

Technical Documentation

Butterfly Valves

Effective September 2008

Belimo Project: New York Park Plaza Hotel, New York, New York



HS(U)... Series Valves

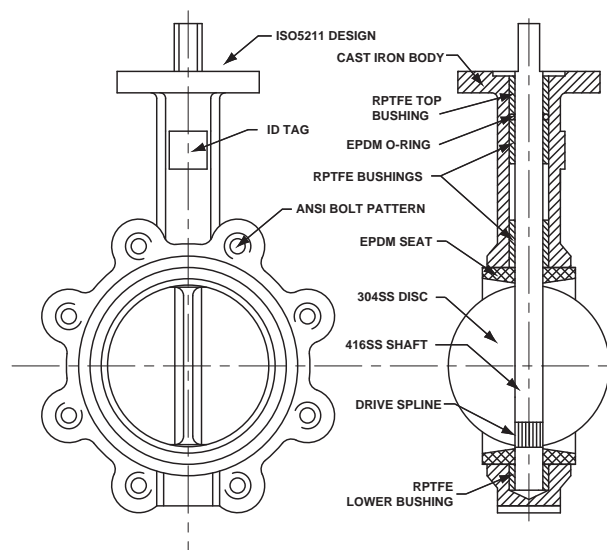
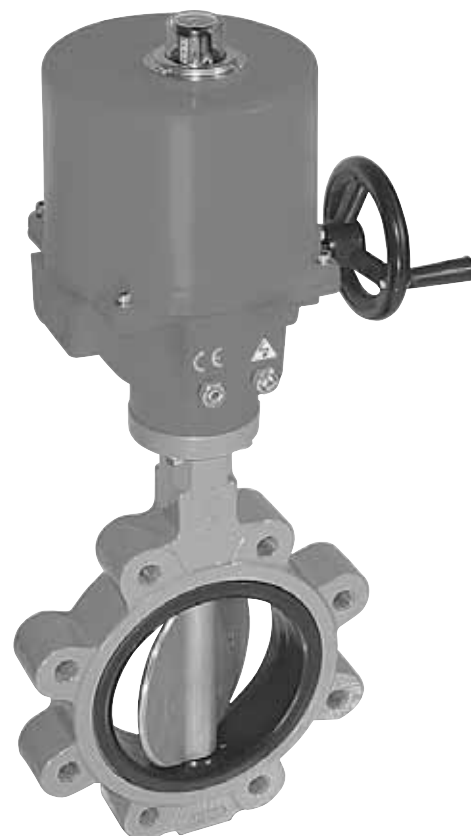
HVAC Service Butterfly Valves

2-way and 3-way Assemblies

Belimo resilient seat HS(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 four 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
- No mechanical shaft-to-disc connections protruding into flow stream (2"-12")
- Cast Iron Full Lug Bodies
- EPDM liner
- Stainless Steel Disc
- Two Models to suit the application:
 - HSU Series provides economical HVAC solutions up to 50 psi close-off with a 200 psi body rating
 - HS Series provides full-rated close-off to 200 psi (2"-12") or 150 psi (14"-30")
- 2-way and 3-way applications



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"	F650HSU	118	50	16 lbs.		17 lbs.	
		2.5"	F665HSU	184	50	16 lbs.		18 lbs.	
		3"	F680HSU	264	50	17 lbs.			29 lbs.
		4"	F6100HSU	470	50		28 lbs.		38 lbs.
		5"	F6125HSU	734	50		33 lbs.		43 lbs.
	3-WAY	6"	F6150HSU	1058	50		50 lbs.		
		2"	F750HSU	118	50	50 lbs.		52 lbs.	
		2.5"	F765HSU	184	50	62 lbs.			73 lbs.
		3"	F780HSU	264	50		70 lbs.		80 lbs.
		4"	F7100HSU	470	50		130 lbs.		
		5"	F7125HSU	734	50		160 lbs.		
		6"	F7150HSU	1058	50		200 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"	F650HS	118	200	16 lbs.		17 lbs.	
		2.5"	F665HS	184	200	16 lbs.			28 lbs.
		3"	F680HS	264	200		19 lbs.		29 lbs.
		4"	F6100HS	470	200		38 lbs.		
	3-WAY	2"	F750HS	118	200	50 lbs.		52 lbs.	
		2.5"	F765HS	184	200		63 lbs.		73 lbs.
		3"	F780HS	264	200		80 lbs.		
		4"	F7100HS	470	200		130 lbs.		

Industrial Actuation (Average Assembly Weights)

					ACTUATOR			
					NON-SPRING RETURN			
	Size	Valve	Max GPM	COP	SY1...	SY2...	SY3...	SY4...
UNDERCUT MODELS	2-WAY	2"	F650HSU	118	50	17 lbs.		
		2.5"	F665HSU	184	50	18 lbs.		
		3"	F680HSU	264	50	19 lbs.		
		4"	F6100HSU	470	50		50 lbs.	
		5"	F6125HSU	734	50		54 lbs.	
		6"	F6150HSU	1058	50		61 lbs.	
		8"	F6200HSU	1880	50			70 lbs.
		10"	F6250HSU	2938	50			89 lbs.
		12"	F6300HSU	4230	50			118 lbs.
	3-WAY	2"	F750HSU	118	50	52 lbs.		
		2.5"	F765HSU	184	50	63 lbs.		
		3"	F780HSU	264	50		92 lbs.	
		4"	F7100HSU	470	50		142 lbs.	
		5"	F7125HSU	734	50		171 lbs.	
		6"	F7150HSU	1058	50		211 lbs.	
		8"	F7200HSU	1880	50			289 lbs.
		10"	F7250HSU	2938	50			472 lbs.
		12"	F7300HSU	4230	50			643 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.

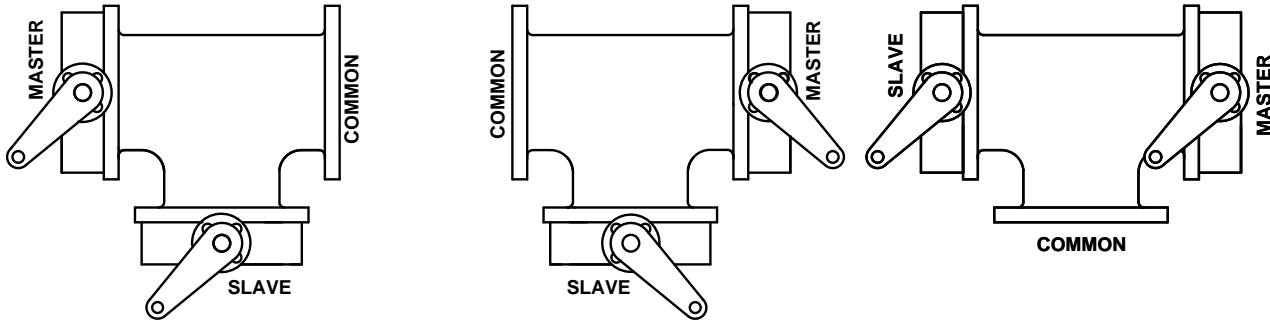
COP = Close-Off Pressure stated in psi. This is the maximum differential pressure the valve will close-off against while maintaining a bubble tight seal.

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"	F650HS	118	200	39 lbs.						
		2.5"	F665HS	184	200	39 lbs.						
		3"	F680HS	264	200	40 lbs.						
		4"	F6100HS	470	200	50 lbs.						
		5"	F6125HS	734	200	54 lbs.						
		6"	F6150HS	1058	200		61 lbs.					
		8"	F6200HS	1880	200			94 lbs.				
		10"	F6250HS	2938	200			113 lbs.				
		12"	F6300HS	4230	200			142 lbs.				
		14"	F6350HS	5758	150			178 lbs.				
		16"	F6400HS	7520	150				253 lbs.			
		18"	F6450HS	9518	150					330 lbs.		
	3-WAY	20"	F6500HS	11750	150						364 lbs.	
		24"	F6600HS	16921	150							529 lbs.
		30"	F6750HS	26438	150							1199 lbs.
		2"	F750HS	118	200	73 lbs.						
		2.5"	F765HS	184	200	85 lbs.						
		3"	F780HS	264	200	92 lbs.						
		4"	F7100HS	470	200	142 lbs.						
		5"	F7125HS	734	200	171 lbs.						
		6"	F7150HS	1058	200		211 lbs.					
		8"	F7200HS	1880	200			313 lbs.				
		10"	F7250HS	2938	200			472 lbs.				
		12"	F7300HS	4230	200			643 lbs.				
		14"	F7350HS	5758	150				879 lbs.			
		16"	F7400HS	7520	150					1252 lbs.		
		18"	F7450HS	9518	150						1524 lbs.	
		20"	F7500HS	11750	150						1845 lbs.	
		24"	F7600HS	16921	150							2813 lbs.

Butterfly Valve Selection-Velocity Chart

HSU/HS Series Valves



D163

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:

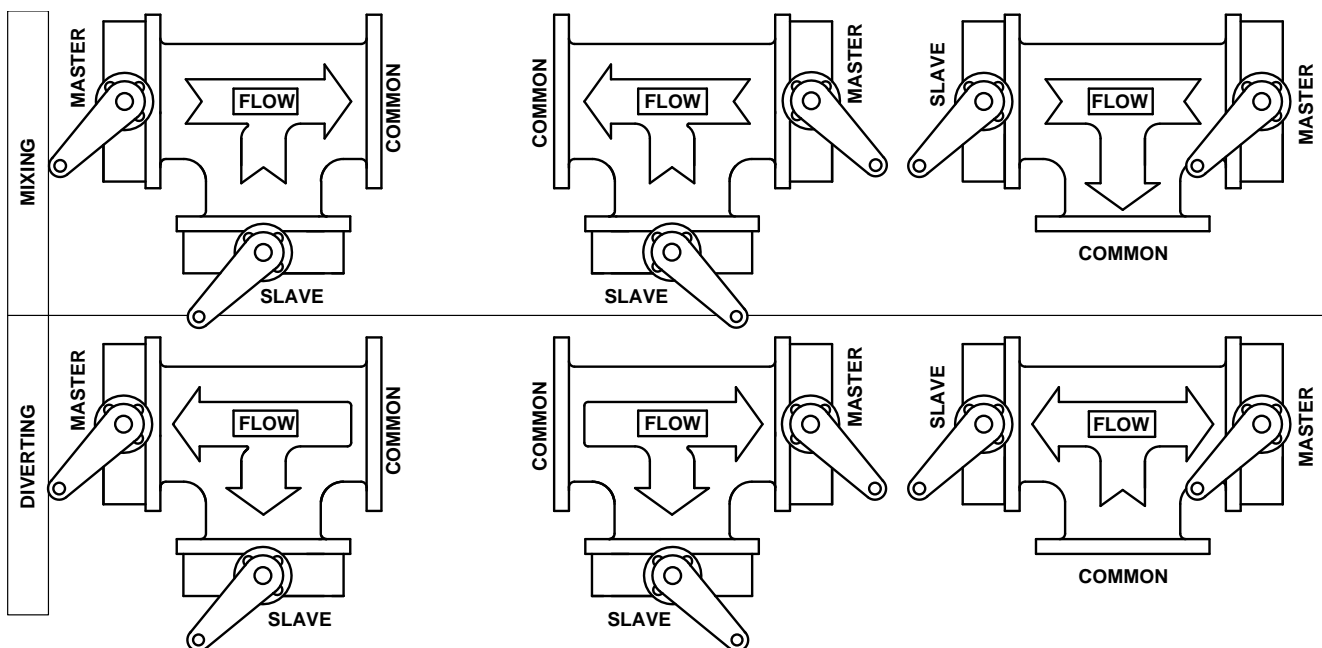
1. Slave Valve operates inversely of the Master Valve.
2. The Master Valve is always located on the run.
3. The Slave Valve may also have an actuator if required (Direct Coupled).
4. On/Off actuator normal position is a function of field logic.
5. Proportional actuator normal position is a function of 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.

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



D145

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 switch.
6. All 3-way assemblies are designed for 90 degree actuator rotation.

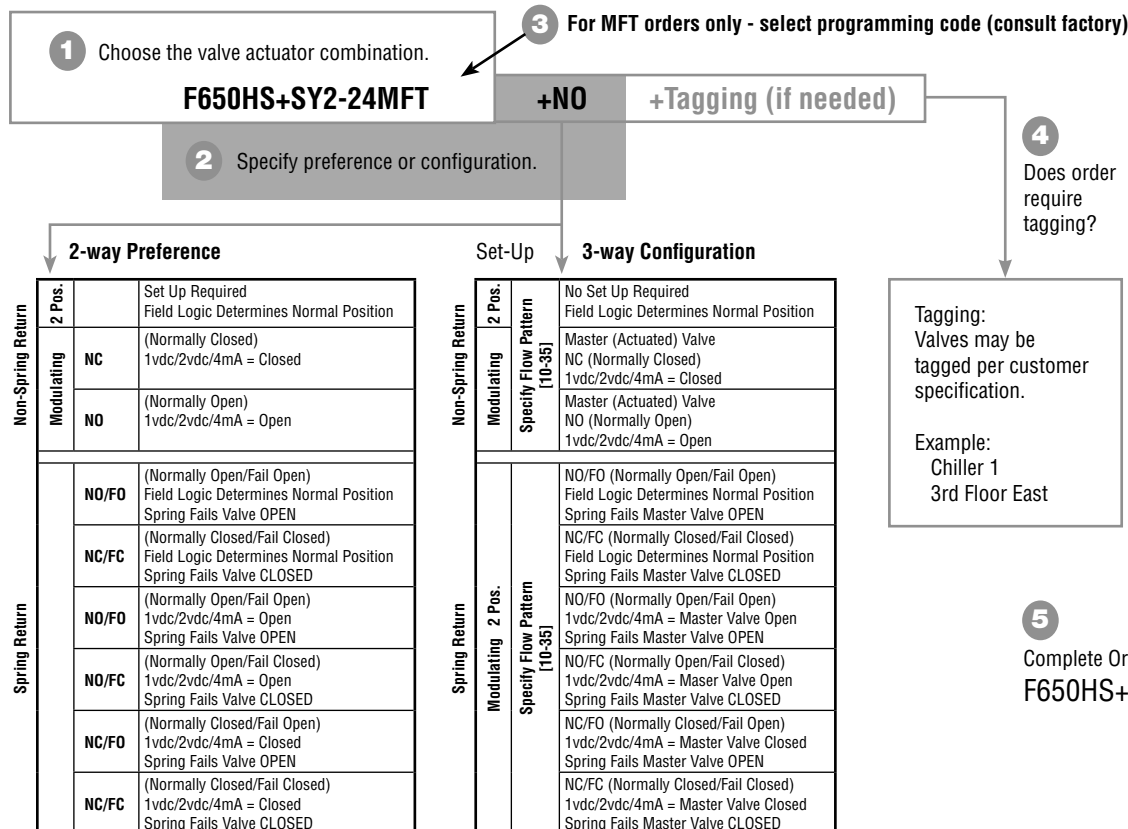
Flow in Std Weight Pipe (Fluid Velocity in GPM). Use with SHP Series BF Valves.

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.

F6	50	HS	SY2	-24	MFT	
Valve F6 = 2-way F7 = 3-way	Valve Size 50-750 = 2"-30"	Trim Material HSU = Stainless Disc, Cast Iron Full Lug, EPDM Liner, Bubble Tight Close-Off to 50 psi HS = Stainless Disc, Cast Iron Full Lug, EPDM Liner, Bubble Tight Close-Off to 200 psi (2"-12"), 150 psi (14"+) -150SHP = ANSI Class 150, Stainless Disc, Cast Steel Full Lug, RTFE Seat, Bubble Tight Close-off up to 285 psi -300SHP = ANSI Class 300, Stainless Disc, Cast Steel Full Lug, RTFE Seat, Bubble Tight Close-off up to 600 psi	Actuator Type Non-Spring Return AMB(X) GMB(X) SY.. Spring Return AF...	Power Supply -24 = 24 VAC/DC -110 = 110/120 VAC -120 = 120 VAC -230 = 230 VAC	Control Blank = On/Off -SR = 2-10 VDC -3X1 = On/Off, Floating Point MFT or MFTX1 = Multi-Function Technology	S = Built-in Auxiliary Switch

ORDERING EXAMPLE





- 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...HS/HSU Butterfly Valves.

Technical Data	
Service	chilled, hot water, 60% glycol
Flow Characteristic	modified equal percentage
Action	90° rotation
Sizes	2" to 5"
Type of End Fitting	125/150 lb. flanged, ASME/ANSI B16.1/B16.5
Materials	
Body	cast iron ASTM A126
Disc	304 stainless steel
Seat	EPDM standard
Body Pressure	200 psi at -30°F to 275°F
Shaft	416 stainless steel
O-ring	EPDM
Upper bushing	RPTFE
Middle bushings	RPTFE
Lower bushing	RPTFE
Flange	for use with ANSI 125/150 Flanges
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]
Maximum Differential Pressure	50 psi
Rangeability	10:1 (for 30° to 70° range)
Maximum Velocity	12 FPS

Valve				Type	Suitable Actuators		
Nominal Size					Spring	Non-Spring	
C _v 90°	C _v 60°	IN	DN [mm]	2-way	AF Series	AM Series	SY Series
115	44	2"	50	F650HSU			
196	75	2½"	65	F665HSU			
302	116	3"	80	F680HSU	GM		
600	230	4"	100	F6100HSU			
1022	392	5"	125	F6125HSU			
1579	605	6"	150	F6150HSU			
3136	1202	8"	200	F6200HSU			
5340	2047	10"	250	F6250HSU			
8250	3062	12"	300	F6300HSU			

Valve	Size	C_v	MOD								ON/OFF	
			10°	20°	30°	40°	50°	60°	70°	80°	90°	
F650HSU	2"	115	.06	3	7	15	27	44	70	105	115	
F665HSU	2½"	196	.10	6	12	25	45	75	119	178	196	
F680HSU	3"	302	.20	9	18	39	70	116	183	275	302	
F6100HSU	4"	600	.30	17	36	78	139	230	364	546	600	
F6125HSU	5"	1022	.50	29	61	133	237	392	620	930	1022	
F6150HSU	6"	1579	.80	45	95	205	366	605	958	1437	1579	
F6200HSU	8"	3136	2	89	188	408	727	1202	1903	2854	3136	
F6250HSU	10"	5340	3	151	320	694	1237	2047	3240	4859	5340	
F6300HSU	12"	8250	4	234	495	1072	1911	3062	5005	7507	8250	

F6...HSU Butterfly Valves 2"–12" Cast 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)	
F650HSU	2"	115	44	1.65	9.00	9.00	19.50	4.75	4	5/8-11UNC	AF	50	Fail Safe
F665HSU	2½"	196	75	1.76	9.00	9.00	20.00	5.50	4	5/8-11UNC		50	
F680HSU	3"	302	116	1.78	9.00	9.00	20.50	6.00	4	5/8-11UNC		50	
F6100HSU	4"	600	230	2.05	9.00	9.00	21.00	7.50	8	5/8-11UNC	2*AF	50	Fail Safe
F6125HSU	5"	1022	392	2.14	9.00	9.00	22.00	8.50	8	3/4-10UNC		50	
F650HSU	2"	115	44	1.65	7.00	7.00	15.00	4.75	4	5/8-11UNC	AMB(X)	50	Non-Fail Safe
F665HSU	2½"	196	75	1.76	7.00	7.00	15.50	5.50	4	5/8-11UNC		50	
F680HSU	3"	302	116	1.78	7.00	7.00	16.00	6.00	4	5/8-11UNC		50	
F6100HSU	4"	600	230	2.05	8.00	8.00	17.00	7.50	8	5/8-11UNC	GMB(X)	50	Non-Fail Safe
F6125HSU	5"	1022	392	2.14	8.00	8.00	17.50	8.50	8	3/4-10UNC		50	
F6150HSU	6"	1579	605	2.19	8.00	8.00	22.50	9.50	8	3/4-10UNC	GMB(X)	50	Non-Fail Safe
F650HSU	2"	115	44	1.65	4.25	4.25	15.50	4.75	4	5/8-11UNC	SY1...	50	
F665HSU	2½"	196	75	1.76	4.25	4.25	16.00	5.50	4	5/8-11UNC		50	
F680HSU	3"	302	116	1.78	4.25	4.25	16.25	6.00	4	5/8-11UNC		50	
F6100HSU	4"	600	230	2.05	8.00	13.00	22.00	7.50	8	5/8-11UNC	SY2...	50	
F6125HSU	5"	1022	392	2.14	8.00	13.00	22.50	8.50	8	3/4-10UNC		50	
F6150HSU	6"	1579	605	2.19	8.00	13.00	23.00	9.50	8	3/4-10UNC	SY3...	50	
F6200HSU	8"	3136	1202	2.37	8.00	13.00	24.25	11.75	8	3/4-10UNC		50	
F6250HSU	10"	5340	2047	2.58	8.00	13.00	25.50	14.25	12	7/8-9UNC		50	
F6300HSU	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.

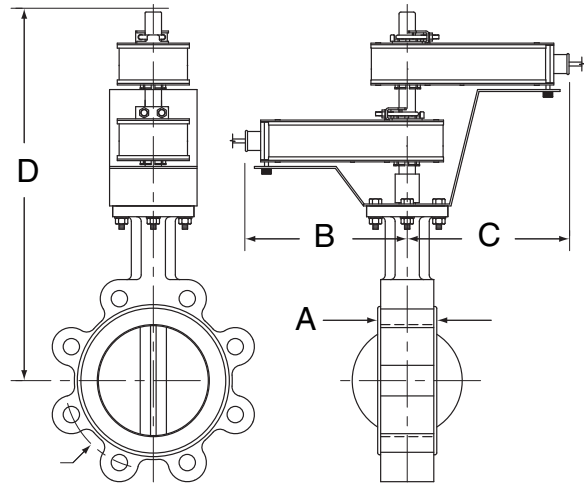
SY maximum actuator ambient temperature is 150°F.

Model SY1... does not have handwheel - override is via 8mm wrench on bottom side of actuator.

Application Notes

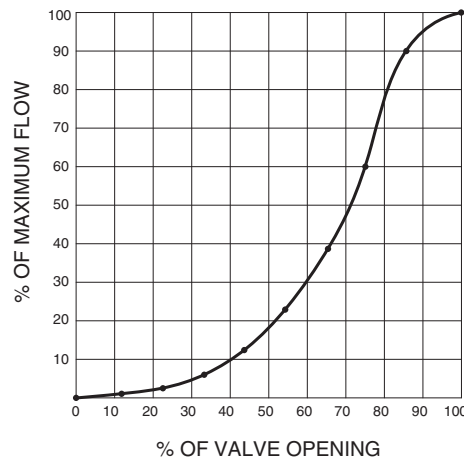
1. Valves are rated at 50 psi differential pressure in the closed position.
2. Valves are furnished with lugs tapped for use with ANSI Class 125/150 flanges. Installation flanges and hardware are not included.
3. 2-way assemblies are furnished assembled and tested, ready for installation.
4. Dimension "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.

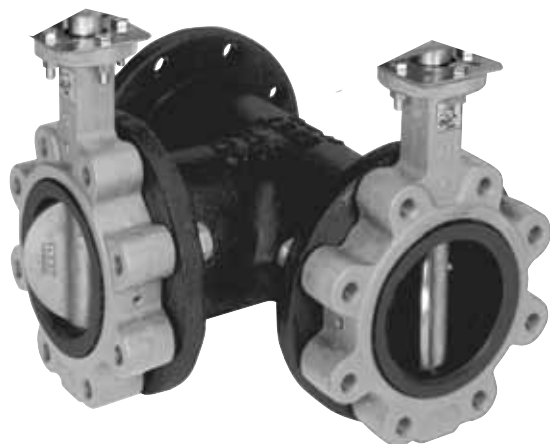
Dimensions



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...HS/HSU 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	125/150 lb. flanged, ASME/ANSI B16.1/B16.5
Materials	
Body	cast iron ASTM A126
Disc	304 stainless steel
Seat	EPDM standard
Body Pressure	200 psi at -30°F to 275°F
Shaft	416 stainless steel
O-ring	EPDM
Upper bushing	PTFE
Middle bushings	PTFE
Lower bushing	PTFE
Flange	for use with ANSI 125/150 Flanges
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]
Maximum Differential 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	F750HSU	AF Series	AM	GM Series
196	75	2½"	65	F765HSU			
302	116	3"	80	F780HSU			
600	230	4"	100	F7100HSU			
1022	392	5"	125	F7125HSU			
1579	605	6"	150	F7150HSU			
3136	1202	8"	200	F7200HSU			
5340	2047	10"	250	F7250HSU			
8250	3062	12"	300	F7300HSU			
							SY Series

MOD									ON/OFF		
Valve	Size	C _v	10°	20°	30°	40°	50°	60°	70°	80°	90°
F750HSU	2"	115	.06	3	7	15	27	44	70	105	115
F765HSU	2½"	196	.10	6	12	25	45	75	119	178	196
F780HSU	3"	302	.20	9	18	39	70	116	183	275	302
F7100HSU	4"	600	.30	17	36	78	139	230	364	546	600
F7125HSU	5"	1022	.50	29	61	133	237	392	620	930	1022
F7150HSU	6"	1579	.80	45	95	205	366	605	958	1437	1579
F7200HSU	8"	3136	2	89	188	408	727	1202	1903	2854	3136
F7250HSU	10"	5340	3	151	320	694	1237	2047	3240	4859	5340
F7300HSU	12"	8250	4	234	495	1072	1911	3062	5005	7507	8250

F7...HSU Butterfly Valves 2"–12" Cast 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)	
F750HSU	2"	115	4.50	6.15	6.15	15.50	4.75	4	5/8-11UNC	AF	50	Fail Safe
F765HSU	2½"	196	5.00	6.76	6.76	16.00	5.50	4	5/8-11UNC	2*AF	50	
F780HSU	3"	302	5.50	7.28	7.28	16.25	6.00	4	5/8-11UNC		50	
F750HSU	2"	115	4.50	6.15	6.15	15.50	4.75	4	5/8-11UNC	SY1...	50	Non-Fail Safe
F765HSU	2½"	196	5.00	6.76	6.76	16.00	5.50	4	5/8-11UNC		50	
F780HSU	3"	302	5.50	7.28	7.28	21.00	6.00	4	5/8-11UNC		50	
F7100HSU	4"	600	6.50	8.55	8.55	21.75	7.50	8	5/8-11UNC	SY2...	50	
F7125HSU	5"	1022	7.50	9.64	9.64	22.25	8.50	8	3/4-10UNC		50	
F7150HSU	6"	1579	8.00	10.19	10.19	22.75	9.50	8	3/4-10UNC		50	
F7200HSU	8"	3136	9.00	11.37	11.37	24.25	11.75	8	3/4-10UNC	SY3...	50	
F7250HSU	10"	5340	11.00	13.58	13.58	30.00	14.25	12	7/8-9UNC	SY4...	50	
F7300HSU	12"	8250	12.00	15.01	15.01	32.00	17.00	12	7/8-9UNC		50	

AF maximum actuator ambient temperature is 122°F.

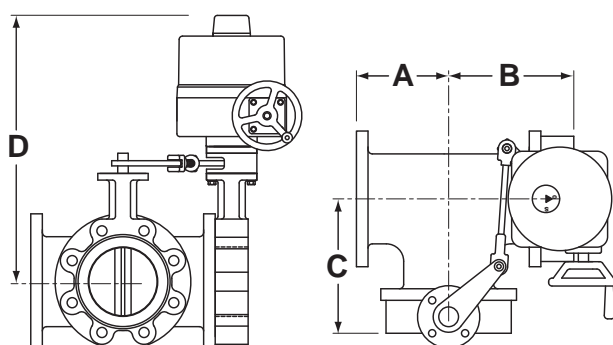
SY... maximum actuator ambient temperature is 150°F.

Model SY1... does not have hand wheel-override is via 8mm wrench on bottom side of actuator.

Application Notes

- Valves are rated at 50 psi differential pressure in the closed position.
- Valves are furnished with lugs tapped for use with ANSI Class 125/150 flanges. Installation flanges and hardware are not included.
- 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.
- Dimension "D" allows for actuator removal without the need to remove the valve from the pipe.
- Weather shields are available, dimensional data upon request.
- Dual actuated valves have single actuators mounted on each valve shaft.
- Bolts supplied are for shipping purposes only. Upon installation replace with an appropriate SAE grade 5 or better hardware.
- Belimo SY Series actuators are NEMA 4X rated.

Dimensions



HS DWG P15



- 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...HS/HSU 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	125/150 lb. flanged, ASME/ANSI B16.1/B16.5
Materials	
Body	cast iron ASTM A126
Disc	304 stainless steel
Seat	EPDM standard
Body Pressure	200 psi at -30°F to 275°F
Shaft	416 stainless steel
O-ring	EPDM
Upper bushing	RPTFE
Middle bushings	RPTFE
Lower bushing	RPTFE
Flange	for use with ANSI 125/150 Flanges
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]
Maximum Differential Pressure	200 psi (2"-12"), 150 psi (14"-30")
Rangeability	10:1 (for 30° to 70° range)
Maximum Velocity	12 FPS

Valve				Type	Suitable Actuators		
C _v 90°	C _v 60°	IN	DN [mm]		Spring	Non-Spring	
115	44	2"	50	F650HS	AF Series	AM	SY Series
196	75	2½"	65	F665HS			
302	116	3"	80	F680HS		GM	
600	230	4"	100	F6100HS			
1022	392	5"	125	F6125HS			
1579	605	6"	150	F6150HS			
3136	1202	8"	200	F6200HS			
5340	2047	10"	250	F6250HS			
8250	3062	12"	300	F6300HS			
11917	4568	14"	350	F6350HS			
16388	6282	16"	400	F6400HS			
21705	8320	18"	450	F6450HS			
27908	10698	20"	500	F6500HS			
43116	16528	24"	600	F6600HS			
73426	28146	30"	750	F6750HS			

Valve	Size	C_v	MOD								ON/OFF
			10°	20°	30°	40°	50°	60°	70°	80°	90°
F650HS	2"	115	.06	3	7	15	27	44	70	105	115
F665HS	2-1/2"	196	.10	6	12	25	45	75	119	178	196
F680HS	3"	302	.20	9	18	39	70	116	183	275	302
F6100HS	4"	600	.30	17	36	78	139	230	364	546	600
F6125HS	5"	1022	.50	29	61	133	237	392	620	930	1022
F6150HS	6"	1579	.80	45	95	205	366	605	958	1437	1579
F6200HS	8"	3136	2	89	188	408	727	1202	1903	2854	3136
F6250HS	10"	5340	3	151	320	694	1237	2047	3240	4859	5340
F6300HS	12"	8250	4	234	495	1072	1911	3062	5005	7507	8250
F6350HS	14"	11917	6	338	715	1549	2761	4568	7230	10844	11917
F6400HS	16"	16388	8	464	983	2130	3797	6282	9942	14913	16388
F6450HS	18"	21705	11	615	1302	2822	5028	8320	13168	19752	21705
F6500HS	20"	27908	14	791	1674	3628	6465	10698	16931	25396	27908
F6600HS	24"	43116	22	1222	2587	5605	9989	16528	26157	39236	43116
F6750HS	30"	73426	37	2081	4405	9545	17011	28146	44545	66818	73426

F6...HS Butterfly Valves 2"–30" Cast 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)	
F650HS	2"	115	44	1.65	9.00	9.00	19.50	4.75	4	5/8-11UNC	AF	200	Fail Safe
F665HS	2½"	196	75	1.76	9.00	9.00	20.00	5.50	4	5/8-11UNC	2*AF	200	
F680HS	3"	302	116	1.78	9.00	9.00	20.50	6.00	4	5/8-11UNC		200	
F650HS	2"	115	44	1.65	7.00	7.00	15.00	4.75	4	5/8-11UNC	AMB(X)	200	Non-Fail Safe
F665HS	2½"	196	75	1.76	7.00	7.00	15.50	5.50	4	5/8-11UNC	GMB(X)	200	
F680HS	3"	302	116	1.78	8.00	8.00	16.00	6.00	4	5/8-11UNC		200	
F6100HS	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)	
F650HS	2"	115	44	1.65	8.00	13.00	20.25	4.75	4	5/8-11UNC	SY2...	200	Non-Fail Safe
F665HS	2½"	196	75	1.76	8.00	13.00	20.75	5.50	4	5/8-11UNC		200	
F680HS	3"	302	116	1.78	8.00	13.00	21.00	6.00	4	5/8-11UNC		200	
F6100HS	4"	600	230	2.05	8.00	13.00	21.75	7.50	8	5/8-11UNC		200	
F6125HS	5"	1022	392	2.14	8.00	13.00	22.25	8.50	8	3/4-10UNC		200	
F6150HS	6"	1579	605	2.19	8.00	13.00	22.75	9.50	8	3/4-10UNC	SY3...	200	
F6200HS	8"	3136	1202	2.37	12.00	15.00	29.00	11.75	8	3/4-10UNC	SY4...	200	
F6250HS	10"	5340	2047	2.58	12.00	15.00	30.00	14.25	12	7/8-9UNC		200	
F6300HS	12"	8250	3062	3.01	12.00	15.00	32.00	17.00	12	7/8-9UNC		200	
F6350HS	14"	11917	4568	3.02	12.00	15.00	33.00	18.75	12	1-8UNC	SY5...	150	
F6400HS	16"	16388	6282	3.39	12.00	15.00	34.50	21.25	16	1-8UNC	SY6...†	150	
F6450HS	18"	21705	8320	4.13	14.00	21.00	39.25	22.75	16	1 1/8-7UNC	SY8...†	150	
F6500HS	20"	27908	10698	5.00	14.00	21.00	41.50	25.00	20	1 1/8-7UNC		150	
F6600HS	24"	43116	16528	5.94	14.00	22.00	53.25	29.50	20	1 1/4-7UNC	SY11...†	150	
F6750HS	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.

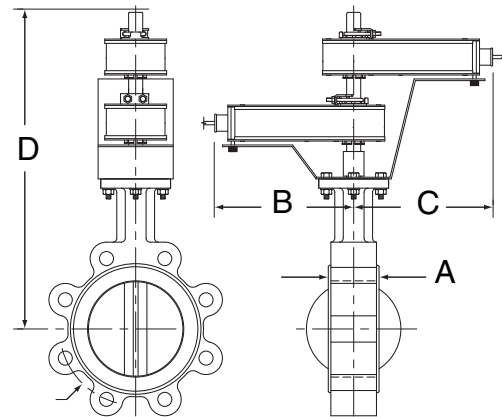
AF, AM and GM maximum actuator ambient temperature is 122°F.

SY... maximum actuator ambient temperature is 150°F.

Application Notes

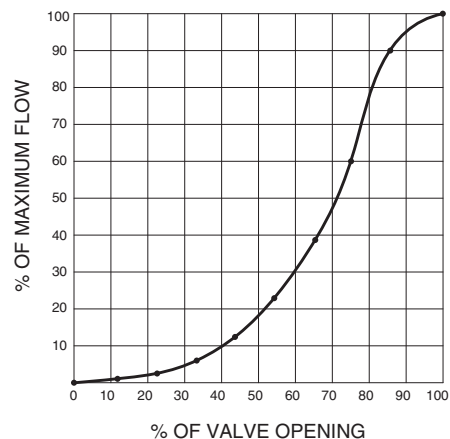
- Valves are rated at 200 psi differential pressure in the closed position (SY... 150 psi 14"+).
- Valves are furnished with lugs tapped for use with ANSI Class 125/150 flanges. Installation flanges and hardware are not included.
- 2-way assemblies are furnished assembled and tested, ready for installation.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

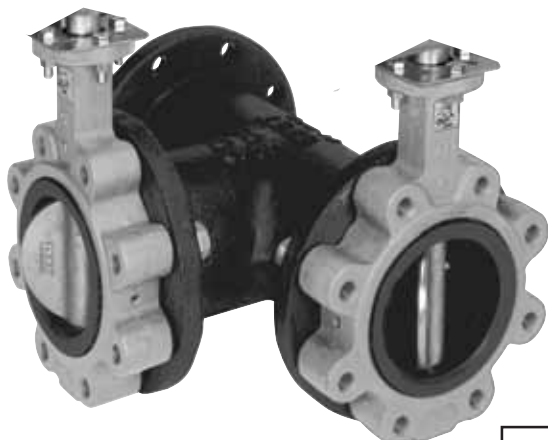
Dimensions



BF2WUDIM

Flow Pattern





- 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...HS/HSU 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	125/150 lb. flanged, ASME/ANSI B16.1/B16.5
Materials:	
Body	cast iron ASTM A126
Disc	304 stainless steel
Seat	EPDM standard
Body Pressure	200 psi at -30°F to 275°F
Shaft	416 stainless steel
O-ring	EPDM
Upper bushing	RPTFE
Middle bushings	RPTFE
Lower bushing	RPTFE
Flange	for use with ANSI 125/150 Flanges
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]
Maximum Differential 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	F750HS	AF Series	AM	GM Series	SY Series
196	75	2½"	65	F765HS				
302	116	3"	80	F780HS				
600	230	4"	100	F7100HS				
1022	392	5"	125	F7125HS				
1579	605	6"	150	F7150HS				
3136	1202	8"	200	F7200HS				
5340	2047	10"	250	F7250HS				
8250	3062	12"	300	F7300HS				
11917	4568	14"	350	F7350HS				
16388	6282	16"	400	F7400HS				
21705	8320	18"	450	F7450HS				
27908	10698	20"	500	F7500HS				
43116	16528	24"	600	F7600HS				

Valve	Size	C_v	MOD							ON/OFF	
			10°	20°	30°	40°	50°	60°	70°	80°	90°
F750HS	2"	115	.06	3	7	15	27	44	70	105	115
F765HS	2½"	196	.10	6	12	25	45	75	119	178	196
F780HS	3"	302	.20	9	18	39	70	116	183	275	302
F7100HS	4"	600	.30	17	36	78	139	230	364	546	600
F7125HS	5"	1022	.50	29	61	133	237	392	620	930	1022
F7150HS	6"	1579	.80	45	95	205	366	605	958	1437	1579
F7200HS	8"	3136	2	89	188	408	727	1202	1903	2854	3136
F7250HS	10"	5340	3	151	320	694	1237	2047	3240	4859	5340
F7300HS	12"	8250	4	234	495	1072	1911	3062	5005	7507	8250
F7350HS	14"	11917	6	338	715	1549	2761	4568	7230	10844	11917
F7400HS	16"	16388	8	464	983	2130	3797	6282	9942	14913	16388
F7450HS	18"	21705	11	615	1302	2822	5028	8320	13168	19752	21705
F7500HS	20"	27908	14	791	1674	3628	6465	10698	16931	25396	27908
F7600HS	24"	43116	22	1222	2587	5605	9989	16528	26157	39236	43116

F7...HS Butterfly Valves 2"-24" Cast Iron Lug Body Resilient Seat, 304 Stainless Disc



Maximum Dimensions (Inches)

Valve	Size	Cv 90°	A	B	C	D(Max)	BHC	No. of Holes	Lug Bolt	Actuator	Close-Off (PSI)	Fail Safe
F750HS	2"	115	4.50	6.15	6.15	20.25	4.75	4	5/8-11UNC	AF	200	Fail Safe
F765HS	2½"	196	5.00	6.76	6.76	20.75	5.50	4	5/8-11UNC	2*AF	200	
F750HS	2"	115	4.50	6.15	6.15	20.25	4.75	4	5/8-11UNC	SY2...	200	
F765HS	2½"	196	5.00	6.76	6.76	20.75	5.50	4	5/8-11UNC		200	
F780HS	3"	302	5.50	7.28	7.28	21.00	6.00	4	5/8-11UNC		200	
F7100HS	4"	600	6.50	8.55	8.55	21.75	7.50	8	5/8-11UNC		200	Non-Fail Safe
F7125HS	5"	1022	7.50	9.64	9.64	22.25	8.50	8	3/4-10UNC	SY3...	200	
F7150HS	6"	1579	8.00	10.19	10.19	22.75	9.50	8	3/4-10UNC		200	
F7200HS	8"	3136	9.00	11.37	11.37	29.00	11.75	8	3/4-10UNC	SY4...	200	
F7250HS	10"	5340	11.00	13.58	13.58	30.00	14.25	12	7/8-9UNC		200	
F7300HS	12"	8250	12.00	15.01	15.01	32.00	17.00	12	7/8-9UNC	SY5...	200	
F7350HS	14"	11917	14.00	17.02	17.02	33.00	18.75	12	1-8UNC	SY6...†	150	
F7400HS	16"	16388	15.00	18.39	18.39	38.50	21.25	16	1-8UNC	SY7...†	150	
F7450HS	18"	21705	16.50	20.63	20.63	39.50	22.75	16	1 1/8-7UNC	SY9...†	150	
F7500HS	20"	27908	18.00	23.00	23.00	41.50	25.00	20	1 1/8-7UNC		150	
F7600HS	24"	43116	22.00	27.9	27.9	53.25	29.50	20	1 1/4-7UNC	SY12...†	150	

AF maximum actuator ambient temperature is 122°F.

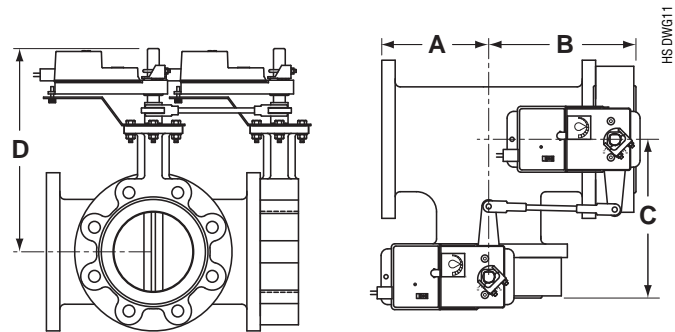
SY... maximum actuator ambient temperature is 150°F.

†SY6 and larger available in 110/220 VAC versions only.

Application Notes

- Valves are rated at 200 psi differential pressure in the closed position.
- Valves are furnished with lugs tapped for use with ANSI Class 125/150 flanges. Installation flanges and hardware are not included.
- 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.
- Dimension "D" allows for actuator removal without the need to remove the valve from the pipe.
- Belimo SY Series actuators are NEMA 4X rated.
- Weather shields are available, dimensional data upon request.
- Dual actuated valves have single actuators mounted on each valve shaft.
- Bolts supplied are for shipping purposes only. Upon installation replace with an appropriate SAE grade 5 or better hardware.

Dimensions



3-Way Configuration Codes

D163									
	CONFIG CODE	ON/OFF OR MOD@2VDC MASTER VALVE IS	MASTER VALVE @ FAIL	CONFIG CODE	ON/OFF OR MOD@2VDC MASTER VALVE IS	MASTER VALVE @ FAIL	CONFIG CODE	ON/OFF OR MOD@2VDC MASTER VALVE IS	MASTER VALVE @ FAIL
	X10	OPEN	NON-FAIL	X20	OPEN	NON-FAIL	X30	OPEN	NON-FAIL
	X11	OPEN	OPEN	X21	OPEN	OPEN	X31	OPEN	OPEN
	X12	OPEN	CLOSED	X22	OPEN	CLOSED	X32	OPEN	CLOSED
	X13	CLOSED	NON-FAIL	X23	CLOSED	NON-FAIL	X33	CLOSED	NON-FAIL
	X14	CLOSED	OPEN	X24	CLOSED	OPEN	X34	CLOSED	OPEN
	X15	CLOSED	CLOSED	X25	CLOSED	CLOSED	X35	CLOSED	CLOSED

X Specifies Bi-Directional Flow Capability

NOTES

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

ORDERING INFORMATION

Please note that HS 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.

K20928 - 09/22/08 - Subject to change. © Belimo Aircontrols (USA), Inc.

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

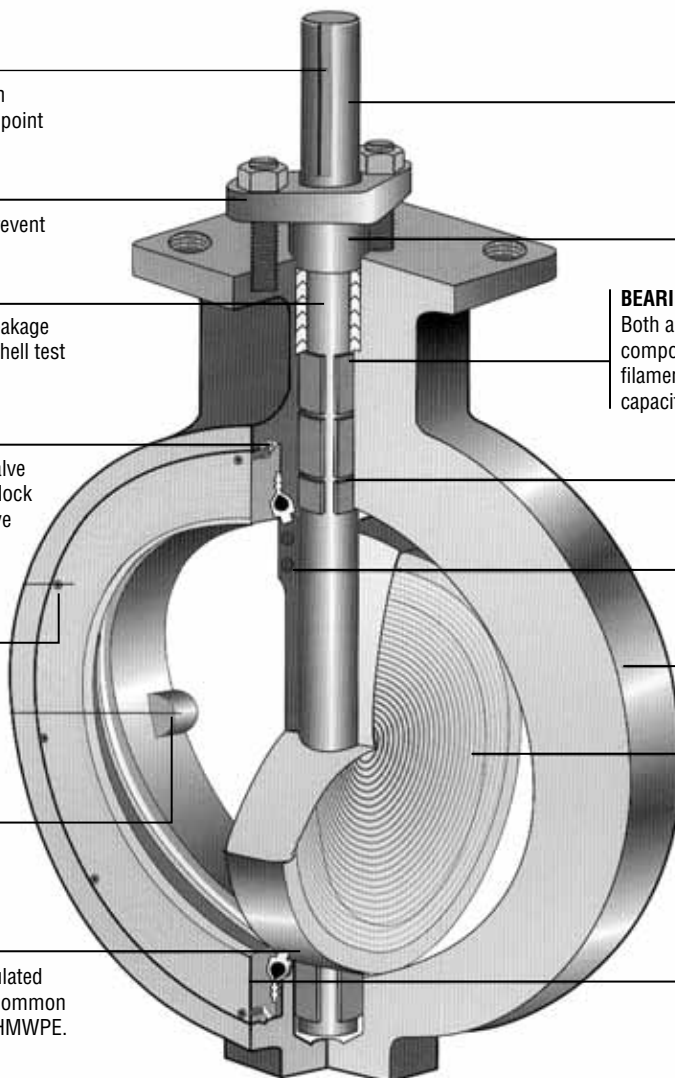
ANSI B16.34 design in either wafer or lug configuration.

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.



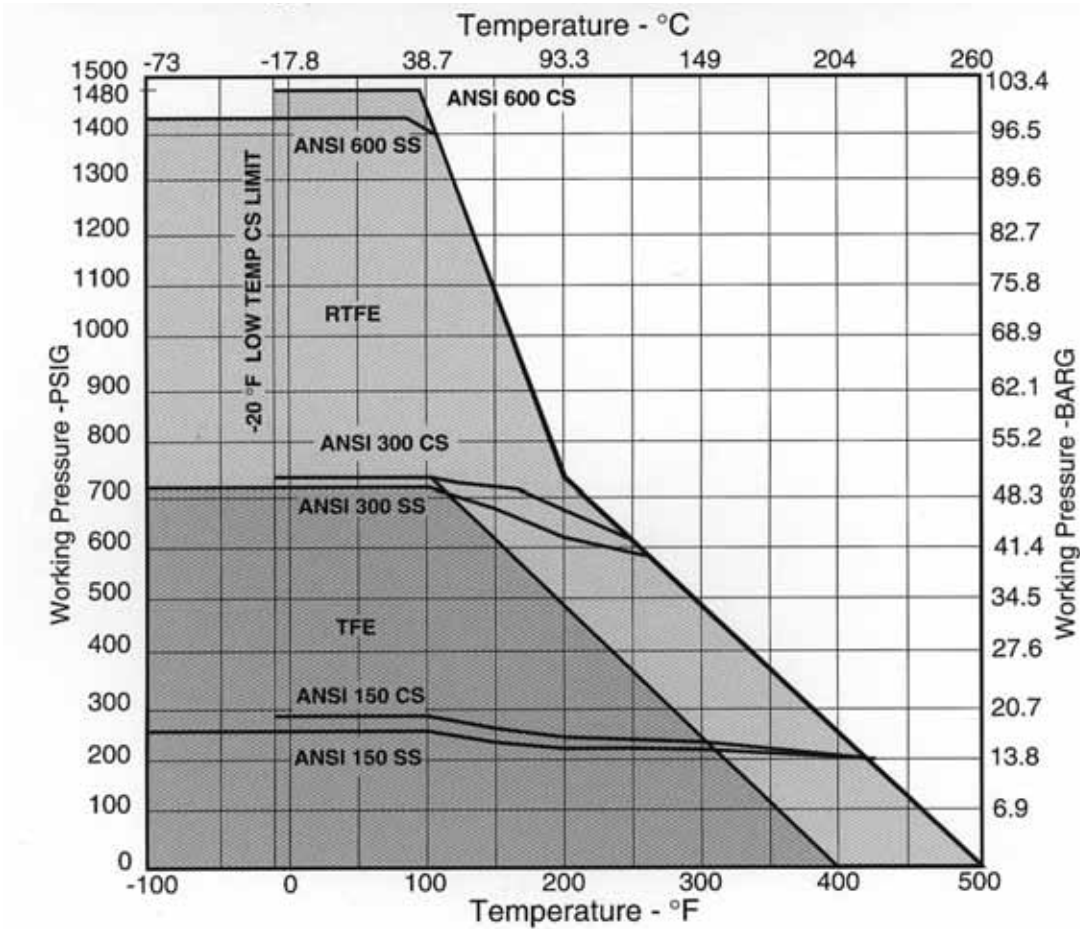
Pressure/Temperature Ratings

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 TFE and RTFE 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

RTFE 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.	
	3-way	4"	F6100-150SHP	1253	150	GMB(X)24...	32 lbs.	
					285	2*GMB(X)24...	40 lbs.	
		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.	
	3-way	4"	F6100-300SHP	1253	150	GMB(X)24...	31 lbs.	
					285	2*GMB(X)24...	39 lbs.	
		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

		Non-Spring Return					
	Size	Valve Model	Max GPM	COP	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				
ANSI 300	2-way	Size	Valve Model	Max GPM	COP	Actuator Weight
		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.
		18"	F6450-300SHP	25381	285	SY8-110 603 lbs.
					400	SY9-110 647 lbs.
					600	SY11-110 647 lbs.
		20"	F6500-300SHP	31334	150	SY8-110 821 lbs.
					285	SY10-110 865 lbs.
		24"	F6600-300SHP	45121	400	SY11-110 865 lbs.
					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

		Non-Spring Return				
ANSI 300	3-way	Size	Valve Model	Max GPM	COP	Actuator Weight
		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.



- 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	
Service	chilled, hot water, 60% glycol, steam to 50 psi
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	ANSI Class 125/150 flanged
Body Pressure	ANSI Class 150
Materials	
Body	carbon steel full lug
Disc	316 stainless steel
Seat	RTFE
Shaft	17-4 pH stainless
Gland Seal	TFE
Bushings	glass backed TFE
Flange	for use with ANSI Class 125/150 flanges
Media Temp Range	ANSI Class 150 limitations
Operation Ambient Temperature Range	-22°F to 122°F [-30°C to 50°C]
Maximum Pressure Differential	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	Type	Suitable Actuators	
				Spring	Non-Spring
102	56	2"	F650-150SHP	AF Series	GM 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	SY Series	
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

BELIMO®

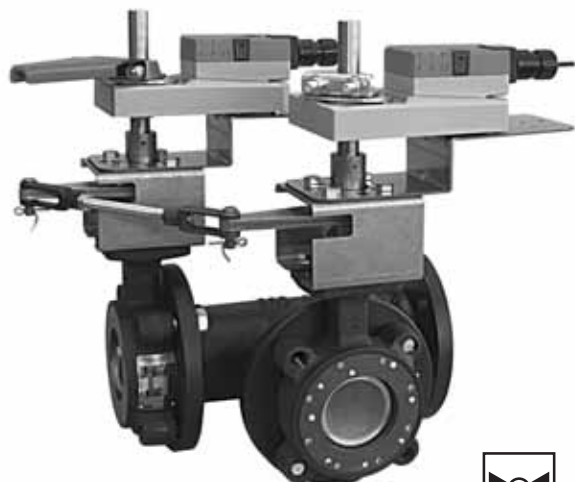
Valve	Size	C _v 90°	A	B	C	D(Max)	BHC	No. of Holes	Lug Bolt	Actuator	Close-Off (PSI)	Fail Safe
F650-150SHP	2"	102	1.75	9.00	9.00	19.50	4.75	4	5/8-11	2*AF	150	
F665-150SHP	2.5"	146	1.88	9.00	9.00	20.00	5.50	4	5/8-11		150	
F680-150SHP	3"	228	1.92	9.00	9.00	20.50	6.00	4	5/8-11		150	
F6100-150SHP	4"	451	2.13	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	
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	
										SY8...	150	
F6500-150SHP	20"	14420	5.00	14.00	14.00	49.50	25.00	20	1 1/8-8 UNC	SY10...	285	
										SY10...	150	
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	

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.

This chart displays the pressure-temperature ratings for various materials, including ANSI 600 CS, ANSI 600 SS, ANSI 300 CS, ANSI 300 SS, ANSI 150 CS, and ANSI 150 SS. The chart includes a shaded area for the RPTFE RANGE and a vertical line for the 20°F LOW TEMP CS LIMIT. The temperature scale is shown in both °F and °C, and the pressure scale is shown in both PSIG and BARG.

Material	Temperature (°F)	Temperature (°C)	Pressure (PSIG)	Pressure (BARG)
ANSI 600 CS	-100	-73	1450	103.4
	0	-17.8	1450	103.4
	100	38.7	1450	103.4
ANSI 600 SS	-100	-73	1400	96.5
	0	-17.8	1400	96.5
	100	38.7	1400	96.5
ANSI 300 CS	-100	-73	720	48.3
	0	-17.8	720	48.3
	100	38.7	720	48.3
ANSI 300 SS	-100	-73	700	46.2
	0	-17.8	700	46.2
	100	38.7	700	46.2
ANSI 150 CS	-100	-73	250	13.8
	0	-17.8	250	13.8
	100	38.7	250	13.8
ANSI 150 SS	-100	-73	230	12.1
	0	-17.8	230	12.1
	100	38.7	230	12.1

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Technical Data	
Service	chilled, hot water, 60% glycol, steam to 50 psi
Flow Characteristic	modified linear, unidirectional
Recommended Install	SUS (Seat Up Stream)
Action	quarter turn, mechanically limited
Sizes	2" to 24"
Type of End Fitting	ANSI Class 125/150 flanged
Body Pressure	ANSI Class 150
Materials	
Body	carbon steel full lug
Disc	316 stainless steel
Seat	RTFE
Shaft	17-4 pH stainless
Gland Seal	TFE
Bushings	glass backed TFE
Flange	for use with ANSI Class 125/150 flanges
Media Temp Range	ANSI Class 150 limitations
Operation Ambient Temperature Range	-22°F to 122°F [-30°C to 50°C]
Maximum Pressure Differential	285 psi @ 100°F
Rangeability	10:1 (for 30 deg to 70 deg range)
Maximum Velocity	32 FPS

- 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.

		Valve Nominal Size	Type	Suitable Actuators	
C_v 90°	C_v 60°	IN	ANSI 150 3-way	Spring	Non-Spring
102	56	2"	F750-150SHP	AF Series	GM 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	SY Series	
11500	3270	18"	F7450-150SHP		
14420	7590	20"	F7500-150SHP		
22050	11550	24"	F7600-150SHP		

Valve	Size	C_v	MOD								ON/OFF
			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

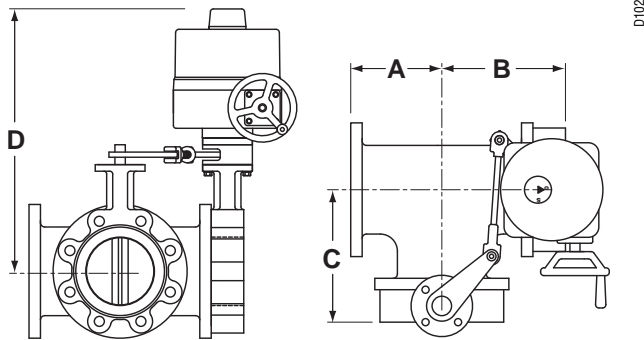


Maximum Dimensions (Inches)

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	6.25	6.25	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	7.42	7.42	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	6.25	6.25	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	7.42	7.42	17.50	6.00	4	5/8-11		285
F750-150SHP	2"	102	4.50	8.00	8.00	22.25	4.75	4	5/8-11 UNC		285
F765-150SHP	2.5"	146	5.00	8.00	8.00	22.75	5.50	4	5/8-11 UNC	SY2...	285
F780-150SHP	3"	228	5.50	8.00	8.00	23.00	6.00	4	5/8-11 UNC		285
F7100-150SHP	4"	451	6.50	8.00	8.00	23.75	7.50	8	5/8-11 UNC		285
F7125-150SHP	5"	714	7.50	8.00	8.00	24.25	8.50	8	3/4-10 UNC		285
F7150-150SHP	6"	1103	8.00	8.00	8.00	24.75	9.50	8	3/4-10 UNC	SY3...	285
F7200-150SHP	8"	2064	9.00	12.00	12.00	32.00	11.75	8	3/4-10 UNC		150
F7250-150SHP	10"	3517	11.00	12.00	12.00	33.00	14.25	12	7/8-9 UNC	SY4...	150
										SY4...	150
										SY5...	285
										SY5...	150
F7300-150SHP	12"	4837	12.00	12.00	12.00	35.00	17.00	12	7/8-9 UNC	SY7...	285
F7350-150SHP	14"	6857	14.00	14.00	14.00	36.00	18.75	12	1-8 UNC	SY7...	285
F7400-150SHP	16"	9287	15.00	14.00	14.00	37.50	21.25	16	1-8 UNC	SY7...	150
										SY9...	285
										SY8...	150
										SY10...	285
F7450-150SHP	18"	11400	16.50	14.00	14.00	42.25	22.75	16	1 1/8-8 UNC	SY9...	150
F7500-150SHP	20"	14420	18.00	14.00	14.00	49.50	25.00	20	1 1/8-8 UNC	SY11...	285
										SY11...	285
										SY12...	150
										SY12...	150
F7600-150SHP	24"	22050	22.00	14.00	14.00	56.25	29.50	20	1 1/4-8 UNC		

Non-Fail Safe

Dimensions

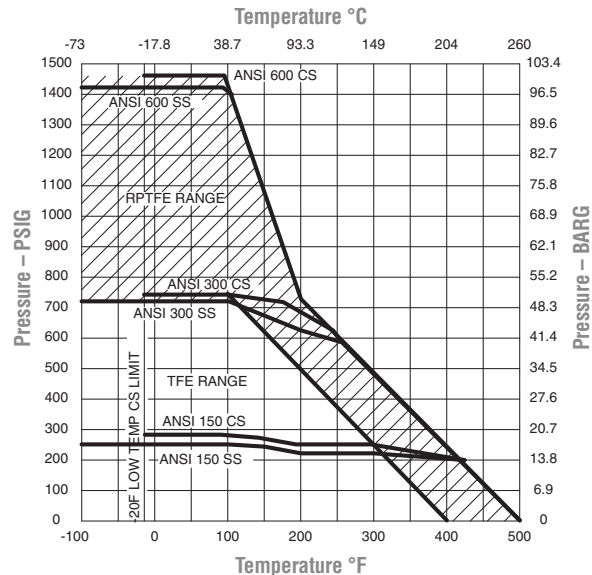


Dimensions "A, B and C" do not include flange gaskets. (3 required per valve)

Application Notes

- Valves are rated at 285 psi differential pressure in the closed position @ 100°F media temperature.
- Valves are furnished with lugs tapped for use between ANSI Class 125/150 flanges conforming to ANSI B16.5 Standards.
- 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.
- Dimension "D" allows for actuator(s) removal without the need to remove the valve from the pipe.
- Weather shields are available, dimensional data furnished upon request.
- Dual actuated valves have single actuators mounted on each valve shaft.
- Flange gaskets (3 required, not provided with valve) MUST be used between valve and ANSI flange.
- 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.



Preferred Flowrate

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Technical Data	
Service	chilled, hot water, 60% glycol, steam to 50 psi
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	ANSI Class 250/300 flanged
Body Pressure	ANSI Class 300
Materials	
Body	carbon steel full lug
Disc	316 stainless steel
Seat	RTFE
Shaft	17-4 pH stainless
Gland Seal	TFE
Bushings	glass backed TFE
Flange	for use with ANSI Class 250/300 flanges
Media Temp Range	ANSI Class 300 limitations
Operation Ambient Temperature Range	-22°F to 122°F [-30°C to 50°C]
Maximum Pressure Differential	725 psi @ 100°F
Rangeability	10:1 (for 30 deg to 70 deg range)
Maximum Velocity	32 FPS

- 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.

Valve Nominal Size			Type	Suitable Actuators		
C _v 90°	C _v 60°	IN	ANSI 150 2-way	Spring	Non-Spring	SY Series
102	56	2"	F650-300SHP	AF Series	GM Series	
146	80	2½"	F665-300SHP			
228	125	3"	F680-300SHP			
451	248	4"	F6100-300SHP			
714	392	5"	F6125-300SHP			
1103	607	6"	F6150-300SHP			
2064	1135	8"	F6200-300SHP			
3517	1934	10"	F6250-300SHP			
4837	2660	12"	F6300-300SHP			
6857	3592	14"	F6350-300SHP			
9287	4865	16"	F6400-300SHP			
11500	3270	18"	F6450-300SHP			
14420	7590	20"	F6500-300SHP			
22050	11550	24"	F6600-300SHP			
34388	18012	30"	n/a			

Valve	Size	C _v	MOD								ON/OFF	
			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	
F6500-300SHP	24"	16205	242	966	2254	4057	6118	8855	12075	16100	16205	

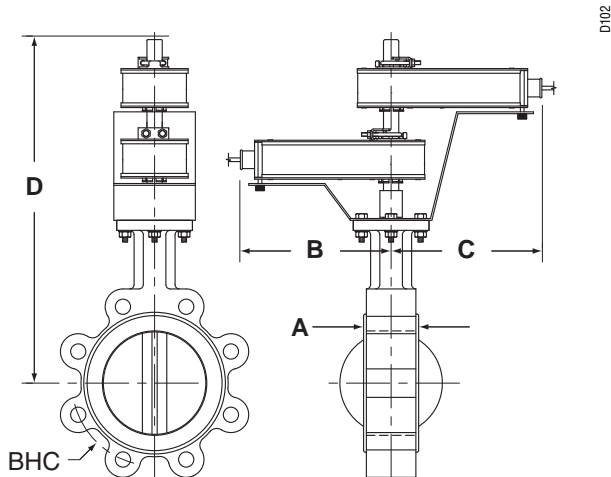
F6 ANSI Class 300 Reinforced Teflon Seat, 316 Stainless Disc



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	
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	Non-Fail Safe
										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	
										SY3...	150	
F6200-300SHP	8"	1911	2.88	12.00	12.00	32.00	11.75	12	7/8-9 UNC	SY4...	600	
										SY4...	285	
										SY5...	400	
F6250-300SHP	10"	3194	3.25	12.00	12.00	33.00	14.25	16	1-8 UNC	SY7...	600	
										SY4...	150	
										SY5...	285	
F6300-300SHP	12"	4428	3.62	12.00	12.00	35.00	17.00	16	1 1/8-8 UNC	SY7...	600	
										SY5...	150	
										SY7...	400	
F6350-300SHP	14"	5702	4.62	14.00	14.00	36.00	18.75	20	1 1/8-8 UNC	SY8...	600	
										SY7...	150	
										SY8...	285	
F6400-300SHP	16"	8243	5.25	14.00	14.00	37.50	21.25	20	1 1/4-8 UNC	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

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

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Technical Data

Service	chilled, hot water, 60% glycol, steam to 50 psi
Flow Characteristic	modified linear, unidirectional
Recommended Install	SUS (Seat Up Stream)
Action	quarter turn, mechanically limited
Sizes	2" to 4"
Type of End Fitting	ANSI Class 250/300 flanged
Body Pressure	ANSI Class 300
Materials	
Body	carbon steel full lug
Disc	316 stainless steel
Seat	RTFE
Shaft	17-4 pH stainless
Gland Seal	TFE
Bushings	glass backed TFE
Flange	for use with ANSI Class 250/300 flanges
Media Temp Range	ANSI Class 300 limitations
Operation Ambient Temperature Range	-22°F to 122°F [-30°C to +50°C]
Maximum Pressure Differential	725 psi @ 100°F
Rangeability	10:1 (for 30 deg to 70 deg range)
Maximum Velocity	32 FPS

- 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 come 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
102	56	2"	F750-300SHP	AF Series	GM Series
146	80	2½"	F765-300SHP		
228	125	3"	F780-300SHP		
451	248	4"	F7100-300SHP		
714	392	5"	F7125-300SHP		
1103	607	6"	F7150-300SHP		
2064	1135	8"	F7200-300SHP		
3517	1934	10"	F6250-300SHP		
4837	2660	12"	F7300-300SHP		
6857	3592	14"	F7350-300SHP		
9287	4865	16"	F7400-300SHP	SY Series	
11500	3270	18"	F7450-300SHP		
14420	7590	20"	F7500-300SHP		
22050	11550	24"	F7600-300SHP		

Valve	Size	C_v	MOD								ON/OFF
			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

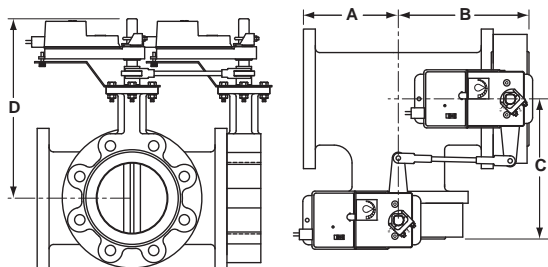


Maximum Dimensions (Inches)

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.

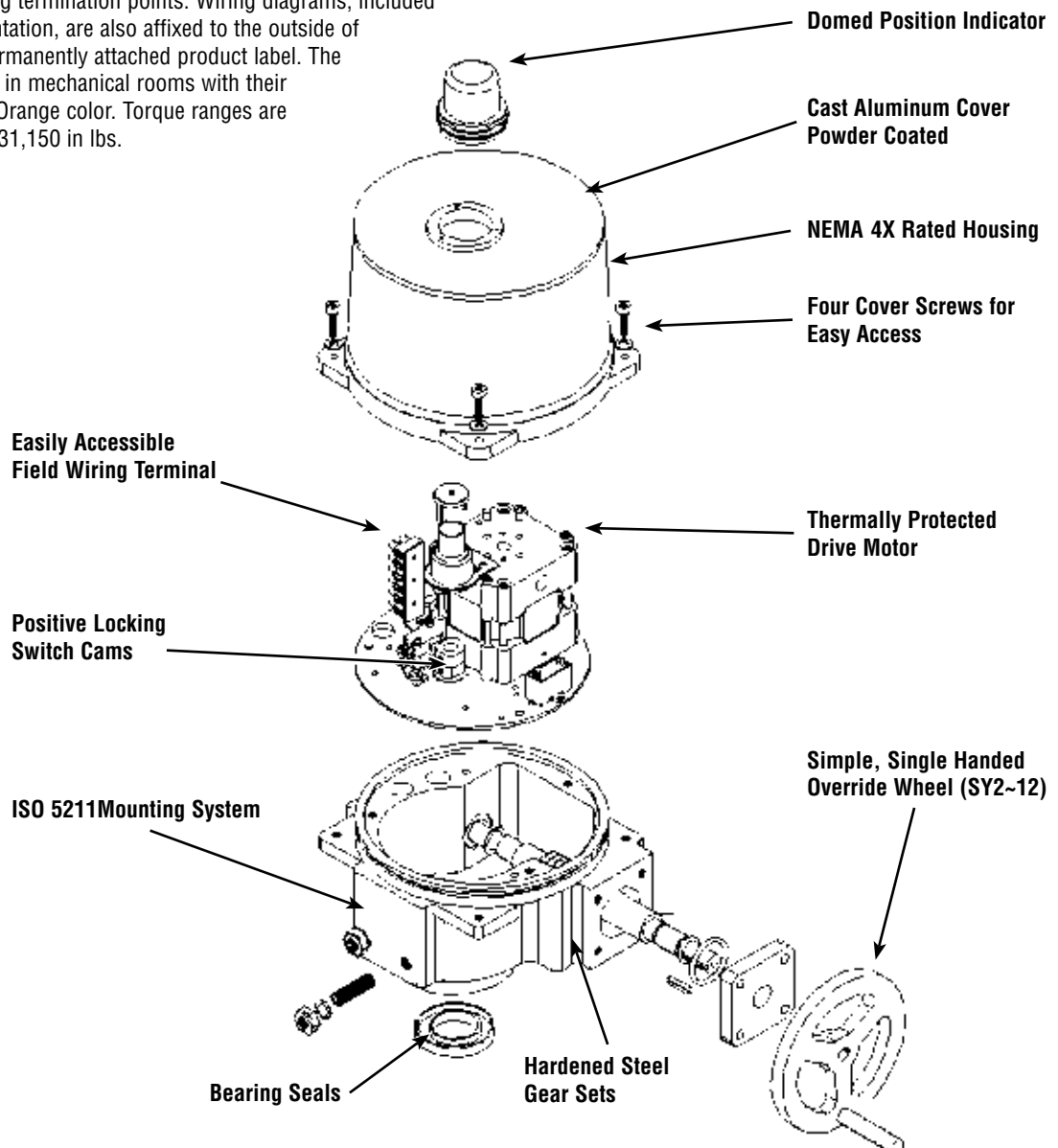
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SY Series Actuators

Belimo's SY series electric actuators have been designed to mate with our HS(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 4, 4x rated and designed to meet the needs of HVAC and Commercial applications. Offered on the HSU and HS butterfly valve series, these actuators are available for on/off and modulating applications. Depending on the application, they are available in 24 VAC, 120 VAC and 230 VAC.

Technical Data	
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...24SR) 2-10 vdc (SY...24MFT) 2-10 vdc, 4-20mA, 0-10 VDC
Sensitivity	(SY...24SR/MFT) 0.4mA/200mV
Reversal Hysteresis	(SY...24SR/MFT) 1.0mA/500mV
Feedback	(SY...24SR/MFT) 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 4, 4X
Housing Material	die cast aluminum alloy
Agency Listings	ISO, CE, cCSAus

Power Supply

24 VAC 50/60Hz, single phase

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



Application:

The SY actuators are NEMA 4, 4x rated and designed to meet the needs of HVAC and Commercial applications. Offered on the HSU and HS butterfly valve series, these actuators are available for on/off and modulating applications. Depending on the application, they are available in 24 VAC, 120 VAC and 230 VAC. The SY series actuators are fractional horsepower devices, and utilize half-wave power supplies. Observe wire sizing and transformer sizing requirements.

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...120SR) 2-10 vdc (SY...120MFT) 2-10 vdc, 4-20mA, 0-10 VDC
Sensitivity	(SY...120SR/MFT) 0.4mA/200mV
Reversal Hysteresis	(SY...120SR/MFT) 1.0mA/500mV
Feedback	(SY...120SR/MFT) 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 4, 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	Override	Weight
SY1-110(P)	35Nm/310 in-lbs	12s	13s	0.5A	8mm Wrench	2.0kg/4.9 lb.
SY2-120(SR/MFT)	90Nm/801 in-lbs	15s	17s	1.0A	Hand Wheel	11kg/24.5 lb.
SY3-120(SR/MFT)	150Nm/1335 in-lbs	22s	26s	1.0A	Hand Wheel	11kg/24.5 lb.
SY4-120(SR/MFT)	400Nm/3560 in-lbs	16s	18s	1.3A	Hand Wheel	22kg/48.5 lb.
SY5-120(SR/MFT)	500Nm/4450 in-lbs	22s	25s	1.5A	Hand Wheel	22kg/48.5 lb.
SY6-120(SR/MFT)	650Nm/5785 in-lbs	28s	31s	1.8A	Hand Wheel	22kg/48.5 lb.
SY7-120(SR/MFT)	1000Nm/8900 in-lbs	46s	55s	3.2A	Hand Wheel	36kg/79.5 lb.
SY8-120(SR/MFT)	1500Nm/13350 in-lbs	46s	55s	4.0A	Hand Wheel	36kg/79.5 lb.
SY9-120(SR/MFT)	2000Nm/17800 in-lbs	58s	70s	3.2A	Hand Wheel	56kg/123.5 lb.
SY10-120(SR/MFT)	2500Nm/22250 in-lbs	58s	70s	4.0A	Hand Wheel	56kg/123.5 lb.
SY11-120(SR/MFT)	3000Nm/26700 in-lbs	58s	70s	3.0A	Hand Wheel	56kg/123.5 lb.
SY12-120(SR/MFT)	3500Nm/31150 in-lbs	58s	70s	4.0A	Hand Wheel	56kg/123.5 lb.

SY...230 Series Non-Spring Return Actuator



Technical Data - 230 VAC



Application:

The SY actuators are NEMA 4, 4x rated and designed to meet the needs of HVAC and Commercial applications. Offered on the HSU and HS butterfly valve series, these actuators are available for on/off and modulating applications. Depending on the application, they are available in 24 VAC, 120 VAC and 230 VAC.

Technical Data

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...230SR) 2-10 vdc (SY...230MFT) 2-10 vdc, 4-20mA, 0-10 vdc
Sensitivity	(SY...230SR/MFT) 0.4mA/200mV
Reversal Hysteresis	(SY...230SR/MFT) 1.0mA/500mV
Feedback	(SY...230SR/MFT) 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 4, 4X
Housing Material	die cast aluminum alloy
Agency Listings	ISO, CE, cCSAus

Power Supply

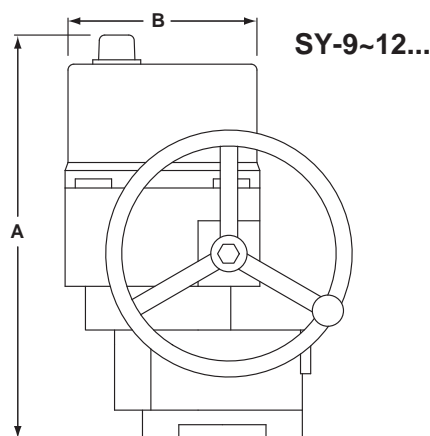
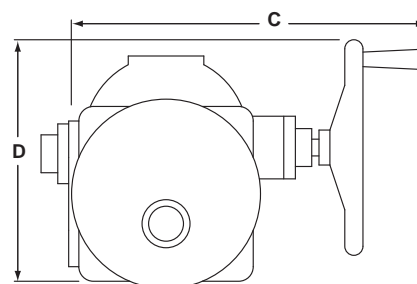
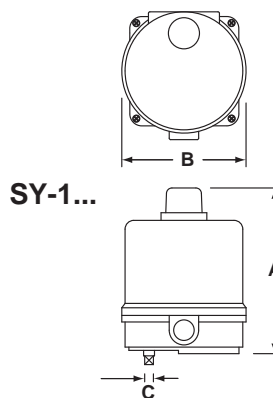
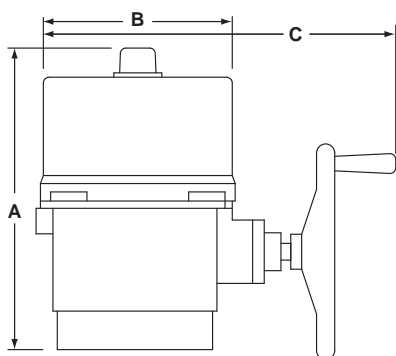
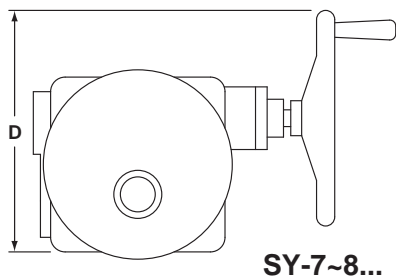
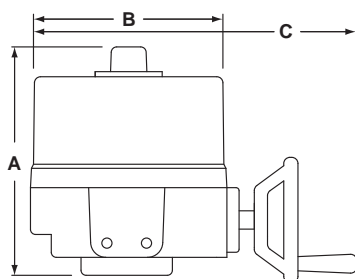
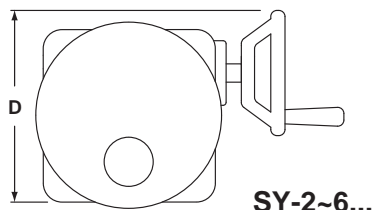
230 VAC 50/60Hz, single phase

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

800-543-9038 USA

866-805-7089 CANADA

203-791-8396 LATIN AMERICA



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



24 VAC					
	SY1	SY2	SY3	SY4	SY5
	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

110 VAC												
	SY1	SY2	SY3	SY4	SY5	SY6	SY7	SY8	SY9	SY10	SY11	SY12
	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

220 VAC												
	SY1	SY2	SY3	SY4	SY5	SY6	SY7	SY8	SY9	SY10	SY11	SY12
	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-SR/MFT



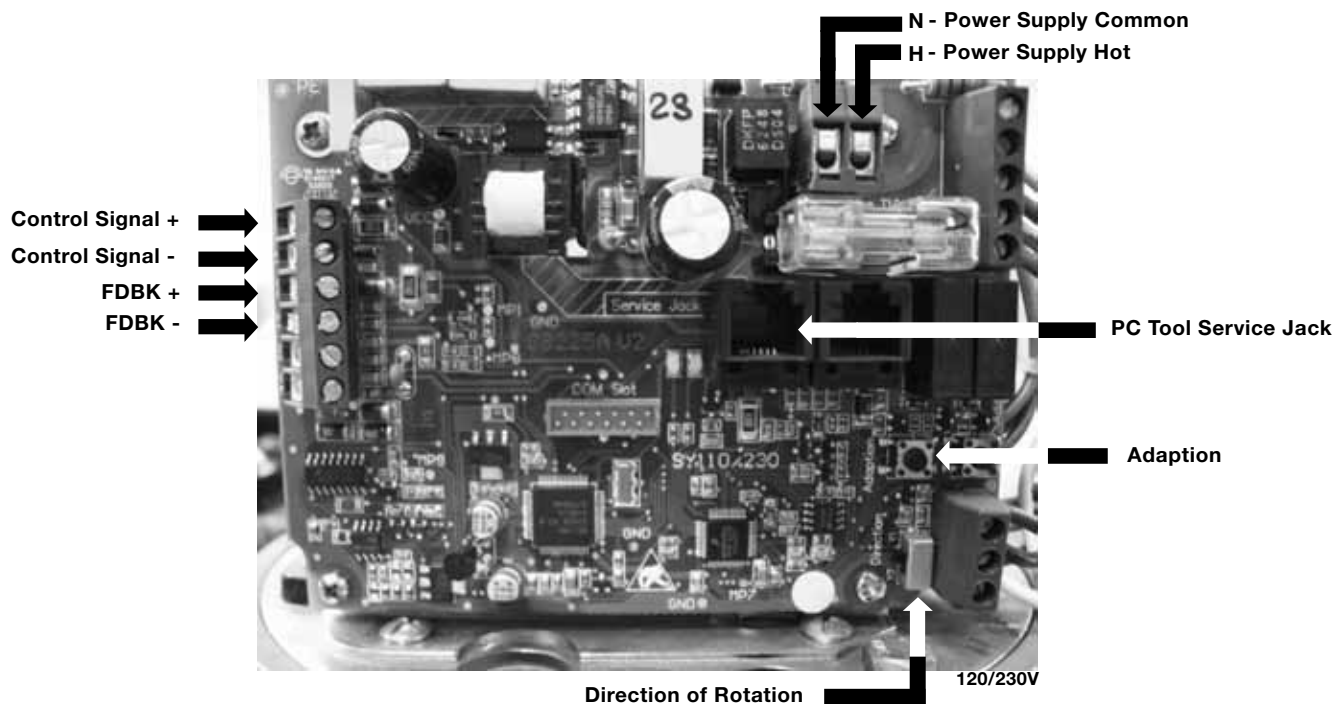
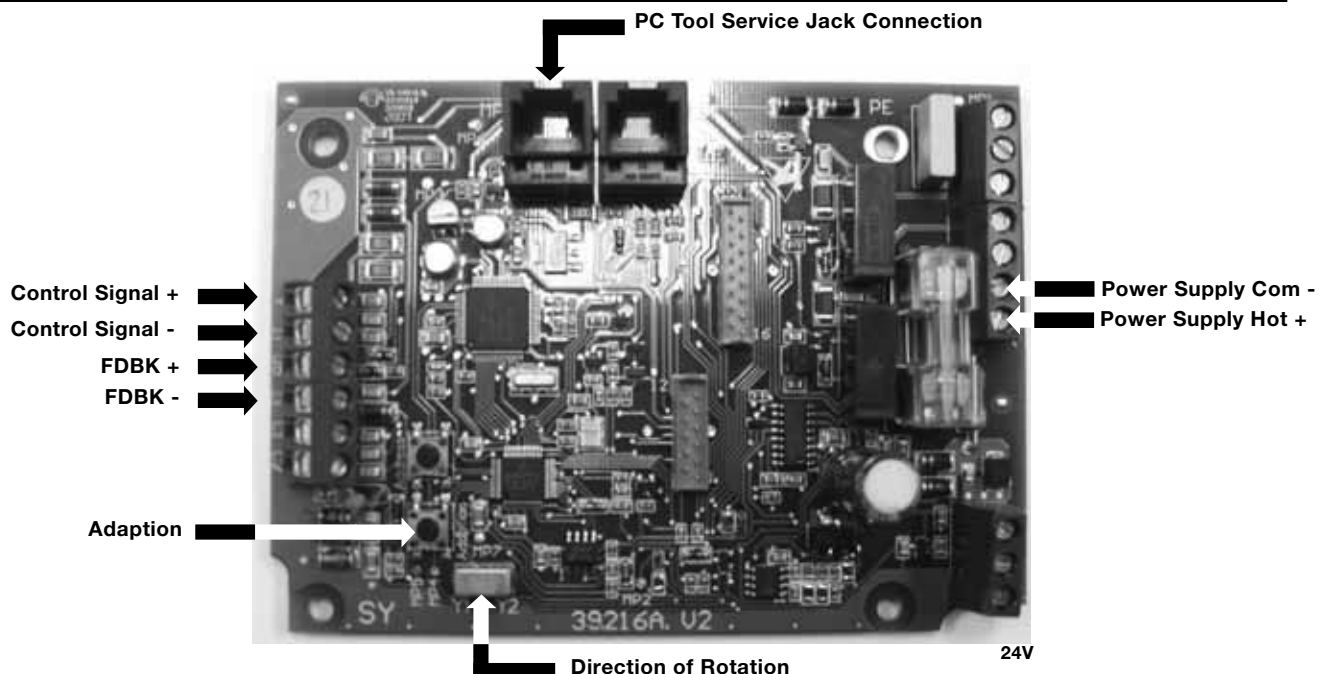
INSTALLATION NOTES

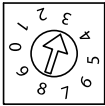
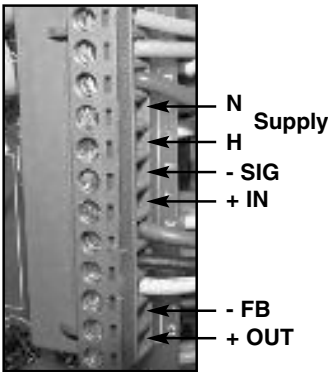
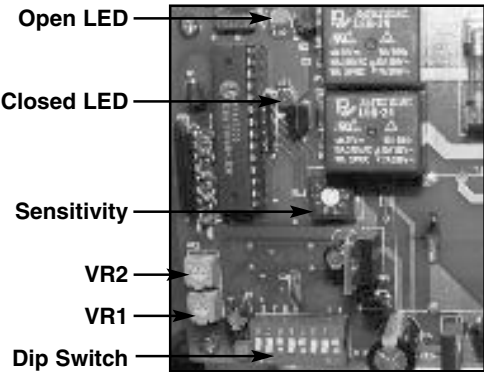


CAUTION

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

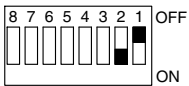


INSTALLATION NOTES

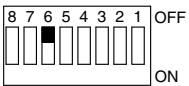
CAUTION

- Notes:
- 1. Do not change sensitivity or dip switch settings with power applied!
 - 2. VR1 and VR2 are factory calibrated and should not be moved.
 - 3. Motor CAMS have been factory calibrated and should not be moved.

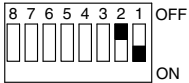
Dip Switch Settings



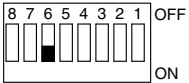
INPUT = 2-10 VDC



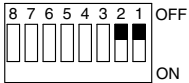
RESPONSE = DIRECT



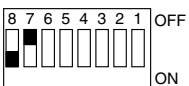
INPUT = 4-20mA



RESPONSE = REVERSE



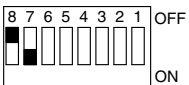
INPUT = 1-5 VDC



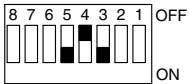
LOSS OF SIGNAL = CLOSED
(Direct Acting)



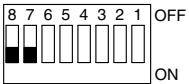
OUTPUT = 4-20mA



LOSS OF SIGNAL = OPEN
(Direct Acting)



OUTPUT = 2-10 VDC



LOSS OF SIGNAL = STOP



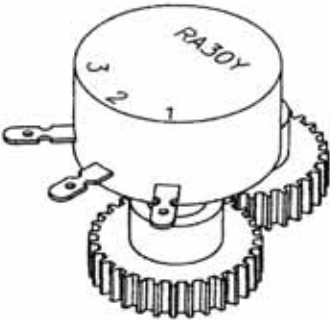
WARNING

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

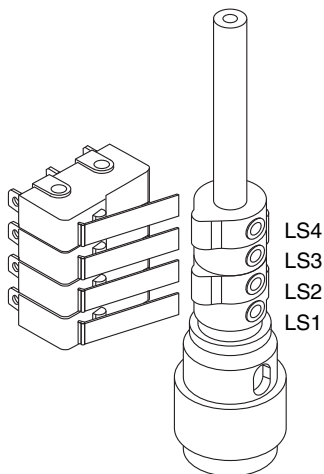
For modulating actuators with 1k feedback option*
Potentiometer points 1, 2, 3 are wired to terminal blocks 8, 9, 10.
When a valve is closed: 8, 9 → 1k Ω
9, 10 → 0k Ω
When a valve is opened: 8, 9 → 0k Ω
9, 10 → 1k Ω





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

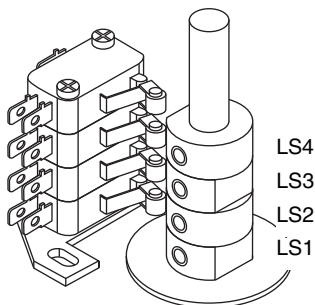


LS1
"OPEN"
Clockwise Increase Opening Angle
Counter-clockwise Decrease Opening Angle



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

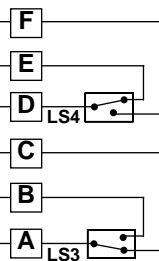
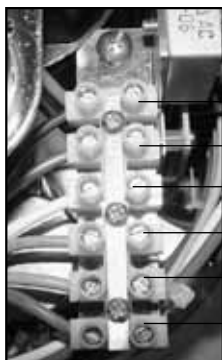
Factory pre-set and calibrated. Do not adjust - warranty voided



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



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



Switches at left are shown with actuator fully open.

	0°	5°	85°	90°
LS3	A - B		A - C	
LS4	D - F		D - E	



INSTALLATION NOTES



CAUTION

Notes:

1. An adaption must be performed when the limit switches are adjusted. For the SYx-SR/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



W546

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

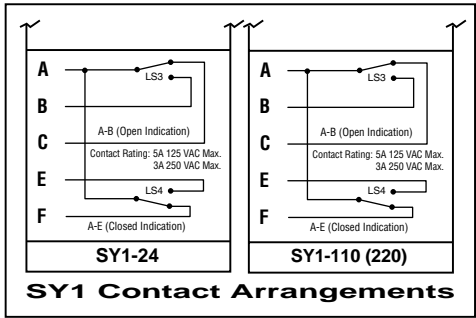
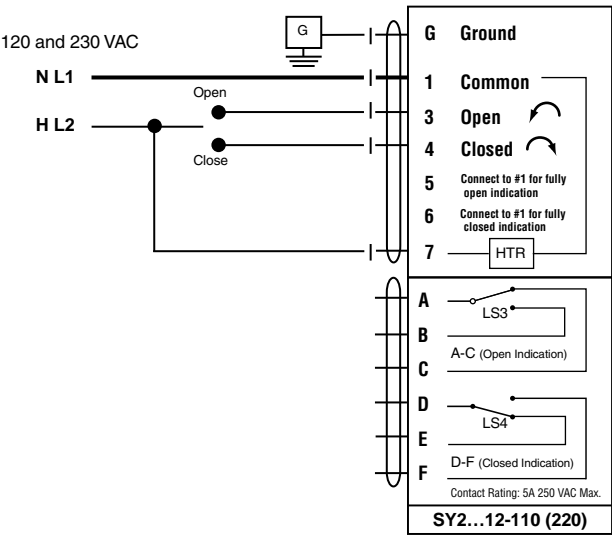
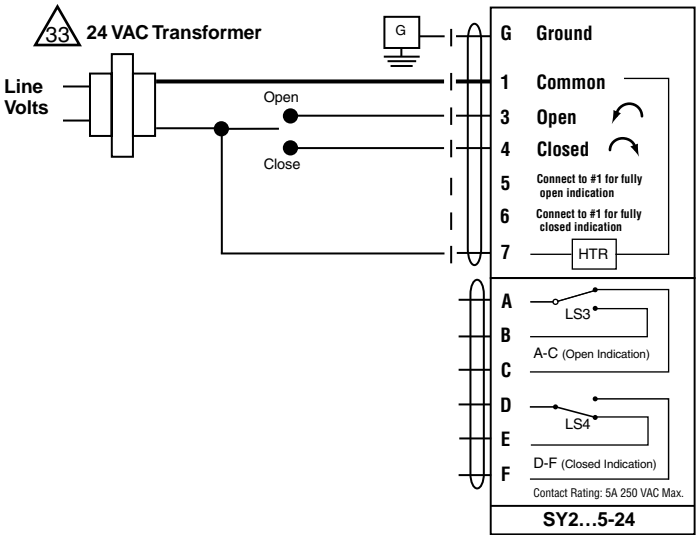
NOTES SY1...12-110 (220)

- **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.

NOTES SY1...5-24

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

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



K20928 - 09/22/08 - Subject to change. © Belimo Aircontrols (USA), Inc.

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.

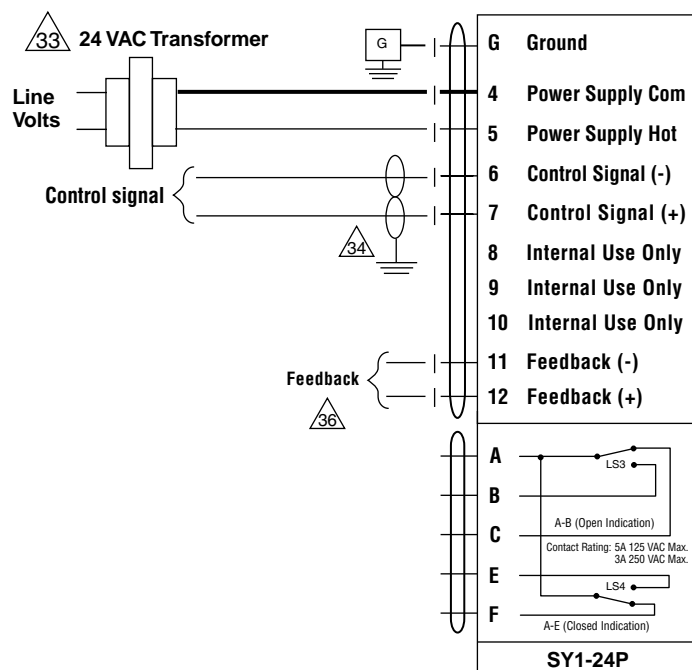
Indicates an action or condition that may cause irreversible damage to the actuator(s) or associated equipment.

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

NOTES SY1...24P

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.



INSTALLATION NOTES

Observe Class 1 and Class 2 wiring restrictions.

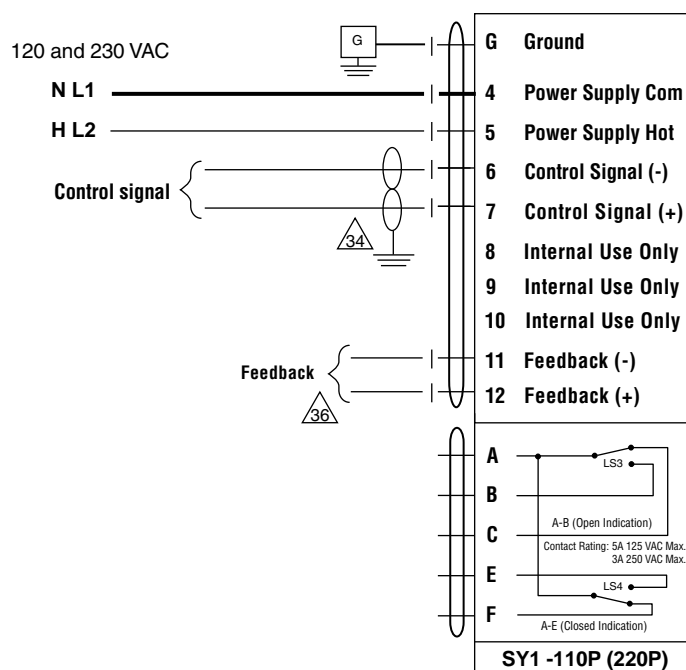
Transformer sizing = SY actuator draw X 1.25 (safety margin)
(Ex. SY2-24 requires 3.0A x 1.25 = 3.75A, 3.75A X 24 VAC = 90VA Transformer)

APPLICATION NOTES

- Ground shielded wire at control panel chassis. Tape back ground at actuator.
- Use of feedback is optional.

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.



Wiring for Damper Actuators and Control Valves

Proportional, 24V, 120/230V



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

W547

W549

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...5-24SR/MFT

- 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

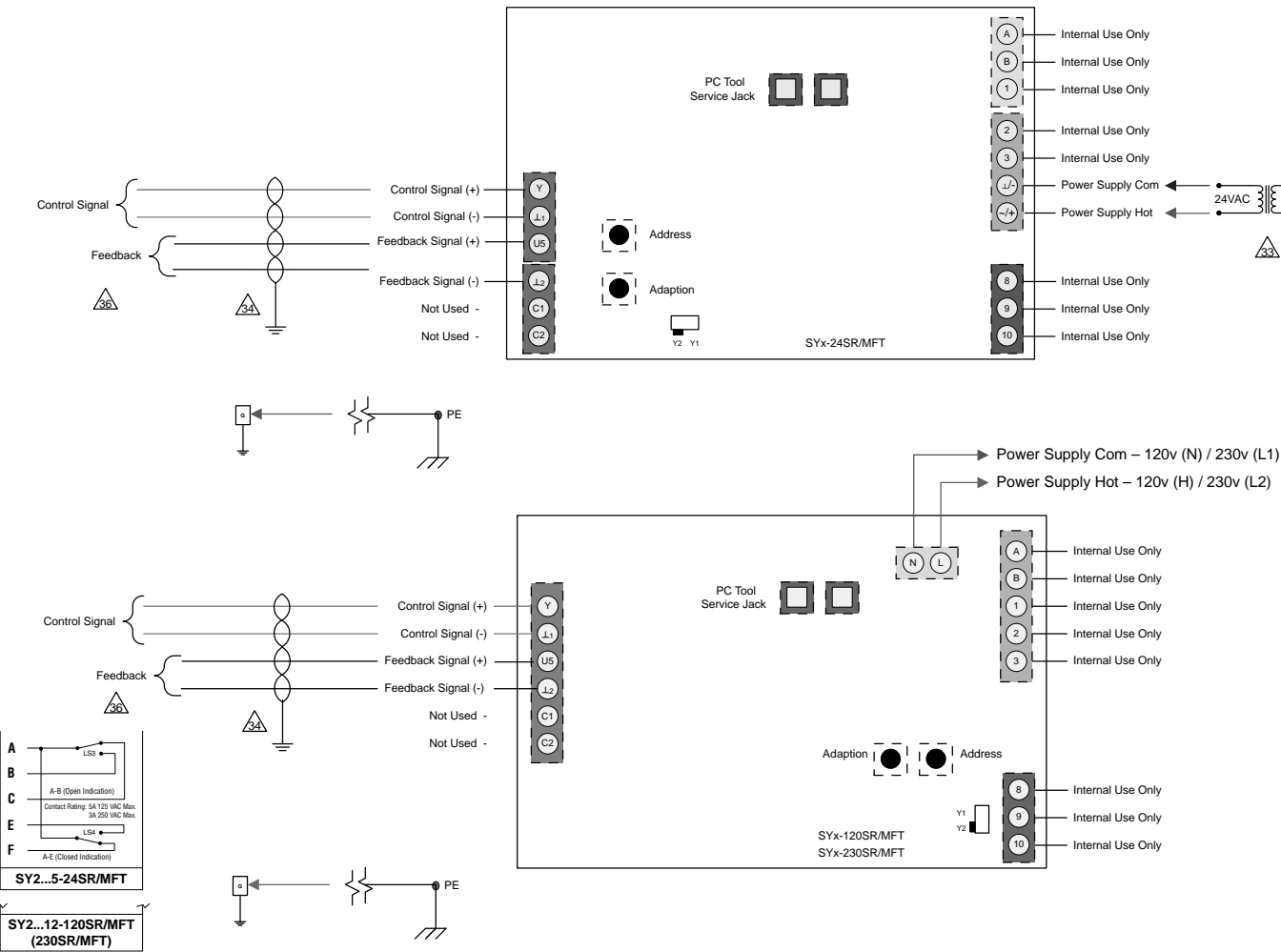
Observe Class 1 and Class 2 wiring restrictions.
Transformer sizing = SY actuator draw X 1.25 (safety margin)
(Ex. SY2-24 requires 3.0A x 1.25 = 3.75A, 3.75A X 24 VAC = 90VA Transformer)

APPLICATION NOTES

- Ground shielded wire at control panel chassis. Tape back ground at actuator.
- Use of feedback is optional.

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

- Caution: Power supply voltage.



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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.

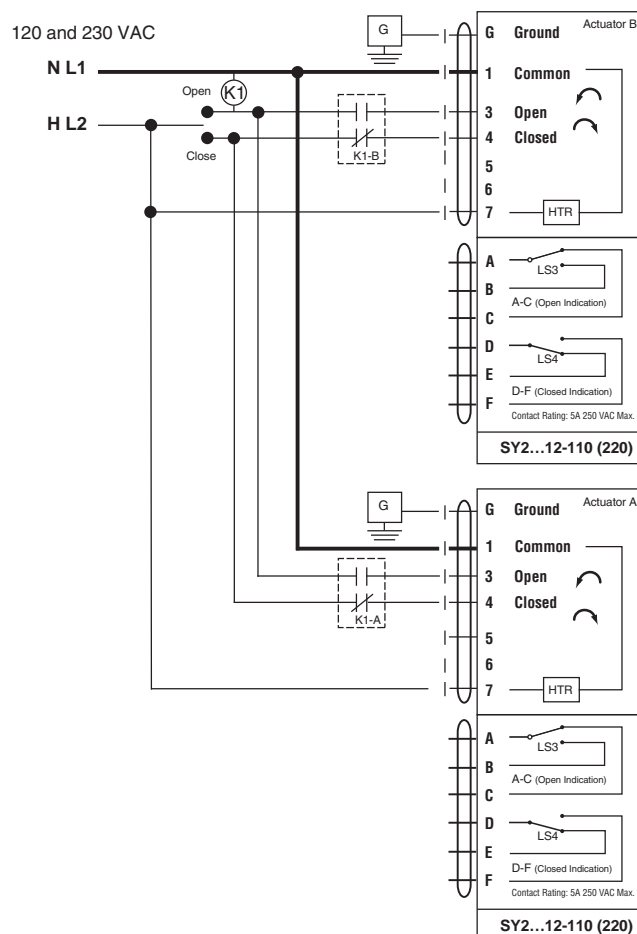
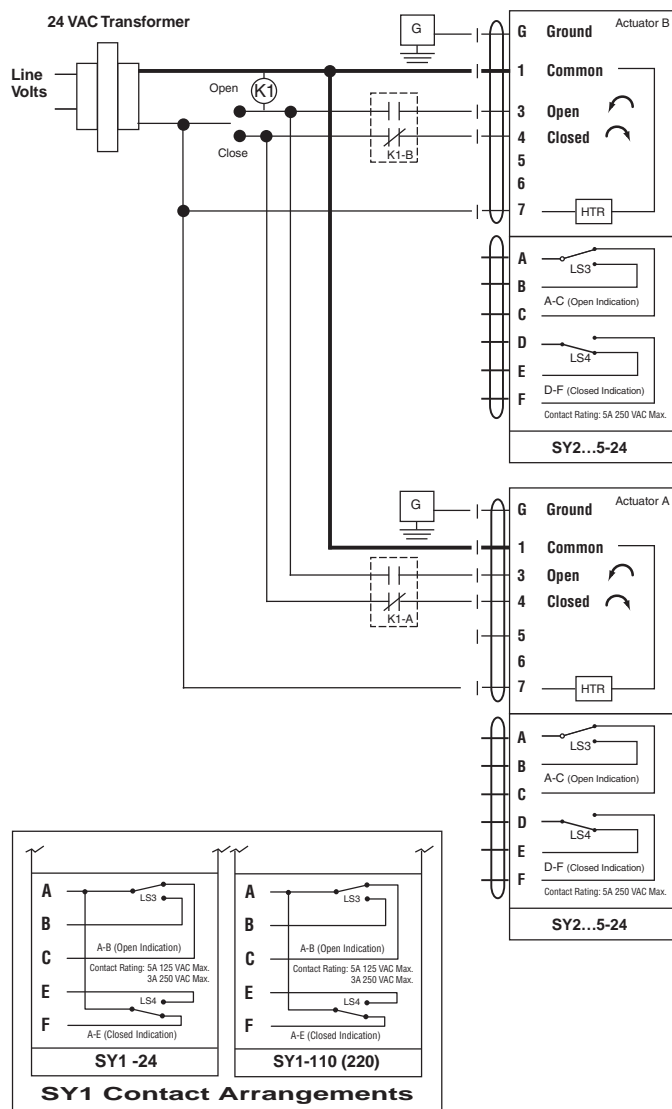
INSTALLATION NOTES

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.



Wiring for Control Valves

Proportional, 24V



W550

Actuators: SY1-24P

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.

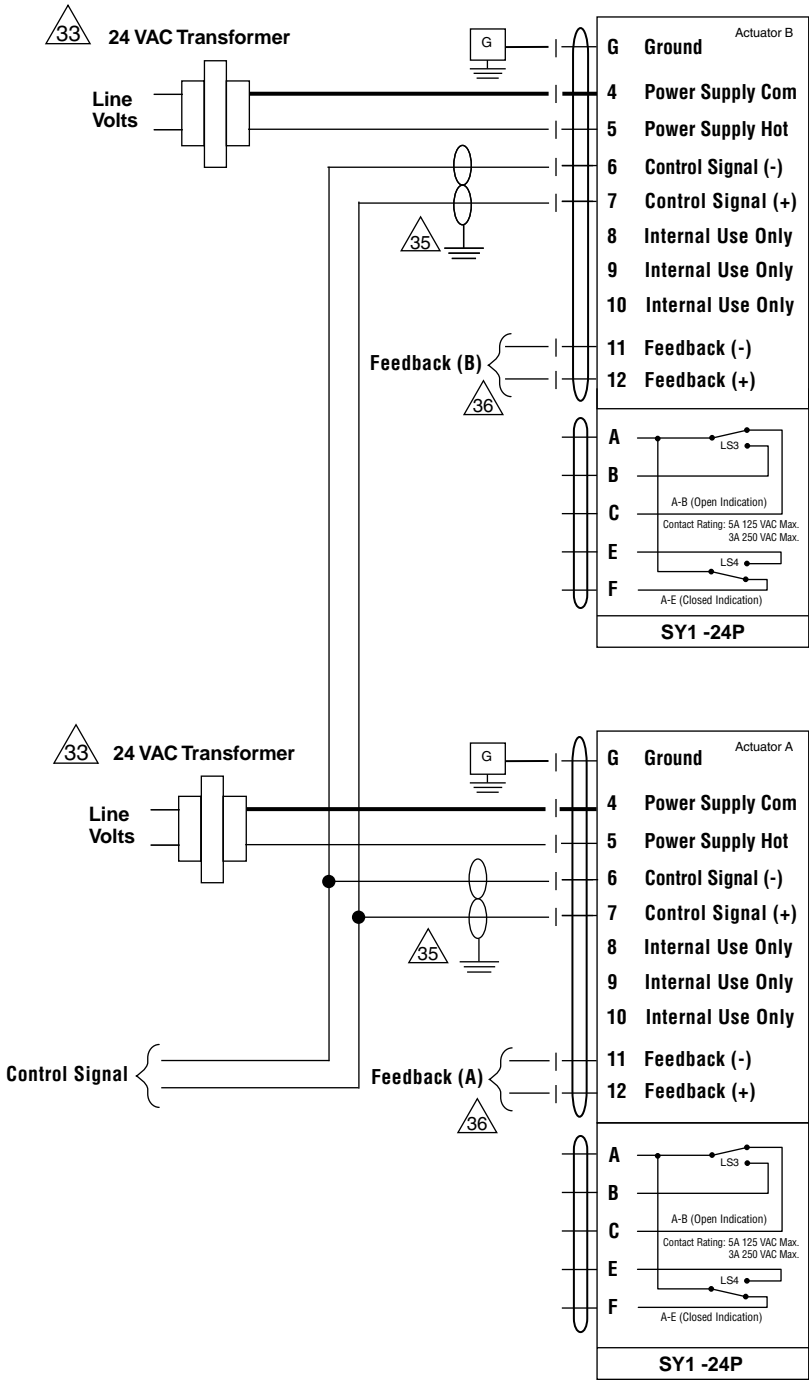
Transformer sizing = SY actuator draw X 1.25 (safety margin)
(Ex. SY2-24 requires 3.0A x 1.25 = 3.75A,
3.75A X 24 VAC = 90VA Transformer).

NOTES SY1-24P

- 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

- Recommended twisted shielded pair for control wiring. Ground shielded wire at control panel chassis. Tape back ground at actuator.
- Use of feedback is optional.



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Actuators: SY2...5-24SR/MFT

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...5-24SR/MFT



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



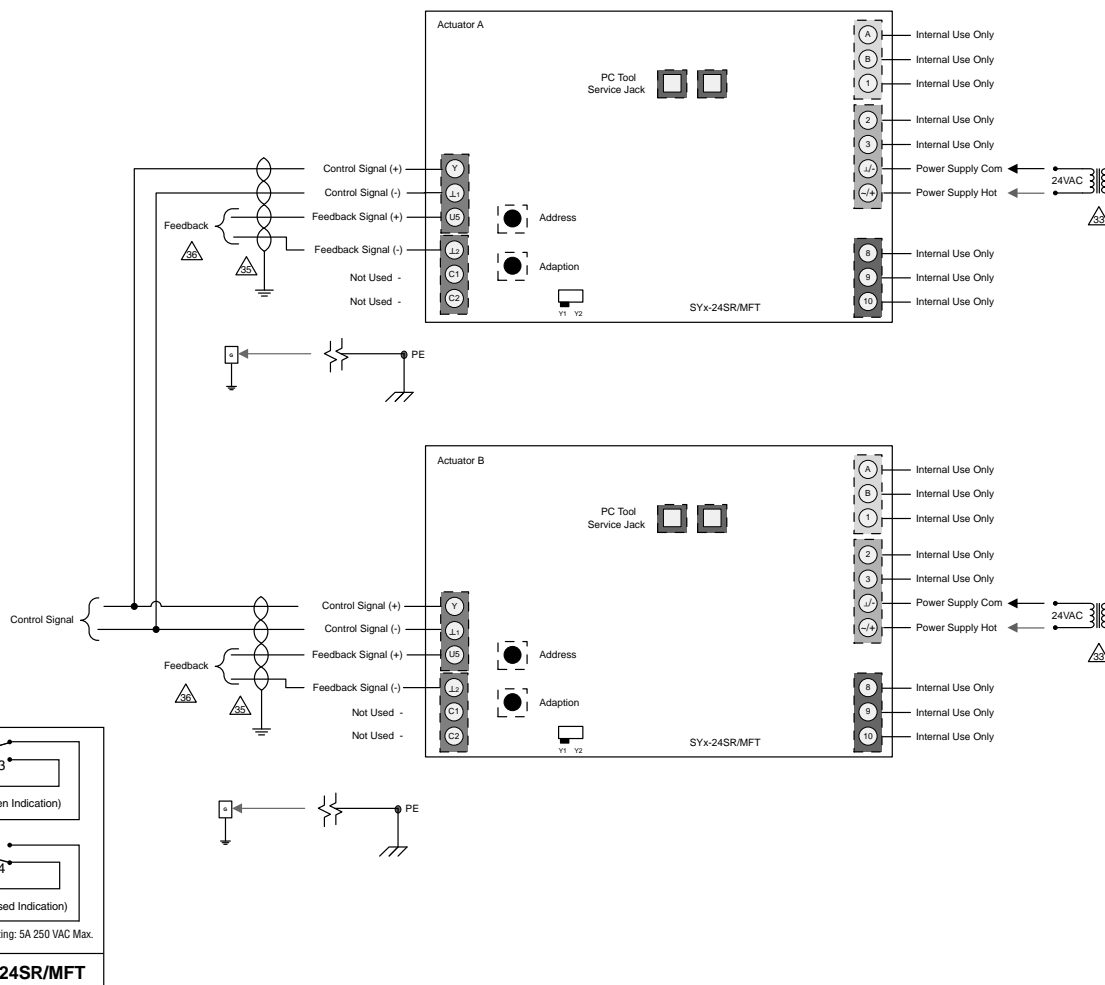
APPLICATION NOTES



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



Use of feedback is optional.



Wiring for Control Valves

Proportional, 110/220V, 120/230V



Actuators: SY1-110P SY1-220P

W652-1

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

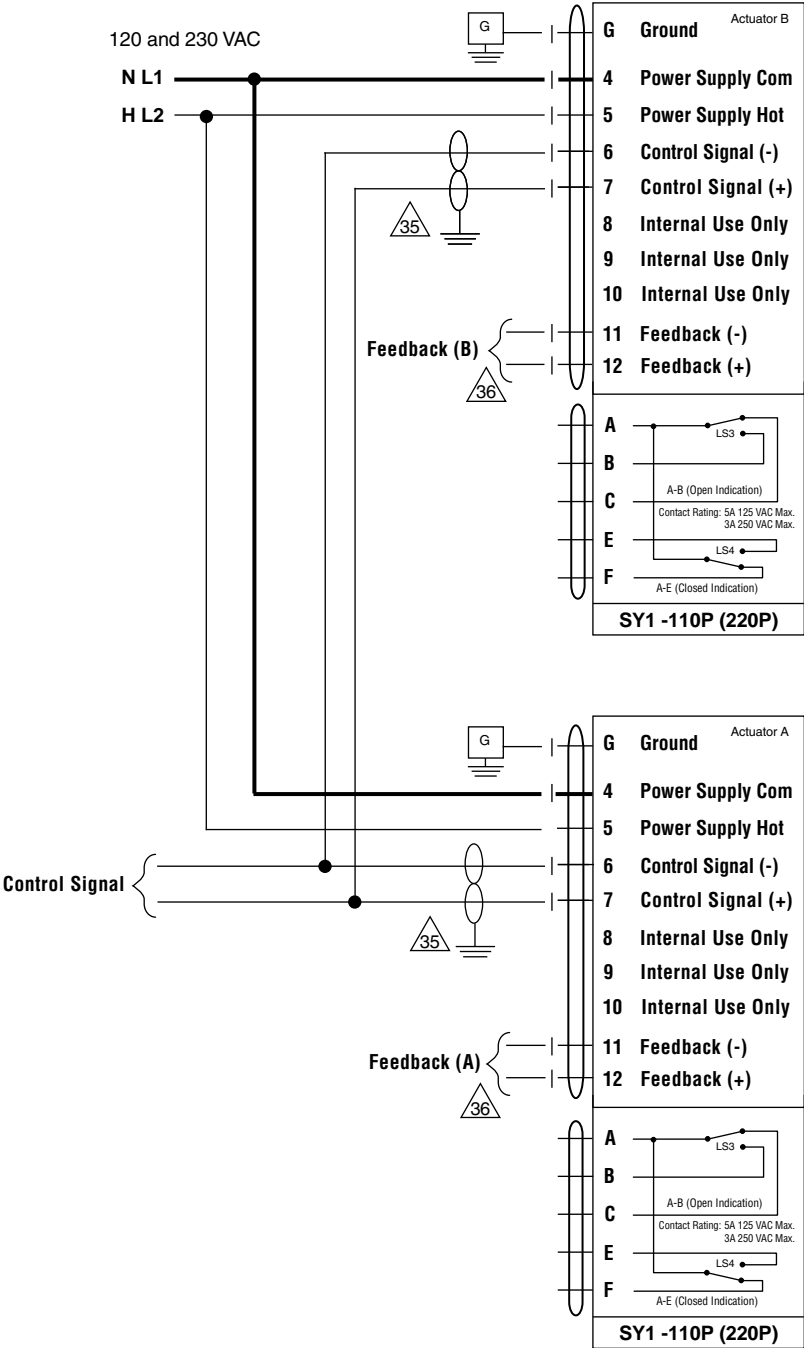
Observe class 1 and class 2 wiring restrictions.

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.



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Hazard Identification

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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.



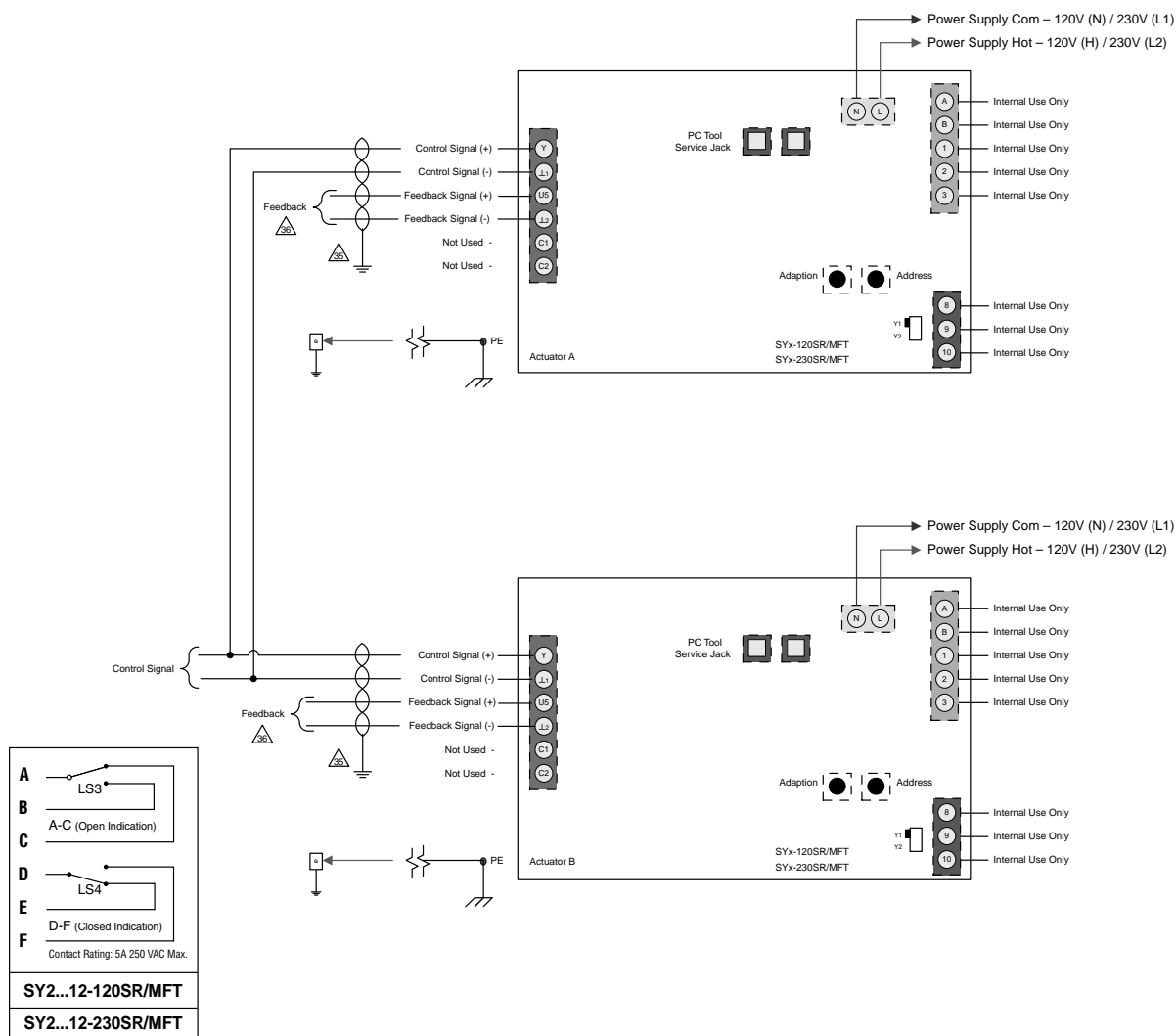
APPLICATION NOTES

- 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...12-120SR/MFT (230SR/MFT)

- **Caution:** Power supply voltage.





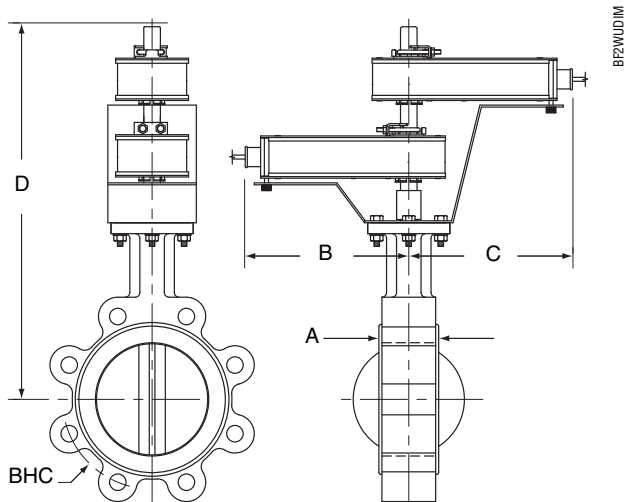
Models

- 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)

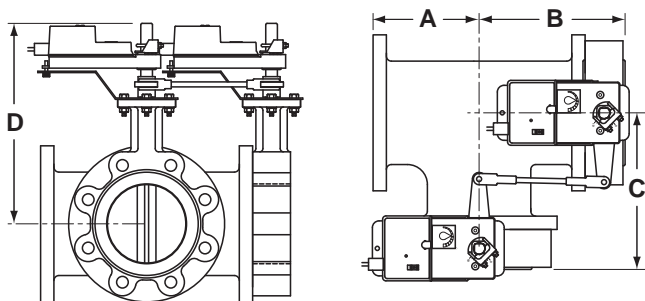
Dimensions with 2-Way Valve



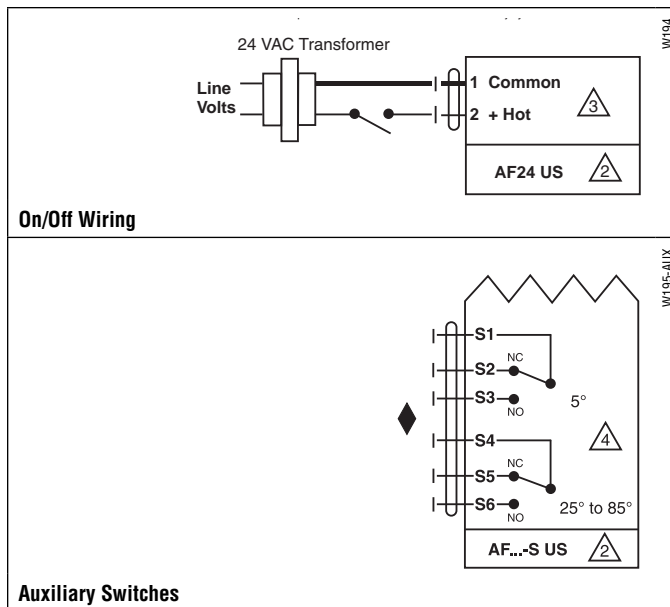
Dimensions (Inches)						Fail Safe (psi)	
Valve	Size	A	B	C	D(Max)	BHC	AF 2*AF
F650HS	2"	1.65	9.00	9.00	19.50	4.75	200
F650HSU	2"	1.65	9.00	9.00	19.50	4.75	50
F665HS	2½"	1.76	9.00	9.00	20.00	5.50	200
F665HSU	2½"	1.76	9.00	9.00	20.00	5.50	50
F680HS	3"	1.78	9.00	9.00	20.50	6.00	200
F680HSU	3"	1.78	9.00	9.00	20.50	6.00	50
F6100HSU	4"	2.05	9.00	9.00	21.00	7.50	50
F6125HSU	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

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Dimensions with 3-Way Valve



Valve	Size	Dimensions (Inches)				Fail Safe (psi)		
		A	B	C	D(Max)	BHC	AF	2*AF
F750HS	2"	4.50	6.15	6.15	15.50	4.75	200	
F750HSU	2"	4.50	6.15	6.15	15.50	4.75	50	
F765HS	2½"	5.00	6.76	6.76	16.00	5.50		200
F765HSU	2½"	5.00	6.76	6.76	16.00	5.50		50
F780HSU	3"	5.50	7.28	7.28	16.25	6.00		50



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.



MFT CE LISTED 5A 125 TEMP. RND. 0 C REG. COOP. UL US



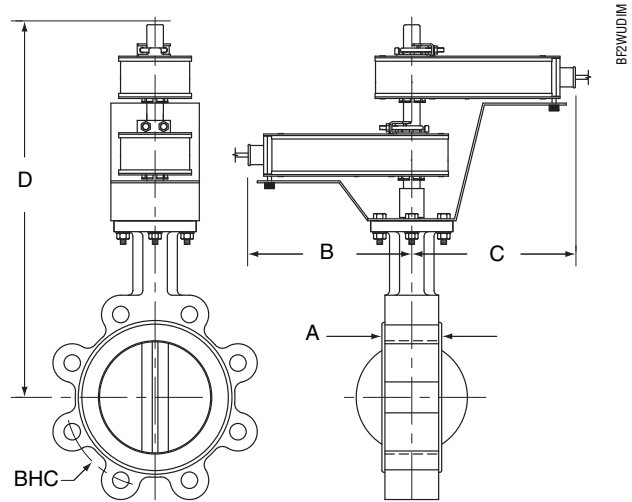
Models

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

Technical Data	
Control	MFT
Control signal	2 to 10 VDC, (4 to 20 mA with 500 Ω resistor)
Power supply	24 VAC \pm 20% 50/60 Hz 24 VDC \pm 10%
Power consumption	running 6 W holding 2.5 W
Transformer sizing	10 VA, class 2 power
Electrical connection	3 ft, 18 GA appliance cables (-S model has 2 cables) 1/2" conduit connector
Overload protection	electronic throughout rotation
Input impedance	100k Ω for 2 to 10 VDC (0.1 mA) 500 Ω for 4 to 20 mA 750 Ω for PWM 1500 Ω for on/off and floating point
Feedback output	2 to 10 VDC, 0.5 mA max
Angle of rotation	95°
Direction of Rotation	spring reversible with CW/CCW mounting motor reversible with built-in \curvearrowright / \curvearrowleft switch
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)

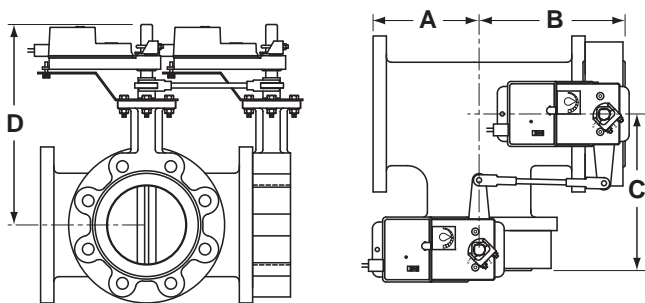
AF24-MFT-S US	
Auxiliary switches	2 x SPDT, 7A (2.5A) @ 250 VAC, UL listed, one switch is fixed at +5°, one is adjustable 25° to 85° (double insulated)

Dimensions with 2-Way Valve



Valve	Size	Dimensions (Inches)					Fail Safe (psi)	
		A	B	C	D(Max)	BHC	AF	2*AF
F650HS	2"	1.65	9.00	9.00	19.50	4.75	200	
F650HSU	2"	1.65	9.00	9.00	19.50	4.75	50	
F665HS	2½"	1.76	9.00	9.00	20.00	5.50		200
F665HSU	2½"	1.76	9.00	9.00	20.00	5.50	50	
F680HS	3"	1.78	9.00	9.00	20.50	6.00		500
F680HSU	3"	1.78	9.00	9.00	20.50	6.00		50
F6100HSU	4"	2.05	9.00	9.00	21.00	7.50		50
F6125HSU	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



Valve	Size	Dimensions (Inches)				Fail Safe (psi)	
		A	B	C	D(Max)	BHC	AF 2*AF
F750HS	2"	4.50	6.15	6.15	15.50	4.75	200
F750HSU	2"	4.50	6.15	6.15	15.50	4.75	50
F765HS	2½"	5.00	6.76	6.76	16.00	5.50	200
F765HSU	2½"	5.00	6.76	6.76	16.00	5.50	50
F780HSU	3"	5.50	7.28	7.28	16.25	6.00	50

Wiring Diagrams

INSTALLATION NOTES

- 2 **CAUTION Equipment damage!**
Actuators may be connected in parallel if not mechanically mounted to the same shaft. Power consumption and input impedance must be observed.
- 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.

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On/Off control

W043

PWM, triac source and sink

W302

Floating Point control

W303


Proportional 2 to 10 or 4 to 20 mA control signal

W195-AUXMFT

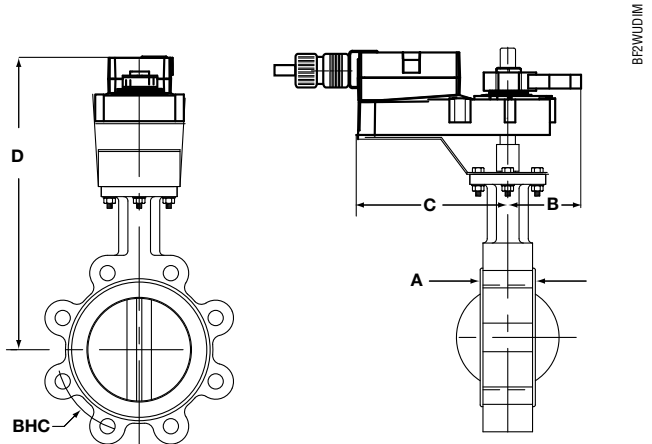


Models

AMB24-3X1

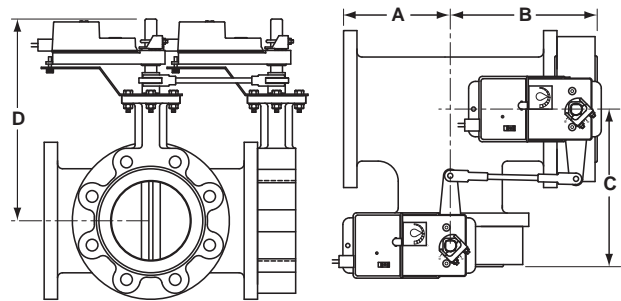
Technical Data	
Power supply	24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Power consumption	running 2.0 W holding 0.2 W
Transformer sizing	5.5 VA (class 2 power source)
Electrical connection	3 ft, 18 GA plenum rated cable ½" conduit connector
Overload protection	electronic throughout 0° to 95° rotation
Control	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 acc. to UL 60730-1A/-2-14, CAN/CSA E60730-1, CSA C22.2 No. 24-93, CE acc. 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



Dimensions (Inches)							Non-Fail Safe (psi)	
Valve	Size	A	B	C	D(Max)	BHC	HS	HSU
F650HS(U)	2"	1.65	7.00	7.00	15.00	4.75	200	50
F665HS(U)	2½"	1.76	7.00	7.00	15.50	5.50	200	50
F680HSU	3"	1.78	7.00	7.00	16.00	6.00		50

Dimensions with 3-Way Valve



Dimensions (Inches)							Non-Fail Safe (psi)	
Valve	Size	A	B	C	D(Max)	BHC	HS	HSU
F750HS	2"	4.50	6.15	6.15	15.50	4.75	200	
F765HSU	2½"	5.00	6.76	6.76	16.00	5.50	200	50

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Wiring Diagrams



INSTALLATION NOTES



CAUTION Equipment damage!

Actuators may be connected in parallel.
Power consumption and input impedance must be observed.



Actuators may also be powered by 24 VDC.



APPLICATION NOTES

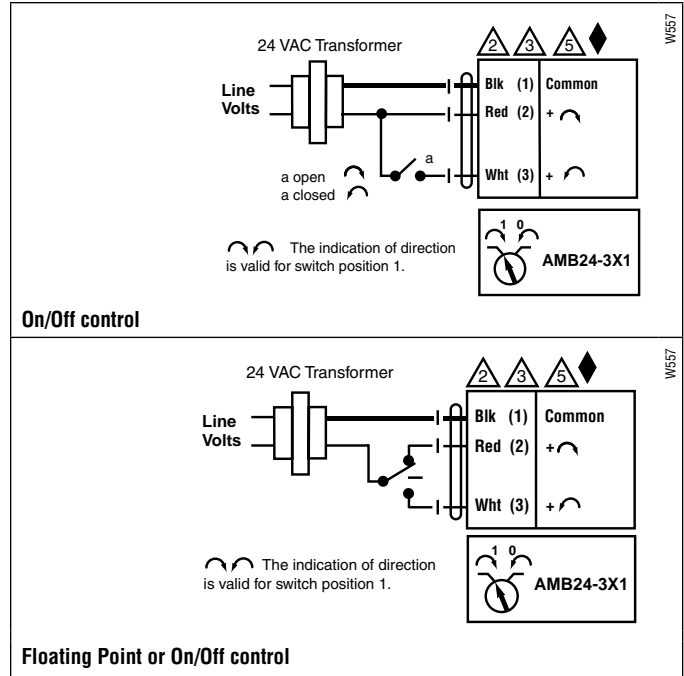


Meets cULus or UL and CSA requirements without the need of an electrical ground connection.




WARNING Live Electrical Components!

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.



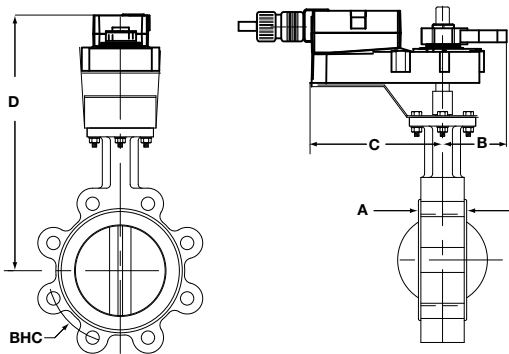


Models
AMX24-MFTX1

Technical Data	
Power supply	24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Power consumption	running 4 W
	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 acc. to UL60730-1A/-2-14, CAN/CSA E60730-1, CSA C22.2 No. 24-93, CE acc. to 89/336/EEC
Noise level	<45dB(A)
Quality standard	ISO 9001

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

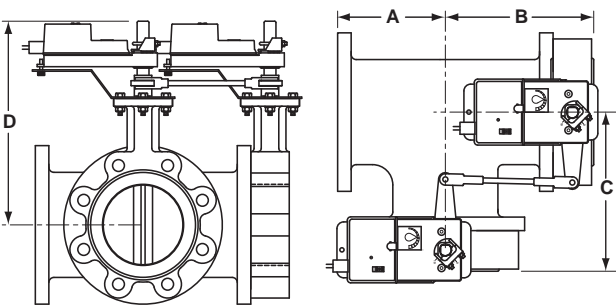
Dimensions with 2-Way Valve



Dimensions (Inches)						
Valve	Size	A	B	C	D(Max)	BHC
F650HS(U)	2"	1.65	7.00	7.00	15.00	4.75
F665HS(U)	2½"	1.76	7.00	7.00	15.50	5.50
F680HSU	3"	1.78	7.00	7.00	16.00	6.00

Non-Fail
Safe (psi)

Dimensions with 3-Way Valve



Dimensions (Inches)							Non-Fail Safe (psi)	
Valve	Size	A	B	C	D(Max)	BHC	HS	HSU
F750HS	2"	4.50	6.15	6.15	15.50	4.75	200	
F765HSU	2½"	5.00	6.76	6.76	16.00	5.50	200	50

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Wiring Diagrams

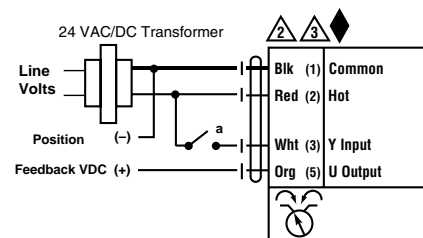
✂ INSTALLATION NOTES

- 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.
- 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.
- 8 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.

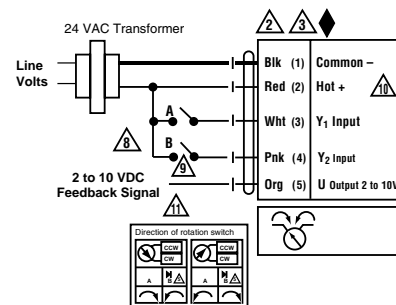
📄 APPLICATION NOTES

- ◆ The ZG-R01 500 Ω resistor converts the 4 to 20 mA control signal to 2 to 10 VDC, up to 2 actuators may be connected in parallel.

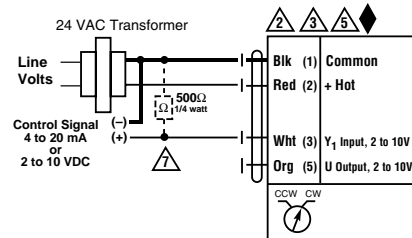
⚠ **WARNING Live Electrical Components!**
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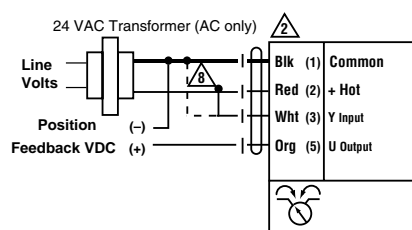
Two Position



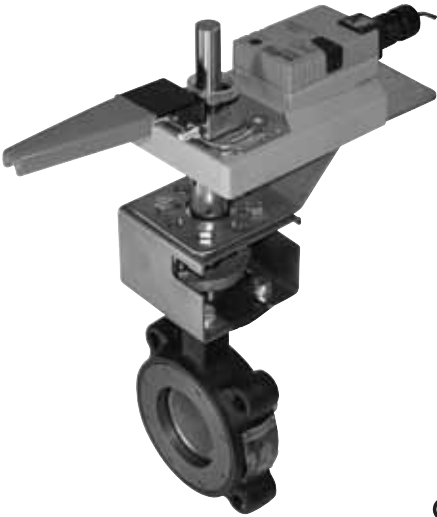
Floating Point



VDC/4-20 mA



PWM

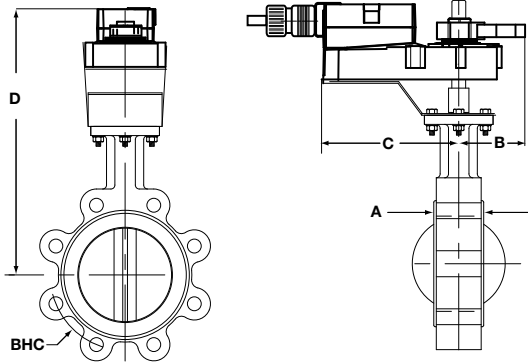


Models

GMB24-3X1

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 acc. to UL60730-1A/-2-14, CAN/CSA E60730-1, CSA C22.2 No.24-93, CE acc. to 89/336/EEC
Noise level	max. 45 dB (A)
Servicing	maintenance free
Quality standard	ISO 9001

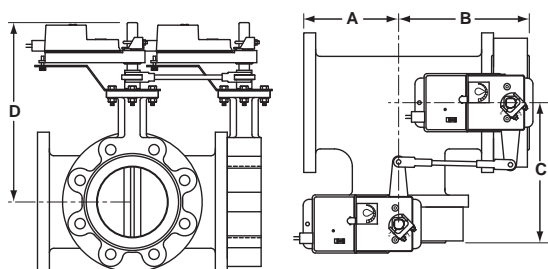
Dimensions with 2-Way Valve



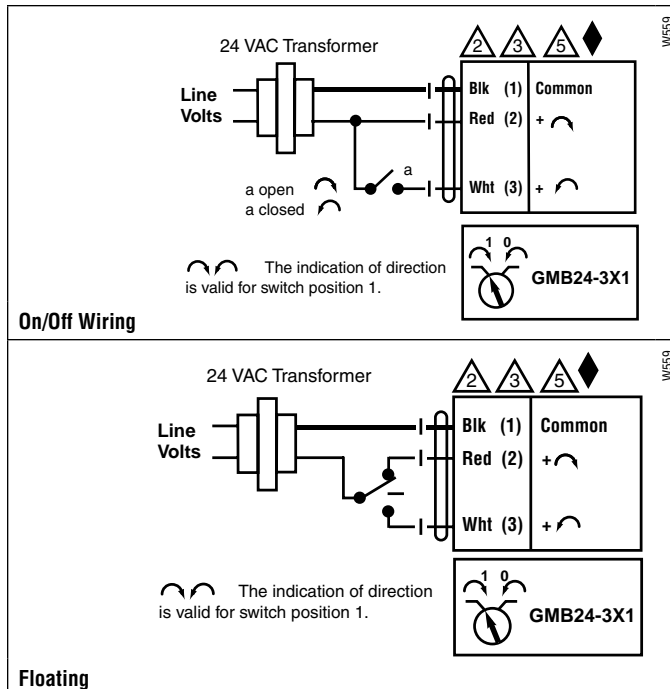
Dimensions (Inches)							Non-Fail Safe (psi)	
Valve	Size	A	B	C	D(Max)	BHC	GM	2*GM
F680HS	3"	1.78	7.00	7.00	16.00	6.00	200	
F6100HS	4"	2.05	8.00	8.00	17.00	7.50		200
F6100HSU	4"	2.05	8.00	8.00	17.00	7.50	50	
F6125HSU	5"	2.14	8.00	8.00	17.50	8.50	50	
F6150HSU	6"	2.19	8.00	8.00	22.50	9.50		50
F650-150SHP	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

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Dimensions with 3-Way Valve



Dimensions (Inches)						Non-Fail Safe (psi)	
Valve	Size	A	B	C	D(Max)	BHC	GM 2*GM
F765HS	2½"	5.00	6.70	6.70	16.00	5.50	200
F780HS	3"	5.50	7.20	7.20	16.25	6.00	200
F780HSU	3"	5.50	7.20	7.20	16.25	6.00	50
F7100HS	4"	6.50	8.45	8.45	17.00	7.50	200
F7100HSU	4"	6.50	8.45	8.45	17.00	7.50	50
F7125HSU	5"	7.50	9.60	9.60	17.50	8.50	50
F7150HSU	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



CAUTION Equipment damage!

Actuators may be connected in parallel. Power consumption and input impedance must be observed.



Actuators may also be powered by 24 VDC.



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



APPLICATION NOTES

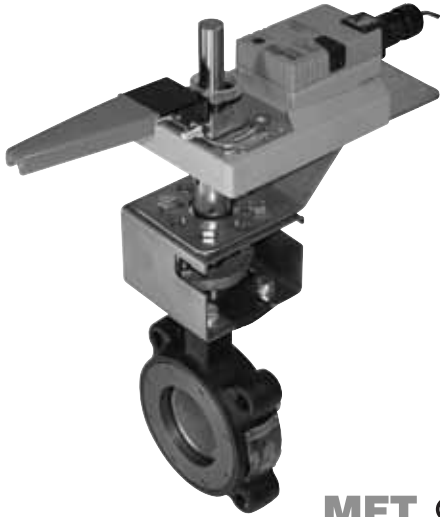


Meets cULus or UL and CSA requirements without the need of an electrical ground connection.



WARNING Live Electrical Components!

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MFT CE LISTED 94 05 TEMA MD, A C RES, EDIRC UL US

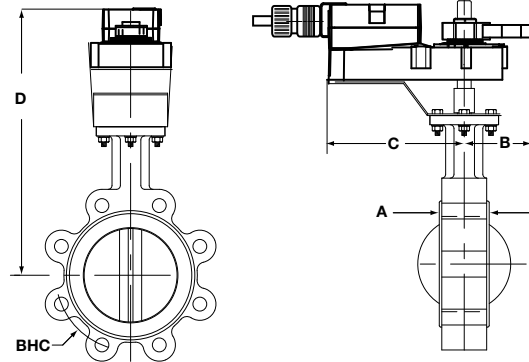


Models

GMX24-MFTX1

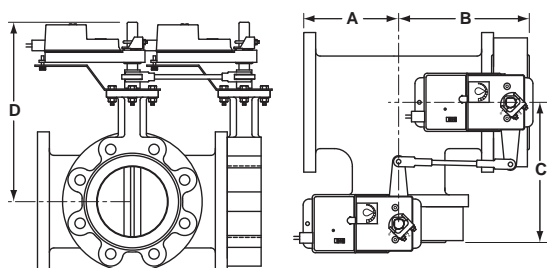
Technical Data	
Power supply	24 VAC \pm 20% 50/60 Hz 24 VDC \pm 10%
Power consumption	running 4.5 W holding 2 W
Transformer sizing	7 VA (class 2 power source)
Electrical connection	3 ft, 18 GA appliance cable, 1/2" conduit connector
Overload protection	electronic throughout 0 to 95° rotation
Control 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 acc. to UL60730-1A/-2-14, CAN/CSA E60730-1, CSA C22.2 No.24-93, CE acc. to 89/336/EEC
Noise level	max. 45 dB (A)
Servicing	maintenance free
Quality standard	ISO 9001

Dimensions with 2-Way Valve



Valve	Size	Dimensions (Inches)					Non-Fail Safe (psi)	
		A	B	C	D(Max)	BHC	GM	2*GM
F680HS	3"	1.69	9.00	9.00	20.50	6.00	200	
F6100HS	4"	1.92	9.00	9.00	21.00	7.50		200
F6100HSU	4"	1.92	9.00	9.00	21.00	7.50	50	
F6125HSU	5"	2.08	9.00	9.00	22.00	8.50	50	
F6150HSU	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



Dimensions (Inches)

Non-Fail Safe (psi)

Valve	Size	A	B	C	D(Max)	BHC	GM	2*GM
F765HS	2½"	5.00	6.70	6.70	16.00	5.50	200	
F780HS	3"	5.50	7.20	7.20	16.25	6.00		200
F780HSU	3"	5.50	7.20	7.20	16.25	6.00	50	
F7100HS	4"	6.50	8.45	8.45	17.00	7.50		200
F7100HSU	4"	6.50	8.45	8.45	17.00	7.50		50
F7125HSU	5"	7.50	9.60	9.60	17.50	8.50		50
F7150HSU	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



CAUTION Equipment damage!

Actuators may be connected in parallel. Power consumption and input impedance must be observed.



Actuators may also be powered by 24 VDC.



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



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



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.



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

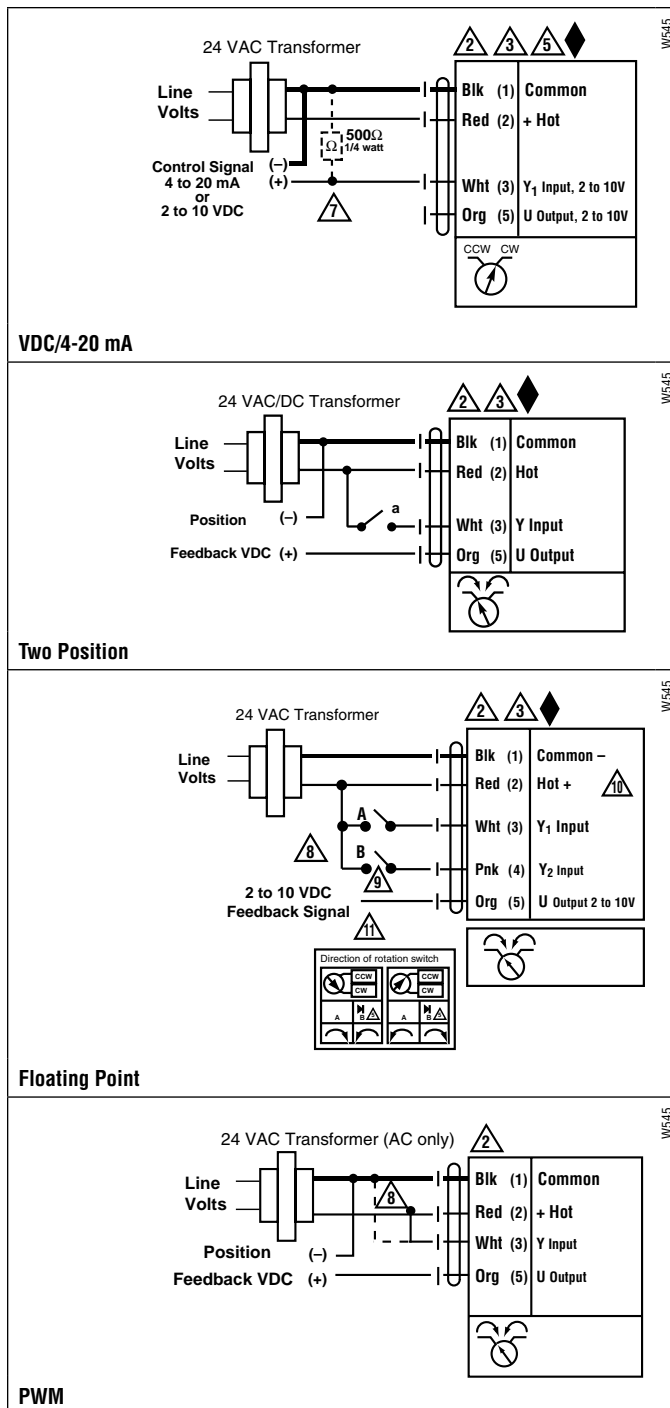


Position feedback cannot be used with a Triac sink controller. The actuator internal common reference is not compatible.



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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.

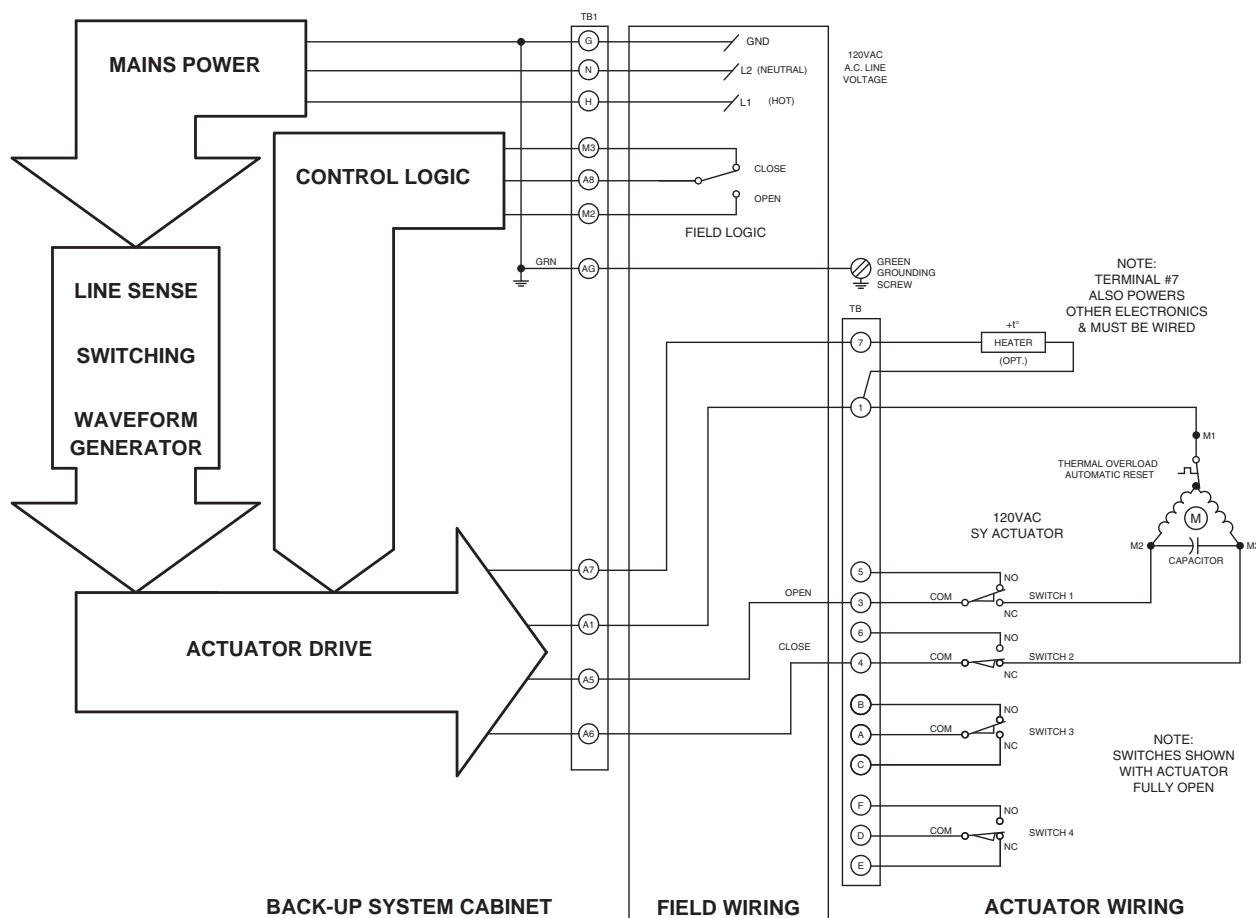
Simple User Interface

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 effect 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

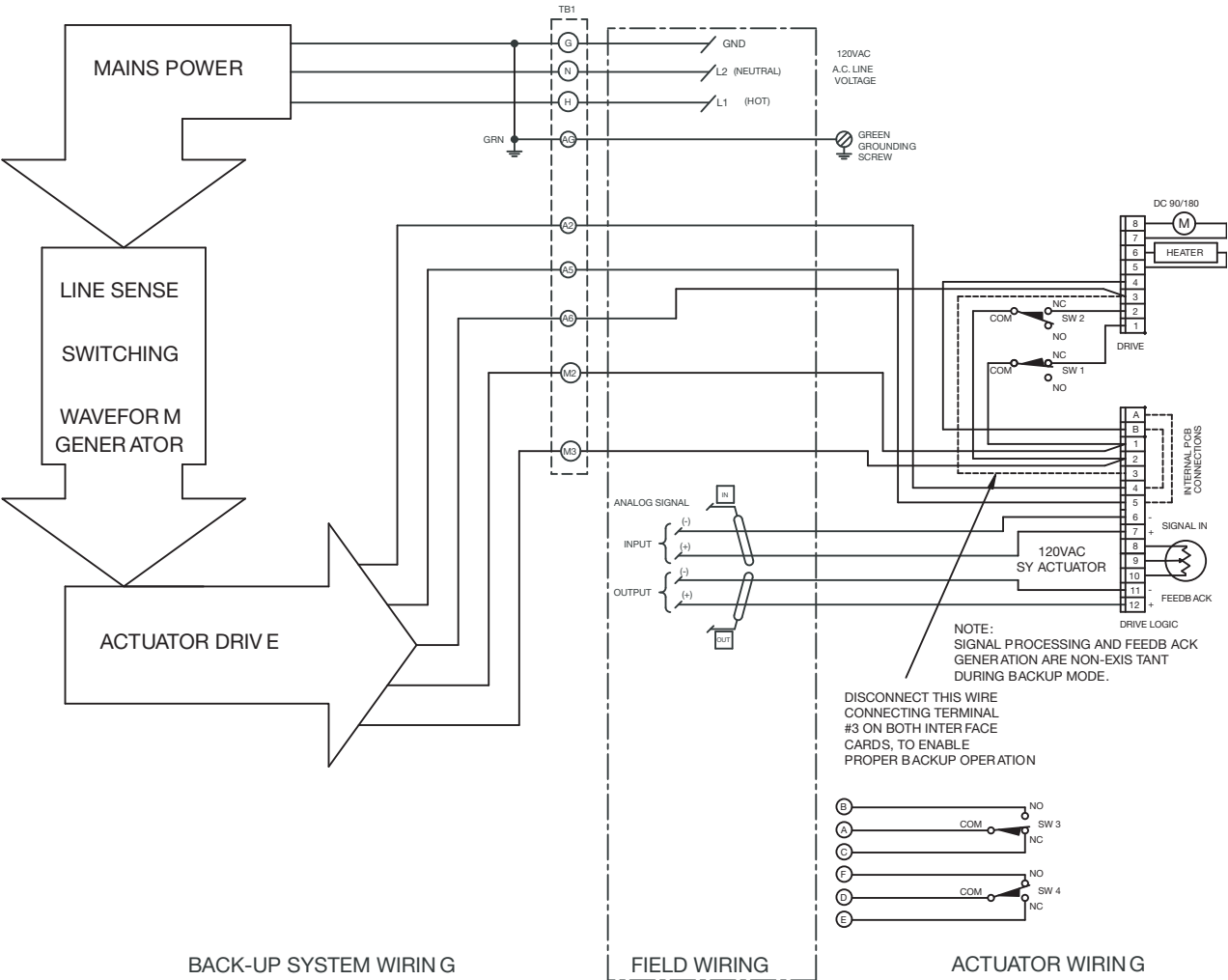


Sequence of Operation - Modulating Control

Note: This Model requires modification to SY “P” 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 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.

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.



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Key Access and Status Viewports



Battery System Status Indicators



All Connections to
APC Backup are Modular



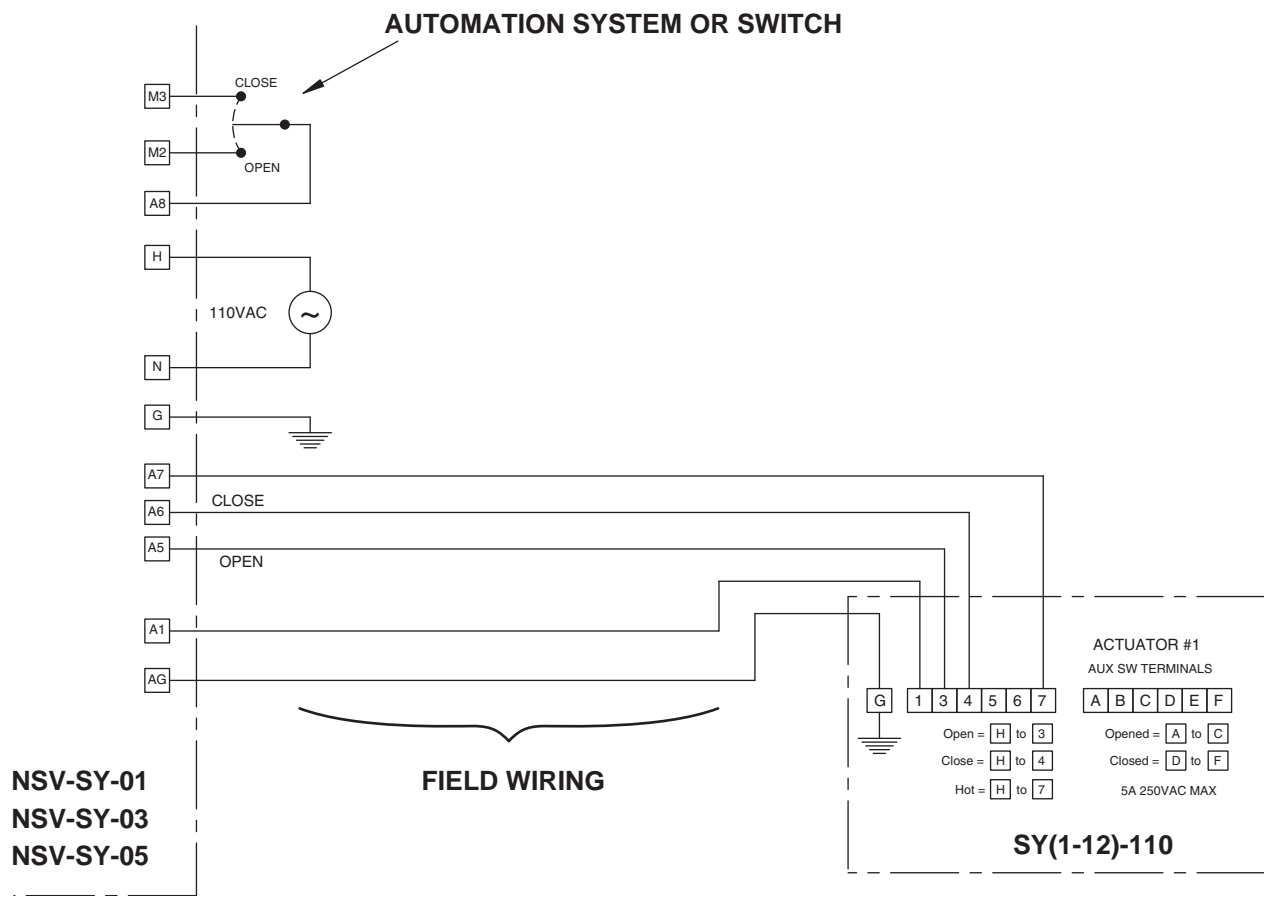
Connection to SA16E Interface

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(P)	801	15	1.0	NSV-SY-01	NSV-SY-02	35	0.7%	RBC2
SY3-110(P)	1335	22	1.0	NSV-SY-01	NSV-SY-02	35	1.0%	RBC2
SY4-110(P)	3560	16	1.3	NSV-SY-01	NSV-SY-02	19	1.4%	RBC2
SY5-110(P)	4450	22	1.5	NSV-SY-01	NSV-SY-02	17	2.2%	RBC2
SY6-110(P)	5785	28	1.85	NSV-SY-01	NSV-SY-02	17	2.7%	RBC2
SY7-110(P)	8900	46	3.2	NSV-SY-03	NSV-SY-04	5	15.3%	RBC2
SY8-110(P)	13350	46	4.0	NSV-SY-05	NSV-SY-06	15	5.1%	RBC32
SY9-110(P)	17800	58	3.2	NSV-SY-05	NSV-SY-06	24	4.0%	RBC32
SY10-110(P)	22250	58	4.0	NSV-SY-05	NSV-SY-06	15	6.4%	RBC32
SY11-110(P)	26700	58	3.0	NSV-SY-05	NSV-SY-06	25	3.9%	RBC32
SY12-110(P)	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(P)	801	15	3.0	NSV-SY-11	NSV-SY-12	40	0.6%	RBC2
SY3-24(P)	1335	22	3.0	NSV-SY-11	NSV-SY-12	40	0.9%	RBC2
SY4-24(P)	3560	16	6.0	NSV-SY-11	NSV-SY-12	20	1.3%	RBC2
SY5-24(P)	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(P)	801	15	0.5	NSV-SY-21	NSV-SY-22	36	0.7%	RBC2
SY3-220(P)	1335	22	0.5	NSV-SY-21	NSV-SY-22	36	1.0%	RBC2
SY4-220(P)	3560	16	0.6	NSV-SY-21	NSV-SY-22	22	1.2%	RBC2
SY5-220(P)	4450	22	0.7	NSV-SY-21	NSV-SY-22	19	1.9%	RBC2
SY6-220(P)	5785	28	0.8	NSV-SY-21	NSV-SY-22	17	2.7%	RBC2
SY7-220(P)	8900	46	1.6	NSV-SY-23	NSV-SY-24	6	12.8%	RBC32
SY8-220(P)	13350	46	2.0	NSV-SY-23	NSV-SY-24	4	19.2%	RBC32
SY9-220(P)	17800	58	1.6	NSV-SY-23	NSV-SY-24	6	16.1%	RBC32
SY10-220(P)	22250	58	2.0	NSV-SY-25	NSV-SY-26	18	5.4%	RBC32
SY11-220(P)	36700	58	1.6	NSV-SY-25	NSV-SY-26	26	3.7%	RBC32
SY12-220(P)	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.

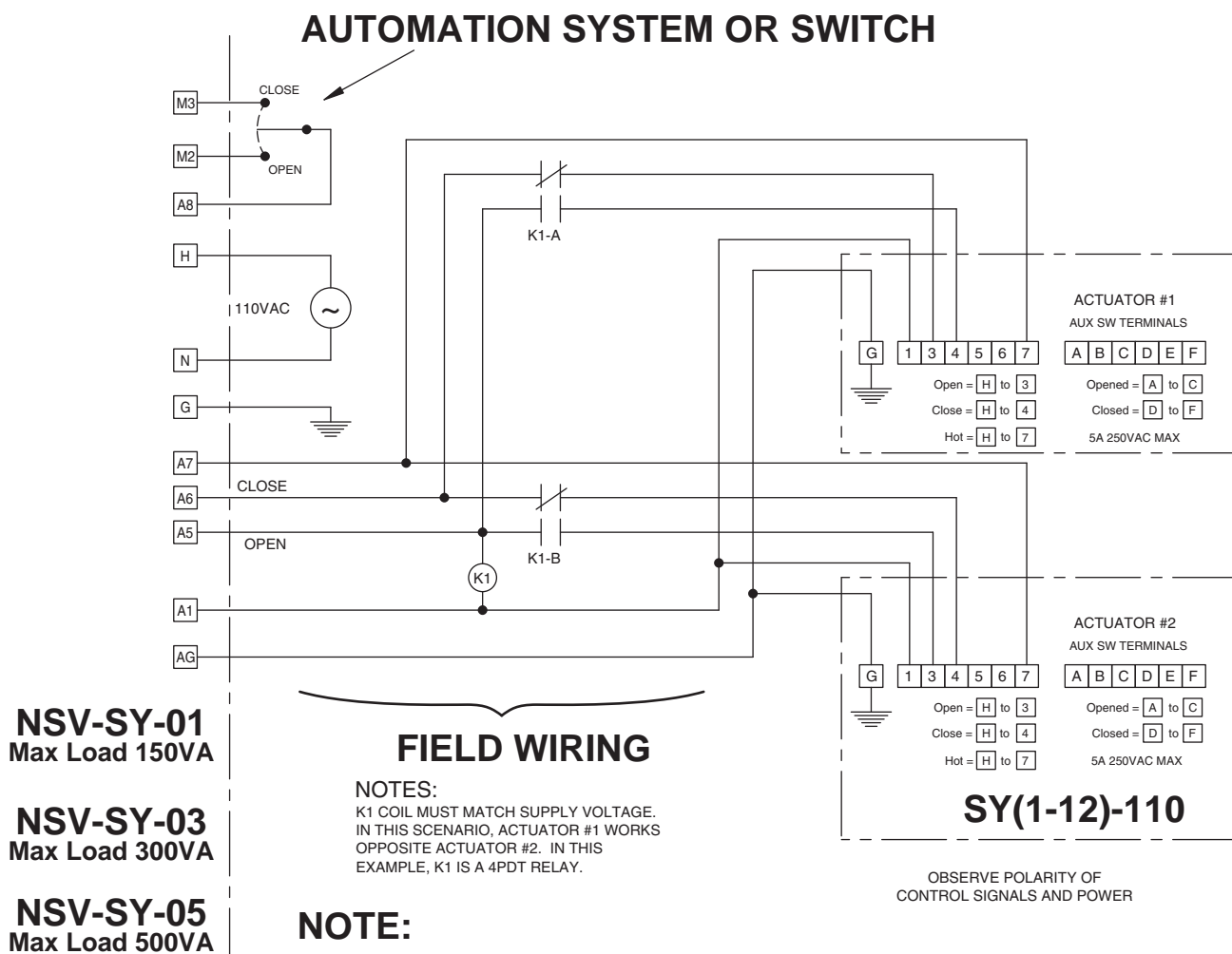
Building **mains power** is connected to G, N & H terminals. A control switch or dry contacts are connected between terminal A8 and M2 or M3 to control the positioning of the actuator under power. Terminals AG, A1, A5, A6 & A7 are connected to the SY actuator as shown. Observe wire size rules for longer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



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.

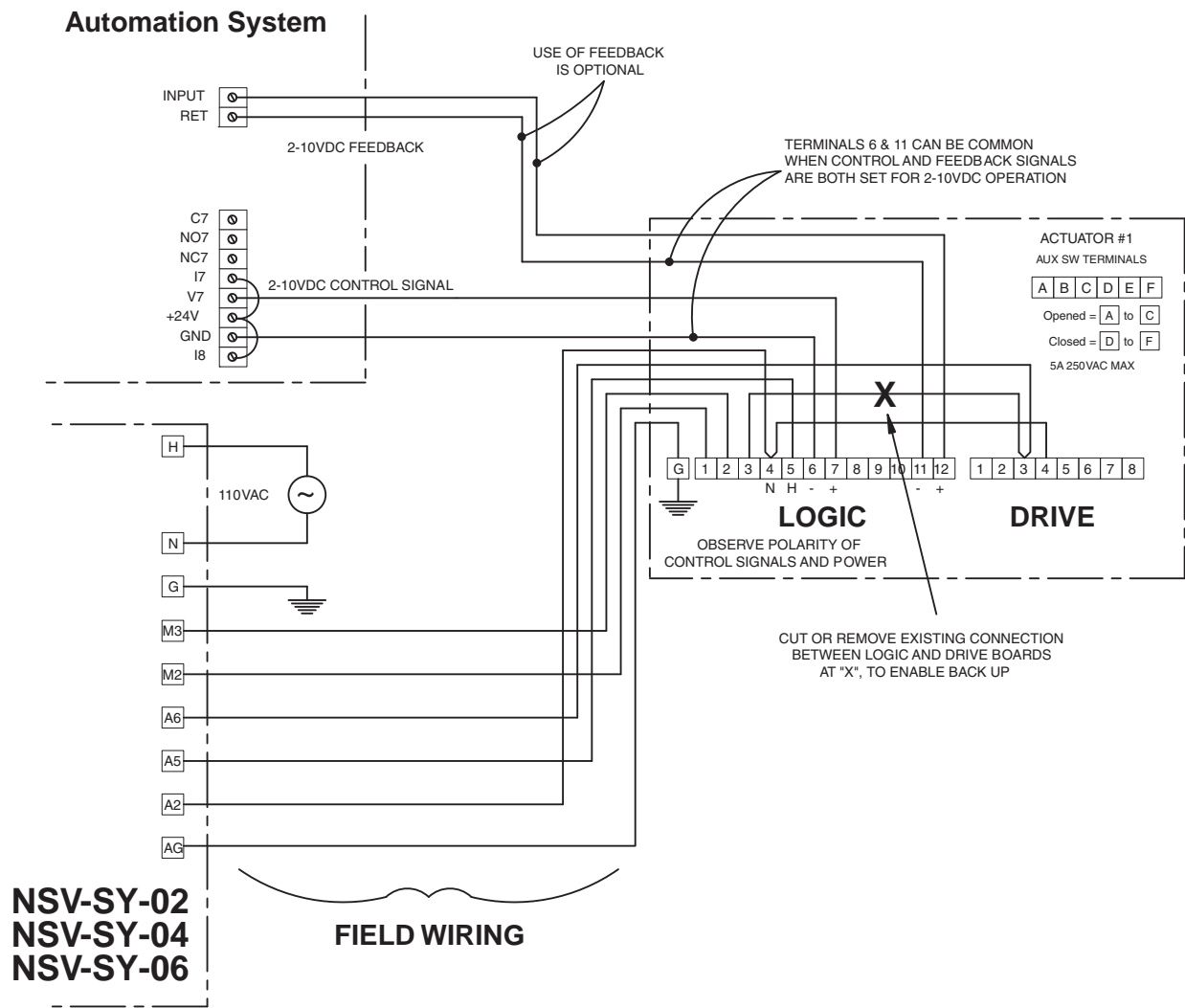
Building mains power is connected to G, N & H terminals. A control switch or dry contacts are connected between terminal A8 and M2 or M3 to control the positioning of the actuator under power. Terminals AG, A1, A5, A6 & A7 are connected to the SY actuator as shown. Observe wire size rules for longer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



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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.

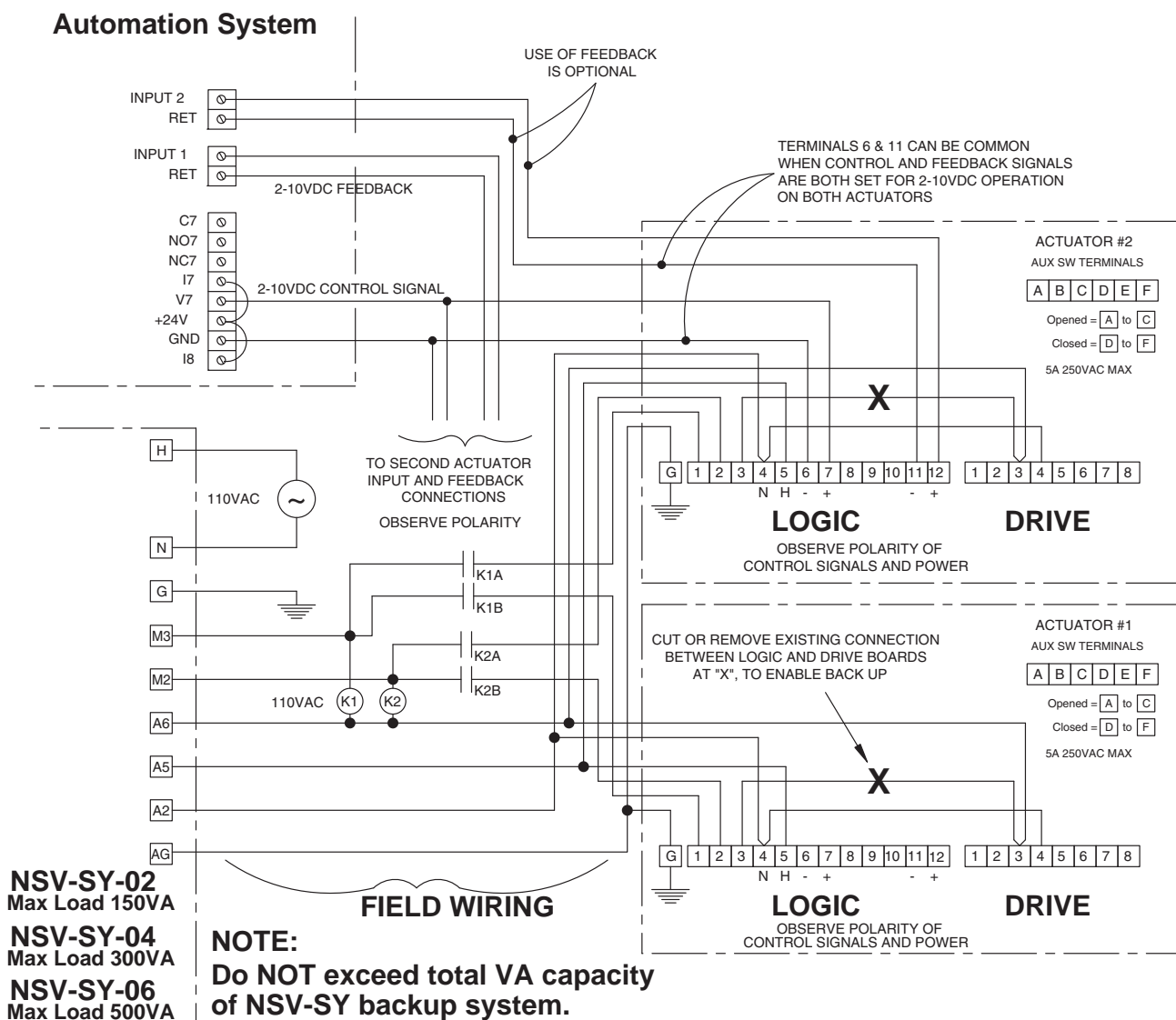


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Wiring diagram for multiple proportional SY series 110vac actuators.

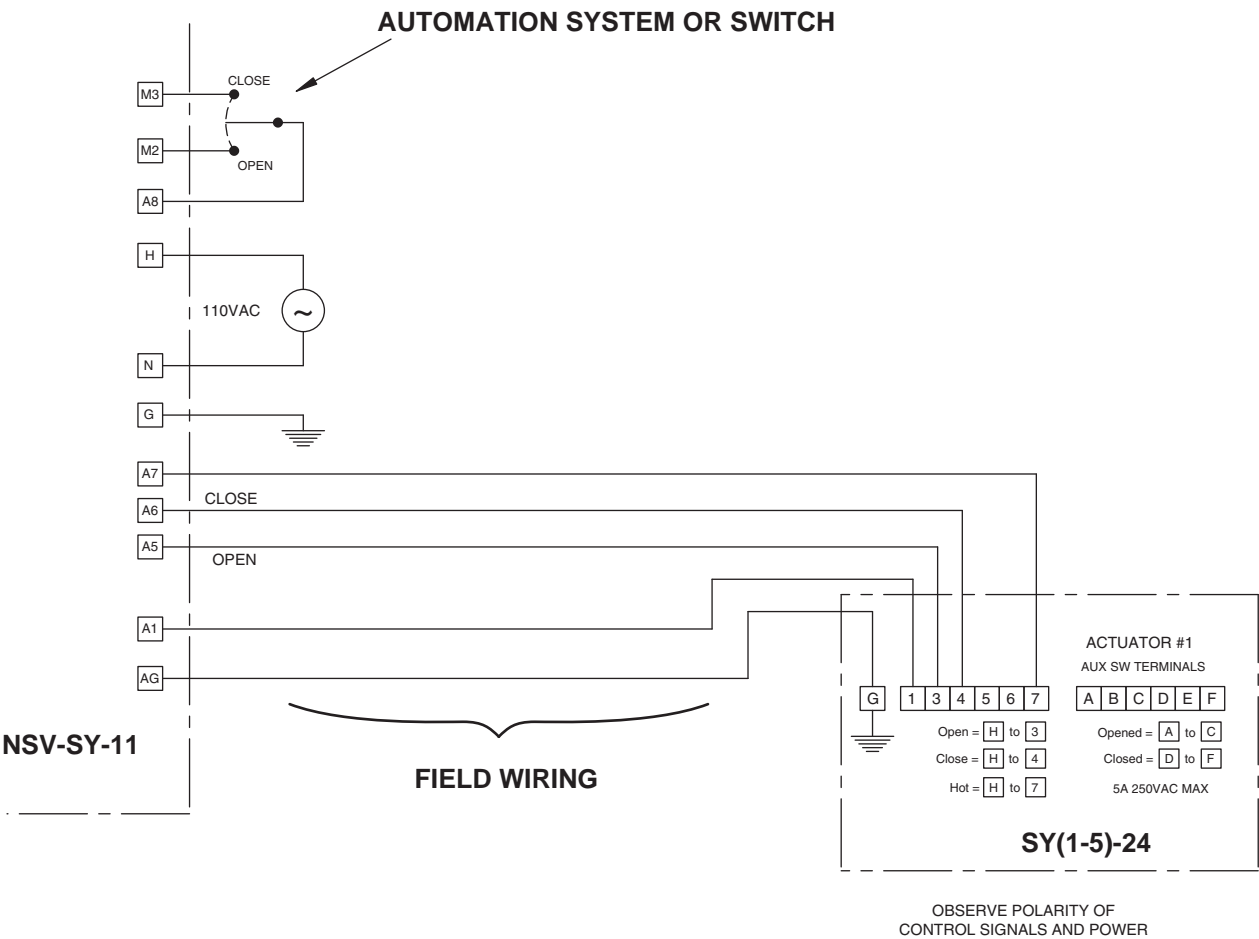
Do NOT exceed the Max Loads as stated above when connecting multiple actuators. Actuators connected in this manner operate in parallel from the common automation control signal and will fail-safe position together.

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 SYx-24 actuator is built in to the NSV cabinet.

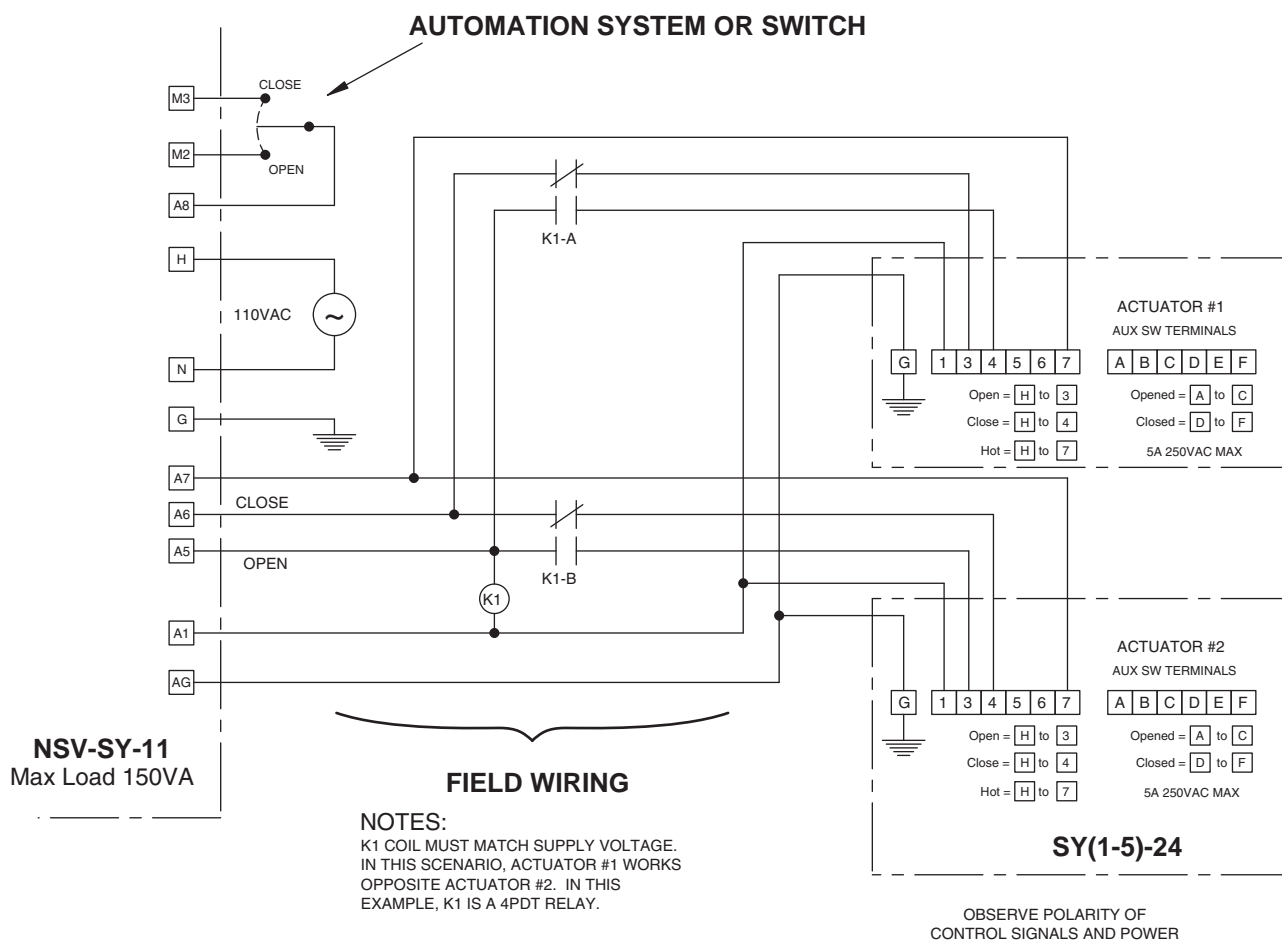


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Wiring diagram for multiple on/off SY series 24vac actuators.

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 SYx-24 actuator is built in to the NSV cabinet.

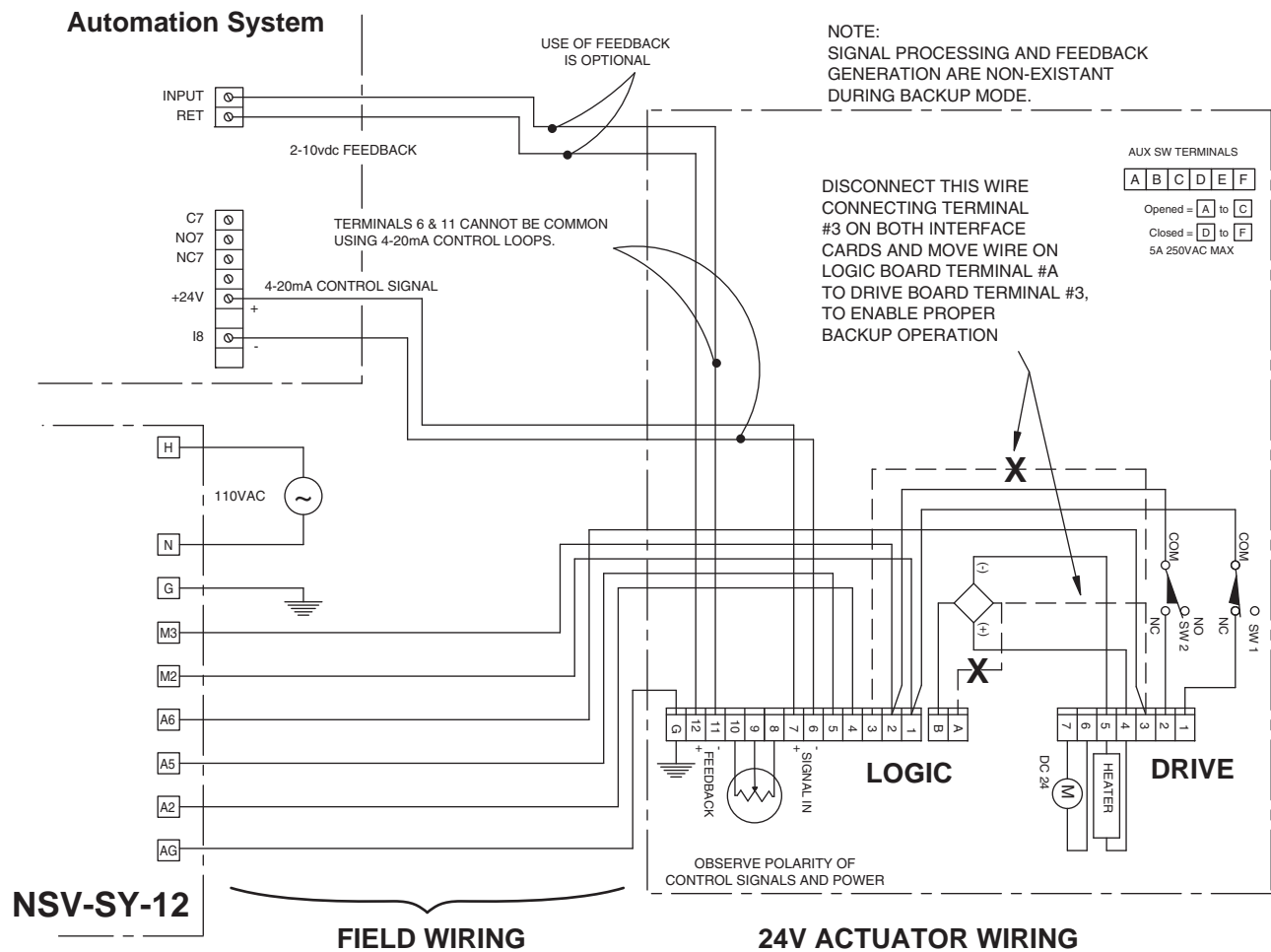


NOTE:

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

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 SYx-24 actuator is built in to the NSV cabinet.

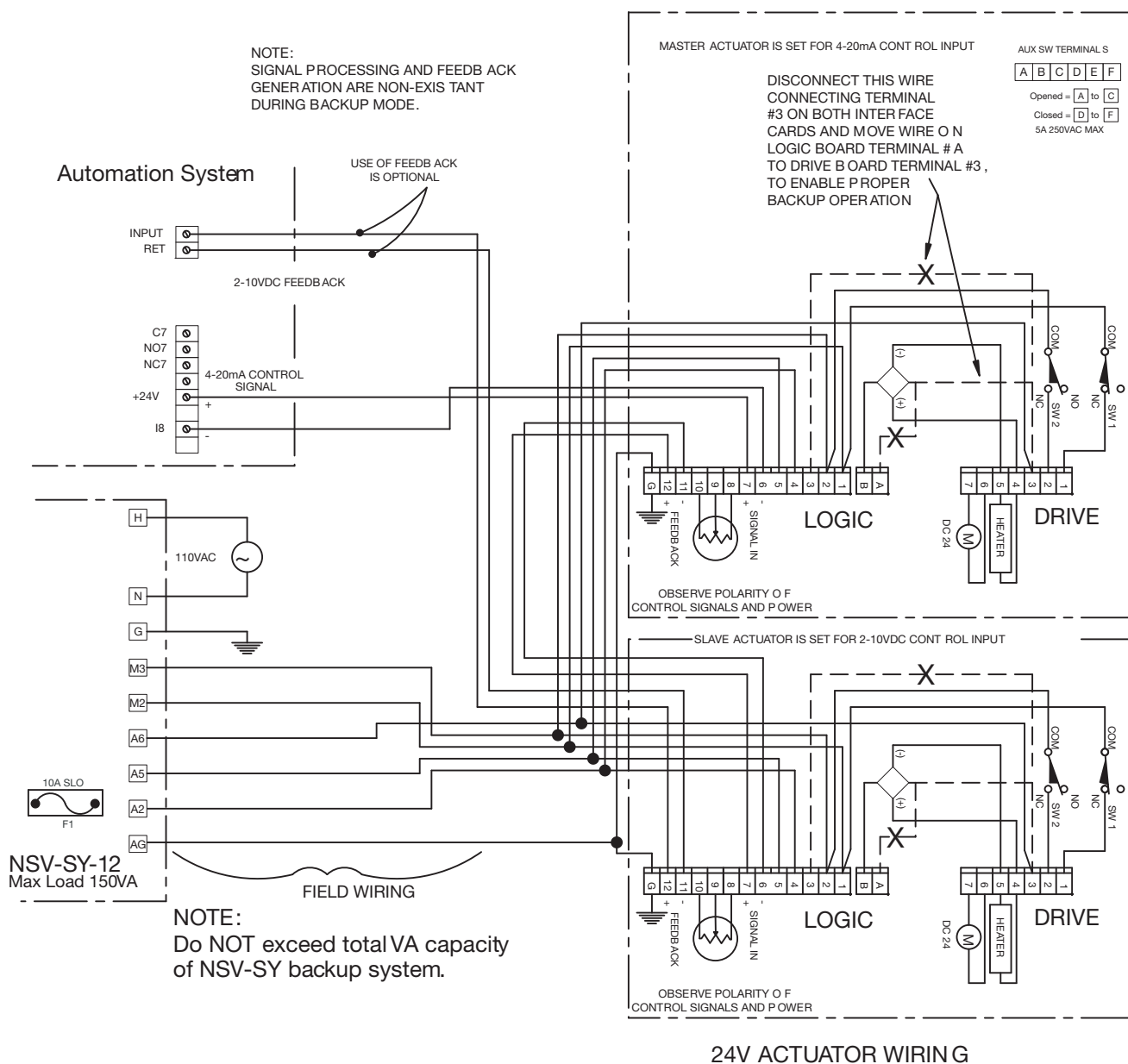


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Wiring diagram for multiple proportional SY series 24vac actuators.

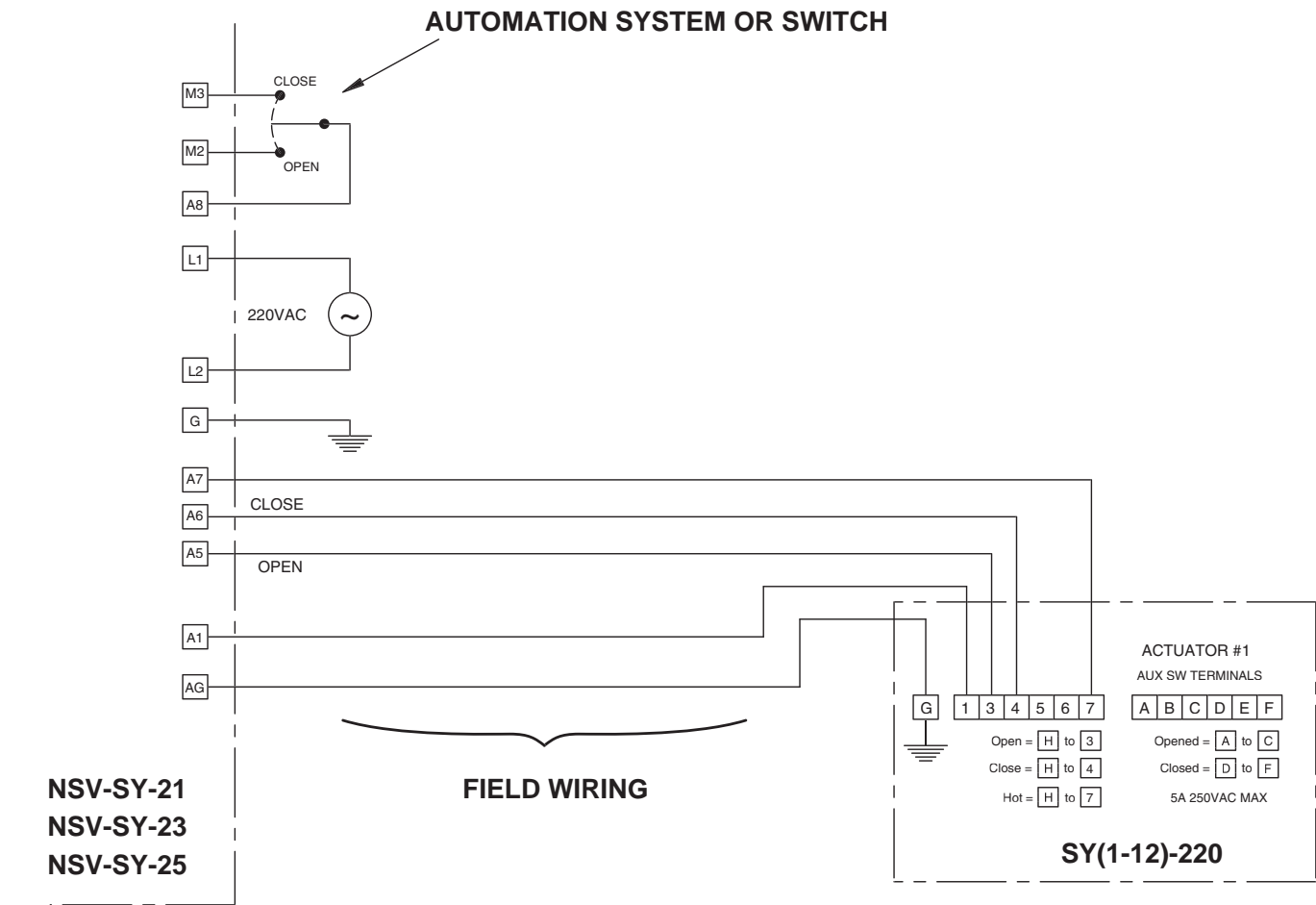
Do NOT exceed the Max Loads as stated above when connecting multiple actuators. Actuators connected in this manner operate in parallel from the common automation control signal and will fail-safe position together.

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 SYx-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.

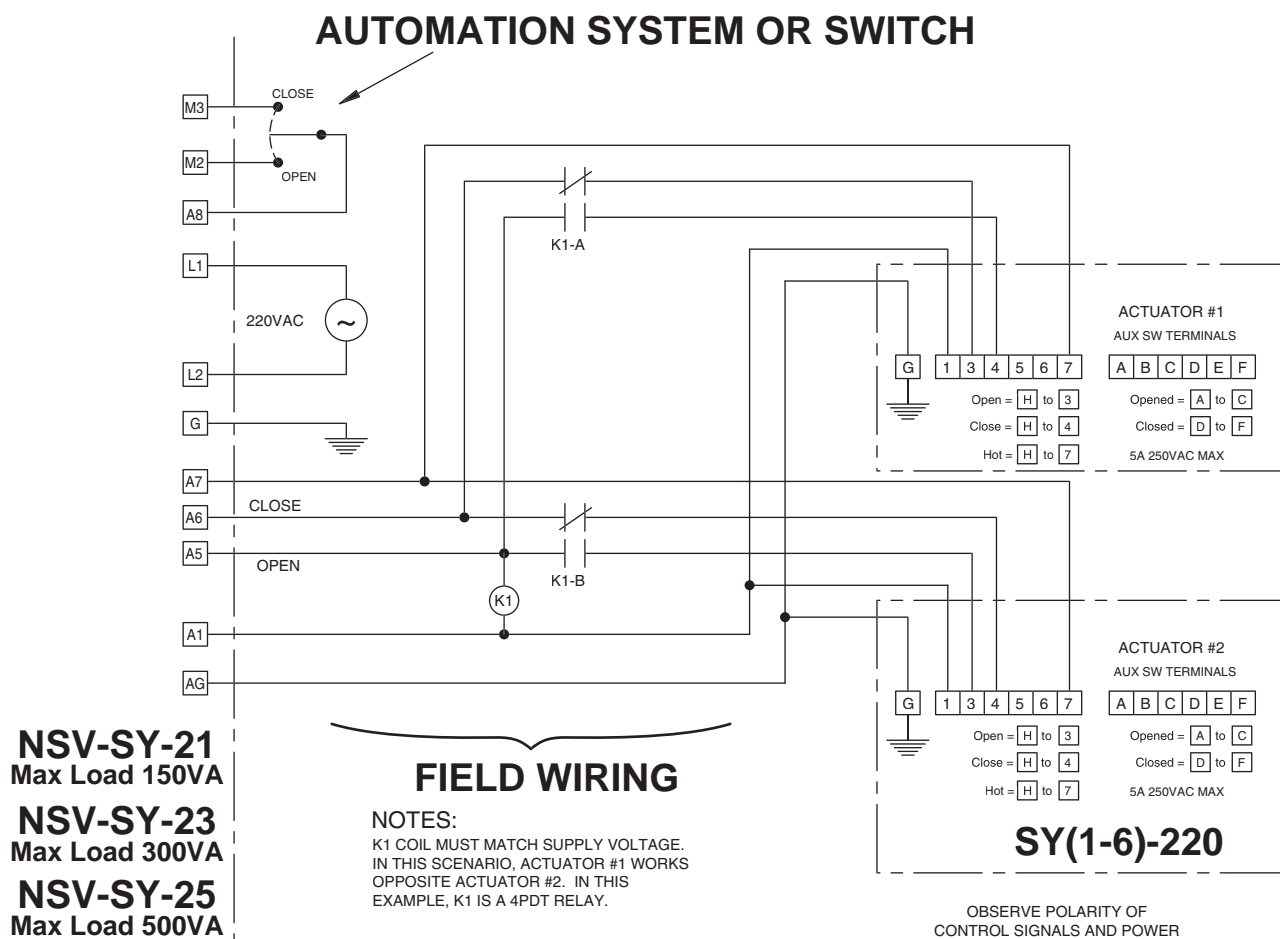


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Wiring diagram for multiple on/off SY series 220vac actuators.

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.

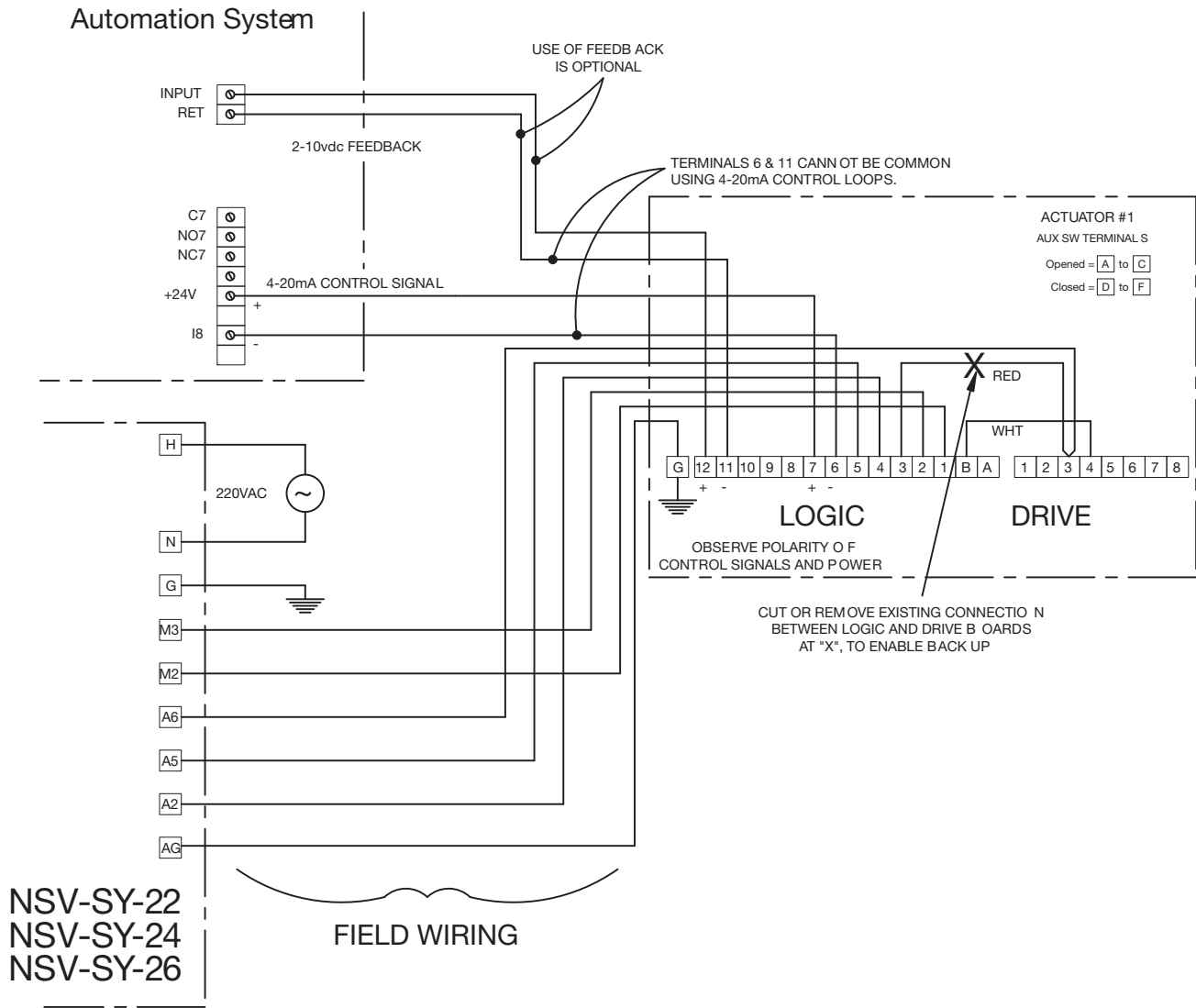
Building mains power is connected to G, N & H terminals. A control switch or dry contacts are connected between terminal A8 and M2 or M3 to control the positioning of the actuator under power. Terminals AG, A1, A5, A6 & A7 are connected to the SY actuator as shown. Observe wire size rules for longer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



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

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.



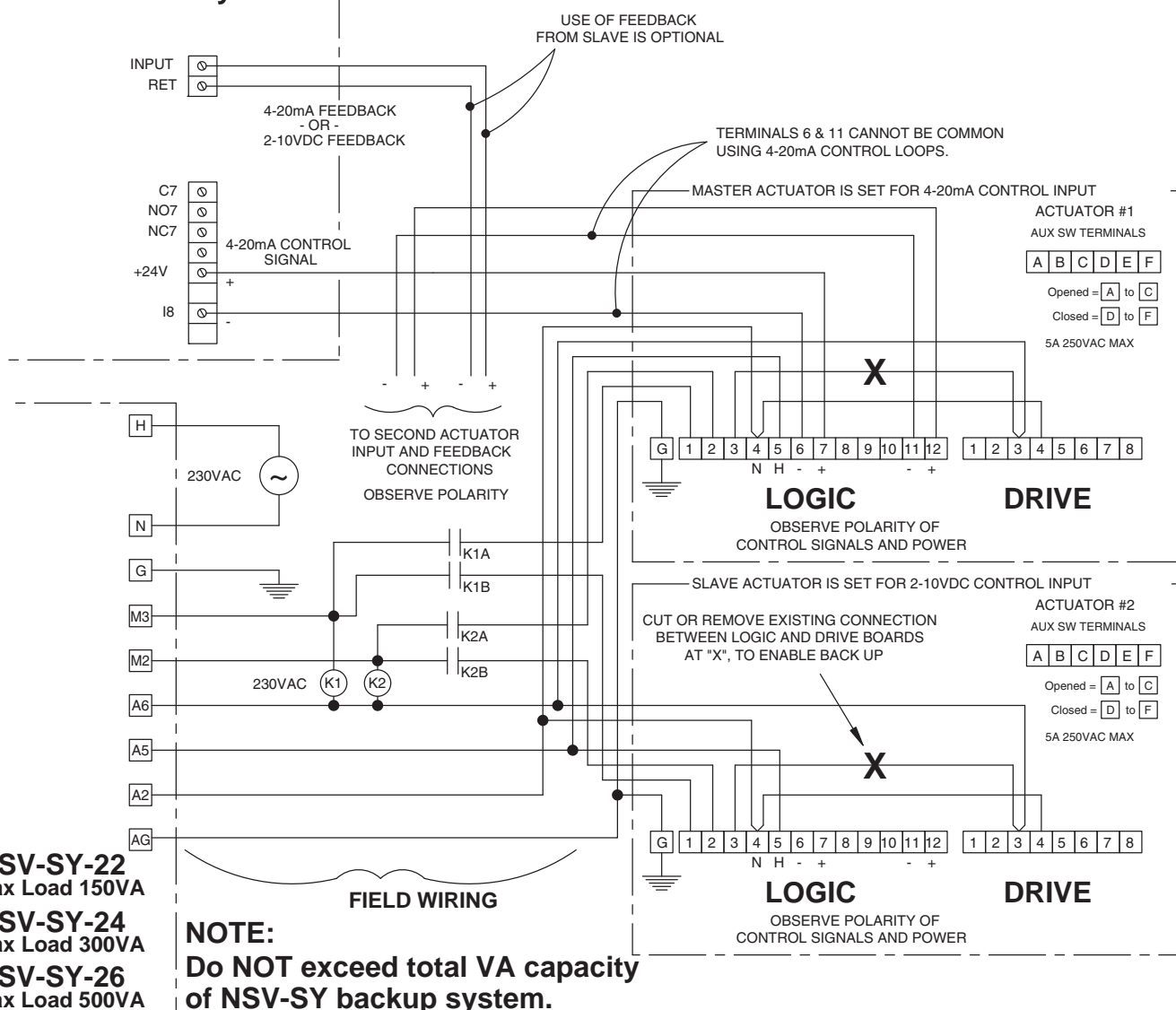
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Wiring diagram for multiple proportional SY series 220vac actuators.

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.

Automation System



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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



Table with 2 columns: Input, Output. Input details include 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 details include 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



Table with 2 columns: Input, Output. Input details include 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 details include 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

	NSV	NSV-SY	NSV-SY
Maximum Dimensions	01, 02 21, 22	03, 04, 11 12, 23, 24	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.

HS(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

- HS(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 HS (U) series BF valves.
- Follow the recommended flange bolting sequence and bolt tightening torques found in the "Installation Recommendations" section of this guide.
- 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.
- Make sure the valve liner 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 liner due to heat migration through the flange to the valve body.

FLANGE BOLTING RECOMMENDATIONS

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

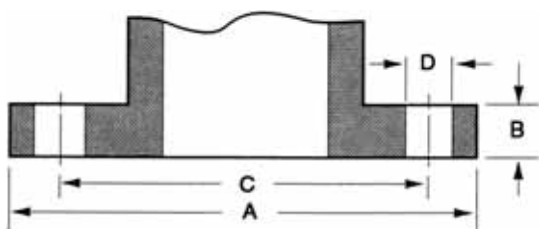
Valve Size	Thread Size	Number Required	Bolt Length Semi-Lug Butterfly (inches)
2"	5/8-11	4	1.25
2-1/2"	5/8-11	4	1.50
3"	5/8-11	4	1.50
4"	5/8-11	8	1.75
5"	3/4-10	8	1.75
6"	3/4-10	8	2.00
8"	3/4-10	8	2.25
10"	7/8-9	12	2.25
12"	7/8-9	12	2.50
14"	1-8	12	2.75
16"	1-8	16	2.75
18"	1 1/8-7	16	3.50
20"	1 1/8-7	20	4.25
24"	1 1/4-7	20	4.75
30"	1 1/4-7	24	4.50

Bolting and torque recommendations are made without a warrant, and applies 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. Refer to figure 3 for proper tightening procedures. Observe clearance dimension between valve body and flange face.

FLANGE BOLTING RECOMMENDATIONS

Flange Detail for ANSI B16.5 Pipe Flanges

Nominal Pipe Size	FLANGES		DRILLING		BOLTING	
	A Flange Diameter	B Flange Thickness	C Diameter of Bolt Circle	D Diameter of Bolt Holes	Number of Bolts	Diameter of Bolts
2"	6"	3/4"	4-3/4"	3/4"	4	5/8"
2-1/2"	7"	7/8"	5-1/2"	3/4"	4	5/8"
3"	7-1/2"	15/16"	6"	3/4"	4	5/8"
4"	9"	15/16"	7-1/2"	3/4"	8	5/8"
5"	10"	15/16"	8-1/2"	7/8"	8	3/4"
6"	11"	1"	9-1/2"	7/8"	8	3/4"
8"	13-1/2"	1-1/8"	11-3/4"	7/8"	8	3/4"
10"	16"	1-3/16"	14-1/4"	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"



Pre-Installation Procedure

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

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

5. Check the flange bolts or studs for proper size, threading, and length.
6. These valves are designed to be installed between ASME/ANSI Class 125/150 flanges.
7. **Carefully follow installation using welded flanges on page 30 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.

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 (*See Figure 1*). Exercise particular care in handling the valve so as to prevent possible damage to the disc or seat faces.

- For Lug style valves:
 - Place the valve between the flanges.
 - Install all bolts between the valve and the mating flanges. Hand tighten bolts as necessary.
- Before completing the tightening of any bolts, the valve should be centered between the flanges and then carefully opened and closed to insure free, unobstructed disc movement (*see Figure 2*).
- Using the sequence shown in *Figure 3*, tighten the flange bolts evenly to assure uniform compression. In assembling flange joints, the resilient seating surface shall be uniformly compressed to the proper minimum dimension as shown in the detail drawing below.
- If an actuator is to be used, air hoses or electricity should be connected to the unit as specified by the actuator manufacturer.
- 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.
- The valve is now ready for operation.

REMEMBER: Install the valve with the disc in the “ALMOST CLOSED” position. Do not use any flange gaskets.

NOTE

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

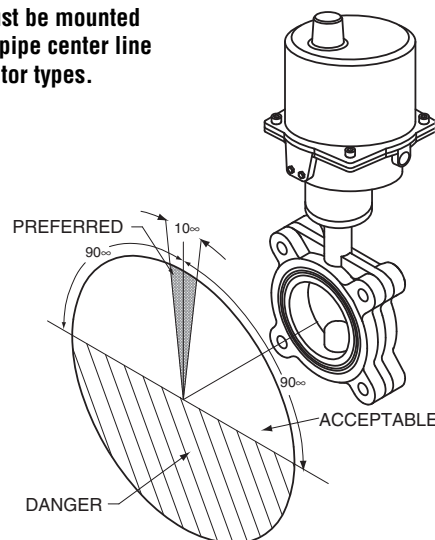
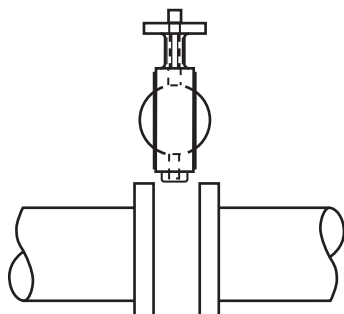


FIGURE 1 — Initial Installation of Valve

INCORRECT

Disc opened beyond valve body face. Pipe flanges not spread sufficiently.



CORRECT

Disc positioned in the almost closed position. Pipe flange spread allows sufficient room for valve.

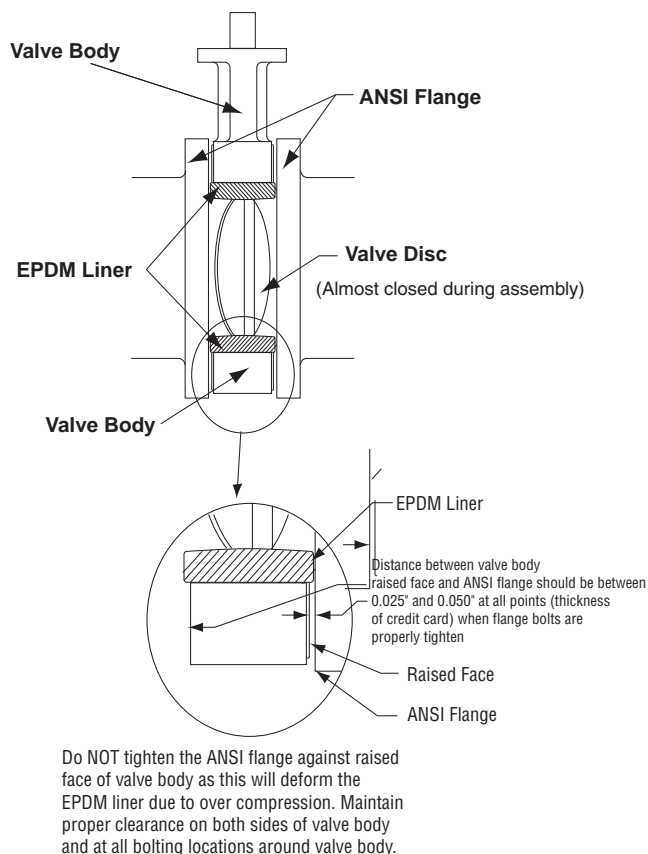
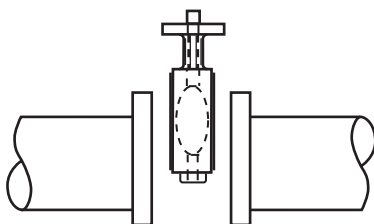
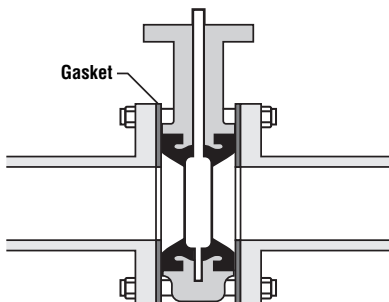


FIGURE 2 — Centering and Flanging of Valve

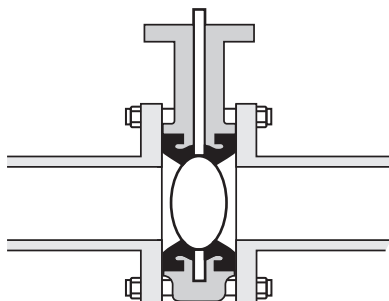
INCORRECT

Disc in closed position. Gaskets installed between valve and mating flanges.



CORRECT

No flange gaskets used. Disc in the "almost closed" position.



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.

FIGURE 3 — Flange Bolt Tightening Sequence

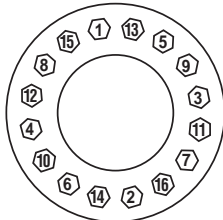
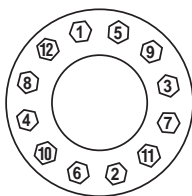
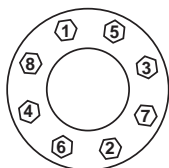
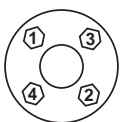
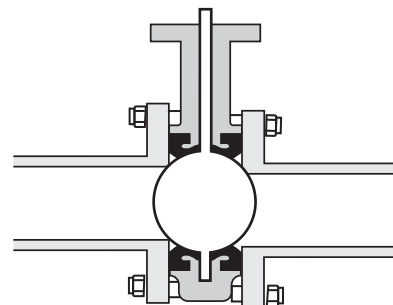


FIGURE 4 — Final Valve Alignment & Tightening of Flange Bolts

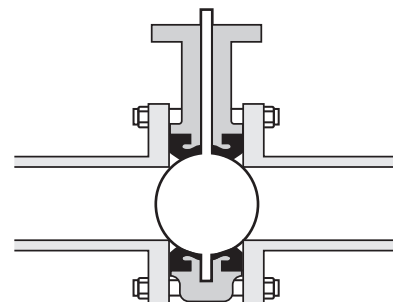
INCORRECT

Pipe Flanges misaligned. Uneven torque applied to bolting.



CORRECT

Piping aligned. Thread engagement even on both sides of valve.



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.



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.

K20928 - 09/22/08 - Subject to change. © Belimo Aircontrols (USA), Inc.

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 and bolt tightening torques 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 64

(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.
3. Determine the size of actuation for your application using the selection charts on pages 44-47.

Consult Belimo Customer Service 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

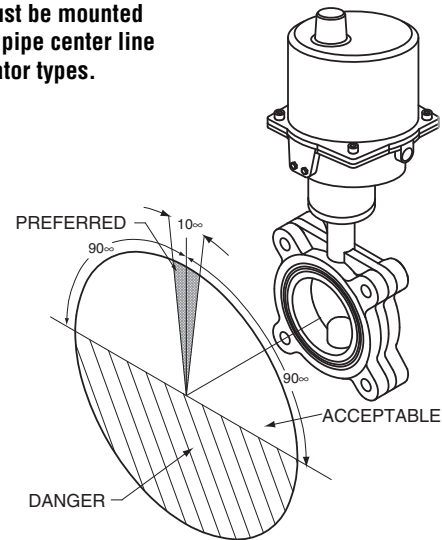
- a. Noting the flow direction arrow on the tag, place the valve between the flanges, making sure the arrow on the tag points in the direction of the flow.
 - b. Install the lower flange bolts loosely, leaving space for the flange gaskets.
 - c. After inserting the flange gaskets, install the remaining bolts.
3. Using the sequence shown in *Figure 3*, 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.

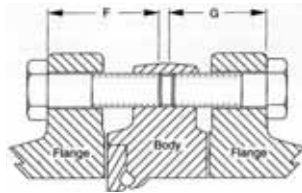


FLANGE BOLTING RECOMMENDATIONS

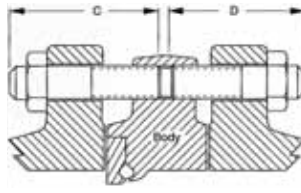
Lug Valves, 2"– 30", ANSI 125/150 Bolt Pattern

Valve Size	Thread Size	STUDS & NUTS						MACHINE BOLTS					
		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
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
			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:

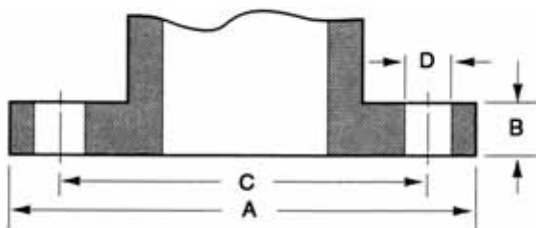
1. Gasket thickness of 0.06 inches.
2. Minimum flange thickness of weld-neck flanges per ANSI B16.5 and B16.47 Series A.

* 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

Nominal Pipe Size	FLANGES		DRILLING		BOLTING	
	A Flange Diameter	B Flange Thickness	C Diameter of Bolt Circle	D Diameter of Bolt Holes	Number of Bolts	Diameter of Bolts
2"	6"	3/4"	4-3/4"	3/4"	4	5/8"
2-1/2"	7"	7/8"	5-1/2"	3/4"	4	5/8"
3"	7-1/2"	15/16"	6"	3/4"	4	5/8"
4"	9"	15/16"	7-1/2"	3/4"	8	5/8"
5"	10"	15/16"	8-1/2"	7/8"	8	3/4"
6"	11"	1"	9-1/2"	7/8"	8	3/4"
8"	13-1/2"	1-1/8"	11-3/4"	7/8"	8	3/4"
10"	16"	1-3/16"	14-1/4"	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.

Installation Recommendations

SHP Series Butterfly Valves

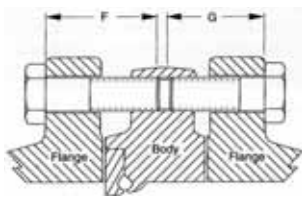


FLANGE BOLTING RECOMMENDATIONS

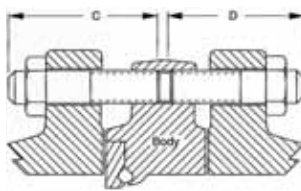
Lug Valves, 2"-24", ANSI 250/300 Bolt Pattern

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

LUG BODY
HEX HEAD MACHINE BOLTS



LUG BODY
STUDS and NUTS



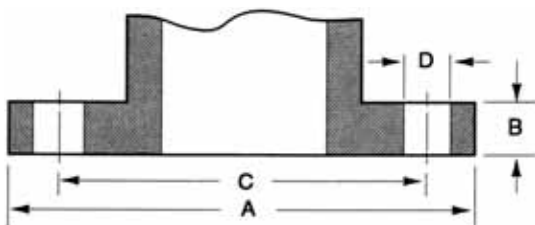
* Bolt lengths "A" & "B" are from face of valve body to minimum depth in lug. Flange & gasket thickness must be added to calculate minimum bolt length.

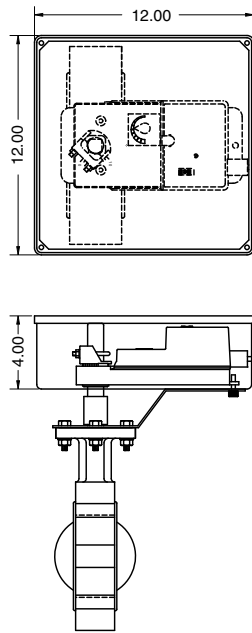
**Special length required for tapped blind holes on either side of the valve shaft at the top and bottom ends of the valve body.

FLANGE BOLTING RECOMMENDATIONS

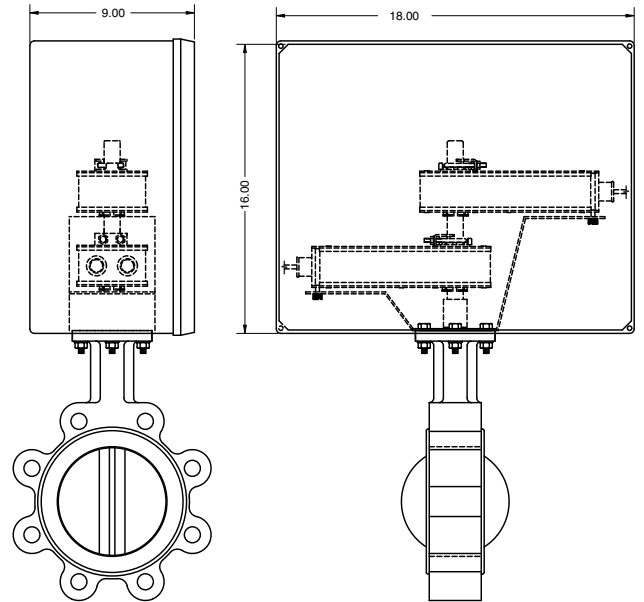
Flange Detail for ANSI 300 B16.5 Pipe Flanges 300 SHP Series Butterfly Valves

Nominal Pipe Size	FLANGES		DRILLING		BOLTING	
	A Flange Diameter	B Flange Thickness	C Diameter of Bolt Circle	D Diameter of Bolt Holes	Number of Bolts	Diameter of Bolts
2"	6.50	.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"

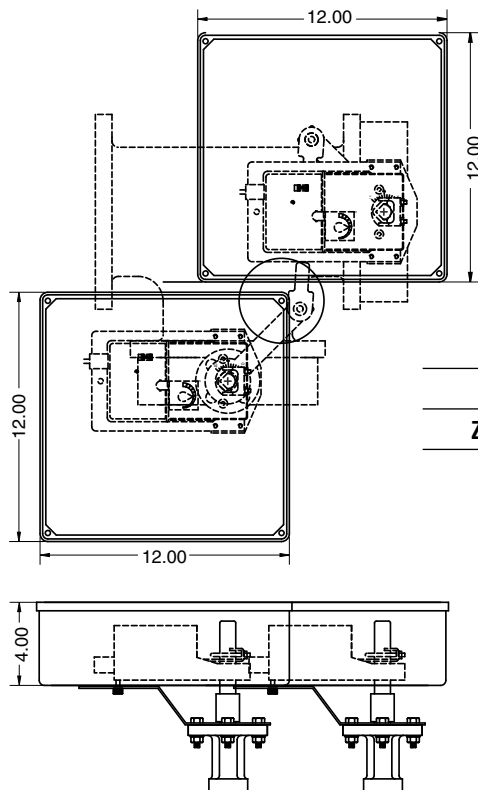




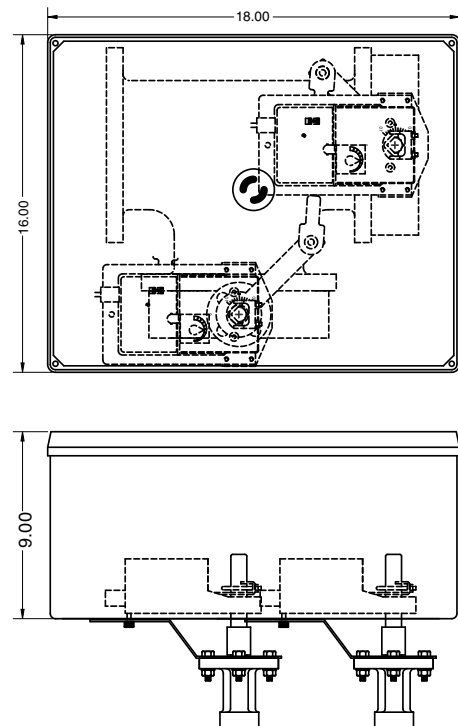
ZS-BFV-10
ZS-BFV-20
ZS-BFV-30(X1)



ZS-BFV-60
ZS-BFV-70
ZS-BFV-80



ZS-BFV-30(X2)
ZS-BFV-100(X2)



ZS-BFV-90

#1 Select an Actuator

(use one sheet for each unique actuator/configuration)

	Quantity		Quantity
<input type="checkbox"/> AF24-MFT US	_____	<input type="checkbox"/> AMX24-MFT	_____
<input type="checkbox"/> AF24-MFT-S US	_____	<input type="checkbox"/> AMX24-MFTX1	_____
<input type="checkbox"/> NF24-MFT US	_____	<input type="checkbox"/> NMX24-MFT	_____
<input type="checkbox"/> LF24-MFT US	_____	<input type="checkbox"/> NMX24-MFTX1	_____
<input type="checkbox"/> LF24-MFT-S US	_____	<input type="checkbox"/> LMX24-MFT	_____
<input type="checkbox"/> AF24-MFT95 US	_____	<input type="checkbox"/> LMX24-MFTX1	_____
<input type="checkbox"/> NV24-MFT US	_____	<input type="checkbox"/> LRX24-MFT	_____
<input type="checkbox"/> NVF24-MFT US	_____	<input type="checkbox"/> GMX24-MFT95	_____
<input type="checkbox"/> NVF24-MFT-E US	_____	<input type="checkbox"/> AMX24-MFT95	_____
<input type="checkbox"/> NVFD24-MFT US	_____	<input type="checkbox"/> NMX24-MFT95	_____
<input type="checkbox"/> NVFD24-MFT-E US	_____	<input type="checkbox"/> LMX24-MFT95	_____
<input type="checkbox"/> GMX24-MFT	_____	<input type="checkbox"/> LHX24-MFT	_____
<input type="checkbox"/> GMX24-MFTX1	_____	<input type="checkbox"/> 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 1-1/4" 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
<input type="checkbox"/> 2 - 10	<input type="checkbox"/> 0.2 to 5.0 seconds	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> 0 - 10	<input type="checkbox"/> 0.1 to 25.5 seconds		
<input type="checkbox"/> Variable	<input type="checkbox"/> 0.59 to 2.93 seconds		
Start <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> · <input type="checkbox"/>	<input type="checkbox"/> Variable		
Stop <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> · <input type="checkbox"/>	Start <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> · <input type="checkbox"/>		
	Stop <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> · <input type="checkbox"/>		

3 Feedback Signals U_s

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

☐ **Position Feedback U** DC 0...10 V

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

Finish DC ☐☐☐ V (2...10 V)

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%) <1 (beginning of working range) default 0

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

Max. (max. position) = ☐☐☐ % (0...100%) <1 (end of working range) default 100

Section 230900 – INSTRUMENTATION AND CONTROL FOR HVAC

2.15 ACTUATORS

- A. Electronic Damper Actuators:
 1. Manufactured, brand labeled or distributed by BELIMO.
 2. Size for torque required for damper seal at load conditions.
 3. Coupling: V-bolt dual nut clamp with a V-shaped, toothed cradle.
 4. Mounting: Actuators shall be capable of being mechanically and electrically paralleled to increase torque if required.
 5. Overload Protection: Electronic overload or digital rotation-sensing circuitry without the use of end switches to prevent any damage to the actuator during a stall condition.
 6. Fail-Safe Operation: Mechanical, spring-return mechanism. Internal chemical storage systems, capacitors, or other internal non-mechanical forms of fail-safe operation are not acceptable.
 7. Power Requirements (Two-Position Spring Return): 24 [120] [230] VAC.
 8. Power Requirements (Proportional): Maximum 10 VA at 24 VAC or 8 W at 24 VDC.
 9. Proportional Actuators shall be fully programmable. Control input, position feedback and running time shall be factory or field programmable by use of external computer software Diagnostic feedback shall provide indications of hunting or oscillation, mechanical overload and mechanical travel. Programming shall be through an EEPROM without the use of actuator mounted switches.
 10. Temperature Rating: -22 to +122°F -30 to +50°C [-58 to +122°F -50 to +50°C]
 11. Housing: Minimum requirement NEMA type 2 / IP54 mounted in any orientation.
 12. Agency Listing: ISO 9001, cULus, and CSA C22.2 No. 24-93.
 13. The manufacturer shall warrant all components for a period of 5 years from the date of production, with the first two years unconditional.
- B. Electronic Valve Actuators:
 1. Manufactured, brand labeled or distributed by BELIMO.
 2. Size for torque required for valve close off at 150% of total system (head) pressure for 2-way valves; and 100% of pressure differential across the valve or 100% of total system (pump) head differential pressure for 3-way valves.
 3. Coupling: Directly couple end mount to stem, shaft, or ISO-style direct-coupled mounting pad.
 4. Mounting: Actuators shall be capable of being mechanically and electrically paralleled to increase torque if required.
 5. Overload Protection: Electronic overload or digital rotation-sensing circuitry without the use of end switches to deactivate the actuator at the end of rotation.
 6. Fail-Safe Operation: Mechanical, spring-return mechanism. Internal chemical storage systems, capacitors, or other internal non-mechanical forms of fail-safe operation are not acceptable.
 7. Power Requirements: Maximum 10 VA at 24 VAC or 8 W at 24 VDC.
 8. Maximum 1 VA at 24 VAC or 1 W at 24 VDC.
 9. Temperature Rating: -22 to +122°F -30 to +50°C [-58 to +122°F -50 to +50°C]
 10. Housing: Minimum requirement NEMA type 2 / IP54 mounted in any orientation.
 11. Agency Listing: ISO 9001, cULus, and CSA C22.2 No. 24-93.
 12. The manufacturer shall warrant all components for a period of 5 years from the date of production, with the first two years unconditional.
- C. Terminal Unit Actuators:
 1. Manufactured, brand labeled or distributed by BELIMO.
 2. Close-off (Differential) Pressure Rating: 200 psi.
 3. Coupling: V-bolt dual nut clamp with a V-shaped, toothed cradle or an ISO-style direct-coupled mounting pad.
 4. Power Requirements: Maximum 1 VA at 24 VAC or 1 W at 24 VDC.
 5. Temperature Rating: -22 to +122°F -30 to +50°C.

6. Housing Rating: Minimum UL94-5V(B) flammability.
 7. Agency Listing: CE, UL 60730-1A/-2-14, CAN/CSA E60730-1, CSA C22.2 No. 24-93, CE according to 89/336/EEC.
 8. The manufacturer shall warrant all components for a period of 5 years from the date of production, with the first two years unconditional.
- D. Industrial Actuators
(ONLY TO BE USED WITH BUTTERFLY VALVE SECTION)
 1. Manufactured, brand labeled or distributed by BELIMO.
 2. The combination of valve and actuator shall meet the close-off requirements as specified in Section 2.16.F – Butterfly Valves.
 3. Coupling: ISO 5211 mounting standards.
 4. Overload Protection: A self resetting thermal switch embedded in the motor.
 5. Manual Override: Actuator shall be equipped with a hand wheel or shaft for manual override to permit operation of the actuator in the event of an electrical power failure
 6. Auxiliary Switches: 2 SPDT rated 3A at 250 VAC.
 7. Temperature Rating: -4 to +150°F -20 to +65°C.
 8. Housing: Minimum requirement NEMA type 4X/ IP67. Actuator shall have an internal heater. A visual indication beacon shall indicate position status of the device.
 9. Agency Listing: ISO, CE, CSA
 10. The manufacturer shall warrant for 2 years from the date of production.

2.16 CONTROL VALVES

- A. Manufacturer:
 1. Manufactured, brand labeled or distributed by BELIMO.
- B. Control Valves: Factory fabricated of type, body material, and pressure class based on maximum pressure and temperature rating of piping system, unless otherwise indicated.
- C. The manufacturer shall warrant all components for a period of 5 years from the date of production, with the first two years unconditional (except as noted).
- D. Pressure Independent Control Valves
 1. NPS 2 and Smaller: Forged brass body rated at no less than 400 psi, chrome plated brass ball and stem, female NPT union ends, dual EPDM lubricated O-rings and TEFZEL® characterizing disc.
 2. Accuracy: The control valves shall accurately control the flow from 0 to 100% full rated flow. The flow shall not vary more than ±5% due to system pressure fluctuations across the valve with a minimum of 5 psid across the valve.
 3. Flow Characteristics: Equal percentage characteristics.
 4. Close-off Pressure Rating: 200 psi.
 5. All actuators shall be electronically programmed by use of external computer software. Programming using actuator mounted switches or multi-turn actuators are NOT acceptable. **[Actuators for 3-wire floating (tri-state) on ½" to 1" pressure independent control valves shall fail in place and have a mechanical device inserted between the valve and the actuator for the adjustment of flow.] [Actuators for two-position ½" to 1" pressure independent control valves shall fail in place and have a mechanical device inserted between the valve and the actuator for the adjustment of flow.] [Actuators shall be provided with an auxiliary switch to prove valve position.]**
 6. The actuator shall be the same manufacturer as the valve, integrally mounted to the valve at the factory with a single screw on a four-way DIN mounting-base.
 7. The control valve shall require no maintenance and shall not include replaceable cartridges.
 8. The manufacturer shall warrant all components for a period of 5 years from the date of production, with the first two years unconditional.
 9. The use of pressure independent valves piped in parallel to achieve the rated coil flow shall be permitted. Actuators shall be electronically programmed to permit sequencing the flow with a single control output point. The use of external devices to permit sequencing is NOT acceptable.

SPECIFYING PRESSURE INDEPENDENT CONTROL VALVES REQUIRE THE FOLLOWING ADDITIONS TO SECTIONS 232113 AND 230593.

To be inserted into Section 232113 – HYDRONIC PIPING

2.6 CONTROL VALVES

- K. Calibrated Balancing Valves and Automatic Flow-Control Valves shall not be required on devices where pressure independent control valves are installed.

To be inserted into Section 230593 – TESTING, ADJUSTING, AND BALANCING FOR HVAC

3.11 PROCEDURE FOR HYDRONIC SYSTEMS

- H. Systems installed with pressure independent control valves shall not require hydronic system balancing. **[Flow shall be verified for [10%] [20%] [25%] <Insert Percentage> of the total installed product. Exact locations of tested product to be coordinated with the design engineer.]**

E. Characterized Control Valves:

1. NPS 3 and Smaller: Nickel-plated forged brass body rated at no less than 400 psi, stainless steel ball and blowout proof stem, NPT female end fittings, with a dual EPDM O-ring packing design, fiberglass reinforced Teflon® seats, and a TEFZEL® flow characterizing disc. **[NPS ¾" and Smaller for Terminal Units: Nickel plated forged brass body rated at no less than 600 psi, chrome plated brass ball and blowout proof stem, NPT female end fittings, with a dual EPDM O-Ring packing design, fiberglass reinforced Teflon® seats, and a TEFZEL® flow characterizing disc.]**
2. Sizing:
 - a. Two-Position: Line size or size using a pressure differential of 1 psi.
 - b. 2-way Modulating: [3 psig] 5 psig or twice the load pressure drop, whichever is greater.
 - c. 3-way Modulating: Twice the load pressure drop, but not more than [3 psig] 5 psig.
3. Close-off Pressure Rating: 100 psi. [NPS ¾" and Smaller for Terminal Units: 200 psi.]
4. The actuator shall be the same manufacturer as the valve, integrally mounted to the valve at the factory with a single screw on a four-way DIN mounting-base.

F. Hydronic system globe valves shall have the following characteristics:

1. NPS 2 and Smaller: ANSI Class 250 bronze body, stainless steel stem, brass plug, bronze seat, and a TFE packing.
2. NPS 2-½ and Larger: ANSI Class 125 [250] cast iron body, stainless steel stem, bronze plug, bronze seat, and a TFE V-ring packing.
3. Sizing:
 - a. Two-Position: Line size or size using a pressure differential of 1 psi.
 - b. 2-way Modulating: [3 psig] 5 psig or twice the load pressure drop, whichever is greater.
 - c. 3-way Modulating: Twice the load pressure drop, but not more than [3 psig] 5 psig.
4. Flow Characteristics: 2-way valves shall have equal percentage characteristics; 3-way valves shall have linear characteristics.
5. Close-off Pressure Rating: Combination of actuator and trim shall provide minimum close-off pressure rating of 150% of total system head pressure for 2-way valves and 150% of the design pressure differential across the 3-way valves.
6. 2- and 3-way globe valves shall be used only if characterized control valves do not fit the sizing criteria or application.

G. Steam system globe valves shall have the following characteristics:

1. NPS 2 and Smaller: ANSI Class 250 bronze body; stainless steel seat, stem and plug; and a TFE packing.
2. NPS 2-½ and Larger: ANSI Class 125 [250] cast iron body; stainless steel seat, stem and plug; and a TFE V-ring packing.
3. Sizing:
 - a. Two-Position: Line size or sized using 10% of inlet gauge pressure.
 - b. Modulating: 15 psig or less inlet steam pressure, the pressure drop shall be 80% of inlet gauge pressure. Higher than 15 psig inlet steam pressure the pressure drop shall be 42% of the inlet absolute pressure.
4. Flow Characteristics: Linear or equal percentage characteristics.
5. Close-off Pressure Rating: Combination of actuator and trim shall provide minimum close-off pressure rating of 150% of operating (inlet) pressure.

H. Butterfly Valves – Resilient Seat:

1. NPS 2 to 12: Valve body shall be full lugged cast iron 200 psig body with a 304 stainless steel disc, EPDM seat, extended neck and shall meet ANSI Class 125/150 flange standards. Disc-to-stem connection shall utilize an internal spline. External mechanical methods to achieve this mechanical connection, such as pins or screws, are not acceptable. The shaft shall be supported at four locations by RPTFE bushings.
2. NPS 14 and Larger: Valve body shall be full lugged cast iron 150 psig body with a 304 stainless steel disc, EPDM seat, extended neck and shall meet ANSI Class 125/150 flange standards. Disc-to-stem connection shall utilize a dual-pin method to prevent the disc from settling onto the liner. The shaft shall be supported at four locations by RPTFE bushings.
3. Sizing:
 - a. Two-Position: Line size or size using a pressure differential of 1 psi.
 - b. Modulating: 3 psig [5 psig] or twice the load pressure drop, whichever is greater. Size for the design flow with the disc in a 60° open-position with the design velocity less than 12 feet per second.
4. Close-off Pressure Rating: NPS 2" to 12" 200 psi bubble tight shut-off. NPS 14" and larger, 150 psi bubble tight shut-off.

I. Zone Valves (On/Off, Two-Position Applications):

1. NPS 1 and Smaller: Forged brass body rated at no less than 300 psi, stainless steel stem, female NPT union or sweat with a stainless steel stem and EPDM seals.
2. Sizing:
 - a. Two-Position: Line size or size using a pressure differential of 1 psi.
3. Close-off Pressure Rating: Combination of actuator and trim shall provide minimum close-off pressure rating of 150% of total system head pressure for 2-way valves and 125% of the design pressure differential across the 3-way valves.
4. The actuator shall be the same manufacturer as the valve, integrally mounted to the valve at the factory.
5. The manufacturer shall warrant all components for a period of 2 years from the date of production.

To be inserted into Section 233300 – AIR DUCT ACCESSORIES

2.8 SMOKE DAMPERS

Replace with the following:

- I. Damper Motors:
 1. Manufactured, brand labeled or distributed by BELIMO.
 2. Size for torque required for damper seal at load conditions.
 3. Coupling: V-bolt dual nut clamp with a V-shaped toothed cradle. Aluminum clamps or set screws are not acceptable.
 4. Overload Protection: Microprocessor or an electronic based motor controller providing burnout protection if stalled before full rotation is reached. The actuator shall be electronically cut off at full open to eliminate noise generation with the holding noise level to be inaudible.
 5. Power Requirements (Two-Position Spring Return): 24 [120] [230] VAC.
 6. Power Requirements (Proportional): Maximum (running) 12 VA at 24 VAC or 8 W at 24 VDC. Maximum (holding) 5VA at 24 VAC or 3 W at 24 VDC holding.
 7. Proportional Actuators (24 VAC/VDC): Control signal shall be 2-10 VDC or 4-20 mA, with a 2-10 VDC position feedback signal.
 8. Actuator timing shall meet 15 seconds [75 seconds] [local codes].
 9. Temperature Rating: Actuator shall have a UL555S listing by the damper manufacturer for 350°F [250°F].

The following replaces item 2.8.K.1

10. Auxiliary switches for **[signaling] [fan control] [or] [position indication]**.

2.9 COMBINATION FIRE AND SMOKE DAMPERS

Replace with the following:

- O. Damper Motors:
 11. Manufactured, brand labeled or distributed by BELIMO.
 12. Size for torque required for damper seal at load conditions.
 13. Coupling: V-bolt dual nut clamp with a V-shaped toothed cradle. Aluminum clamps or set screws are not acceptable.

14. Overload Protection: Microprocessor or an electronic based motor controller providing burnout protection if stalled before full rotation is reached. The actuator shall be electronically cut off at full open to eliminate noise generation with the holding noise level to be inaudible.
15. Power Requirements (Two-Position Spring Return): 24 [120] [230] VAC.
16. Power Requirements (Proportional): Maximum (running) 12 VA at 24 VAC or 8 W at 24 VDC. Maximum (holding) 5VA at 24 VAC or 3 W at 24 VDC holding.
17. Proportional Actuators (24 VAC/VDC): Control signal shall be 2-10 VDC or 4-20 mA, with a 2-10 VDC position feedback signal.
18. Actuator timing shall meet 15 seconds [75 seconds] [local codes].
19. Temperature Rating: Actuator shall have a UL555S listing by the damper manufacturer for 350°F [250°F].

The following replaces item 2.9.Q.1

20. Auxiliary switches for **[signaling] [fan control] [or] [position indication]**.

NOTE TO SPECIFIER

Any (or all) of the following manufacturers are listed per UL555S with Belimo actuators: Air Balance, Arlan, E.H. Price, Greenheck, Leader, Lloyd Industries, Naylor, Pottorff, Prefco, Ruskin and Safe-Air.

21. Housing: Steel housing, aluminum is unacceptable.
22. Agency Listing: ISO 9001, UL873, or UL60730.
23. The manufacturer shall warrant all components for a period of 5 years from the date of production, with the first two years unconditional.

I. General

- 1.1. The following Terms and Conditions of Sale ("Terms") apply to the sale of products described in this Product Guide ("Products"). As used herein, "Seller" or "Belimo" refers to Belimo Aircontrols (USA) Inc. or Belimo Aircontrols (CAN) Inc., as applicable, and "Client" refers to the individual or business entity that purchases the Products from Seller. These Terms shall apply unless the parties mutually agree to different terms and memorialize such agreement in a writing signed by both Client and Seller.

II. Price

- 2.1. The Seller's price for Products (the "Price") is net, F.O.B. Point of Origin, and is calculated in US currency for sales made by Belimo Aircontrols (USA), Inc. and calculated in Canadian currency for sales made by Belimo Aircontrols (CAN) Inc.
- 2.1. The Price, unless otherwise agreed upon, does not include freight and packaging (wooden crates, pallets, etc), the costs of which will be charged to Client at cost for each shipment and shall be payable with payment of the Price.
- 2.3. Orders for Products with a net value of less than US\$300 (CAN\$450) will be subject to a US\$20 (CAN\$35) handling fee (the "Handling Fee"). The Handling Fee will not be charged for orders of Products with a net value equal to or greater than US\$300 (CAN\$450) or for Products ordered through Seller's internet ordering system at: www.belimo.com.
- 2.4. Seller reserves the right to make partial deliveries of orders of Products, each of which deliveries may be invoiced separately by Seller.
- 2.5. The Price does include charges for wiring diagrams, installation, and commissioning, which will be charged to Client separately and will be payable on demand.

III. Payment

- 3.1. Invoices are payable in US currency for sales made by Belimo Aircontrols (USA), Inc. and in Canadian currency for sales made by Belimo Aircontrols (CAN) Inc. and are due no later than 30 days from the date of invoice, without any deductions.
- 3.2. If Client fails to pay the entire invoice balance within 60 days from the date of the invoice, Client will be subject to an interest charge of 2% per month (or the maximum rate permitted by law, whichever is less) on the outstanding unpaid balance due to Seller.
- 3.3. Clients who maintain outstanding balances for 45 days or more after the date of invoice may be subject to restricted shipments of Products or may be required to pay for all future deliveries of Products on a cash-on-delivery basis.

IV. Title and Risk

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

V. Damage or Loss in Transit

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

VI. Delivery

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

VII. Return of Goods

- 7.1. Products received by Client cannot be returned unless: (i) Client alerts Seller that it intends to return such Products, (ii) Seller agrees to accept the return of such Products, (iii) Client obtains a Return Material Authorization ("RMA") number from Seller for the return of such Products, and (iv) Client follows all return instructions provided by the Seller. The RMA number must be clearly written on the outside of all packaging for any returned Products. Only Products returned to proper the location as instructed by Seller and identified with an RMA number will be considered for credit.
- 7.2. Only Products that are returned in original packaging may be accepted for return. Such returned Products must be received in good condition, adequate for resale as new Products to qualify for credit. Client will be responsible for payment of a restocking charge for all returned Products in an amount no less than 20% of the invoice value of the Products ("Restocking Charges"). All return Products must be shipped to Seller at Client's cost.
- 7.3. Returns that result from Seller errors will be credited in full and will not be subject to Restocking Charges.

VIII. Warranty

VIII.A 5-year Warranty

- 8.1. Products that are listed in this Product Guide as carrying a 5-year warranty and shipped after May 1, 2000 to a location in the United States or Canada shall carry a 5-year warranty. The 5-year warranty is unconditional for the first two years from the date of production of the Products. After the first two years from the date of Production, the warranty shall be conditional and the warranty coverage shall not apply to damage to Products caused by ordinary wear and tear, negligence or improper use by Client, or other causes beyond the control of the Seller. Product -specific terms of warranty with regard to warranty period or conditions of warranty may apply to certain specified Products as stated in the documentation for those Products.

VIII.B 2-year Conditional Warranty

- 8.2. Products that are listed in this Product Guide as carrying a 2-year warranty and shipped after May 1, 2005 to a location in the United States or Canada shall carry a 2-year warranty. The 2-year warranty is conditional and the warranty coverage shall not apply to damage to Products caused by ordinary wear and tear, negligence or improper use by Client, or other causes beyond the control of the Seller. Product -specific terms of warranty with regard to warranty period or conditions of warranty may apply to certain specified Products as stated in the documentation for those Products.

VIII.C General Warranty Terms

- 8.3. Seller's warranty may be null and void in the event of any: (a) modification or unauthorized repairs of Products by Client, (b) unauthorized incorporation or integration of Products into or with Client's equipment, (c) use of Products in an unauthorized manner, or (d) damage to Products not caused by Seller.
- 8.4. Client must promptly notify Seller of Products' alleged defect and provide Seller with other evidence and documentation reasonably requested by Seller. Before removing Products from service, Client should contact a Seller-authorized support technician by calling Belimo customer service. The contact information for Belimo customer service is listed on the back page of Belimo's Product Guide and Price List ("PGPL") or may be found at www.belimo.com. Belimo customer service will work with field technicians to troubleshoot problems. Many problems can be resolved over the phone.
- 8.5. If a problem cannot be resolved over the phone, an RMA number will be issued by Seller for return of the Products. Prior to returning any Products under a warranty, Client must obtain an RMA number from Seller, along with shipping instructions for the return. The RMA number must be clearly written on the outside of the box containing the returned Products. Only Products returned to the proper location and identified with an RMA number will be accepted by the Seller.
- 8.6. All returned Products should be packaged appropriately to prevent further damage. Seller reserves the right to refuse any returned material if improperly packaged or labeled (without an RMA number). Products returned without proper RMA documentation will void Seller's warranty.
- 8.7. Products found to be defective for which a warranty is applicable will either be replaced or repaired at the Seller's discretion. Seller is not responsible for charges that Client may incur as a result of the removal or replacement of Products.

- 8.8. Repaired or replacement Products are shipped from Seller via ground shipment. Other shipping methods are available at the sole expense of the Client.
- 8.9. Repaired, replaced or exchanged Products will carry a warranty for a period of time equal to the greater of: (i) the remainder of the original 5-year warranty or 2-year warranty that was applicable to the repaired, replaced or exchanged Products, or (ii) six months, effective from the date the repaired, exchanged or replaced Products are shipped by Seller (the "Replacement Warranty Period").
- 8.10. Advanced replacement Products for Products covered under warranty may be obtained from Seller after the Belimo customer service troubleshooting process has been completed. For industrial products (such as butterfly valves), a purchase order is required. The purchase order will be credited upon the receipt and verification by Seller of the returned defective Products. For non-industrial products, an invoice will be issued and shall be due and payable is the returned Products are not received by Seller within 60 days from the date of that the replacement Products are shipped. Additional charges may apply if the nature of the problem has been misrepresented by Client.
- 8.11. Both the conditional and unconditional warranties cover the Products only, and do NOT cover labor associated with the troubleshooting, removal or replacement of such Products.
- 8.12. New Products ordered in an attempt to circumvent the warranty process may NOT be reimbursed if, upon receipt of returned Products, it is determined that the defect in the returned Products is actually field related, or the Products have been returned for cosmetic reasons only.
- 8.13. Advanced replacement Products for butterfly valve actuators may not be new, but have been verified by the Seller for electrical and mechanical operation. Such Products carry the full warranty for the entire Replacement Warranty Period.

IX. No Warranty for Non-HVAC Application

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

X. Liability Disclaimer

- 10.1. These Terms constitute the entire understanding and agreement between Seller and Client regarding the warranties that cover Products and supersedes all previous understandings, agreements, communications and representations. Seller shall not be responsible for and Client does not have any right to make any claim for, damage that occurs to any property other than Products. Seller shall in no way be responsible for any costs incurred by Client in the determination of the causes of damage to any of Client's property, for expert opinions, or for any punitive or special, incidental or consequential damages of any kind whatsoever.
- 10.2. Seller shall not be liable for any damage resulting from or contributed by Client or third parties acting within the scope of responsibility of Client or such third party when:
 1. Products are used for non-HVAC applications, such as in aircrafts, industrial processes, etc.;
 2. Client uses the Products without complying with applicable law or institutional regulations or Belimo data and installation sheets or Client uses the Products without following good industry practice;
 3. Products are used by personnel who have not received suitable instruction; or
 4. Products are modified or repaired without the written approval of Seller. When requested to do so, Client shall immediately release Seller in full from any possible third party claims resulting in connection with the circumstances listed above. This also applies to claims in connection with product liability.
- 10.3. If Client becomes aware that any third party has made or appears likely to make any claim regarding Products (including, without limitation, regarding Product defects or rights infringed by Products), then Client shall immediately inform Seller and afford to Seller all assistance that Seller may require to enforce its rights and defend such claim.

XIII. Proper Law and Jurisdiction

- 11.1. All sales of Products under these Terms and the warranties described herein shall be governed by the laws of the State of Connecticut, and the parties agree to submit to the exclusive jurisdiction of the Federal and state courts located in the State of Connecticut with respect to any dispute arising from the subject matter hereof. The parties hereby waive all rights to a jury trial in connection with any claims relating to the subject matter hereof.

USA

ACR Supply Company Inc.
2719 Hillsborough Road
Durham, NC 27705
Phone: 919-286-2228
With branches in NC

Aireco Supply
9120 Washington Boulevard
Savage, MD 20763-0414
Phone: 301-953-8800
With branches in MD, VA

Amcon Controls, Inc.
11906 Warfield Street
San Antonio, TX 78216
Phone: 210-349-6161
With branch in Houston, TX

Applied Automation
A Wilson Mohr Company
3186 South Washington Street, #230
Salt Lake City, UT 84115
Phone: 801-486-6454

Boston Aircontrols, Inc.
8 Blanchard Road
Burlington, MA 01803
Phone: 781-272-5800

Charles D. Jones Co.
445 Bryant Street, Unit #1
Denver, CO 80204-4800
Phone: 800-777-0910
With branches in CO, MO, KS

Climatic Control Co., Inc.
5061 W. State Street
Milwaukee, WI 53208
Phone: 800-242-1656
With branches in WI, IL

Cochrane Supply and Engineering, Inc.
30303 Stephenson Highway
Madison Heights, MI 48071-1633
Phone: 800-482-4894
With branches in MI

Columbus Temperature Control
1053 E. 5th Avenue
Columbus, OH 43201
Phone: 800-837-1837

Controlco
5600 Imhoff Drive, Suite G
Concord, CA 94520
Phone: 925-602-7728
With branches in CA

Edward C. Smyers & Co.
223 Fort Pitt Boulevard
Pittsburgh, PA 15222-1505
Phone: 412-471-3222

First Source Distributors, LLC
710 Peninsula Lane, Suite E
Charlotte, NC 28273
Phone: 800-670-5977

G & O Thermal Supply
5435 N. Northwest Highway
Chicago, IL 60630
Phone: 773-763-1300
With branches in IL

Industrial Controls Distributors LLC
1776 Bloomsbury Avenue
Wanamassa, NJ 07712
Phone: 800-631-2112
**With branches in
KY, ME, NC, NY, OH, PA, TN, MA, GA, WI, IL**

Interstate HVAC Controls
30 Vineland Street
Brighton, MA 02135
Phone: 617-782-9000

Jackson Controls
1708 E. 10th Street
Indianapolis, IN 46201
Phone: 317-231-2200

M & M Controls
9E West Aylesbury Road
Timonium, MD 21093
Phone: 410-252-1221

Meier Supply
123 Brown Street
Johnson City, NY 13790
Phone: 607-797-7700
With branches in NY, PA

MICONTROLS, Inc.
6516 5th Place South
Seattle, WA 98124
Phone: 800-877-8026
With branches in WA, OR

Minvalco, Inc.
3340 Gorham Avenue
Minneapolis, MN 55426-4267
Phone: 952-920-0131
With branches in MN

RSD/Total Control
26021 Atlantic Ocean Drive
Lake Forest, CA 92630
Phone: 949-380-7878
**With branches in
CA, NV, OR, AK, AZ, ID, UT, WA**

Saint Louis Boiler Supply, Co.
617 Hanley Industrial Court
St. Louis, MO 63144
Phone: 314-962-9242

South Side Control Supply, Co.
488 N. Milwaukee Avenue
Chicago, IL 60610-3923
Phone: 312-226-4900
With branches in IL, IN

Stromquist and Company
4620 Atlanta Road
Smyrna, GA 30080
Phone: 404-794-3440
With branch in FL

Temperature Control Systems
10315 Brockwood Road
Dallas, TX 75238
Phone: 214-343-1444
With branches in OK, TX

Tower Equipment Co., Inc.
1320 West Broad Street
Stratford, CT 06615
Phone: 800-346-4647

Twinco Supply Corporation
55 Craven Street
Huntington Station, NY 11746-2143
Phone: 800-794-3188
With branches in NY

CANADA

Airex
C - 5 Sandhill Court
Brampton, ON, L6T 5J5
Phone: 905-790-8667

Baymar Supply Co.
3200 Jefferson Boulevard
Windsor, ON, N8T 2W8
Phone: 519-974-5800
With branch in London, ON

Le Groupe Master
1675 de Montarville
Boucherville, QC, J4B 7W4
Phone: 514-527-2301
With branches across Eastern Canada

O'Dell Associates Inc.
#3 - 1038 Cooke Boulevard
Burlington, ON, L7T 4A8
Phone: 905-681-3901

Prokontrol
1989 Michelin
Laval, QC, H7L 5B7
Phone: 450-973-7765
With branches in Ville Vanier and Ontario

Refrigerative Supply
3958 Myrtle Street, Burnaby, BC, V5C 4G2
Phone: 604-435-7151
**With branches in British Columbia,
Alberta, Saskatchewan, Manitoba**

Regal Controls
1156 Kingsway
Vancouver, BC V5V 3C8
Phone: 604-879-6357
With branch in Langley

Regulvar Laval
1985 Boul Industriel Laval, QC, H7S-1P6
Phone: 450-629-0435
**With branches in Sherbrooke,
St. Hubert, Lachine, Quebec City**

Regulvar Ottawa Inc.
170 Laurier Ax West Suite 714
Ottawa, Ontario, K1P-5V6
Phone: 613-565-2129
With branch in Gatineau

Sinclair Supply
10914 - 120 Street
Edmonton, AB, T5H 3P7
Phone: 780-452-3110
**With branches in British Columbia,
Alberta, Saskatchewan**

SCI
3311 Boul Industriel
Laval, QC, H7L 4S3
Phone: 450-668-8866

Wiles & Legault
#5 - 505 Industriel Avenue
Ottawa, ON, K1G 0Z1
Phone: 613-747-1867

Yorkland Controls
2689 Steeles Avenue, W.
Downsview, ON, M3J 2Z8
Phone: 416-661-3306
With branch in Mississauga

Belimo worldwide: www.belimo.com

BELIMO Americas

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Tel. 800-543-9038, Fax 800-228-8283, marketing@us.belimo.com

1675 East Prater Way, Suite 101, Sparks, NV 89434
Tel. 800 987-9042, Fax 800-987-8875, marketing@us.belimo.com

Canada Locations, 14/16 – 5716 Coopers Avenue, Mississauga, Ontario L4Z 2E8
Tel. 866-805-7089, Fax 905-712-3124, marketing@us.belimo.com

Latin America Customer Service, Tel. 203-791-8396, Fax 203-791-9139, marketing@us.belimo.com

