation system is wired directly to the SY actuator. Terminals AG, A2, A5, A6, M2 & M3 are connected to the SY actuators as shown. Observe wire size rules for longer wire runs.



Wiring diagram for a single on/off SY series 24vac actuator.

Building **mains power** is connected to G, N & H terminals. A control switch or dry contacts are connected between terminal A8 and M2 or M3 to control the positioning of the actuator under power. Terminals AG, A1, A5, A6 & A7 are connected to the SY actuator as shown. Observe wire size rules for longer wire runs. The 24vac transformer required to run the SYxxx-24 actuator is **built in** to the NSV cabinet.



NOTE:

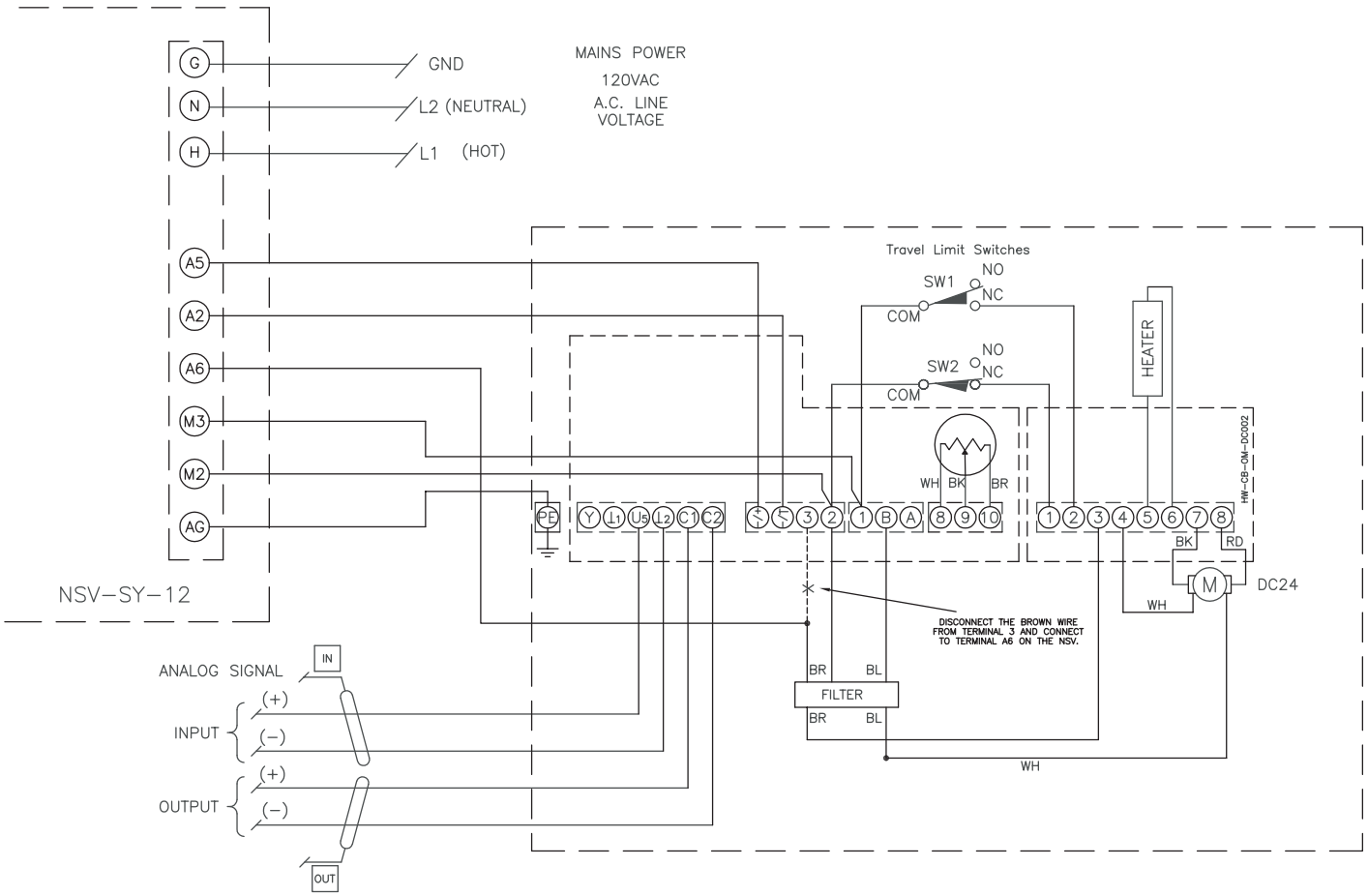
Do NOT exceed total VA capacity

of NSV-SY backup system.

Wiring diagram for multiple on/off SY series 24vac actuators.

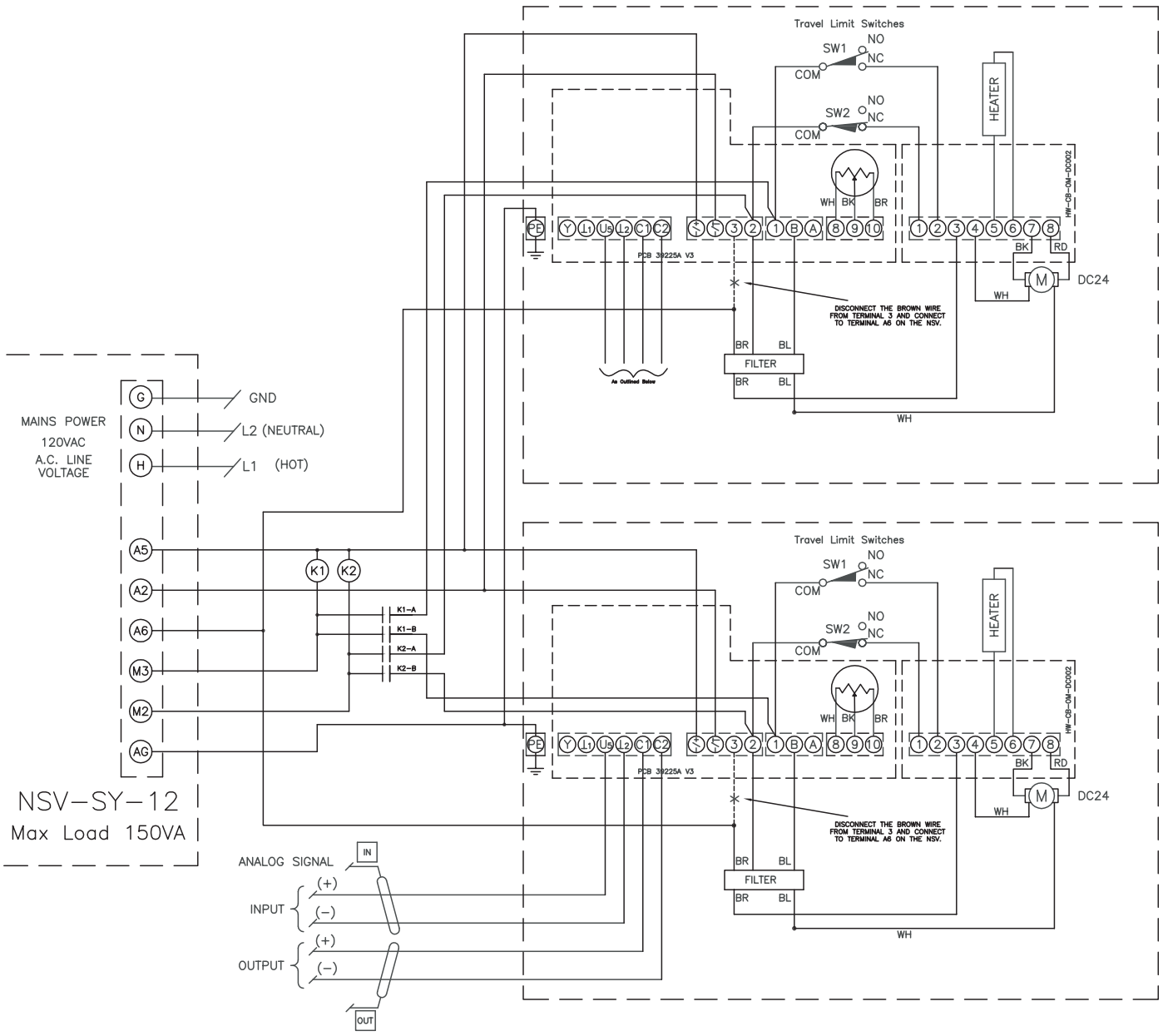
Do NOT exceed the Max Loads as stated above when connecting multiple actuators. Actuators connected in this manner operate in parallel from the common automation control switch and will fail-safe position together.

Building **mains power** is connected to G, N & H terminals. A control switch or dry contacts are connected between terminal A8 and M2 or M3 to control the positioning of the actuator under power. Terminals AG, A1, A5, A6 & A7 are connected to the SY actuator as shown. Observe wire size rules for longer wire runs. The 24vac transformer required to run the SYxxx-24 actuator is **built in** to the NSV cabinet.



Wiring diagram for a single proportional SY series 24vac actuator.

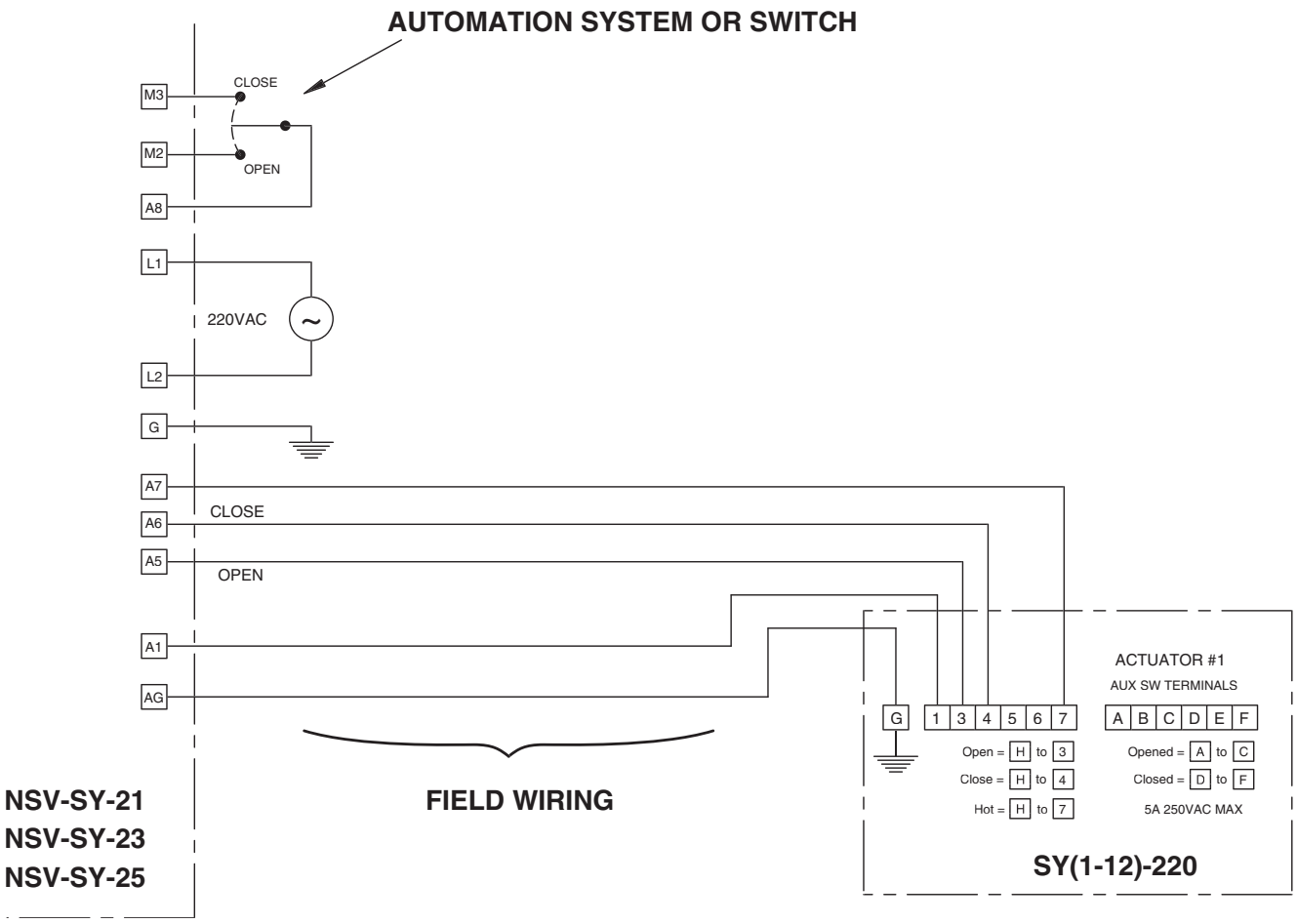
Building **mains power** is connected to G, N & H terminals. The control signal from the automation system is wired directly to the SY actuator. Terminals AG, A2, A5, A6, M2 & M3 are connected to the SY actuator as shown. Observe wire size rules for longer wire runs. The 24vac transformer required to run the SYxxx-24 actuator is **built in** to the NSV cabinet.



Wiring diagram for multiple proportional SY series 24vac actuators.

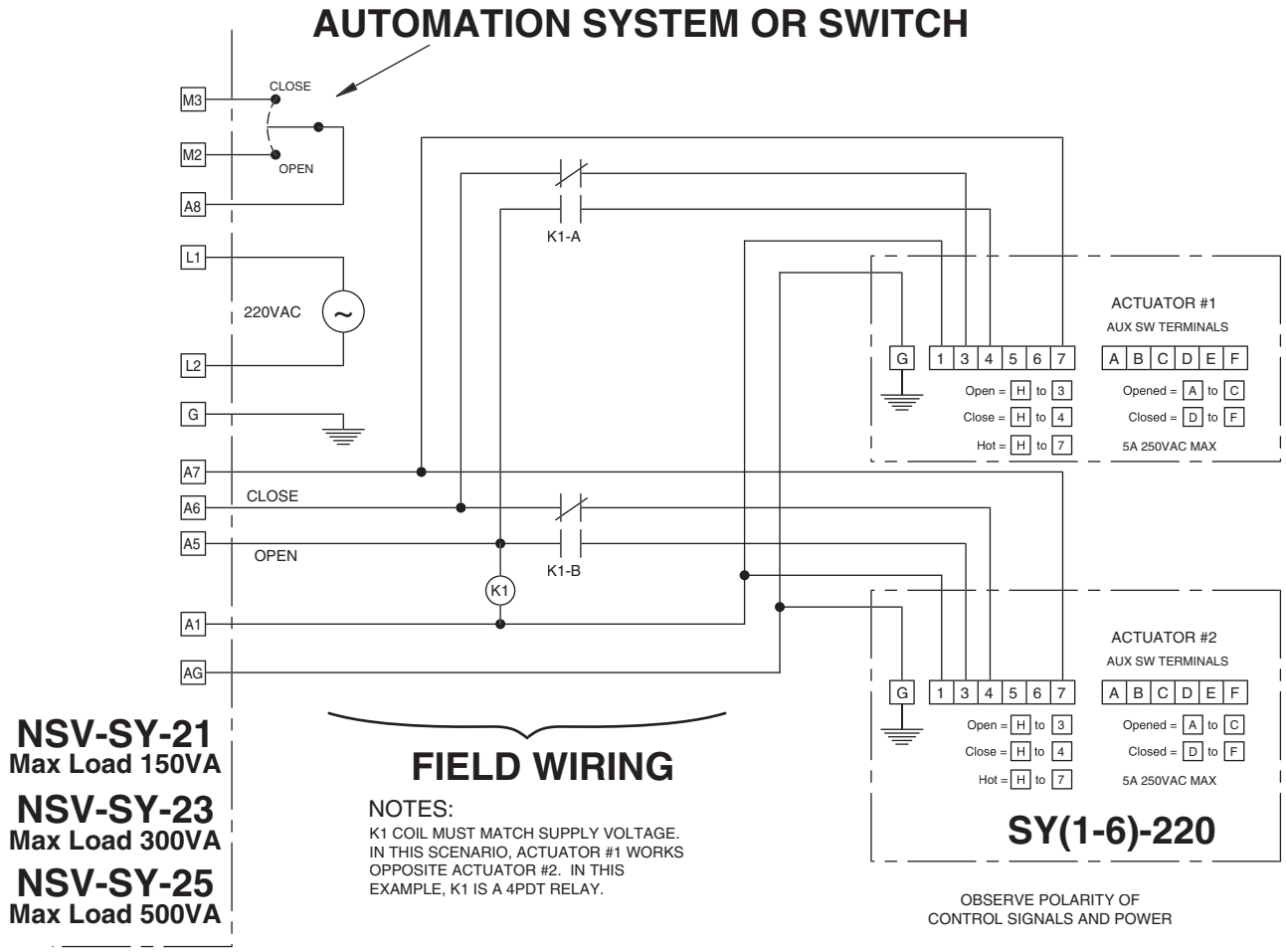
Do NOT exceed the Max Loads as stated above when connecting multiple actuators. Actuators connected in this manner operate in parallel from the common automation control signal and will fail-safe position together.

Building **mains power** is connected to G, N & H terminals. The control signal from the automation system is wired directly to the SY actuator. Terminals AG, A2, A5, A6, M2 & M3 are connected to the SY actuators as shown. Observe wire size rules for longer wire runs. The 24vac transformer required to run the SYxxx-24 actuator is **built in** to the NSV cabinet.



Wiring diagram for a single on/off SY series 220vac actuator.

Building **mains power** is connected to G, N & H terminals. A control switch or dry contacts are connected between terminal A8 and M2 or M3 to control the positioning of the actuator under power. Terminals AG, A1, A5, A6 & A7 are connected to the SY actuator as shown. Observe wire size rules for longer wire runs.

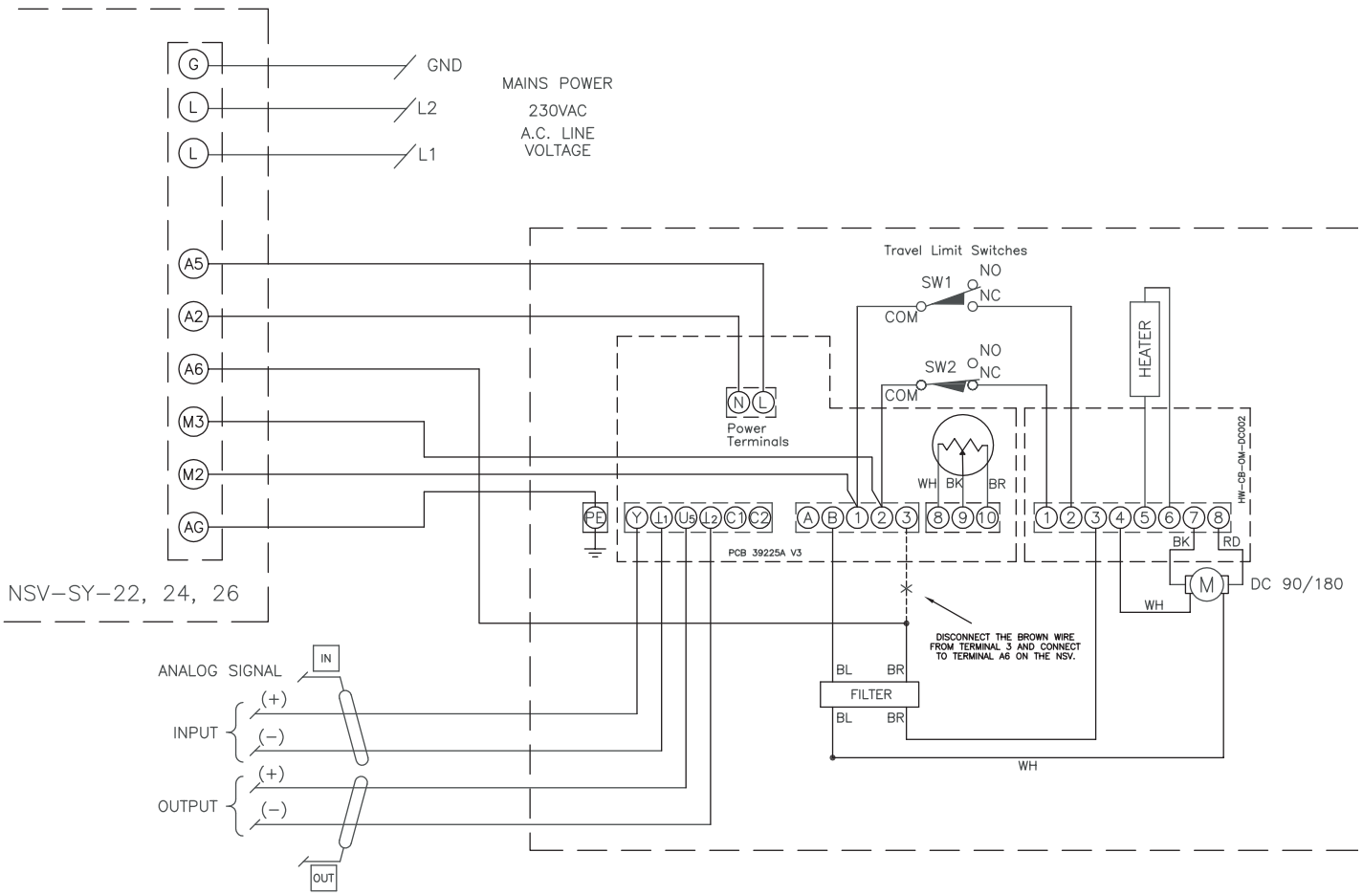


NOTE:
Do NOT exceed total VA capacity of NSV-SY backup system.

Wiring diagram for multiple on/off SY series 220vac actuators.

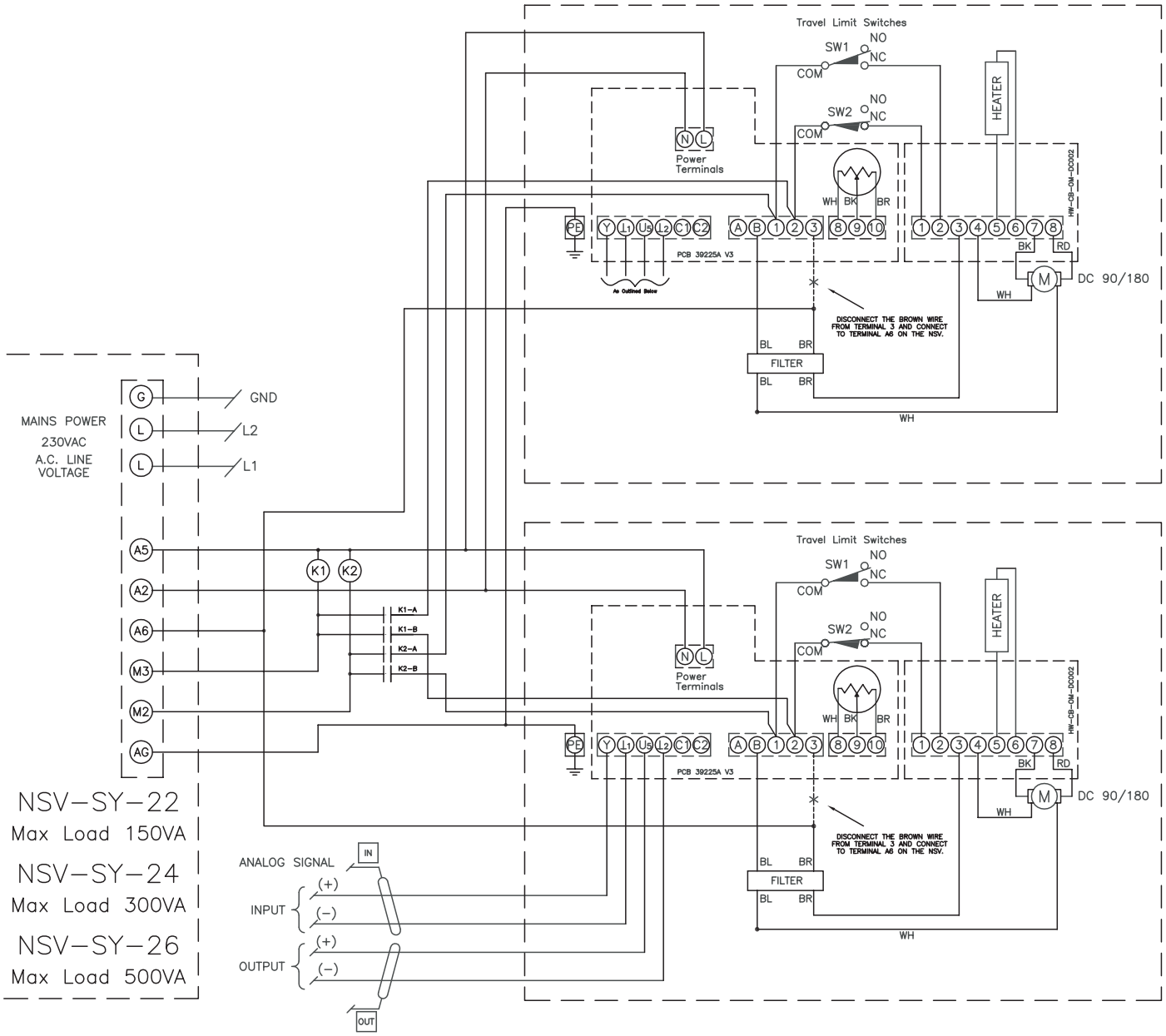
Do NOT exceed the Max Loads as stated above when connecting multiple actuators. Actuators connected in this manner operate in parallel from the common automation control switch and will fail-safe position together.

Building **mains power** is connected to G, N & H terminals. A control switch or dry contacts are connected between terminal A8 and M2 or M3 to control the positioning of the actuator under power. Terminals AG, A1, A5, A6 & A7 are connected to the SY actuator as shown. Observe wire size rules for longer wire runs.



Wiring diagram for a single proportional SY series 220vac actuator.

Building **mains power** is connected to G, N & H terminals. The control signal from the automation system is wired directly to the SY actuator. Terminals AG, A2, A5, A6, M2 & M3 are connected to the SY actuator as shown. Observe wire size rules for longer wire runs.



Wiring diagram for multiple proportional SY series 220vac actuators.

Do NOT exceed the Max Loads as stated above when connecting multiple actuators. Actuators connected in this manner operate in parallel from the common automation control signal and will fail-safe position together.

Building **mains power** is connected to G, N & H terminals. The control signal from the automation system is wired directly to the SY actuator. Terminals AG, A2, A5, A6, M2 & M3 are connected to the SY actuators as shown. Observe wire size rules for longer wire runs.

Battery Back-Up System
For Belimo SY Series Electric Actuators, 2 Position or Modulating

BACK-UPS CS 350VA/PART NUMBER: BK350
Availability: North America, Latin America

Product Overview

Description
APC Back-UPS, 350VA/210W,
Input 120V/ Output 120V

General Features
Addl Surge Protected Outlets, Audible Alarms, Cord Management, Intelligent Battery Management, Internet FAX - modem - DSL protection, Overload Indicator, Replace Batt Indicator, Site wiring fault indicator, Software, User Replaceable batteries

Documentation
User Manual

Technical Specifications

Input
Nominal input 120 V
Input frequency 50/60 Hz +/- 5 Hz (auto sensing)
Input Connection Type
NEMA 5-15P
Cord Length 6 feet
Input voltage range for main operations 98 - 140 V

Output

Output power capacity 350 VA
Output power capacity 210 Watts
Nominal output voltage 120 V
Waveform type Stepped approximation to a sinewave

Output Connections (3)
NEMA 5-15R (3)
NEMA 5-15R (Surge)

Batteries

Typical backup time at half load 11.4 minutes
Battery type Maintenance-free sealed Lead-Acid battery with suspended electrolyte: leakproof
Typical recharge time ** 8 hour(s)
Replacement battery cartridge (1) RBC2

Communications & Management

Control panel LED status display with On Line: On Battery: Replace Battery and Overload indicators
Audible alarm Alarm when on battery: distinctive low battery alarm : overload continuous tone alarm

Surge Protection and Filtering

Surge energy rating 480 joules
Filtering Full time multi-pole noise filtering: 5% IEEE surge let-through: zero clamping response time: meets UL 1449
Dataline protection RJ-11 Modem/Fax/DSL protection (two wire single line)

BACK-UPS CS 500VA/PART NUMBER: BK500
Availability: North America, Latin America

Product Overview

Description
APC Back-UPS, 500VA/300W,
Input 120V/ Output 120V

General Features
Addl Surge Protected Outlets, Audible Alarms, Cord Management, Intelligent Battery Management, Internet FAX - modem - DSL protection, Overload Indicator, Replace Batt Indicator, Site wiring fault indicator, Software, User Replaceable batteries

Documentation
User Manual

Technical Specifications

Input
Nominal input 120 V
Input frequency 50/60 Hz +/- 5 Hz (auto sensing)
Input Connection Type
NEMA 5-15P
Cord Length 6 feet
Input voltage range for main operations 98 - 140 V

Output

Output power capacity 500 VA
Output power capacity 300 Watts
Nominal output voltage 120 V
Waveform type Stepped approximation to a sinewave

Output Connections (3)
NEMA 5-15R (3)
NEMA 5-15R (Surge)

Batteries

Typical backup time at half load 11.4 minutes
Battery type Maintenance-free sealed Lead-Acid battery with suspended electrolyte: leakproof
Typical recharge time ** 8 hour(s)
Replacement battery cartridge (1) RBC2

Communications & Management

Control panel LED status display with On Line: On Battery: Replace Battery and Overload indicators
Audible alarm Alarm when on battery: distinctive low battery alarm: overload continuous tone alarm

Surge Protection and Filtering

Surge energy rating 480 joules
Filtering Full time multi-pole noise filtering: 5% IEEE surge let-through: zero clamping response time: meets UL 1449
Dataline protection RJ-11 Modem/Fax/DSL protection (two wire single line)

BACK-UPS 900VA/PART NUMBER: BR900

Availability: North America, Latin America

Product Overview

Description

APC Back-UPS, 900VA/540W, Input 120V/ Output 120V

General Features

Audible Alarms, Automatic Voltage Regulation (AVR), Easy Overload Recovery, Ethernet Protection, Hot Swap Batteries, Modem Protection, Overload Indicator, Replace Batt Indicator, Site wiring fault indicator, User Replaceable batteries

Documentation

User Manual

Technical Specifications

Input

Nominal input voltage 120 V

Input frequency 50/60 Hz +/- 3 Hz (auto sensing)

Input Connection Type NEMA 5-15P

Cord Length 6 feet

Input voltage range for main operations 88 - 139 V

Output

Output power capacity 900 VA

Output power capacity 540 Watts

Nominal output voltage 120 V

Waveform type Stepped approximation to a sinewave

Output Connections (7)NEMA 5-15R

Batteries

Typical backup time at half load 17.6 minutes

Battery type Maintenance-free sealed Lead-Acid battery with suspended electrolyte: leakproof

Typical recharge time ** 8 hour(s)

Replacement battery cartridge (1) RBC32

Communications & Management

Control panel LED status display with On Line: On Battery: Replace Battery and Overload indicators

Audible alarm Alarm when on battery: distinctive low battery alarm: overload continuous tone alarm

Surge Protection and Filtering

Surge energy rating 320 joules

Filtering Full time multi-pole noise filtering: 5% IEEE surge let-through: zero clamping response time: meets UL 1449

Dataline protection RJ-11 Modem/Fax/DSL protection (two wire single line) plus RJ-45 ethernet

PHYSICAL DIMENSIONS

NSV-SY Series Back-Up Systems

Maximum Dimensions	NSV 01, 02 21, 22	NSV-SY 03, 04, 11 12, 23, 24	NSV-SY 05, 06 25, 26
Height	13	13	15
Width	22	22	22
Depth	5	5	5
Net weight	36#	42#	44#
Shipping Weight	38#	44#	48#

Environmental

Operating Relative Humidity 0 - 95%

Operating Elevation 0-10000 feet (0-3000 m)

Storage Temperature -15 - 45 °C (5 - 113°F)

Storage Relative Humidity 0 - 95%

Storage Elevation 0-50000 feet (0-15000 m)

Audible noise at 1 meter from surface of unit 45 dBA

Online thermal dissipation 24 BTU/hr

Conformance - APC Back UP Module

Approvals CSA, FCC B, UL 1778

Approvals FCC Part 15 Class B, Industry Canada, UL 1778, cUL Listed

** The time to recharge to 90% of full battery capacity following a discharge to shutdown using a load rated for 1/2 the full load rating of the UPS.

HD(U) Series Butterfly Valves

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(U) 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(U) series BF valves. (Fig. 1a)
- Follow the recommended flange bolting sequence. (Fig. 8, pg. 85)
- When installing in Victaulic piping systems, use Victaulic 41 series flange nipples.

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.

HD(U) Series Butterfly Valves

Fig. 1

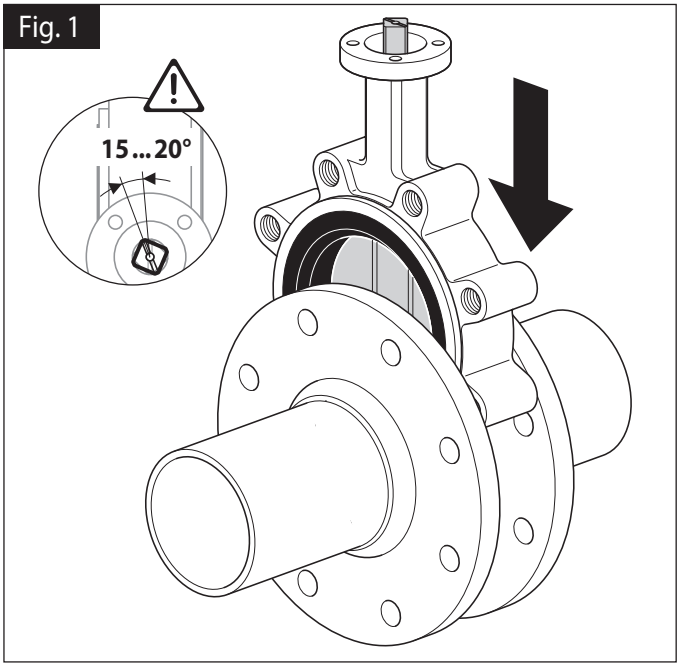


Fig. 1a

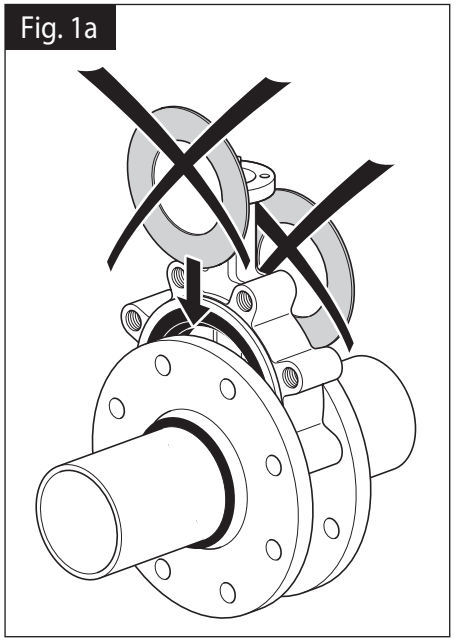


Fig. 2

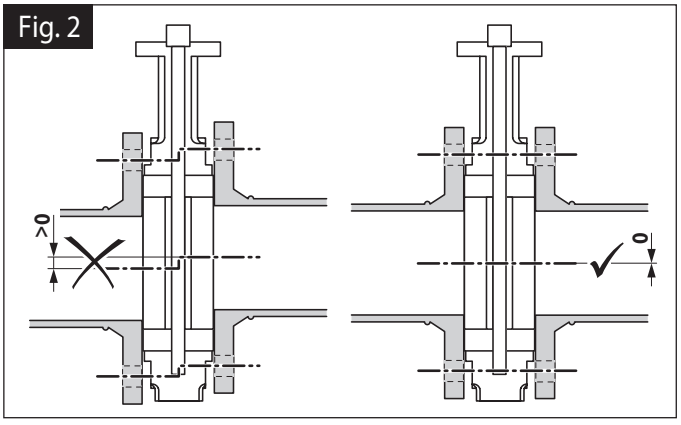


Fig. 3a

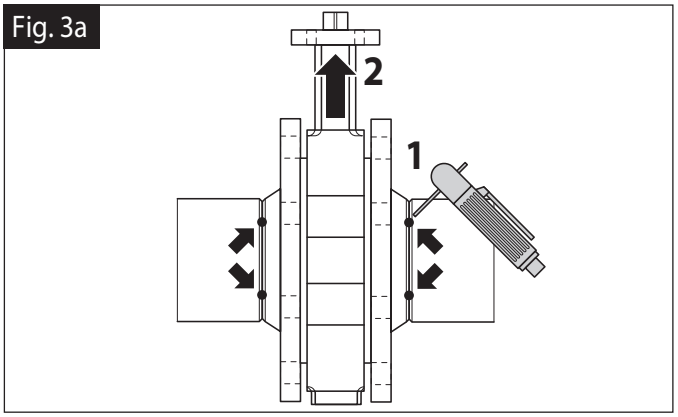


Fig. 3b

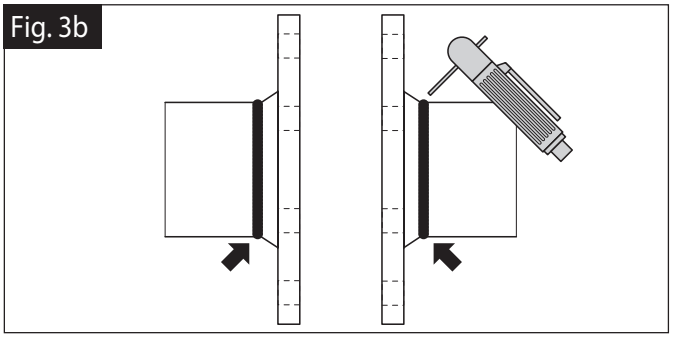
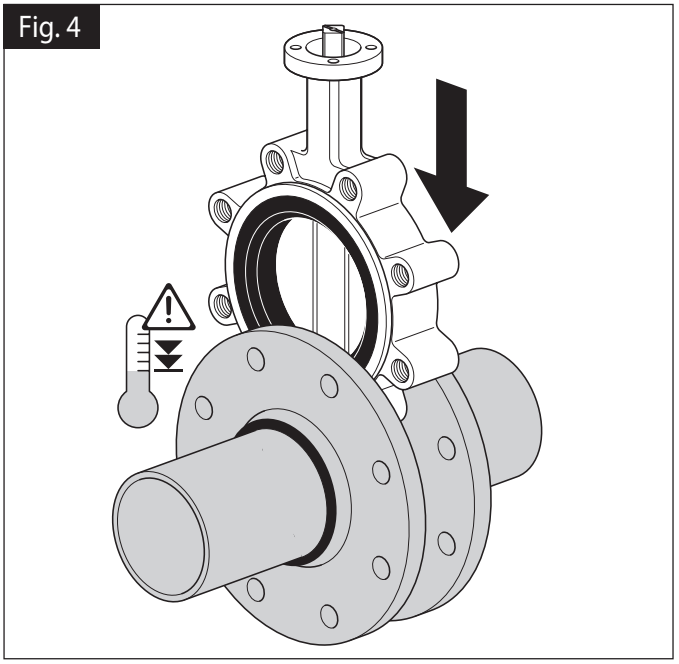


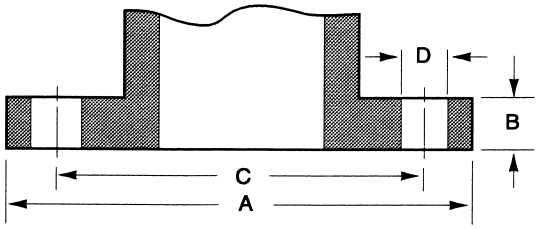
Fig. 4



FLANGE BOLTING RECOMMENDATIONS

Flange Detail for ANSI B16.5 Pipe Flanges

	FLANGES		DRILLING		BOLTING	
Nominal Pipe Size	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”	14-1/4”	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”



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

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.
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	1.25
2-1/2”	5/8-11	4	1.50
3”	5/8-11	4	1.50
4”	5/8-11	8	1.75
5”	3/4-10	8	1.75
6”	3/4-10	8	2.00
8”	3/4-10	8	2.25
10”	7/8-9	12	2.25
12”	7/8-9	12	2.50
14”	1-8	12	2.75
16”	1-8	16	2.75
18”	1 1/8-7	16	3.50
20”	1 1/8-7	20	4.25
24”	1 1/4-7	20	4.75
30”	1 1/4-7	24	4.50

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. 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)
2. 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.
3. 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)
4. If an actuator is to be operated, electricity should be connected to the unit in accordance with the local electrical codes.
5. 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.
6. The valve is now ready for operation.

Fig. 5

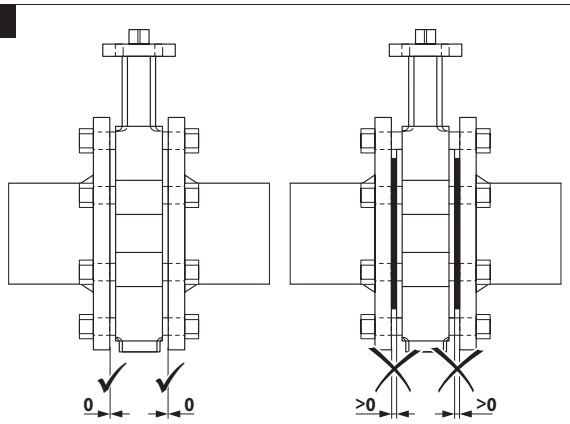


Fig. 6

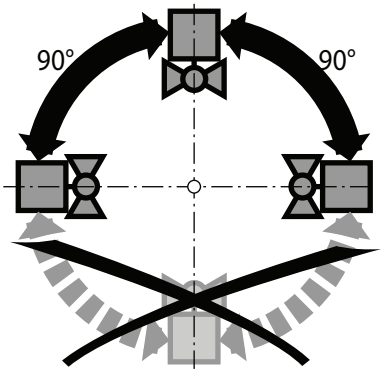


Fig. 7

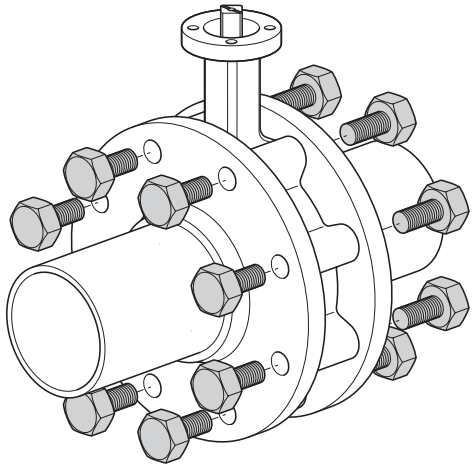


Fig. 8

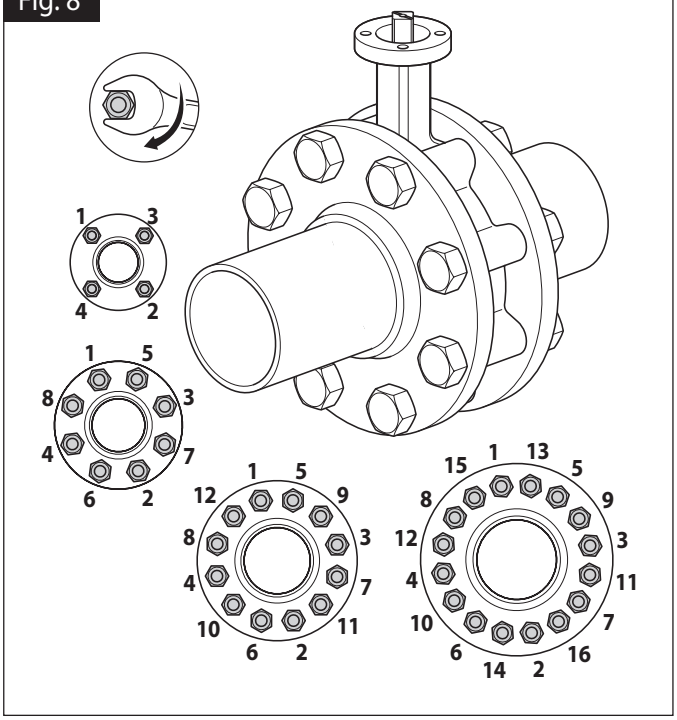
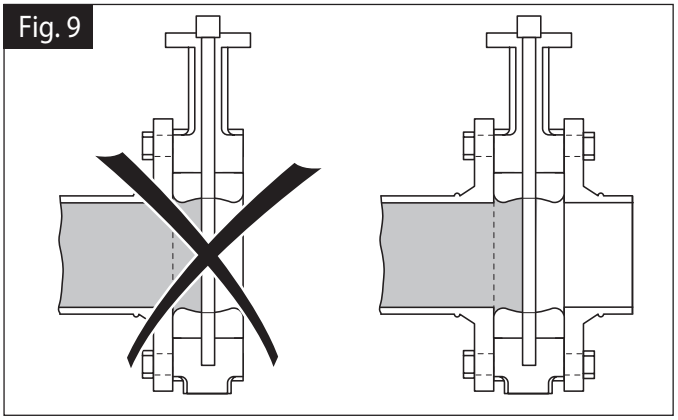


Fig. 9



Valve Installation- Dead End Service

INSTALLATION NOTES

1. Follow previously described pre-installation and installation procedures.
2. To achieve the full close-off pressure of the HD/HDU 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.

Valve Design

1. The SHP Series High Performance Butterfly Valve features a double offset (or, double eccentric) shaft design to minimize seat abrasion and lower torque. This double offset design allows the disc to lift off and "cam" away from the seat as it rotates open.
2. The SHP valve always rotates clockwise to close (when viewed from above) and counterclockwise to open.
3. The valve body has an Overtravel Stop which prevents the disc from over rotating into the wrong quadrant. This stop is not to be used as a disc position stop; if the disc contacts the Overtravel Stop, this means it has rotated beyond the seat.
4. The SHP valve is bidirectional, but the preferred installation position is with the seat in the upstream position (SUS). Note the arrow on the metal tag attached to the valve body.

Safety Precautions

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 install 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 in the full-closed position before installing the valve.
6. Take care in handling the valve; if you treat it like a machine, it will operate like a machine…if you treat it like a piece of pipe, it may work like a piece of pipe.

Flange Compatibility

The SHP valve is designed to fit between flanges as follows:

ANSI Class 150	2" to 24"
MSS SP-44 Class 150	30" to 48"
ANSI B16.47 Class 150 A Flanges	
ANSI Class 300	2" to 24"
MSS SP-44 Class 300	30"
ANSI B16.47 Class 200 A Flanges	

Gasket Compatibility

The SHP valve is designed to accommodate the use of standard fiber gaskets (such as non-asbestos, flexible graphite, asbestos or equivalent gasket materials) of 1/16" or less, meeting the dimensional requirements of ANSI B16.21-1978. Thick elastomeric gaskets are not recommended. Metallic wound (Flexitallic) gaskets may also be used.

Pipe Schedule Compatibility

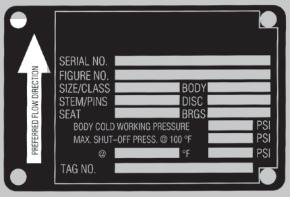
The SHP valve is designed to allow the disc edge to rotate into the open position without interference with the pipeline I.D. in the following pipe schedules:

SIZE	ANSI 150	ANSI 300
2" - 12"	SCH 80	SCH 80
14" - 24"	SCH 40	SCH 80
30"	SCH 30	SCH 80
36" - 42"	STD WT	
48"	XS	

Product Identification

1. Every SHP valve has a metal identification tag attached to the valve body. Information includes the Figure Number, the Size and Pressure Class, the Materials of Construction, and the Operating Pressures and Temperatures.
2. Every SHP valve is hydrostatically tested before it is shipped. The metal tag also includes a Serial Number; this number, unique for each valve, is recorded by the Belimo Quality Control Department along with the test results and material certification data, for individual traceability and verification of every valve produced.

SHP series valves have a preferred flow direction.



PreferredFlowrate

UNPACKING AND STORAGE INSTRUCTIONS

1. Check the packing list against the valve received to verify that the quantities, sizes and materials are correct.
2. Check to make sure that the valve and operator were not damaged during shipment.
3. If the valve is to be stored before being installed, it should be protected from harsh environmental conditions.
4. Store the valve with the disc in the closed position to protect the sealing edge and the seat.
5. Keep the valve in a clean location, away from dirt, debris and corrosive materials.
6. Keep the valve in a dry area with the flange protectors attached.
7. Keep the valve in a cool location if possible, out of direct sunlight.

SHP Series Butterfly Valves

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.

Installation Practices

- SHP series butterfly valves are designed to be installed between ANSI 125/150 flat-faced or raised face, slip-on weld neck flanges.
- Valve should be installed a minimum of 6 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.
- **Flange gaskets must be used on SHP series BF valves.**
- Make sure the flange faces are clean and free of rust, scale and debris to prevent damage to the flange gasket.
- Follow the recommended flange bolting sequence found in the "Installation Recommendations" section of this guide.

Installation using Welded Flanges

- Mount flanges on both sides of valve body and install bolts to properly align valve body and both flanges.
- Make sure the valve I.D. and flange internal diameters are in alignment.
- Take valve body / flange pair assembly and align with piping ends.
- TACK weld the flanges to the piping in several places. 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.
- Let the piping components cool completely before re-inserting the valve body.
- ***WARNING!*** Seam welding with the valve body installed between the flanges can damage the valve seats due to heat migration through the flange to the valve body.

Butterfly Sizing and Selection

CONSULT CHART ON **PAGE 5**
(Flow in Standard Weight Pipe-Fluid Velocity in GPM).

For SHP Series Butterfly Valves, the 32 ft/second column is applied.

For example: Application requires a 2-way, 600 GPM Butterfly valve, a valve of 3" minimum would be selected. The 3" valve at 32 ft/second would be able to withstand a capacity of 705 GPM, without damage to the seat.

Notes

1. Most Butterflies are line size and piping geometry is not considered. If valve size must be reduced, a recommendation is to select a valve only one size less than the pipe. (Do not exceed velocity limit)
2. For a modulating Butterfly valve, the Cv rating is determined at 60° open. For a 2-position Butterfly valve, the Cv is determined at 90° open.

Consult Belimo Technical Support for applications involving steam, high velocity requirements, etc.

Pre-Installation Procedure

1. Remove the protective face 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. Actuators should be mounted on the valve prior to installation to facilitate proper alignment of the disc in the valve seat.
4. The valve should be in the **closed position**. Make sure the open and closed positions of the actuator correspond to the counter-clockwise to open direction of rotation of the valve.
5. 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.
6. Check the valve identification tag for valve class, 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.

7. Check the flange bolts or studs for proper size, threading, and length.

REMEMBER: Install the valve with the disc in the full-closed position using the appropriate flange gaskets on BOTH valve flange faces.

Valve Installation Procedure

The SHP High Performance Butterfly Valve can be installed in the pipeline with the shaft in the vertical, horizontal, or other intermediate position. Based on applications experience, however, in media with concentrations of solid or abrasive particles or media subject to solidification buildup, valve performance and service life will be enhanced by mounting the valve with the shaft in the horizontal position.

All SHP valves are bidirectional and can be mounted in the pipeline in either flow direction; however, the preferred flow direction for all seat styles and materials is with the seat retainer ring located upstream (sus) to provide maximum seat protection.

For SHP Series valves

a. Noting the flow direction arrow on the tag, place the valve between the flanges, making sure the arrow on the tag points in the direction of the flow.

b. Install the lower flange bolts loosely, leaving space for the flange gaskets.

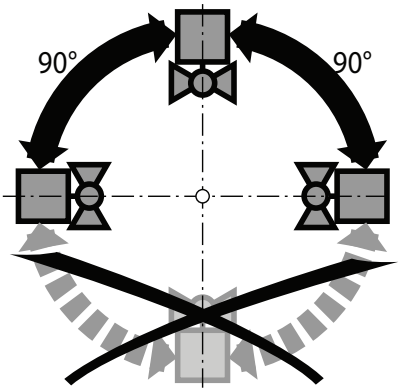
c. After inserting the flange gaskets, install the remaining bolts.

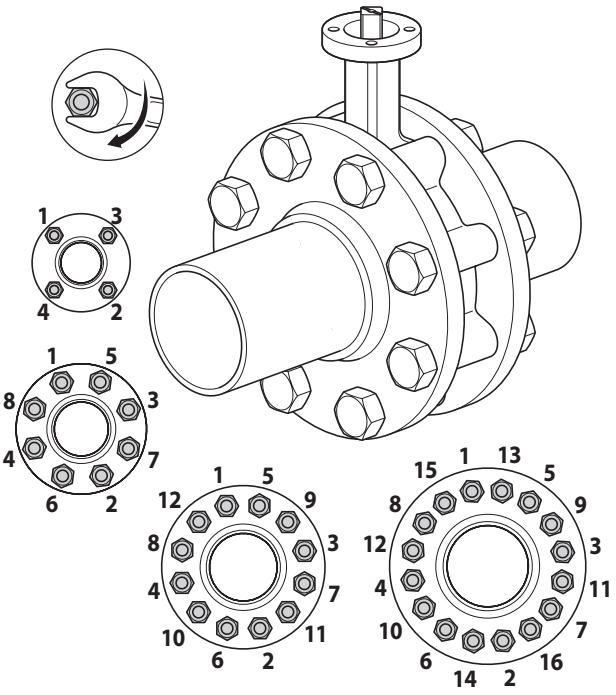
3. Using the sequence shown to the right, tighten the flange bolts evenly to assure uniform gasket compression.

CAUTION: The SHP valve should be centered between the flanges and gaskets to prevent damage to the disc edge and shaft as a result of the disc striking the flange, gasket, or pipe.

4. Electricity should be connected to the unit as specified by the actuator manufacturer.
5. The valve is now ready for operation.

NOTE
Actuator must be mounted at or above pipe center line for all actuator types.



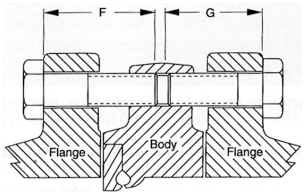


FLANGE BOLTING RECOMMENDATIONS

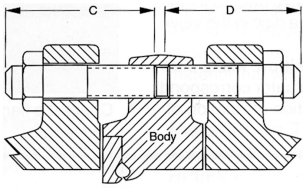
Lug Valves, 2"– 30", ANSI 125/150 Bolt Pattern

		STUDS & NUTS						MACHINE BOLTS					
Valve Size	Thread Size	C	QTY	LENGTH	D	QTY	LENGTH	F	QTY	LENGTH	G	QTY	LENGTH
2"	5/8-11		4	2.50		4	2.50		4	1.63		4	1.63
2-1/2"	5/8-11		4	2.75		4	2.75		4	1.85		4	1.85
3"	5/8-11		4	3.25		4	2.50		4	2.25		4	1.63
4"	5/8-11		8	3.00		8	2.75		8	2.12		8	1.88
5"	3/4-10		8	3.00		8	3.00		8	2.00		8	2.00
6"	3/4-10		8	3.50		8	3.00		8	2.50		8	1.88
8"	3/4-10		8	3.75		8	3.25		8	2.70		8	2.13
10"	7/8-9		12	4.25		12	3.50		12	3.00		12	2.25
12"	7/8-9		12	4.75		12	3.50		12	3.45		12	2.35
14"	1-8		12	5.00		12	4.00		12	3.75		12	2.70
16"	1-8		16	5.50		16	4.25		16	4.12		16	2.75
18"	1-1/8-8		16	5.75		16	4.75		16	4.38		16	3.25
20"	1-1/8-8		16	6.75		16	4.75		16	5.12		16	3.25
	1-1/8-8		4**	5.50		4**	4.75		4*	4.12		4**	3.25
24"	1-1/4-8		20	7.25		20	5.75		20	5.63		20	4.25
30"	1-1/4-8		24	7.75		24	7.75		24	6.25		24	6.25
	1-1/4-8		4**	6.50		4**	6.25		4*	5.00		4**	4.63

LUG BODY
HEX HEAD MACHINE BOLTS



LUG BODY
STUDS and NUTS



Bolting and torque recommendations are made without warranty, and apply only to steel weld-neck or slip-on flanges.

The use of lock washers and/or lubrication with the bolting will affect stated torque values.

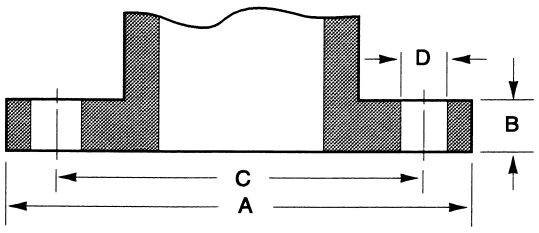
Length of machine bolts based on:
1. Gasket thickness of 0.06 inches.
2. Minimum flange thickness of weld-neck flanges per ANSI B16.5 and B16.47 Series A.

* Variation to specified bolting length may result in improper installation.

FLANGE BOLTING RECOMMENDATIONS

Flange Detail for ANSI 150 B16.5 Pipe Flanges 150 SHP Series Butterfly Valves

	FLANGES		DRILLING		BOLTING	
Nominal Pipe Size	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"	14-1/4"	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"



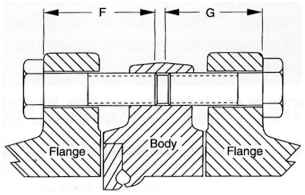
Every effort is made to provide accurate information, but no liability for claims arising from erroneous data will be accepted by Belimo.

FLANGE BOLTING RECOMMENDATIONS

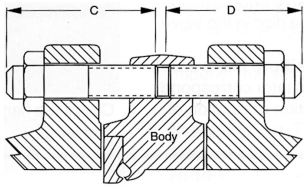
Lug Valves, 2"-24", ANSI 250/300 Bolt Pattern

		BOLT ENGAGEMENT IN VALVE*				STUDS & NUTS				MACHINE BOLTS			
Valve Size	Thread Size	A QTY	LENGTH	B QTY	LENGTH	C QTY	LENGTH	D QTY	LENGTH	F QTY	LENGTH	G QTY	LENGTH
2"	5/8-11	8	.94	8	.57	8	2.25	8	2.62	8	1.50	8	2.00
2-1/2"	5/8-11	8	.97	8	.67	8	2.75	8	3.00	8	1.75	8	2.00
3"	3/4-10	8	1.03	8	.82	8	3.00	8	3.00	8	2.12	8	2.00
4"	3/4-10	8	1.19	8	.87	8	3.50	8	3.25	8	2.50	8	2.00
5"	3/4-10	8	1.22	8	.79	8	5.25	8	3.62	8	2.25	8	2.75
6"	3/4-10	12	1.30	12	.92	12	3.75	12	3.50	12	2.75	12	2.25
8"	7/8-9	12	1.70	12	1.12	12	4.50	12	4.00	12	3.25	12	2.75
10"	1-8	16	1.86	16	1.30	16	5.00	16	4.50	16	3.25	16	3.12
12"	1-1/8-8	16	2.05	16	1.47	16	5.50	16	5.00	16	4.00	16	3.38
14"	1-1/8-8	16	2.44	16	2.11	16	6.00	16	5.75	16	4.62	16	4.25
	1-1/8-8	4**	1.60	4**	1.26	4**	5.25	4**	4.75	4**	3.75	4**	3.44
16"	1-1/4-8	16	2.56	16	2.62	16	6.50	16	6.50	16	4.88	16	4.88
	1-1/4-8	4**	1.53	4**	1.58	4**	5.25	4**	5.25	4**	3.88	4**	4.25
18"	1-1/4-8	20	2.87	20	2.89	20	7.00	20	7.00	20	5.25	20	5.25
	1-1/4-8	4**	1.65	4**	1.43	4**	5.50	4**	5.50	4**	4.00	4**	3.88
20"	1-1/4-8	20	3.18	20	3.00	20	7.50	20	7.25	20	5.69	20	5.69
	1-1/4-8	4**	1.68	4**	1.75	4**	5.75	4**	5.50	4**	4.19	4**	4.00
24"	1-1/2-8	20	3.56	20	3.51	20	8.25	20	8.25	20	6.31	20	6.25
	1-1/2-8	4**	1.80	4**	1.75	4**	6.25	4**	6.25	4**	4.56	4**	4.50

LUG BODY
HEX HEAD MACHINE BOLTS



LUG BODY
STUDS and NUTS



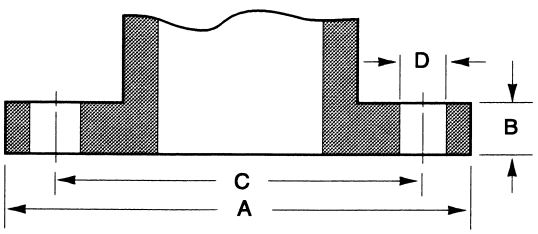
* Bolt lengths "A" & "B" are from face of valve body to minimum depth in lug. Flange & gasket thickness must be added to calculate minimum bolt length.

**Special length required for tapped blind holes on either side of the valve shaft at the top and bottom ends of the valve body.

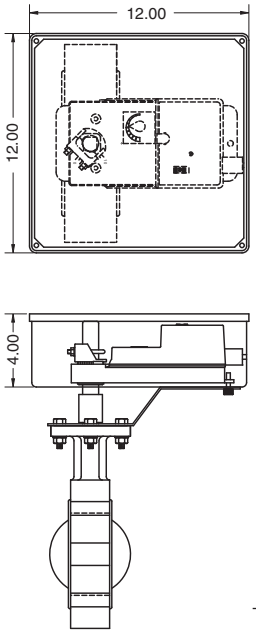
FLANGE BOLTING RECOMMENDATIONS

Flange Detail for ANSI 300 B16.5 Pipe Flanges 300 SHP Series Butterfly Valves

	FLANGES		DRILLING		BOLTING	
Nominal Pipe Size	A Flange Diameter	B Flange Thickness	C Diameter of Bolt Circle	D Diameter of Bolt Holes	Number of Bolts	Diameter of Bolts
2"	6.50	.88	5.00	.75	8	5/8"
2-1/2"	7.50	1.00	5.88	.88	8	3/4"
3"	8.25	1.12	6.63	.88	8	3/4"
4"	10.00	1.25	7.88	.88	8	3/4"
5"	11.00	1.38	9.25	.88	8	3/4"
6"	12.50	1.44	10.63	.88	12	3/4"
8"	15.00	1.62	13.00	1.00	12	7/8"
10"	17.50	1.88	15.25	1.12	16	1"
12"	20.50	2.00	17.75	1.25	16	1-1/8"
14"	23.00	2.12	20.25	1.25	20	1-1/8"
16"	25.50	2.25	22.50	1.37	20	1-1/4"
18"	28.00	2.38	24.75	1.37	24	1-1/4"
20"	30.50	2.50	27.00	1.37	24	1-1/4"
24"	36.00	2.75	32.00	1.62	24	1-1/2"



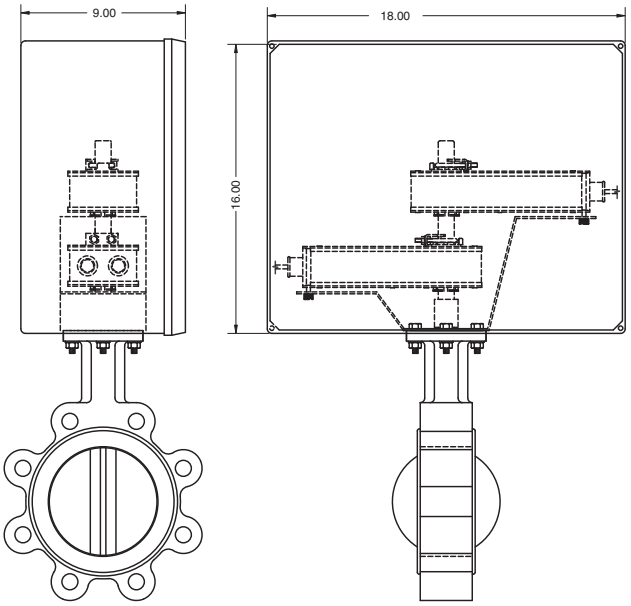
ZS-BFV… Series Dimension Drawings



ZS-BFV-10

ZS-BFV-20

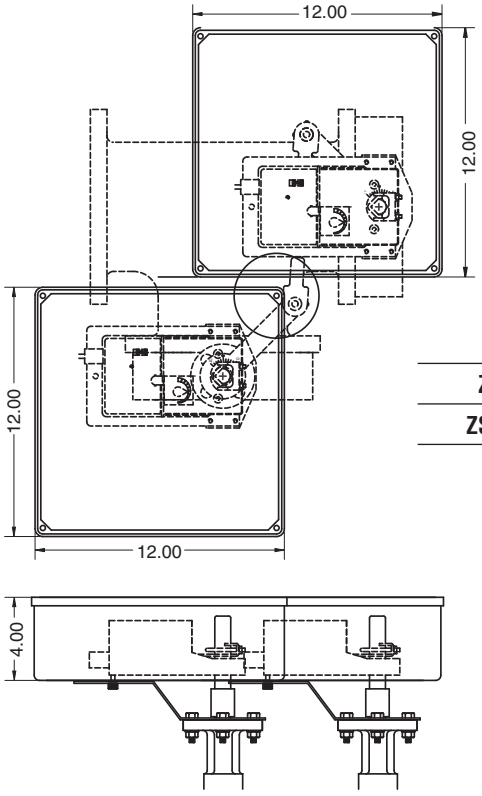
ZS-BFV-30(X1)



ZS-BFV-60

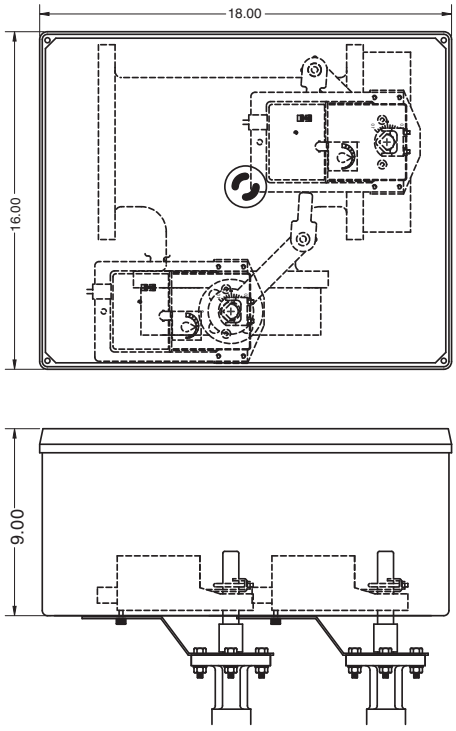
ZS-BFV-70

ZS-BFV-80



ZS-BFV-30(X2)

ZS-BFV-100(X2)



ZS-BFV-90

BELIMO

Custom MFT Configuration Order Form

FAX: USA Toll Free 1-800-228-8283

#1 Select an Actuator

(use one sheet for each unique actuator/configuration)

	Quantity		Quantity
❑ AF24-MFT US	_____	❑ AMX24-MFT	_____
❑ AF24-MFT-S US	_____	❑ AMX24-MFTX1	_____
❑ NF24-MFT US	_____	❑ NMX24-MFT	_____
❑ LF24-MFT US	_____	❑ NMX24-MFTX1	_____
❑ LF24-MFT-S US	_____	❑ LMX24-MFT	_____
❑ AF24-MFT95 US	_____	❑ LMX24-MFTX1	_____
❑ NV24-MFT US	_____	❑ LRX24-MFT	_____
❑ NVF24-MFT US	_____	❑ GMX24-MFT95	_____
❑ NVF24-MFT-E US	_____	❑ AMX24-MFT95	_____
❑ NVFD24-MFT US	_____	❑ NMX24-MFT95	_____
❑ NVFD24-MFT-E US	_____	❑ LMX24-MFT95	_____
❑ GMX24-MFT	_____	❑ LHX24-MFT	_____
❑ GMX24-MFTX1	_____	❑ LUX24-MFT	_____

(-S=Auxiliary Switch)

Name _____

Company _____

Address _____

City _____ State _____ Zip _____

Phone _____ Fax _____

Email _____

FIELD LABELING: LBL-MFT

❑ **Custom configuration labels required**
1-3/8" X 1-¼" orange labels preprinted to your specifications 12 label sets per sheet.
Includes configuration code and wiring labels.

#2 Create a Custom Configuration

1 Angle of rotation setting

☐ **Deactivated** (Default) — The following settings 2 - 5 refer to the full angle of rotation of 95°.

☐ **Activated** — The following settings 2 - 5 are automatically adapted to the effective mechanical angle of rotation.

- ☐ **Manual** triggering by pressing the push button twice.
- ☐ **Automatic** triggering each time the unit is powered up or by pressing the push button twice.

2 Control Types

VDC	PWM	Floating Point	On/Off
☐ 2 – 10	☐ 0.2 to 5.0 seconds	☐	☐
☐ 0 – 10	☐ 0.1 to 25.5 seconds		
☐ Variable	☐ 0.59 to 2.93 seconds		
Start ☐☐.☐	☐ Variable		
Stop ☐☐.☐	Start ☐☐.☐		
	Stop ☐☐.☐		

3 Feedback Signals U_5

☐ **Position Feedback U** DC 2...10 V (Default)

☐ **Position Feedback U** DC 0...10 V

☐ **Position Feedback U**
Start DC ☐.☐ V (0...8 V)
Finish DC ☐☐.☐ V (2...10 V)
The finish must be at least 2 V above the start!

4 Running Time

☐ 150 seconds (Default)

☐ Running time ☐☐☐ seconds (75...300 seconds) (in 5 second increments)

Note: The sound power level [dB(A)] increases when the running time is below 150 seconds.

LM	**35…150 seconds**
NM	**45…170 seconds**
AM	**90…300 seconds**
GM	**90…300 seconds**
Others	**75…300 seconds**

5 Override control and electronic angle of rotation limiting

☐ Min. (min. position) = ☐☐☐ % (0...100%) ◁ (beginning of working range) default 0

ZS (intermediate position) = ☐☐☐ % (0...100%) (0% = Min.; 100% = Max.) default 50

Max. (max. position) = ☐☐☐ % (0...100%) ◁ (end of working range) default 100