



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

### Application

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

### Jobsite Note

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

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

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

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

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# F7...HD Butterfly Valves 2"-24" Ductile Iron Lug Body Resilient Seat, 304 Stainless Disc



## Maximum Dimensions (Inches)

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

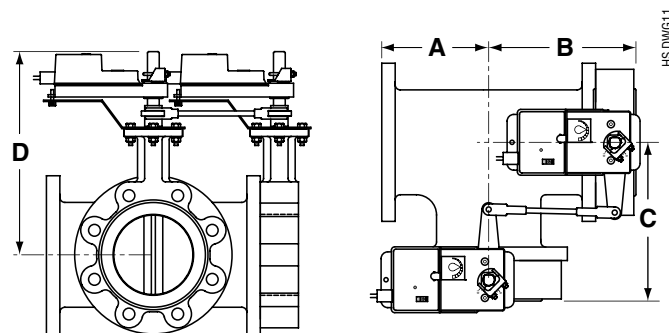
AF maximum actuator ambient temperature is 122°F.  
SY... maximum actuator ambient temperature is 150°F.  
†SY6 and larger available in 110/220 VAC versions only.

## Application Notes

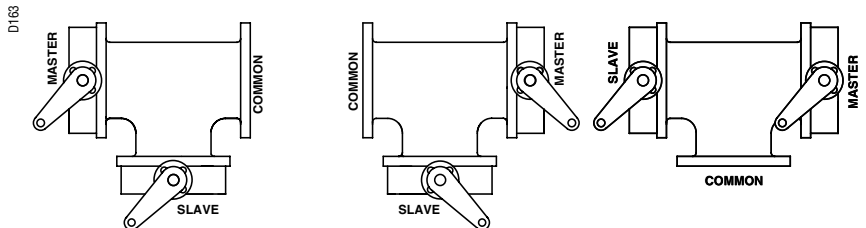
- Valves are rated at 200 psi differential pressure in the closed position.
- Valves are furnished with lugs tapped for use with ANSI Class 125/150 flanges. Installation flanges and hardware are not included.
- 3-way assemblies are furnished assembled and tested, ready for installation.  
**All 3-way 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.

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

## Dimensions



## 3-Way Configuration Codes



CONFIG CODE	ON/OFF OR MOD@2VDC MASTER VALVE IS	MASTER VALVE @ FAIL	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 HD series BF valves over 18" and ALL sizes 3-way tee assemblies ordered with Configuration Codes 30-35 are special order/custom built and are **NOT** returnable.

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# AF Actuators, Multi-Function Technology



## Models

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

### Technical Data

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

\* Variable when configured with MFT options

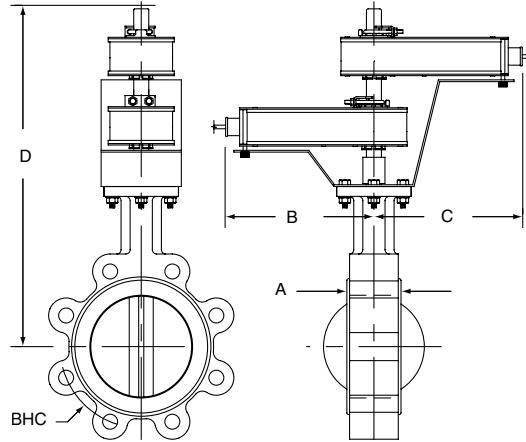
† Rated Impulse Voltage 800V, Type of action 1.AA (1.AAB for -S version), Control Pollution Degree 3.

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

### AFX24-MFT-S-X1

Auxiliary switches	2 x SPDT 3A (0.5A) @ 250 VAC, UL approved one set at +10°, one adjustable 10° to 90°
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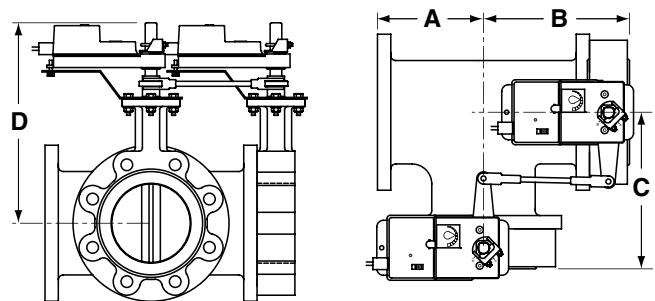
### Dimensions with 2-Way Valve



BF2WUDIM\_A

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

### Dimensions with 3-Way Valve



HS DWGP11

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

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### Wiring Diagrams

#### INSTALLATION NOTES

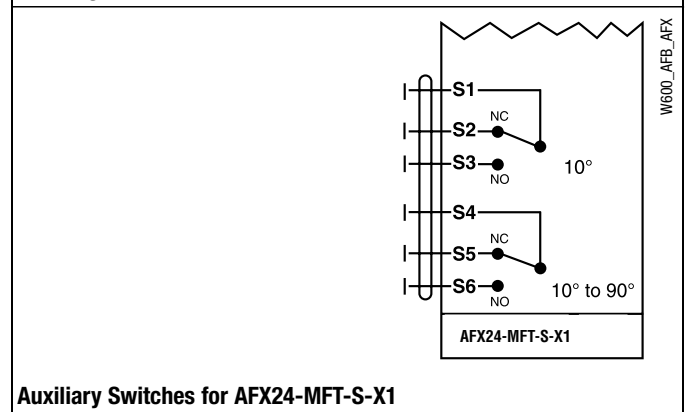
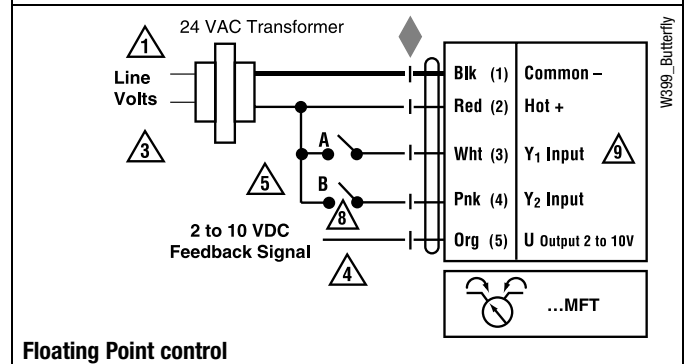
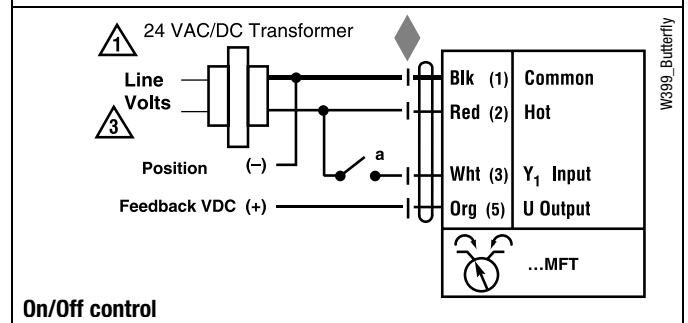
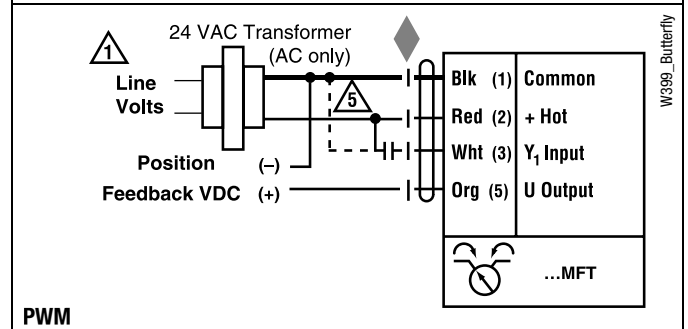
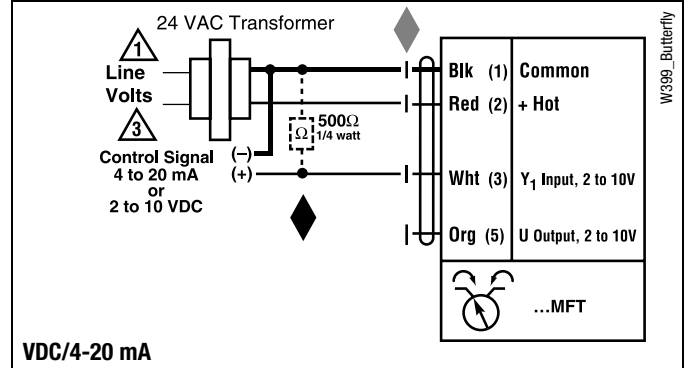
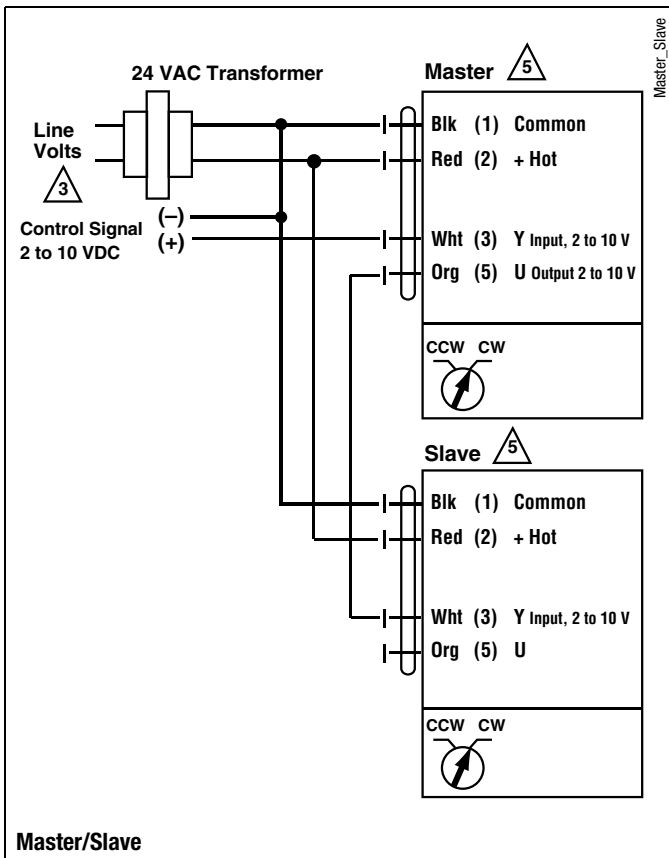
- 3 Actuators may also be powered by 24 VDC.
- 4 IN4004 or IN4007 diode (IN4007 supplied, Belimo part number 40155).
- 5 Triac A and B can also be contact closures.
- 6 Control signal may be pulsed from either the Hot (Source) or Common (Sink) 24 VAC line.
- 7 Position feedback cannot be used with Triac sink controller. The actuators internal common reference is not compatible.

#### APPLICATION NOTES

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

#### WARNING Live Electrical Components!

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



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W399\_Butterfly

W399\_Butterfly

W399\_Butterfly

W399\_Butterfly

W600\_AFB\_AFX